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NUCLEAR WASTE

Yucca Mountain Project
Management and Funding
Issues

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Messrs. Chairmen and Members of the Subcommittees:

We are pleased to be here today to discuss the Department of Energy's (DOE) disposal program for highly radioactive waste. Our testimony will be drawn primarily from our May 1993 report on the scientific investigation of Yucca Mountain, Nevada as a potential disposal site.¹ In this report, we reviewed whether the level of funding for the site investigation project would permit DOE to meet its schedule and, if not, how long the investigation might take. We also examined whether DOE's initiatives to streamline the investigation could affect its technical quality. In addition to summarizing our findings on these issues, our testimony today will address DOE's recent proposal for establishing a revolving fund for the disposal program.

In summary, we found that:

- DOE has given a relatively low priority to scientific investigations of Yucca Mountain. DOE is only requesting about half the funds it estimates are needed to complete the investigation project on schedule because of competition for funds among all of its energy-related programs and competing activities within the disposal program.
- If DOE continues to request and allot funds for the investigation project at recent levels, the project could take at least 5 to 13 years longer than planned and increase the total cost of the disposal program.
- To streamline the project, DOE has compressed the time permitted for various scientific studies and is considering similar measures to reduce costs. These initiatives increase the risk that the investigation of the site will be inadequate. Moreover, they have come at a time when unanticipated technical issues have emerged that could lengthen the investigation project.
- DOE wants to establish a revolving fund to ensure that adequate funds are made available to the disposal program. The Department's proposed legislation would make more funds available to accomplish program objectives; it does, however, have implications for the federal deficit, congressional oversight, and the program's financial health over the long term that also need to be considered.

¹Nuclear Waste: Yucca Mountain Project Behind Schedule and Facing Major Scientific Uncertainties (GAO/RCED-93-124, May 21, 1993).

BACKGROUND

The Nuclear Waste Policy Act of 1982, as amended in 1987, requires DOE to investigate Yucca Mountain and, if the site is selected for a repository, to apply to the Nuclear Regulatory Commission (NRC) for a license to construct a repository. The amended act also authorizes DOE to develop a monitored retrievable storage (MRS) facility for storing nuclear waste temporarily before disposing of it permanently in a repository. However, the amendments prohibit, among other things, construction of an MRS facility until NRC has authorized DOE to construct a repository.

In 1989, DOE established the current schedule for the investigation of Yucca Mountain and defined the technical requirements to determine the site's suitability and prepare a license application. It also developed a formal estimate of the annual cost to complete these requirements on schedule. DOE estimated that the investigation of the site and preparation of a license application could be completed in 2001 at a total cost in year-of-expenditure dollars of \$6.3 billion² and that, if the site proved to be suitable, a repository could be in operation in 2010. DOE also said it would work with the Congress to modify the statutory links between the repository and an MRS facility and that it would embark on an aggressive program to develop a facility and begin accepting nuclear waste there by 1998 or soon thereafter. DOE has since relied on the Office of the Nuclear Waste Negotiator to negotiate an agreement with a state or Indian tribe to host an MRS facility on DOE's schedule.

SITE INVESTIGATION IS LOW PRIORITY

A significant gap exists between the amounts of funds that DOE has estimated are needed to complete the investigation of Yucca Mountain on schedule and the amounts budgeted and appropriated. For fiscal years 1991 through 1993, DOE requested only about one-half of the \$1.2 billion that it had estimated it would need for that time period. The budget proposed for fiscal year 1994 would continue this trend. There are two reasons why the actual funding requested by DOE is so much less than estimated needs.

First, the disposal program competes with other DOE programs for funds. The Budget Enforcement Act of 1990 established procedures for reducing or limiting growth in the federal budget deficit each year through fiscal year 1995 by, among other things,

²DOE arrived at this figure by first estimating the total cost of the site investigation in constant 1992 dollars. The total estimated cost was almost \$5.7 billion. DOE then applied escalation rates to the constant dollar estimates for each year after 1992 to determine the estimated cost in year-of-expenditure dollars.

setting yearly spending limits on discretionary spending. Thus, although the disposal program is funded from a special fund in the Treasury, called the Nuclear Waste Fund, it competes with all other programs within DOE for the Department-wide budget allocation provided each year by the Office of Management and Budget.

Second, within the appropriation that DOE receives for the disposal program, site investigation activities have had to compete for funds with other program objectives and priorities. In 1989, DOE established two program objectives of equal rank: (1) to begin accepting utilities' waste in 1998 (by transporting it to an MRS facility for temporary storage) and (2) to begin permanently disposing of waste in a repository in 2010. Although the budget for the disposal program has not been adequate to fund all of the program's activities at planned levels, DOE has tried to meet both of its program objectives.

For example, in January 1992, DOE's disposal program director stated that DOE would not take any action, such as deferring the procurement of transportation casks, that would prevent DOE from beginning to accept waste in 1998. When faced with shortfalls in appropriations, the director said that DOE would fund, in descending order of priority, (1) the foundation, or infrastructure,³ of the Yucca Mountain project to maintain its continuity; (2) activities related to developing an MRS facility and a transportation system at levels sufficient to allow acceptance of waste in 1998; and (3) site investigation activities that would enable DOE to maintain its schedule for the repository.

These priorities for the disposal program have limited progress on the Yucca Mountain project because the scientific and technical activities that must be completed to investigate the site have been last in line for funding. In fiscal year 1992, for example, DOE used \$106 million of its program appropriation of \$275 million for infrastructure activities and used another \$110 million for other program activities, such as developing a waste transportation system. This left only \$60 million, or 22 percent, of the program appropriation for scientific and technical activities. The latter amount is only one-third of what DOE had estimated that it would need for scientific and technical activities.

We and others have questioned DOE's pursuit of dual program objectives. For example, in a September 1991 report, we said it

³According to DOE, infrastructure costs are incurred to manage contractors' activities; provide assistance to Nevada, its university, and affected local governments; operate and maintain facilities and equipment; comply with applicable laws and regulations; and provide training to staff, communicate with the public, and implement a quality assurance program.

was highly unlikely that DOE could develop an MRS facility by 1998 because, among other reasons, it was unlikely that a state or Indian tribe would be willing to host this facility.⁴ Also, in a March 1992 report, we concluded that in the absence of an MRS facility, DOE would not need to procure transportation casks for nuclear waste until about 2005.⁵ We therefore recommended that the Department bring its cask development activities to an orderly close. DOE disagreed with our positions because it believed that it would meet its 1998 objective for beginning to accept waste for storage at an MRS facility. Subsequently, however, DOE acknowledged that the Office of the Nuclear Waste Negotiator had not succeeded in finding a site for the facility in time to permit the Department to meet its schedule for accepting waste at an MRS facility.

CURRENT FUNDING PRIORITY WILL ADD
YEARS TO PROJECT SCHEDULE

If DOE continues to request and allot funds for the investigation of Yucca Mountain at the same levels it has in recent years, it could take at least 5 to 13 years longer than the Department had estimated to complete all of the planned investigation activities and increase the total cost of the disposal program. For example, surface drilling at the site, through which core samples of rock are extracted from the ground for study, has been slowed in part because of funding limitations. Completing the drilling program on schedule would require working 24 hours a day, 7 days a week, but current funding can support only one 8-hour shift, 5 days a week. At this rate, collecting core samples for analysis will take at least 3 years longer than planned.

We estimated how long it could take DOE to complete the originally planned scientific and technical activities if annual funding for the Yucca Mountain project continued at assumed levels --\$200 million, \$250 million, and \$300 million (in 1992 dollars). These funding levels are similar to recent actual funding levels for the project. According to DOE's cost estimate for the project, about 45 percent of the required funds would be used for scientific and technical activities and about 55 percent would be used for infrastructure activities. Using this ratio of costs, we projected the number of years it would take to complete the planned scientific and technical activities at the three funding levels we had selected.

⁴Nuclear Waste: Operation of Monitored Retrievable Storage Facility Is Unlikely by 1998 (GAO/RCED-91-194, Sept. 24, 1991).

⁵Nuclear Waste: Development of Casks for Transporting Spent Fuel Needs Modification (GAO/RCED-92-56, Mar. 13, 1992).

Our estimates show that it would take from 5 to 13 years beyond 2001 to complete the planned scientific and technical activities. These estimates are conservative because they assume that DOE would be able to maintain the same ratio of spending on scientific and technical activities and infrastructure activities--45 percent and 55 percent. In fiscal year 1992, however, DOE allocated only 36 percent of the Yucca Mountain project's allotment of funds to scientific and technical activities, and a similar situation occurred in fiscal year 1991.

Unless DOE reduces the proportion of funds for the Yucca Mountain project that it has been spending on infrastructure activities and uses more of the available funds for scientific and technical activities, the project's total cost, incurred over a longer period, will increase. The increase will occur because, for each dollar of scientific and technical work performed, DOE is incurring higher infrastructure costs than it had projected in the project's cost estimate. For example, DOE estimated that it would spend about \$1.25 on infrastructure activities for every dollar it expected to spend on scientific and technical activities. In fiscal year 1992, however, DOE spent about \$1.77 on infrastructure activities for every dollar it spent on scientific and technical activities.

A longer site investigation period would also increase the cost of the disposal program. DOE's \$6.3 billion cost estimate for the project includes only the costs of DOE's contractors for the Yucca Mountain project. It does not include the project's share --about \$46 million in fiscal year 1992--of the costs of programwide managerial and technical support. If the site investigation takes 5 to 13 years longer to complete, the program's costs could increase from \$230 million to \$600 million (in 1992 dollars).

EFFORTS TO STREAMLINE THE PROJECT CONSTRAIN SCIENTIFIC INVESTIGATIONS

DOE recently compressed the time allowed for various site investigation activities to maintain its schedule for the Yucca Mountain project and may take similar steps to reduce costs. Project scientists have expressed concern that these initiatives increase the risk that DOE will not be able to demonstrate that the site meets all licensing requirements. At the same time, the Nuclear Waste Technical Review Board has concluded that DOE may not be allowing enough time to study complex technical issues as thoroughly as necessary to complete a sound license application.

In September 1992, DOE completed a study leading it to conclude that, by adjusting the scope of the site investigation, it could still submit a license application to NRC in 2001. In conducting the study, DOE assumed that funding for the Yucca Mountain project would be adequate to complete all investigation

activities on time. DOE instructed its contractors that all data required for a license application in 2001 would have to be gathered by 1999 and that planned work would have to be adjusted as necessary. Thus, adjustments made during the study to contractors' scope of work compressed the time allowed for completing various scientific and technical activities.

Lawrence Livermore National Laboratory, which is responsible for developing the packaging for the waste that would be put into a repository at Yucca Mountain, expressed its concern to DOE that a credible license application could not be prepared by 2001 under the revised constraints and added that these constraints reflect DOE's growing tendency to focus on superimposed milestones rather than on genuine technical capabilities.

DOE also began an effort in September 1992 to reduce the total cost of the Yucca Mountain project by as much as 10 percent. Project contractors are concerned that reducing their funding will also reduce the amount of scientific and technical work that can be completed and, therefore, jeopardize the scientific quality of a future license application for a repository. For example, the U.S. Geological Survey, which is responsible for much of the scientific investigation of Yucca Mountain, stated in a September 1992 letter to DOE that further reducing the scope of the Survey's work would increase the licensing risk and would not enable the Survey to resolve questions raised by the National Academy of Sciences and the Nuclear Waste Technical Review Board.

The Nuclear Waste Technical Review Board has expressed concern that DOE's reliance on the current schedule may not allow enough time to (1) collect and analyze some data, (2) resolve unanticipated technical problems and questions about unpredictable conditions important to the repository's performance, and (3) evaluate the repository's design and the alternatives for the waste management system. In a recent report, the Board urged DOE to consider a management approach under which existing schedules would be taken seriously but not allowed to drive the program's scientific and technical goals. The Board said that attempting to meet unrealistic long-term deadlines might force DOE to make important technical decisions without first performing the appropriate technical and scientific analyses.

Emerging technical issues illustrate the Nuclear Waste Technical Review Board's concern over DOE's schedule. For example, the Board is concerned that DOE's strategy for managing the heat generated by spent fuel in the repository over thousands of years is not supported by scientific evidence. Therefore, the Board has recommended that the agency complete extensive, previously unplanned, testing. This issue has implications that go beyond safety to the potential disposal capacity of the site and to the length of time that nuclear waste might need to be stored for cooling before it is emplaced in a repository.

In addition, new findings at the Ghost Dance Fault at Yucca Mountain could affect the time needed to adequately characterize the site. Recent findings by the Survey indicate that this fault, which crosses Yucca Mountain, may be more complex than originally thought. If this is the case, according to Survey officials, they may need to expand their examination of the site, and their examination results could affect the location and design of the repository and a determination about the suitability of the site. The Survey's representative said that the scientific investigation of the fault illustrated how unanticipated geologic findings might require additional time and resources for further investigation but that DOE's planned cost reductions would not, if implemented, permit the Survey to resolve this issue.

DOE WANTS TO ESTABLISH A REVOLVING FUND TO INCREASE PROGRAM FUNDING

On May 25, 1993, the Secretary of Energy asked the Office of Management and Budget to approve proposed legislation that would establish a Nuclear Waste Revolving Fund to provide an "appropriate" level of funding for the disposal program. The Secretary noted that the Nuclear Waste Fund annually receives about \$600 million in disposal fee payments, earns \$200 million in interest from Fund investments, and has a current balance of about \$4 billion.

Under DOE's proposed language, beginning in fiscal year 1994, all income realized on the total face value of amounts in the Nuclear Waste Fund would be credited to a separate account in the Treasury known as the Nuclear Waste Revolving Fund. In addition, beginning in fiscal year 1995, all nuclear waste fund revenues received by the Secretary and income realized on this revenue would be credited to the revolving fund account. These funds would be available to the Secretary for waste storage, disposal, and related activities, including the acquisition of real property, the construction or expansion of facilities, and the storage of waste at reactor sites, without further appropriation. In addition, the Secretary could request an appropriation from the Nuclear Waste Fund if the balances in the revolving fund account were insufficient to carry out these activities.

In our May report, we discussed the implications of a revolving fund at a conceptual level because the details of DOE's proposal for a revolving fund were not then available. Since then, however, we have reviewed DOE's specific proposal. The proposal would, on the one hand, help ensure that an increased level of revenues were available to the agency to accomplish its objectives of timely acceptance and disposal of nuclear waste. On the other hand, the proposal raises several issues that also need to be considered. First, the proposal could increase annual outlays for the disposal program from the current rate of under \$300 million to

as much as \$800 million. This would increase the federal deficit unless corresponding reductions were made in other programs.

Second, the proposal would reduce congressional control over the disposal program because expenditures from the revolving fund would not be subject to annual appropriations. As we pointed out in our report, congressional appropriations committees recently expressed their concern about the "spiralling" cost estimates for investigating Yucca Mountain and conducting other aspects of the program and stated that they were prepared to give DOE specific line-item direction in the future. This type of committee scrutiny would be missing under DOE's proposal.

Third, the proposal has implications for the long-term financial health of the disposal program. Not only would the program revenues available to DOE be greatly increased, as discussed above, but DOE's proposed language would modify and expand how funds for the disposal program may be used. For example, the proposal provides authority for using the revolving fund for such activities as constructing or expanding facilities. This appears to be a broader grant of authority than DOE now enjoys. Under current law, no funds from the Nuclear Waste Fund may be expended by the Secretary for the construction or expansion of any facility unless such construction or expansion is expressly authorized by the Congress. The proposal also adds storage of spent nuclear fuel at reactor sites as a permissible use of funds from the revolving fund account. Allowing funds to be used for this purpose would, according to the Secretary, enable DOE to possibly compensate utilities for their onsite spent fuel storage costs after 1998 if the Department is unable to accept waste by that date.

By 2010, when, according to DOE's schedule, a repository at Yucca Mountain will be ready to operate, utilities' nuclear plants will, in increasing numbers, be reaching the end of their 40-year operating licenses. As these plants are retired, the fee base for program revenues will decline. However, the costs of shipping the waste to the repository and of operating the repository will still lie ahead for DOE. The Department's most recent cost estimate for the disposal program, made in 1990, shows that the cost to dispose of waste in the repository over a 30-year period would be about \$12 billion in constant 1988 dollars. Therefore, any increase in the use of disposal program revenues, whether by means of a revolving fund or higher annual appropriations, must be carefully monitored to ensure that funds will be available to pay the costs of the program once a repository has been completed.

CONCLUSIONS AND RECOMMENDATIONS

In 1989, DOE established dual objectives of beginning to accept waste at an MRS facility in 1998 and having a repository ready to operate in 2010 by, in part, submitting a license

application to NRC in 2001. Budget requests, however, show that DOE has requested only about one-half of the funds for the Yucca Mountain project that it had estimated would be needed. Furthermore, DOE's priorities for using the funds have not emphasized essential scientific and technical activities. Instead, DOE has pursued its objective of accepting waste in 1998 and has used most of the funds allotted to the project to maintain the project's infrastructure.

DOE has reduced the scope of the investigation of Yucca Mountain in an effort to adhere to its schedule and is considering further measures to reduce costs. The Department has also developed proposed legislation to change the way the funds are provided for the disposal program so that annual funding would be based on need rather than on ability to compete with other programs for limited appropriations. These initiatives fall short of the mark, however, because they address only specific problems perceived by DOE. The initiatives do not comprehensively address the disconnection between funding and policies for the disposal program.

Specifically, DOE will almost certainly not have an MRS facility available by 1998, and it is uncertain whether any state or Indian tribe will volunteer to host an MRS facility on any schedule. Yet, the time when DOE might have an operational repository is moving farther into the future, in part because of the relatively low priority DOE has assigned to funding essential investigation activities at Yucca Mountain. These conditions raise questions about the pace and direction of the disposal program that must be answered if the program is to proceed in an orderly fashion:

- What are the federal government's obligations to begin accepting nuclear waste in 1998?
- How can considerations about the investigation of Yucca Mountain be separated from considerations about the temporary storage of nuclear waste until a repository has been developed for permanently disposing of the waste?
- Should essentially all of the funds appropriated for the disposal program be used to investigate Yucca Mountain?
- Can enough funds be made available to investigate Yucca Mountain, meet appropriate short-term objectives of the program, and ensure the long-term solvency of the Nuclear Waste Fund?
- How might DOE reorganize and manage the Yucca Mountain project to increase the efficiency with which it uses the funds allotted to the site investigation and thereby minimize the duration and cost of the investigation?

These questions are not all-inclusive but are ones that have arisen from our recent review. Some of these questions address basic policy issues pertaining to the management and disposal of nuclear waste. For this reason, we believe that an independent review of the disposal program is in order. We are currently working on a report that will, among other things, suggest ways that such a review might be carried out.

Meanwhile, it is imperative that DOE, as the federal agency charged with implementing the disposal program, address questions pertaining to the interrelationships between program funding and objectives and decide how the Yucca Mountain project should be organized and managed before it asks the Congress to change the method of funding the program. Therefore, we recommended in our May report that the Secretary of Energy review the program's goals and objectives in the context of the program's current low funding priority. In addition, we recommended that the Secretary review and adjust the project's cost and schedule each year in view of actual allotments of funds to the project, realistic assessments of future funding for the project, and progress in resolving technical issues.

We also recommended in our May report that the Congress defer consideration of legislation that would change the method of providing funds to DOE for the disposal program until (1) the Secretary of Energy has completed the review of the program that we recommended, (2) an independent review of the program has been completed, and (3) appropriate legislative, policy, and/or programmatic changes to the program have been implemented.

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Messrs. Chairmen, this concludes my prepared remarks. I will be pleased to respond to any questions from the Subcommittees at this time.

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