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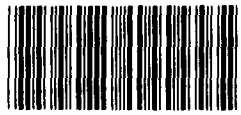

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NUCLEAR WASTE

DOE Expenditures On The Yucca Mountain Project

Statement of
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Before the
Subcommittee on Nuclear Regulation
Committee on Environment and
Public Works
United States Senate

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to discuss the Department of Energy's (DOE) use of funds appropriated for the scientific investigation of Yucca Mountain, Nevada. These investigations are needed to obtain a Nuclear Regulatory Commission (NRC) license to construct and operate the site as a nuclear waste repository. DOE had planned to begin these investigations of the site, including constructing an exploratory shaft facility in the 1988-90 timeframe. Although DOE spent almost $500 million on the Yucca Mountain project in those 3 years, the specific investigations needed for licensing have not begun.

My testimony today presents the results of our review of Yucca Mountain project costs for fiscal years 1988 through 1990. As agreed with the Subcommittee, we limited our review to an analysis of summary cost reports, supplemented by discussions with project officials, and reviews of selected project records. Specifically, we found the following:

-- DOE was not ready to begin on-site investigations needed for licensing until 1991 because it (1) took longer than expected to complete its site investigation plan, and (2) was slow to complete its program for ensuring that investigation work meets NRC's quality standards. Furthermore, DOE still cannot start investigations needed

for licensing because Nevada has yet to issue essential environmental permits.

-- In the years prior to 1987, DOE spent about $48 million on drilling holes and obtaining core samples. Because of technical and management problems with this work, however, there are serious questions about the usefulness of the core samples for repository-licensing purposes. As a result, DOE spent another $12 million in 1989 and 1990 to develop a new drilling technology and a core management facility for use when new on-site investigation work begins.

-- Although DOE spent over $36 million on the design of the exploratory shaft facility in 1988 and 1989, external criticism of the planned design and construction method resulted in DOE selecting a new facility design and construction method. It is uncertain at this time how much of the original design work will have to be redone, or the additional costs that will be incurred.

-- DOE and its contractors spent about $122 million--or 25 percent of total project costs--on general management of the Yucca Mountain project over the 3-year period. When the costs of lower level management-related activities are

added, over 40 percent of all project costs are related to management of the project.

Before I discuss these matters, I would like to provide some background on the site investigation program.

BACKGROUND

The Nuclear Waste Policy Act of 1982 established a program for the permanent disposal of highly radioactive waste in at least one geologic repository. It was anticipated that DOE would select three candidate sites, investigate the sites, recommend one site for development, and construct a repository by 1998. The act also required DOE to issue plans for characterizing, or investigating, candidate sites and to hold public hearings on the plans before sinking exploratory shafts at the sites. Although DOE soon fell behind the act's schedule, in May 1986 it recommended, and the President approved, Yucca Mountain and two other sites for characterization. However, because of the increasing costs of site characterization and the continuing opposition to the civilian waste program, in December 1987 the Congress directed DOE to study only Yucca Mountain.

DOE's task is challenging. First, it must conduct a scientific investigation of the site that is expected to take over 10 years, beginning this year, and cost at least $2 billion.

Then, if Yucca Mountain is selected for a repository under the procedures specified in the nuclear waste act, DOE will seek a license from the Nuclear Regulatory Commission (NRC) to construct a repository there.

To obtain the construction license, DOE must demonstrate that the combination of the site and the proposed repository and waste container designs would comply with NRC's regulations governing repository performance. Finally, DOE would have to demonstrate that the repository would meet the Environmental Protection Agency's standards for the disposal of highly radioactive wastes in repositories. EPA is revising its standards as a result of a 1987 decision by the U.S. Court of Appeals (First Circuit). One standard that is not expected to change, however, is the requirement to provide sufficient assurance that a repository will safely contain the waste for 10,000 years.

For the 3 fiscal years, DOE spent almost $500 million on the Yucca Mountain project in 11 basic cost categories. The three largest were site investigations, exploratory shaft facility, and project management, which accounted for over 60 percent of total expenditures. Attachment I shows total project costs, costs for each of the 11 principal cost categories, and the percentage of total project costs for each category.

WHY DOE WAS NOT READY TO BEGIN SITE CHARACTERIZATION

In late 1986, when DOE was finishing its triennial budget request for fiscal years 1988-90, it anticipated issuing the Yucca Mountain site characterization plan by April 1987 and beginning site investigations and construction of the exploratory shaft facility in the latter part of that year. DOE was not, however, ready to begin the investigations needed for licensing at the site until February 1991, or more than 3 years later. Construction of the exploratory shaft is now scheduled to begin in November 1992. Key reasons for the delay were as follows:

-- DOE did not issue the site characterization plan until December 1988 because it decided to request and obtain NRC comments on the draft plan.

-- In 1985 DOE and NRC agreed that before DOE began key site investigations, it would obtain NRC's acceptance of its quality assurance program--a program for ensuring that information gathered from investigations will be reliable for licensing purposes. However, it was not until March 1991 that NRC had conditionally accepted enough of DOE's quality assurance program for DOE to begin limited new work at the site.

-- DOE planned to use a conventional "drill and blast" method to excavate two exploratory shafts and underground tunnels. In 1989, however, the Nuclear Waste Technical Review Board recommended that DOE use mechanical excavation methods and consider replacing one vertical shaft with a ramp to enhance the investigation of known faults to determine if they could affect the use of the site as a repository.[1] DOE evaluated alternative approaches to the facility and concluded that the ramp design and the mechanical excavation method are preferred. DOE expects to make a final decision on the new facility design in September 1991.

In addition, DOE must obtain environmental permits, such as a waste-water discharge permit, from Nevada before it can perform many investigation activities at Yucca Mountain. Beginning in March 1987, the state excluded work at Yucca Mountain from activities authorized by permits for the Nevada Test Site. Thus, DOE found that it would need to submit separate permit applications to the state for the Yucca Mountain project.

The state, however, would not review DOE's permit applications because it maintained that it had formally disapproved the use of the Yucca Mountain site for a repository.

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[1]The Nuclear Waste Technical Review Board was established in 1987 to, among other things, evaluate the technical and scientific validity of DOE's site characterization activities.

In September 1990 the Ninth Circuit Court of Appeals rejected Nevada's arguments, and in March 1991 the Supreme Court declined to hear the state's appeal. Nevada is now reviewing these applications. DOE is also seeking legislation that would remove the requirement that it obtain environmental permits from the state while fully complying with all federal and state environmental requirements.

Nevada's refusal to provide permits did not affect new on-site construction work until February 1991 because, as discussed above, DOE was not ready to begin this work until then. According to project officials, the state permit issue must be resolved by March 1992 or it will delay the schedule for investigating the site.

SITE INVESTIGATION COSTS

For fiscal years 1988 through 1990, DOE and its contractors spent about $122 million, or 25 percent of total project costs, on site investigation activities.[2] Of that amount, about $77 million was spent on a variety of activities related to planned studies of geology, hydrology, geochemistry, climatology, and natural resources. According to project officials, the major activity in these areas was the preparation and review of detailed study plans.

[2]Site investigation activities include surface-based investigations and the engineering and design work to support those investigations, such as drilling boreholes and digging trenches, as well as work related to subsurface testing, but not the costs of engineering activities related to sub-surface testing.

DOE has identified the need for 106 study plans for site characterization. Four plans have been completed and accepted by NRC, 46 others are under review by either DOE or NRC, and the remaining plans are being prepared by the principal scientific investigators.

About $21 million was also spent on the "management and integration" of these site investigation activities alone in 1989 and 1990. This cost component covers line and technical management and coordination of activities, as well as planning, scheduling, budgeting, controlling, and reporting activities performed by subordinate managers and principal scientific investigators. As I will discuss later, costs in this subcategory are not included in the "project management" cost category.

Finally, DOE spent about $12 million in 1989 and 1990 on developing drilling technology and a facility for managing core samples that will be extracted from new drill holes to be constructed as part of its site investigation program.[3] These costs, and to some extent the costs of future drilling and core management activities, were incurred to correct technical and management problems that DOE encountered in an earlier drilling program.

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[3]In conjunction, DOE bought, out of its capital equipment cost account, a special drill rig for $3 million.

SOME INVESTIGATION WORK NOT USABLE AND WILL HAVE TO BE REDONE

DOE began studying Yucca Mountain as a potential repository site in 1978. By 1986 it had drilled 236 boreholes at the site and collected about 38,000 feet of core samples at a cost of $48 million. All but two of these boreholes were drilled using conventional methods which involved the use of fluids as part of the process. As a result, the core samples obtained were contaminated and may not be usable for licensing. Therefore, DOE found that it needed to develop a new drilling method so it would not contaminate new drill holes and core samples with fluids used in conventional "wet" drilling.

In addition, in the 1982 to 1986 period, both NRC and DOE found that the U.S. Geological Survey, which managed all core samples for DOE's Nevada Test Site, had lost control of the Yucca Mountain samples. Specifically, the samples could not be traced to their origin. As a result of this breakdown in quality assurance, DOE halted all project coring activities. DOE had intended to "qualify" the existing core samples for licensing purposes using quality assurance procedures accepted by NRC. Since then, however, DOE has decided to drill new boreholes and take new core samples because of the difficulty of qualifying the existing samples.

EXPLORATORY SHAFT FACILITY

WORK MAY BE UNUSABLE

DOE spent about $49 million, or 10 percent of total project costs, on exploratory shaft facility activities during fiscal years 1988 through 1990. In fiscal years 1988 and 1989, over $36 million was spent on management and integration activities primarily related to developing preliminary and more advanced designs of its proposed facility. These design activities were stopped late in early fiscal year 1990 because of external criticism, and it is questionable whether this work will be usable for constructing the exploratory shaft facility. As a result, DOE has begun studying alternative facility designs. Depending on the final selection of a new facility design and construction method, according to the manager of the project, significant modifications to the original design may be required; however, the extent and cost of these modifications cannot be determined at this time.

In 1990 DOE spent over $12 million on exploratory shaft facility activities, including about $4 million on the study of facility design and construction alternatives.

PROJECT MANAGEMENT COSTS

DOE spent almost $122 million, or about 25 percent of total project costs in 1988 through 1990, to manage the Yucca Mountain

project. This cost category, which is used to account for the general management of project participants' activities, is made up of three cost elements--management and integration, quality assurance, and project control. We were able to obtain the costs for these elements 1989 and 1990. Of the $93 million spent on overall project management in the 2 years, $51 million was spent on management and integration activities, about $29 million on quality assurance, and about $13 million on project control activities such as project cost and schedule planning, control, and reporting.

The project management cost category does not include the lower level line and technical management and integration costs that, as I discussed earlier, make up part of cost categories, such as site investigations and exploratory shaft facility costs. When these lower level management-related costs are added to general project management costs, management-related costs comprise more than 40 percent of all project costs.

I would like to conclude my statement with an observation on the matters I have discussed.

OBSERVATION

DOE spent about $48 million on the earlier drilling and core management activities, but that effort is largely unusable for

future repository licensing purposes. In addition, it is uncertain how much of the original design of the exploratory shaft facility will be useful in designing the new facility. From our limited review of Yucca Mountain project costs, it appears that more detailed planning coupled with independent technical review could have avoided the need to repeat significant pieces of work at additional expense and delay to the project.

Mr. Chairman, that concludes my testimony. I would be pleased to respond to any questions that you or other members of the Subcommittee may have.

ATTACHMENT I

YUCCA MOUNTAIN PROJECT EXPENDITURES
FISCAL YEARS 1988, 1989, 1990
Dollars in thousands

Category	FY 1988	FY 1989	FY 1990	3-year total	Percentage of total
Site investigations	$34,241	$47,095	$40,731	$122,067	25
Exploratory shaft	18,527	17,966	12,419	48,912	10
Project management	28,722	46,001	47,059	121,782	25
Subtotal	81,490	111,062	100,209	292,761	60
Systems	7,374	8,891	14,398	30,663	6
Waste package	10,684	15,225	14,509	40,418	8
Repository	13,650	15,584	8,545	37,779	8
Regulatory/institutional	8,550	12,513	17,598	38,661	8
Test facilities	917	1,656	1,126	3,699	1
Financial and technical assistance	11,834	11,222	8,830	31,886	7
Land acquisition	210	247	423	880	[a]
Field operations	0	0	4,734	4,734	1
Subtotal	53,219	65,338	70,163	188,720	39
Totals	$134,709	$176,400	$170,372	$481,481	100[b]

[a]Less than one percent.

[b]Does not add to 100 percent due to rounding.