United States General Accounting Office 130677

GAO

Fact Sheet for Congressional Requesters

July 1986

NUCLEAR WASTE

Issues Concerning DOE's Postponement of Second Repository Siting Activities

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

July 30, 1986

B-202377

The Honorable Edward J. Markey
Chairman, Subcommittee on Energy
Conservation and Power
Committee on Energy and Commerce
House of Representatives

The Honorable George J. Mitchell
United States Senate

The Honorable Gerry Sikorski
House of Representatives

On April 29, 1986, you requested that we undertake a study of the Department of Energy's (DOE's) second nuclear waste repository program. On May 28, 1986, the Secretary of Energy announced that site-specific work on a second repository had been indefinitely postponed because of (1) declining projections of spent fuel, (2) continued progress in siting the first repository, (3) high cost estimates of preparing second repository site recommendations, and (4) the expected benefits of a monitored retrievable storage facility (MRS)[1] to the overall repository program. The Secretary also said that the second repository program would continue with an emphasis on broad-based technical studies.

On June 3, 1986, a representative of your offices advised us to redirect our effort and respond to the following questions.

--What is the status and future of the second repository program in light of the postponement decision?

--What high level nuclear waste projections are available?

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[1]An MRS facility as envisioned by the Office of Civilian Radioactive Waste Management would provide temporary storage for up to 15,000 metric tons of waste and provide consolidation and packaging functions for the repository system. DOE has prepared an MRS proposal that would site a facility at Oak Ridge, Tennessee, but has been prevented from submitting it to the Congress for review and authorization because of an ongoing court case initiated by the state of Tennessee.

--How much has been spent on the second repository program to date and what will be spent for continuing technical studies?

--What is the link between the proposed MRS facility and the second repository postponement decision?

--Have any studies been done to measure the socioeconomic impact of a second repository on the sites that were tentatively announced for the second repository program?

To satisfy the request, we agreed to summarize the information we collected in a fact sheet. In brief we found that:

--As the result of the postponement decision, DOE plans to curtail by the end of the year all second repository site-specific activities, including financial assistance to individual states involved in the program. A continuing program will refocus on technical issues and alternate siting strategies for a second repository, with an emphasis on cooperating with other countries on related research programs. DOE officials said that they expect the program to restart in the 1990's, making use of data collected to date and generated by the continuing studies. They also said that they expect the program to begin at "square one" with a new national survey.

--The Energy Information Agency's commercial nuclear waste production projections declined markedly in 1985 as the result of recent nuclear power plant construction deferrals and an expected increase in the use of extended fuel burnup procedures at existing power plants. Projections of the amount of defense waste to be disposed of in future repositories are uncertain because some decisions have yet to be made, such as to how to best dispose of some of the high-level waste stored at DOE's Hanford Reservation.

--As of May 31, 1986, the cumulative cost of the second repository program was about $63.5 million. DOE's tentative revised budget estimates call for the expenditure of about $23 million in fiscal year 1986 as opposed to an earlier $79 million budget estimate.

--DOE expects that an MRS facility will provide added flexibility to a single repository system, and allow DOE to temporarily meet waste acceptance commitments to utilities in the event of a problem at the repository site.

--Socioeconomic studies on tentatively identified second repository sites had not been initiated at the time of the postponement decision.

To address the questions, we interviewed DOE headquarters and project office officials responsible for planning and managing the second repository program, including the Director of the Office of Civilian Radioactive Waste Management. In addition, we reviewed pertinent DOE program documents, publications, correspondence, studies, and financial reports to determine program status and the costs of the second repository efforts. We also talked with DOE officials in DOE's Energy Information Agency and Office of Defense Programs who prepare spent fuel and defense waste projections, and reviewed other projections prepared by the private sector. We did not verify data collected at DOE's project offices on the potential capacity of the candidate first repository sites.

We did not ask DOE officials to formally comment on this fact sheet; however, we discussed a draft of this fact sheet with DOE officials and incorporated their comments as appropriate.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this fact sheet until 10 days from the date of this letter. At that time we will send copies to interested parties and make copies available to others on request. Please call me on 275-1441 if you have any questions on the fact sheet.

Keith O. Fultz
Associate Director

Contents

ABBREVIATIONS

DOE	Department of Energy
EIA	Energy Information Agency
GAO	General Accounting Office
MRS	monitored retrievable storage
NWPA	Nuclear Waste Policy Act of 1982
OCRWM	Office of Civilian Radioactive Waste Management
PNL	Pacific Northwest Laboratory
RCED	Resources, Community, and Economic Development Division
TVA	Tennessee Valley Authority

SECTION I

STATUS OF THE SECOND REPOSITORY PROGRAM

DOE announced on May 28, 1986, that it was postponing site-specific work for a second nuclear waste repository because of progress made in siting the first repository and the uncertainty about when a second repository might be needed. DOE emphasized at the time that the second repository program was not terminated and that non-site-specific technical studies would continue. At the time of the postponement decision, DOE's Office of Civilian Radioactive Waste Management (OCRWM) was in the process of preparing an Area Recommendation Report that would have formally identified potential sites for a second nuclear waste repository. A draft of that report, released in January 1986, tentatively identified potential sites in seven different states. The draft report received considerable comment and objections by concerned states, Indian tribes, and individual citizens.

Following the postponement decision, actions were promptly initiated by DOE to redirect and restructure the second repository program, concentrating on technical issues rather than site-specific work. This redirection includes a phase-down of siting activities and the formulation of a Technology Development Program with an emphasis on cooperative efforts in international research.

FACTORS LEADING TO THE POSTPONEMENT DECISION

According to the Director of OCRWM, the option of postponing second repository site-specific work had been discussed within OCRWM as early as December 1985, prior to the release of the draft Area Recommendation Report. However, because of uncertainties in the first repository program and because DOE officials believed that it was desirable to obtain outside comments on the draft Area Recommendation Report, the report was issued for public review. The Director told us in June 1986 that since December, a number of changing factors contributed to the consideration and selection of the option to postpone second repository site-specific efforts. These included:

(1) A decline in the estimated quantities of spent fuel to be generated by nuclear power plants.

(2) An increased confidence in the technical suitability of the candidate first repository sites.

(3) Questions about to the need to spend an estimated $600 million to $800 million to determine candidate second repository sites before determining when and if such a repository is needed.

(4) OCRWM's growing expectation that a monitored retrievable storage (MRS) system will be authorized by the Congress.

The Director also emphasized that DOE's current Mission Plan, which presents DOE's overall strategy for the civilian radioactive waste program, calls for the first repository to begin accepting about 3,000 metric tons of uranium waste (hereafter referred to as metric tons) per year beginning around the year 2000. Thus by 2020, about 60,000 metric tons would be in the repository--still short of the legislated cap of 70,000 metric tons.[2] This time frame, he said, allows for the postponement of expensive second repository siting activities until the 1990's when the need can be better defined.

The Director also told us that the number (over 60,000) and critical nature of the comments received on the draft Area Recommendation Report had an impact on the decision--but that the main reasons for the postponement were those cited above.

ACTIONS INITIATED ON THE SECOND REPOSITORY PROGRAM SINCE THE POSTPONEMENT DECISION

The second repository program focused primarily on the study of crystalline rock in the north central and eastern regions of the nation. OCRWM's Crystalline Repository Project Office at DOE's Chicago Operations Office in Argonne, Illinois, is responsible for the second repository program and implementing the Secretary of Energy's decision to postpone siting activities.

In accordance with the Secretary's decision, planned activities relating to specific sites have been curtailed and will be phased out by the end of the fiscal year. For example, on June 20, 1986, OCRWM notified the states and Indian tribes receiving financial assistance under the second repository program that their grants would be closed out. OCRWM suggested that immediate steps be taken to phase down activities planned for the balance of the year and expressed a desire to have all work under the grants concluded on or before September 30, 1986. Furthermore, the project office will not proceed with any activities directed toward identifying specific sites for a second repository.

The Chicago project office also provided guidance to Battelle Memorial Institute, the DOE contractor which has responsibility

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[2]The Nuclear Waste Policy Act stipulates that no more than 70,000 metric tons can be stored in the first repository, before a second repository is in operation.

for managing aspects of the second repository program, on June 19, 1986, concerning the phasedown of second repository activities. This included the immediate suspension of all activities related to finalizing the Area Recommendation Report except completing the cataloging of comments received on the draft report. A computerized system, known as the Comment Response Tracking System, will be used for this purpose.

The tracking system will identify, code, track, and sort the over 60,000 comments received on the draft Area Recommendation Report. The process will include establishing a verbatim record of comments, and coding to identify, among other things, the topic, subject, and issue addressed. The cataloging is to also identify technical and siting strategy issues raised by the comments. A computer printout is to be prepared identifying these issues. No further processing or analysis of the comments is currently planned.

The Chicago project office is currently formulating a Technology Development Program Plan to redirect the second repository program. Overall objectives of the plan are to (1) identify and resolve technical issues for the repository program and (2) develop and evaluate alternate siting strategies and the technical basis necessary for the possible development of a second repository. According to project office officials, the plan will consider work in more than one geologic setting with priority given to crystalline rock, followed by shale, sandstone, and other potential media. Also, maximum benefit is to be derived from research being conducted in foreign programs and from lessons learned in the first repository program.

In implementing the Secretary's decision on the second repository program, certain interpretations have been made for planning purposes. For example, OCRWM is assuming that siting studies will not resume until the mid 1990's. Accordingly, OCRWM officials also stated that if and when the program for a second repository is revived, data collected to date would be studied and used along with information developed by the interim technical studies. They also said that they expect the site selection process to start with a new national survey, which they termed essentially starting from "square one."

International aspects of the continuing program

The redirection of program efforts places added emphasis on international cooperation in the hopes of obtaining information about different kinds of rock bodies that can be applied to repository development efforts in the United States. For example, about 50 percent of the tentative proposed budget for fiscal year

1987 for the second repository is directed to international activities. These are expected to include projects examining

(1) crystalline rocks in Canada, Sweden, France, and Switzerland;

(2) other geologic formations in Belgium and Italy; and

(3) testing facilities in the Federal Republic of Germany.

Of particular note, a recent cooperative agreement dated April 7, 1986, between the United States and Canada will be reevaluated in the light of the Secretary's decision to postpone second repository siting activities. This agreement is for carrying out a joint experimental and analytical research project on the characterization of crystalline rock in an underground research laboratory in Canada.

SECTION II

PROJECTIONS OF NUCLEAR WASTE PRODUCTION

OCRWM uses projections of spent fuel and defense high-level waste production to estimate the long-term need for high-level waste repositories. These estimates are primarily provided by DOE's Energy Information Administration (EIA) and Office of Defense Programs. The EIA commercial spent fuel projections have declined in the last year while the defense waste estimates are uncertain because decisions on the construction of reprocessing facilities and the amounts of defense waste to be stored in a repository have yet to be made.

COMMERCIAL WASTE PRODUCTION

Since the Nuclear Waste Policy Act (NWPA) was passed in 1983, EIA has provided OCRWM with spent fuel projections for planning purposes. EIA uses historical electricity generation and spent fuel data obtained directly from individual nuclear utility companies and applies these data to previously developed computer models to develop its projections.

EIA develops four different sets of waste projections--a high, middle, and low case and a no new orders case--that reflect different assumptions about nuclear power plant construction schedules, cancellations, and new reactor orders through the year 2020. The "no new orders" case assumes that (1) there will be no new reactor orders, (2) all plants meeting certain conditions, such as less than 40-percent complete, will be cancelled, and (3) most reactors will have been retired by 2020.

Generally, DOE relies on EIA's mid-case projections as its reference base for analysis regarding spent fuel discharges. The mid-case is based on the current known reactor projects in operation or under construction, using utility start-up estimates adjusted for known potential changes and an assumed nuclear share of the total electricity market after the year 2000. In considering the postponement of the second repository, DOE also examined the "no new orders" case projections.

EIA officials said that between the time NWPA was passed in January 1983 and December 1985, EIA's projections using constant

burnup assumptions consistently showed cumulative spent fuel to be 130,000 to 140,000 metric tons (mid-case) by 2020. Table II.I shows EIA's November 1984 projections.

Table II.1: Cumulative Spent Fuel Discharges From U.S. Nuclear Power Plants, 1983 to 2020--as of November, 1984
(thousand metric tons)

Year	High case	Middle case	Low case	No new orders case
1983[a]	9.9	9.9	9.9	9.9
1985	12.4	12.4	12.4	12.4
1990	22.4	21.8	21.4	21.4
1995	35.5	34.5	33.6	33.5
2000	50.2	49.0	46.8	46.4
2005	66.7	64.8	60.7	59.6
2010	91.7	86.4	78.8	73.3
2015	119.9	107.3	94.6	89.2
2020	154.5	130.3	111.0	97.7

[a]1983 spent fuel discharges include all cumulative discharges since 1957.

EIA's December 1985 spent fuel projections shifted downward markedly from the previous year's estimates. EIA officials said that one reason for the decrease from 1984 to 1985 was the continuing trend of industry cancellations of reactors under construction including six in 1984. Another reason was that EIA assumed utilities would increase their use of extended burnup procedures[3] by 1993. Table II.2 shows a decrease in spent fuel when compared with the November 1984 EIA projections.

[3]Extended burnup procedures, that is, allowing nuclear fuel to remain in the reactor for longer periods of time, are now being considered by nuclear utilities. Extended burnup results in less waste but the spent fuel is hotter and more radioactive. Before its December 1985 projections, EIA assumed a constant burnup factor for its mid-case projections, assuming that current levels of fuel burnup would remain constant in the future.

Table II.2: Total Spent Fuel Discharges From U.S. Nuclear Power Plants, 1984 to 2020--as of December 1985
(thousand metric tons)

Year	High case	Middle case	Low case	No new orders case
1984[a]	11.4	11.4	11.4	11.4
1985	12.5	12.5	12.5	12.5
1990	21.3	21.0	20.7	20.7
1995	32.0	31.4	30.6	30.6
2000	42.2	41.7	39.9	39.9
2005	53.7	52.4	49.2	48.8
2010	70.8	66.4	60.0	58.1
2015	96.9	86.4	74.8	69.3
2020	126.2	106.4	87.4	74.6

[a]1984 spent fuel discharges include all cumulative discharges since 1957 that are not scheduled for reinsertion.

Comparison of available spent fuel projections

We obtained other spent fuel projections made in April 1985 by the Pacific Northwest Laboratory (PNL), and in December 1985 by a team of experts studying DOE's draft MRS proposal. The experts were from the University of Tennessee, Vanderbuilt University, Oak Ridge Associated Universities, and the Nuclear Assurance Corporation. These projections and EIA's December 1985 mid-case and "no new orders" case are shown in table II.3.

Table II.3: Comparison of Studies of Cumulative Spent Fuel Projections from U.S. Nuclear Power Plants, 1985 to 2020
(thousand metric tons)

Date	EIA		TVA	PNL	Team
	mid-case	no new orders			
1985	12.5	12.5	13.8	13.2	12.8
1990	21.0	20.7	22.1	25.4	21.5
1995	31.4	30.6	31.2	39.6	31.3
2000	41.7	39.9	40.5	54.1	40.8
2005	52.4	48.8	50.8	68.5	50.3
2010	66.4	58.1	57.1	83.6	62.1
2015	86.4	69.3	63.3	94.7	74.3
2020	106.4	74.6	65.8	103.1	86.2

Potential effects of extended burnup on projections and disposal of spent fuel

As requested, we also reviewed available studies on the impact that extended burnup procedures could have on the amount of

spent fuel to be disposed of and the need for additional repository space because of its higher heat content. These studies show that, as nuclear fuel undergoes extended burnup (is burned for longer periods of time) in reactors, the quantities and characteristics of the spent fuel change. For a given forecast of nuclear electricity-generating capacity, extending the burnup reduces the annual quantities of spent fuel discharged and hence the cumulative quantities of spent fuel.

Reduced quantities of spent fuel could be of benefit to the design, operation, and cost of the waste management system because less spent fuel would have to be stored. However, spent fuel with higher burnup levels generates more heat and is more radioactive than other spent fuel, which means that this fuel would require more storage space. Therefore, the counterbalancing effects of higher heat-generation rates and radioactivity must be considered to determine the net effect. DOE's waste repository program has not yet progessed to the point where repository design configurations have been developed to accommodate these factors.

In a March 1985 study prepared by Roy F. Weston, Inc., a private contractor providing general management support to OCRWM, the effects of extended burnup on total cumulative spent fuel were shown to be comparable to projections shown in tables II.2 and II.3. Using four burnup scenarios (base, medium, high, peak), the study's projections were as follows:

Table II.4: Cumulative Spent Fuel Discharges With Extended Burnup From U.S. Nuclear Power Plants, 1985-2020 (thousand metric tons)

Year	Base[a]	Medium[a]	High[a]	Peak[a]
1985[b]	12.1	11.9	11.9	11.2
1990	21.6	20.1	19.7	18.0
1995	34.3	29.6	28.5	25.7
2000	48.8	39.5	37.4	33.3
2005	64.6	49.9	46.8	41.4
2010	86.2	66.3	62.3	55.8
2015	107.1	82.1	77.2	69.6
2020	130.2	97.5	91.3	82.0

[a]Weston's "base" scenario is roughly equivalent to EIA's 1984 mid-case, the most recently available projection at the time of the report. Neither the EIA mid-case projection nor the Western base case assumes any extended burnup. Weston's "peak" scenario is described as an unrealistic scenario because, among other conditions, it defines the highest burnup possible if all utilities used extended burnup 100 percent efficiently. Medium and high burnup scenarios reflect gradual implementation of extended burnup procedures.

[b]1985 spent fuel discharges include all cumulative discharges since 1957.

The Weston study points out that, although the quantity of spent fuel discharged will be reduced with extended burnup, the specific effects of extended burnup on spent fuel projections are unknown at this time. Extended burnup will probably be implemented gradually by the utilities, and the rate of implementation and actual burnup levels that might be achieved is highly uncertain.

The study also points out that the underground area required for the disposal of spent fuel depends on the heat output of the total spent fuel inventory, rather than the total quantity. Therefore, even though the extended burnup scenarios show significant reductions in the quantity of spent fuel, the report states that the area size of the repository will be "equivalent to or greater than" that required for the base-burnup scenario because of the increased heat generation rate per metric ton of uranium that results from extended burnup. An April 1985 study by DOE states that, "at very high levels of burnup, waste disposal savings, though significant in terms of the dollar value, are projected to be less than 4 percent of the total program cost."

DEFENSE WASTE PRODUCTION

As requested, we also reviewed available data on the generation of defense nuclear waste. We talked with the Deputy Director for Defense Waste and Transportation Management for DOE's Office of Defense Programs about a March 1986 draft report which contained the most current defense waste projections. He said that the delivery of high-level nuclear waste generated by DOE's defense production activities to a repository is largely dependent upon two factors.

(1) The funding and completion of defense waste processing facilities at the three sites where high-level wastes are generated. These facilities will glassify the liquid or powdered waste and put it in canisters suitable for long-term disposal.

(2) The amount of existing defense wastes that will ultimately be stored in the first repository.

DOE's Office of Defense Programs has developed defense waste production projections for three cases: (1) a base case that assumes that a minimum quantity of waste from DOE's Savannah River, Hanford, and Idaho production facilities will be processed and stored; (2) an augmented case that assumes extensive volume reduction processes will not be used for Idaho wastes; and (3) a maximum case that also assumes volume reduction techniques for Idaho will not be used and that all high-level nuclear waste

at the Hanford Reservation will be extracted and processed for the repository.[4] Table II.5 depicts these estimates.

Table II.5: Defense High-Level Waste Quantities (at end of stated years)

	Number of canisters[a]		
	1986	2000	2020
Base Case	6,400	10,500	16,000
Augmented Case	8,700	17,500	33,000
Maximum Case	30,700	39,500	55,000

[a]It is very difficult to compare defense waste projections in terms generally applied to commercial spent fuel because defense waste (1) usually has the uranium extracted through reprocessing, and (2) is processed somewhat differently from site to site. For purposes of comparison, however, DOE generally assumes that one canister of defense high-level waste contains 0.5 metric tons of waste material. (One canister of spent fuel is assumed to contain 2 metric tons of waste uranium.)

DOE officials told us that the total amount of waste to be disposed of is yet to be determined. The key question is whether the waste currently stored in 149 single-walled storage tanks at Hanford can be best stored in place, or whether it should be extracted. A draft environmental assessment prepared by DOE presents the option of leaving these wastes in place and sealing them off from the environment. Until the Secretary of Energy makes this decision, the actual amount of defense high-level waste that will be disposed of in a geologic repository is uncertain.

Reprocessing of defense high-level wastes is planned to begin at Savannah River in 1990, Hanford in 1996, and Idaho in 2008. A defense program official points out that only the Savannah River facility is under construction. DOE currently plans to ship 800 canisters (400 tons) of waste annually from the reprocessing facilities to the repository beginning in 2003 and continue for 15 years. (The rate must then drop to 500 canisters per year for another 6 years to drop the remaining inventory to about zero, assuming the base case.)

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[4]The Hanford Reservation stores some of its older high-level nuclear waste in 149 single-walled tanks constructed early in the nuclear production program.

The Office of Defense Program's draft report also compares civilian and defense wastes. DOE assumed a maximum of 65,000 canisters of civilian waste (or 130,000 metric tons) would be disposed of by 2020. DOE also estimates for the base case that when defense waste is added it will make up 20 percent of the canisters, 5 to 13 percent of the total space in the repository, and generate less than 3 percent of the total radioactivity and heat created in the repository.

SECTION III

COSTS OF THE SECOND REPOSITORY PROGRAM

Cumulative costs of OCRWM's second repository program since 1983, as recorded in DOE's financial information system, totaled $63.5 million as of May 31, 1986. Table III.1 shows these costs by major tasks.

Table III.1: Total Costs for the Second Repository Program

Second repository task	Second repository fiscal year 1983	1984	1985	1986[a]	Total cumulative
	(millions)				
Systems	$ .697	$1.383	$ 3.163[b]	$ .953	$ 6.196
Waste Package	.150	-.077[c]	.049	.097	.219
Site	3.908	8.647	11.721	10.146[d]	34.422
Repository	.573	1.441	.504	.500	3.018
Regulatory and Institutional	.435	1.158	1.342	1.482	4.417
Exploratory Shaft	0	0	0	0	0
Test Facilities	.362	.632	.820	.650	2.464
Land Acquisition	.004	-.002[c]	0	.007	.009
Program Management	1.298	2.129	2.434	2.184	8.045
Financial and Technical Assistance	0[e]	0[e]	1.991	.626	2.617
Other	.949	.526	.237	.193	1.905
Capital Equipment[f]	0	0	.111	.099	.210
Total	$8.376	$15.837	$22.372	$16.937	$63.522

[a]FY 1986 costs through May 31, 1986.

[b]Includes $1.913 million for sedimintary rock studies.

[c]Negative figure due to prior year adjustments.

[d]Includes $837,000 for sedimintary rock studies.

[e]Financial assistance for FY 1983 and FY 1984 was included in "Regulatory and Institutional" category.

[f]Capital equipment is the only nonwork breakdown structure cost for the second repository program.

Source: DOE's Financial Information System.

REVISED BUDGET ESTIMATES FOR THE SECOND REPOSITORY PROGRAM

As shown in table III.2, in February 1986, DOE estimated that $35.5 million would be spent on the second repository program in fiscal year 1986, $78.7 million for fiscal year 1987, $74.2 million for fiscal year 1988, and $71.5 million for fiscal year 1989.

Table III.2: Budget Estimates for Fiscal Years 1986, 1987, 1988, 1989

Second repository task	Fiscal year 1986	1987	1988	1989
	(millions)			
Systems	$ 3.5	$ 5.9	$ 4.5	$ 4.0
Waste Package	.7	1.1	1.6	1.7
Site	16.4	45.7	44.8	43.2
Repository	1.4	3.8	2.6	4.5
Regulatory and Institutional[a]	5.8	8.9	8.4	7.9
Exploratory Shaft	-	-	.3	.7
Test Facilities	3.0	7.5	7.2	4.7
Land Aquisition	.5	.8	.6	.6
Program Management	4.2	5.0	4.2	4.2
Total	$35.5	$78.7	$74.2	$71.5

[a]Financial assistance to states and tribes included in this category.

In June 1986, DOE began revising its second repository budget based on the postponement decision. Siting activities, which accounted for about 50 percent of the 1986 program budget, are planned to be phased out and technology development including international activities to develop generic technical data for use in the United States are being increased. DOE officials said that their preliminary estimates for total fiscal year 1986 costs for the second repository are between $20 million and $25 million, and that the tentative budgeted amount for fiscal year 1987 is about $23 million, or about 29 percent of what was previously estimated (see table III.3), with similar amounts forecasted for subsequent years.

Table III.3: Revised Fiscal Year 1987 Budget Estimate for Second Repository Program

Budget item	FY 1987 (millions)
Site	$ .830
International	9.860
Technology Development:	
Siting Strategies	.375
Alternative Geologic Media	2.700
Geologic and Hydrologic Investigations	3.400
Repository Performance	.875
Modeling Development	2.100
Instrumentation Development	.360
Project Management	2.500
Total	$23.000

Close-out of all siting activities is planned during the first quarter of fiscal year 1987 with funds totaling $830,000 budgeted for completing the cataloging and coding of the draft Area Recommendation Report comments. OCRWM officials told us that budget estimates for the following fiscal years had not been finalized.

COST OF A SINGLE REPOSITORY VERSUS A TWO REPOSITORY SYSTEM

In an April 1986 internal study, OCRWM projected costs for a single repository system versus a two repository system with and without an MRS facility. Total system life-cycle costs of a single repository without an MRS capable of disposing of all commercial and defense waste projected through 2020 ranged from $18.5 billion to $29 billion, depending on the various types of rock bodies selected for the repository. Total projected costs of a two repository system without an MRS ranged from $23.6 billion to $32.3 billion, depending on the various combinations of rock bodies selected for the two repositories.

Projected costs were $2.3 billion to $3.5 billion higher for a single repository with a separate MRS facility and $1.7 billion to $2.6 billion higher for a two repository system with an MRS system.

SECTION IV

OTHER ISSUES

The following sections discuss other issues raised by the postponement of the second repository program. These include (1) the relationship between the proposed MRS facility and the decision to postpone the siting activities of the second repository program, (2) a description of studies done to determine existing capacity levels of the first repository candidate sites, and (3) a discussion of socioeconomic studies conducted at tentatively proposed second repository areas.

MRS AND THE DECISION TO POSTPONE

DOE officials emphasized that a key attribute that an MRS would add to a single repository waste disposal system would be flexibility. As envisioned by DOE, the MRS facility would accept spent fuel, consolidate and repackage it, and send it on to the repository. The officials hypothesize that, in a single repository system, should a problem develop at the repository, the MRS would still be able to accept waste on a short-term basis and thereby fulfill DOE's contract commitments to nuclear utilities.

DOE officials also said that with an expected 15,000 metric ton capacity, an MRS facility could temporarily store an estimated 5 years worth of expected waste deliveries, providing a "buffer" between the single repository and the utilities in addition to its anticipated consolidation and packaging functions. DOE officials said, however, that this capability did not enter into the decision to postpone the second repository. They said that a 70,000-ton repository alone is currently expected to provide adequate capacity through the year 2020, thereby providing the lead time necessary to allow DOE to postpone the second repository.

LIMITED CAPACITY DATA AVAILABLE AT FIRST REPOSITORY SITES

On May 28, 1986, the President confirmed the Secretary of Energy's recommendation of three sites in Nevada, Washington and Texas for detailed studies called site characterization. Preliminary site work conducted at the three candidate first repository sites to determine available capacity of the rock bodies seems to have generally been directed to determining if the rock body is large enough to allow sufficient flexibility in locating the repository to contain 70,000 metric tons of spent fuel--the amount specified in the NWPA. DOE officials told us, however, that available data tentatively indicate that significant expansion beyond the 70,000 ton limit would not be a problem at either the Hanford (Washington) or Deaf Smith (Texas) sites. They also told us that the rock body at the Nevada site may be more limited than at the other sites.

SOCIOECONOMIC STUDIES

Socioeconomic studies on the impact of a potential waste repository on the areas and populations around the sites tenatively identified in the draft Area Recommendation Report had not been initiated at the time of the decision to postpone site-specific second repository work. DOE officials told us that local officials or groups may have initiated such studies, but they were not aware of any. Limited research had been conducted and available existing studies on regional demographics and broad-based socioeconomic characteristics had been collected and documented in the Regional Characterizational Reports issued in 1985 as part of the site-screening process for the second repository.

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