

December 1989

NUCLEAR WASTE

Quarterly Report on DOE's Nuclear Waste Program as of June 30, 1989



**Resources, Community, and
Economic Development Division**

B-202377

December 12, 1989

The Honorable J. Bennett Johnston
Chairman, Committee on Energy
and Natural Resources
United States Senate

The Honorable James A. McClure
Ranking Minority Member
Committee on Energy and Natural Resources
United States Senate

On March 26, 1984, you requested that we provide quarterly status reports on the Department of Energy's (DOE) implementation of the Nuclear Waste Policy Act of 1982 (NWPA). Because of your Committee's interest in DOE contracting practices in the nuclear waste program and in controlling program costs, this quarterly report addresses a number of contracting issues. It discusses changes in waste program contracting patterns that have occurred since the enactment of the Nuclear Waste Policy Amendments Act in December 1987. The report also discusses the status of the legal challenge to DOE's selection of Bechtel Systems Management, Inc. as the waste program's management and operating (M&O) contractor and recent concerns raised about DOE's management of M&O contracts.

Results in Brief

The 1987 amendments significantly altered DOE's waste program by (1) terminating work investigating two sites for a first repository, (2) focusing first repository activities on the Yucca Mountain, Nevada, site, and (3) postponing work on a second repository. Our analysis shows that the total number of nuclear waste program contracts decreased by 123 after the amendments were passed, including 113 contracts related to non-Yucca Mountain project work.

Similarly, spending patterns for nuclear waste program contracts have changed since 1987. Contracts for the Yucca Mountain Project now account for a greater percentage of total contract costs than they did in 1987. Currently, about 35 percent of total waste program costs are for Yucca Mountain contracts while, prior to the 1987 amendments, these contracts accounted for about 29 percent of contract costs. Costs for Yucca Mountain contracts have increased by 67 percent since September 1987, while costs for other waste program contracts increased only 28 percent over that period.

On August 24, 1989, the U.S. Claims Court held that a DOE official violated a conflict of interest statute by participating in the selection of Bechtel Systems Management, Inc. to manage and integrate the development of the nuclear waste management system. As a result, the court imposed a permanent injunction preventing DOE from awarding a contract under this request for proposals to any company other than the one challenging DOE's selection. On October 23, 1989, DOE filed a "protective notice of appeal" to preserve its option to appeal the court's decision.

DOE's Office of Inspector General (IG) found that DOE's fundamental policy is to completely indemnify (insure) its M&O contractors against most nuclear and non-nuclear risks. Of particular interest to the nuclear waste program, the IG found that DOE's contract with AT&T Technologies, Inc.—the operator of DOE's Sandia National Laboratories and a major waste program contractor—provides the most comprehensive indemnification of any M&O contract.

Background

NWPA established a national program and policy for safely storing, transporting, and disposing of nuclear waste in one or more geologic repositories. To achieve this objective, NWPA required DOE to develop, site, construct, and operate one repository and select a site for a second repository. However, the Nuclear Waste Policy Amendments Act of 1987, signed into law on December 22, 1987, made substantial changes to NWPA and the manner in which DOE conducts its nuclear waste program. One of the most significant changes directed DOE to investigate a site for a first repository at Yucca Mountain and terminate all site-specific activities, except reclamation efforts, at candidate sites in Deaf Smith County, Texas, and Hanford, Washington. In addition, the amendments postponed further work on a second repository for at least 20 years.

DOE relies heavily on contractor support to implement the nuclear waste program. About 80 prime contracts were active in June 1989. DOE currently has about 20 active contracts for the Yucca Mountain Project but has relied on 10 major contractors to perform most repository work. DOE has approximately 60 additional active contracts for (1) indirect support to the repository program through general technical or management assistance, and/or (2) direct support to waste transportation, efforts to integrate the various components of DOE's waste management system, monitored retrievable storage, and other program elements.

Nuclear Waste Program Contracts and Costs

Since late 1987, the number of active contracts for DOE's nuclear waste program has decreased from 203 to 80 contracts. This is a decrease of 123 contracts, or about 60 percent. Contracts for the Yucca Mountain Project have decreased by 10 (32 percent) and for other activities by 113 (66 percent). Prior to the 1987 amendments, the latter activities included investigating candidate first-repository sites in Texas and Washington and geologic rock formations for a possible second repository. (Appendix I discusses these waste program contracting changes in detail.)

Although these figures represent a net decrease in the number of contracts, over this 21-month period some waste program contracts remained active, while others became inactive (were completed or terminated), and some new contracts were awarded for work on both the Yucca Mountain Project and other waste program elements.

At the end of June 1989, cumulative costs for all nuclear waste program contracts amounted to approximately \$1.9 billion. Of this amount, about \$654 million was spent on contracts for the Yucca Mountain Project. The remaining \$1.2 billion was used for other nuclear waste program activities. As shown in appendix I, table I.1, cumulative costs for waste program contracts have increased since September 1987 by about \$529 million—approximately 40 percent. Of this amount, \$263 million was for Yucca Mountain Project contracts and \$267 million was for other waste program contracts. These figures indicate that although cumulative costs for Yucca Mountain Project contracts increased 67 percent between September 1987 and June 1989, costs for other nuclear waste contracts increased only 28 percent over that period.

Court Rules Against DOE's Selection of Waste Program Contractor

As we discussed in our last quarterly report,¹ in mid-1987 DOE decided to enter into an M&O contract for systems engineering, design, and management services for the nuclear waste program, and issued a request for proposals from prospective contractors. The contract was estimated to be worth \$100 million per year over a 10-year period. In December 1988, DOE selected Bechtel Systems Management, Inc. as the M&O contractor. However, shortly after the selection was announced, TRW Environmental Safety Systems, Inc.—an unsuccessful bidder for the contract—filed a pre-award bid protest with the U.S. Claims Court. The protest alleged that DOE had not properly handled the procurement. TRW's principal allegations were that DOE (1) had violated conflict of interest provisions

¹Nuclear Waste: Quarterly Report as of March 31, 1989 (GAO/RCED-89-178, Aug. 14, 1989).

by appointing a DOE official who was formerly affiliated with one of Bechtel's subcontractors to the Source Evaluation Board, a DOE board established to oversee the development of this procurement and an evaluation of proposals; and (2) had unfairly evaluated TRW's proposal by using different criteria than those announced in the Request for Proposals.

When our August 1989 report was issued, DOE was under a preliminary injunction barring DOE and the Bechtel group from proceeding with any work under the contract pending settlement of the lawsuit. On August 24, 1989, the Court held that the chairman of DOE's Source Evaluation Board had violated a conflict of interest statute (42 U.S.C. 7216) by participating in a procurement involving a previous employer, Science Applications International Corporation (SAIC)—one of Bechtel's eight subcontractors under this contract—within less than 1 year of joining DOE. On this basis, the Court granted TRW's motion for a permanent injunction. The permanent injunction restrained and enjoined DOE from awarding a contract and disbursing funds under this request for proposals to anyone other than TRW. The injunction also permanently restrained and enjoined Bechtel Systems Management Inc. from performing any work or receiving any funds from DOE under the same request for proposals.

Following the Court's decision, DOE officials stated that they would review DOE's options to determine how best to proceed with M&O contractor services. According to a DOE official, on October 23, 1989, DOE filed a "protective notice of appeal" to preserve its option to appeal the court's decision in the future. DOE officials have not yet decided whether DOE will file an appeal.

DOE officials do not believe that the Court's ruling will significantly affect DOE's ability to proceed with near-term characterization studies at the Yucca Mountain site.

New Concerns Over M&O Contract Management Identified

In September 1989, DOE's Office of Inspector General (IG) issued a report on DOE's policies for indemnifying (insuring) its M&O contractors.² Five of DOE's M&O contractors are major contractors on the Yucca Mountain Project. The IG found that DOE's fundamental policy is to completely indemnify its M&O contractors, bear substantially all risk (both nuclear and non-nuclear), and pay all costs associated with running DOE facilities, including fines, penalties, liabilities, claims, losses, and damages. DOE's indemnification of nuclear activities is required by the Price-Anderson Amendments Act of 1988 and non-nuclear indemnification is permitted through general contract authority. The major exceptions to total indemnification are (1) costs specifically identified in the contract as unallowable, (2) losses or expenses that result from the willful misconduct or lack of good faith on the part of a few key contractor management personnel, and (3) fines and penalties on activities outside of the scope of work or without contracting officer approval.

The IG found that DOE's contract with AT&T Technologies, Inc. provides the most comprehensive indemnification of any M&O contract. AT&T Technologies, Inc. operates—through its subsidiary, the Sandia Corporation—DOE's Sandia National Laboratories. Through June 30, 1989, the contractor had incurred the largest amount of costs (about \$140 million) on the Yucca Mountain Project. The IG found that this M&O contract does not require that costs be reasonable in order to be allowable. All costs and expenses incurred are to be considered within the scope of the contract and payable by DOE, except those due to the willful misconduct or bad faith of the corporate officer in charge of the laboratories.

In commenting on the IG report, the Secretary of Energy said that (1) the matters discussed in the report fit within the context of an overall contract management reform program within DOE to which he has paid special attention; (2) he has instituted a new procedure whereby all projects exceeding \$25 million will be submitted for his, the Deputy Secretary's, or the Under Secretary's approval to ensure compliance with new accountability and oversight guidelines; and (3) DOE has conducted a thorough analysis of its award-fee contracts, resulting in an increased emphasis on compliance with environmental, safety, and health requirements.

²Report on Indemnification of the Department of Energy's Management and Operating Contractors (DOE/IG-0272, Sept. 15, 1989).

We discussed the facts presented in this report with cognizant DOE officials and incorporated their comments as appropriate. Our work was performed between June and October 1989.

Appendix I to this report discusses nuclear waste program contracts that (1) were active in 1987 and are still active in 1989, (2) became inactive since September 1987, and (3) were awarded since September 1987. It also presents cumulative contract costs as of September 30, 1987, and June 30, 1989. Appendix II discusses major nuclear waste program contractors and summarizes their activities. Appendix III describes our objectives, scope and methodology.

We are sending copies of this report to the Chairmen of the Senate Committee on Governmental Affairs, the House Committee on Government Operations, and the House Committee on Energy and Commerce; the Chairman, Nuclear Regulatory Commission; the Secretary of Energy; and other interested parties. If you have further questions, please contact me at (202) 275-1441.

Major contributors to this report are listed in appendix IV.



Victor S. Rezendes
Director, Energy Issues

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Abbreviations

DOE	Department of Energy
GAO	General Accounting Office
IG	Inspector General
M&O	management and operating
MACTEC	MAC Technical Services Company, Incorporated
NWPA	Nuclear Waste Policy Act
OCRWM	Office of Civilian Radioactive Waste Management
PNL	Pacific Northwest Laboratory
RCED	Resources, Community, and Economic Development Division
REECO	Reynolds Electrical and Engineering Company, Incorporated
SAIC	Scientific Applications International Corporation

Changes in Nuclear Waste Program Contracting Patterns

Number of Nuclear Waste Program Contracts Has Decreased Since 1987

Since 1987, the number of active contracts for DOE's nuclear waste program has significantly decreased. At the end of June 1989, 80 contracts for various activities supporting DOE's nuclear waste program were in effect.¹ (See table I.1.) Twenty-one of these contracts were for activities directly relating to the repository program at Yucca Mountain. The remaining 59 contracts were awarded for other program activities. By comparison, in September 1987—shortly before the 1987 amendments were passed—203 contracts were in effect, including 31 contracts for work on the Yucca Mountain Project and 172 contracts for other waste program activities. The latter activities included investigations of first-repository sites in Texas and Washington and geologic rock formations for a possible second repository that were subsequently terminated following the 1987 amendments. Since the end of 1987, the total number of active nuclear waste program contracts has decreased by 123 contracts—about 60 percent. Contracts for the Yucca Mountain Project have decreased by 10 (32 percent) and for other activities by 113 (66 percent).

¹These contracts do not include (1) grants to state and local governments for their participation in the nuclear waste program or (2) contracts for activities that are not funded from the Nuclear Waste Fund, such as cooperative agreements between DOE and utilities to demonstrate dry cask storage techniques. They do include, however, agreements with other federal entities—such as the U.S. Geological Survey—which technically are not contracts. Although our analysis is based primarily on data from DOE's Financial Information System, we also used information from DOE's Procurement and Assistance Data System.

**Appendix I
Changes in Nuclear Waste Program
Contracting Patterns**

Table I.1: Summary of Nuclear Waste Program Contracts

Contract activity	All contracts	Major contracts^a
Contracts active in 1987		
Yucca Mountain	31	15
Others	172	42 ^b
Total	203	57
Contracts active in 1989		
Yucca Mountain	21	11
Others	59	30
Total	80	41
Contracts active in both 1987 and 1989		
Yucca Mountain	15	9
Others	44	25
Total	59	34
New contracts added since 1987		
Yucca Mountain	6	2
Others	45	5
Total	51	7
Contracts deactivated since 1987		
Yucca Mountain	16	6
Others	128	17
Total	144	23

^aWe define a major contract as one having cumulative costs of \$1 million or more at the end of June 1989.

^bOf the 42 major contracts having \$1 million or more in costs at the end of June 1989, 31 also had incurred \$1 million or more in costs as of Sept. 30, 1987.

Although these figures represent a net decrease in the number of contracts, over the 21-month period some waste program contracts remained active, while others became inactive (were completed or terminated), and some new contracts were awarded for work on both the Yucca Mountain Project and other waste program elements. For example, 59—about 30 percent—of the 203 contracts active in 1987 were still in effect at the end of June 1989. Only 15 of these continuing contracts were for the Yucca Mountain Project; 44 were for other waste activities.

The number of contracts completed or otherwise becoming inactive after September 1987 totalled 144, or 71 percent. Of these contracts, 16 were for work directly related to the Yucca Mountain Project and the remaining 128 contracts were for other waste program activities.

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Finally, between September 1987 and the end of June 1989, DOE awarded 51 new waste program contracts. Thirty of these contracts were completed before June 30, 1989. The remaining 21 new contracts represented 26 percent of the 80 nuclear waste program contracts that were active at the end of June 1989. Of these 21 new contracts, 6 were awarded for the Yucca Mountain Project and 15 were for other waste program activities.

Major Contracts

Forty-one of the 80 nuclear waste program contracts active in June 1989 were "major" contracts. (See app. II for a description of major contractors' activities.) We define a major contract as one having cumulative costs of \$1 million or more at the end of June 1989. Of these 41 contracts, 11 were for the Yucca Mountain Project and 30 were contracts for other waste program activities. These 41 contracts accounted for 99 percent of the cumulative costs for all 80 contracts active at the end of June 1989. Table I.2 summarizes information on cumulative costs of waste program contracts.

Table I.2: Summary of Nuclear Waste Program Contract Costs

Dollars in millions		
Contract activity	All contracts	Major Contracts
Cumulative costs as of 9/87		
Yucca Mountain	\$392	\$390
Others	962	952
Total	\$1,354	\$1,342
Cumulative costs as of 6/89		
Yucca Mountain	\$654	\$651
Others	1,229	1,214
Total	\$1,883	\$1,864
Increase in costs since 9/87		
Yucca Mountain	\$263	\$261
Others	267	261
Total	\$529	\$523

Note: Dollar amounts have been rounded to the nearest million. Columns may not add to totals because of rounding.

Table I.3 lists major contractors (1) active in the nuclear waste program in September 1987 and June 1989, (2) inactive (completed, terminated, or receiving no funds) since September 1987, and (3) added to the program since September 1987. This table also shows cumulative costs for each contractor as of September 30, 1987, and June 30, 1989, and the increase in costs over that 21-month period.

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Changes in Nuclear Waste Program
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Table I.3: Cost Comparison for Major Nuclear Waste Program Contracts

Dollars in thousands

Yucca Mountain (First Repository) Project

Contractor	Contracts^a active in 1987 and 1989		
	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
AT&T Tech. (Sandia)	\$91,931	\$139,836	\$47,905
Department of Interior	56,651	92,435	35,784
Fenix & Scisson, Inc.	9,584	21,009	11,425
Holmes & Narver, Inc.	3,063	13,515	10,452
MAC Technical Services	3,677	7,948	4,271
Reynolds Elec. & Eng.	^b	^b	^b
Science Applications	12,863	74,899	62,036
Univ. of CA (Los Alamos)	48,806	76,089	27,282
Univ. of CA (Livermore)	54,575	87,714	33,138
Univ. of CA (Berkeley)	9,708	16,235	6,526
Total contracts (9)	\$290,860	\$529,680	\$238,820
	Contracts completed since September 1987		
Contractor	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
Fenix & Scisson, Inc.	\$1,368	\$1,368	\$0
Holmes & Narver, Inc.	2,569	2,569	0
Reynolds Elec. & Eng. ^c	44,550	54,395	9,845
Science Applications	40,677	40,679	1
Westinghouse Electric	9,503	9,503	0
Total contracts (6)	\$98,668	\$108,514	\$9,846
	Contracts awarded since September 1987		
Contractor	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
EG&G Energy Measurements	^d	\$1,201	\$1,201
Reynolds Elec. & Eng.	^d	11,476	11,476
Total contracts (2)	\$0	\$12,677	\$12,677
Total cumulative costs-Yucca Mountain	\$389,527	\$650,870	\$261,343

**Appendix I
Changes in Nuclear Waste Program
Contracting Patterns**

Other Waste Program Activities

Contractor	Contracts active in 1987 and 1989		
	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
Analysas Corp.	\$2,938	\$4,979	\$2,042
Associated Universities	7,902	10,534	2,633
Battelle Memorial Inst. ^e	483,823	569,942	86,119
CER Corporation	3,900	9,749	5,849
Department of Interior	1,746	2,493	747
EG&G Idaho, Inc.	15,978	27,084	11,106
KOH Systems, Inc.	179	4,374	4,196
Martin Marietta Energy	18,368	35,403	17,035
NUS Corporation	866	2,058	1,192
Oak Ridge Assoc. Univ.	555	1,596	1,041
Ralph M. Parsons Co.	16,080	16,411	331
Roy F. Weston, Inc.	0	26,069	26,069
SKB	251	1,610	1,359
SRA Technologies, Inc.	690	3,690	3,000
Science Applications	0	4,259	4,259
Stone & Webster	0	14,859	14,859
Systematic Management	0	1,273	1,273
UNC Geotech Inc.	2,136	2,328	191
University of Chicago	13,102	18,653	5,551
University of Texas	14,782	17,458	2,676
Westinghouse Hanford Co.	85,936	134,401	48,464
Total contracts (25)	\$669,231	\$909,223	\$239,991

**Appendix I
Changes in Nuclear Waste Program
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Contractor	Contracts completed since September 1987		
	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
Bendix Field Engineering	\$3,878	\$3,878	\$0
Computer Data Systems	1,329	1,329	0
Department of Interior	1,201	1,201	0
Main Hurdman	1,042	1,337	294
Maxima Corporation	1,787	2,254	467
Morrison-Knudsen Co., Inc.	22,622	26,784	4,161
Nutech Engineers Inc.	817	2,013	1,196
Parsons-Brinkerhoff	8,592	11,927	3,336
Raymond Kaiser	21,951	22,668	717
Rockwell Hanford	198,134	198,134	0
SKBF	1,297	1,397	99
Science Applications	2,357	2,357	0
Union Carbide Corp.	1,038	1,038	0
University of Washington	1,338	1,421	83
U.S. Geological Survey	1,151	1,152	0
Westinghouse Electric Co.	767	2,094	1,327
Westinghouse Hanford Co.	13,840	13,840	0
Total contracts (17)	\$283,142	\$294,824	\$11,681

**Appendix I
Changes in Nuclear Waste Program
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Contractor	Contracts awarded since September 1987		
	Cumulative costs as of 9/30/87	Cumulative costs as of 6/30/89	Increase in costs since 9/30/87
Babcock & Wilcox	^d	\$1,927	\$1,927
General Atomics	^d	2,544	2,544
Nuclear Assurance Corp.	^d	1,178	1,178
Nuclear Packaging Inc.	^d	1,589	1,589
Westinghouse Electric	^d	2,287	2,287
Total contracts (5)	\$0	\$9,525	\$9,525
Total cumulative costs-other program activities	\$952,374	\$1,213,571	\$261,197
Grand total—all major contracts	\$1,341,901	\$1,864,441	\$522,540

Note: Dollar amounts have been rounded to the nearest thousand. Columns may not add to totals because of rounding.

^aContracts with cumulative costs of \$1 million or more as of June 30, 1989. Excludes grants and non-Nuclear Waste Fund contracts.

^bReynolds Electrical and Engineering Company, Inc. (REECO) was an active DOE contractor in 1987 and continues to perform work for the nuclear waste program in 1989. In Sept. 1987, two contracts with REECO were in effect. Subsequently, both of these contracts were completed; however, since that time DOE has awarded an additional contract to REECO. Yucca Mountain Project costs incurred by REECO under these contracts are shown in the categories "contracts completed since 1987" and "contracts awarded since 1987."

^cIn Sept. 1987, two contracts with Reynolds Electric and Engineering Company were in effect.

^dContracts were awarded after Sept. 1987; therefore, no cost figures were available for these contracts as of Sept. 30, 1987.

^eFive contracts with Battelle Memorial Institute were in effect in both 1987 and 1989.

This table shows that (1) 34 major contracts were active in both 1987 and 1989; (2) 23 major contracts became inactive after September 1987; and (3) DOE awarded 7 new major contracts since September 1987. Nine major Yucca Mountain Project contracts were active in both 1987 and 1989; six major Yucca Mountain Project contracts became inactive after September 1987, and two additional major contracts for Yucca Mountain work have been awarded since September 1987.

For other elements of the waste program, 25 major contracts were active in both 1987 and 1989; 17 major contracts became inactive after September 1987, and five new major contracts have been awarded since September 1987. This results in a change in the number of major contracts from 42 in September 1987 to 30 in June 1989, or a net decrease of 12 contracts.

Rate of Cost Increase for Repository Contracts Was Greater Than for Other Contracts

Non-repository contracts showed a larger absolute increase in cumulative costs since September 1987 than contracts for the Yucca Mountain Project. However, over the 21-month period, the rate of spending increase on contracts for the Yucca Mountain Project was higher than the rate of increase for contracts for all other waste program activities combined.

At the end of June 1989, cumulative costs for all nuclear waste program contracts amounted to approximately \$1.9 billion. Of this amount, \$654 million was spent on contracts for the Yucca Mountain Project. The remaining \$1.2 billion funded other nuclear waste program activities. By comparison, cumulative costs for the waste contracts at the end of September 1987 amounted to almost \$1.4 billion. Of these costs, contracts for the Yucca Mountain Project accounted for almost \$400 million; contracts for other program activities accounted for about \$960 million.

As shown in tables I.2 and I.3, since September 1987 cumulative costs have increased by about \$529 million—approximately 40 percent. Yucca Mountain Project contracts accounted for \$263 million (about 50 percent) of the cost increase; other waste program contracts accounted for \$267 million of the increase. These figures also indicate that although cumulative costs for Yucca Mountain Project contracts increased 67 percent between September 1987 and June 1989, costs for other nuclear waste contracts increased only 28 percent over that period.

Major Contracts

As shown in tables I.2 and I.3, the cumulative cost of all major contracts in September 1987 was about \$1.3 billion. Yucca Mountain Project contracts accounted for about \$390 million (29 percent) of this total. The remaining \$952 million (71 percent) was allocated to other nuclear waste program activities. By June 30, 1989, total cumulative costs for these major contracts had increased by \$523 million to about \$1.9 billion—an increase of approximately 39 percent. Major Yucca Mountain Project contract costs increased by \$261 million to \$651 million by the end of June 1989—an increase of 67 percent. Costs for other major contracts also increased over the period by \$261 million to \$1.2 billion—a 27 percent cost increase.

Activities of Major Active Nuclear Waste Program Contractors

Yucca Mountain (First Repository) Project

AT&T Technologies, Incorporated operates Sandia National Laboratories through its subsidiary the Sandia Corporation. For the Yucca Mountain Project, Sandia is responsible for (1) repository systems development; (2) data management and analysis; (3) repository conceptual design and systems performance assessment; (4) determining thermal and mechanical properties of the repository host rock; (5) determining repository sealing requirements and designing and testing sealing techniques; (6) providing technical development, data systems, and test support for the Cask Systems Development Program; and (7) providing specialized assistance to other project participants.

Department of Interior/U.S. Geological Survey is responsible for (1) conducting the geology, hydrology, tectonism, and seismicity aspects of Yucca Mountain site characterization; (2) leading site characterization drilling activities; and (3) providing assistance to other contractors in its specialized area of expertise.

EG&G Energy Measurements, Incorporated is responsible for, among other activities, (1) planning, designing, fabricating, installing, testing, operating, and maintaining geophysical, seismic, photographic, and other equipment for data collection and measurement for the Yucca Mountain Project; (2) providing technical and management support in such areas as scientific computer, communications coordination, and graphics; and (3) providing the capability to directly and remotely detect and measure the environmental effects of operation of DOE facilities at the Yucca Mountain site.

Fenix & Scisson, Incorporated is the architect/engineer for drilling and mining for the Yucca Mountain Project's exploratory shaft facility. Fenix and Scisson is responsible for field surveillance and inspection of drilling and mining activities, and construction and testing of subsurface facilities.

Holmes & Narver, Incorporated is the architect/engineer responsible for designing the above-ground facilities and underground support systems for the exploratory shaft facility at Yucca Mountain. Holmes and Narver is also responsible for (1) field surveillance and inspection of facilities construction; (2) test laboratory support, non-destructive examination services, and field surveying services; and (3) microfilming and archival storage of project records.

Appendix II
Activities of Major Active Nuclear Waste
Program Contractors

MAC Technical Services Company, Incorporated (MACTEC) is responsible for providing quality assurance and project management support to the Yucca Mountain Project Office.

Reynolds Electrical and Engineering Company, Incorporated (REECO) is responsible for providing support for subsurface and surface construction, drilling, and mining. REECO also assists in operating and maintaining Yucca Mountain site facilities and provides procurement and logistical support to the Project Office when requested.

Science Applications International Corporation (SAIC) is the Yucca Mountain Project contractor responsible for integrating all other participants' authorized work. SAIC (1) interfaces with other contractors and the project office regarding waste program planning, design, field investigations, laboratory work, construction, and regulatory licensing, and provides scientific, regulatory, and institutional expertise; and (2) monitors other contractors' cost, technical, and schedule performance.

The University of California operates Los Alamos National Laboratory. In support of the Yucca Mountain Project, Los Alamos is responsible for (1) performing studies of nuclide migration, geochemistry, volcanism, mineralogy, and petrology; (2) acting as the lead technical organization for coordinating and scheduling the exploratory shaft testing program; and (3) providing specialized assistance to other project participants.

The university also operates Lawrence Livermore National Laboratory. With regard to the Yucca Mountain Project, Lawrence Livermore is responsible for designing, developing, and analyzing the performance of a waste package for tuff emplacement, and providing specialized assistance to the other project participants as needed.

In addition, the university operates Lawrence Berkeley Laboratory. Lawrence Berkeley provides technical support for hydrologic investigations. Among other activities, it is investigating the flow of materials through fractured media as a participant in a project being conducted in Sweden to support the repository program. It is also conducting hydrologic investigations for a project involving geohydrologic field testing and instrumentation development.

Other Nuclear Waste Program Activities

Analysas Corporation is responsible for operating and managing the American Museum of Science and Energy, and managing the National Public Presentation Program.

Associated Universities, Incorporated operates Brookhaven National Laboratory. In addition to other activities, Brookhaven is assisting in the development of a design for the Yucca Mountain repository that meets applicable licensing and safety standards for the preclosure phase of repository operation, as well as developing a technical basis for repository preclosure safety assessments.

In this regard, Brookhaven is (1) evaluating existing analytical methodologies to assess preclosure safety under currently available designs, and identifying additional approaches and analytical tools required to perform preclosure safety analyses; (2) identifying critical factors, including gaps in available information, affecting spent fuel during normal operation and under accident conditions; (3) applying uncertainty/sensitivity analysis methodology to safety assessment; and (4) completing a Preclosure Risk Assessment Methodology Procedures Guide.

Babcock & Wilcox is responsible for engineering, designing, manufacturing, certifying, testing, and inspecting a prototype 100-ton rail/barge spent-fuel cask to transport waste from reactors to a federal facility.

Battelle Memorial Institute operates the Battelle Columbus Laboratories and the Pacific Northwest Laboratory. Battelle's nuclear waste program responsibilities include performing all research and development necessary for the Repository Technology and Transportation Division of DOE's Chicago Operations Office and for managing and coordinating the division's activities, including (1) developing and coordinating technology development; (2) planning institutional and siting-related activities; (3) licensing support to OCRWM emphasizing regulatory compliance demonstration, MRS licensing planning, and licensing/performance assessment; (4) technical reviews of study plans and other program documents; (5) support for a repository-related joint international project with Canada; (6) planning, developing and testing experiments and instruments; (7) conducting field tests; (8) performing independent technical reviews; and (9) supporting transportation-related programs including institutional activities to identify and resolve transportation issues, conducting economic and system analysis studies for life cycle costs and transportation services, and transportation schedule and cost planning.

In addition, Battelle provides (1) hydromechanical and hydrochemical assessments and performs spent fuel investigations, (2) technical support for cask design and operational planning, and (3) support to other

waste programs, including the Commercial Spent Fuel Management Program, Concrete Cask Testing Program, Systems Integration Program, Monitored Retrievable Storage Program, and numerous others.

CER Corporation provides general technical support to DOE on geologic and geotechnical subjects related to the characterization of potential geologic concepts, including (1) reviewing state-of-the-art geologic and geotechnical information and data collection techniques; and (2) conducting independent technical reviews of other contractors' deliverables, evaluating the planning, scheduling, and budgeting of other contractors' technical tasks, and assessing progress of specific technical tasks performed by other contractors. In addition, CER is providing records management support as well as technical licensing support, including (1) developing regulatory interpretations of relevant codes; (2) preparing integrated licensing schedules and plans; and (3) developing a technical approach to achieve regulatory compliance.

Department of Interior/U.S. Geological Survey is responsible for developing geologic characterization techniques and methods in support of the Repository Technology Program's technology development and OCRWM program objectives. Activities include (1) conducting specific experiments and studies to model and characterize features of rock types; (2) developing equipment and instruments to help measure, verify, and detect these characteristics; (3) providing peer reviews of technical documents, including reports dealing with various geologic considerations; and (4) providing programmatic reviews of geotechnical activities involving geology, hydrology, geophysics, geochemistry, etc., for the development of a technological basis for a repository.

EG&G Idaho, Incorporated is responsible for (1) providing support service to DOE and day-to-day technical, financial, and administrative coordination and direction to waste transportation cask development contractors, (2) implementing a quality assurance program, (3) monitoring contractors and tests, (4) providing support in evaluating cost proposals, and (5) procuring specialist consulting services for the Cask Systems Development Program.

In addition, EG&G is responsible for managing, planning, and conducting a demonstration project for prototype spent-fuel rod consolidation equipment, including (1) providing project management, quality assurance plans, cost and schedule control, and technical support and integration; (2) monitoring private sector contractors; (3) arranging for transportation of spent fuel from reactor sites to the DOE Idaho National

Engineering Laboratory; and (4) installing and testing the rod consolidation system in the hot demonstration.

General Atomics Corporation (GA Technologies, Incorporated) is responsible for engineering, designing, manufacturing, certifying, testing, and inspecting (1) a legal weight truck cask and (2) an overweight truck cask for waste transportation from reactors to a federal facility.

KOH Systems, Incorporated is responsible for (1) operating and maintaining the OCRWM headquarters central record facility and records processing functions; (2) assisting in preparing, screening, validating, and producing documents required for Freedom of Information Act requests; (3) assisting in collecting, preparing and assembling documents for all program administrative records; (4) providing technical support to implement and evaluate program information systems; and (5) providing support for preparation of major program documents.

Martin Marietta Energy Systems, Incorporated operates the Oak Ridge National Laboratory, which performs work in the areas of transportation and systems integration as well as providing program management and technical support to the nuclear waste program. Oak Ridge's activities include (1) developing data bases, technology models, and waste acceptance criteria, and assessing and enhancing technical computer codes for the Waste Systems Data and Development Project; (2) providing technical support to the OCRWM Transportation Operations Program; (3) providing analytical, experimental, and testing support for cask development and institutional and economic aspects of waste transportation; and (4) reviewing environmental aspects of key OCRWM documents.

NUS Corporation is responsible for all design, procurement, fabrication, installation, testing, reporting, quality, management, and associated activities required to build, test, and demonstrate spent-fuel rod consolidation equipment that will place the rods in a trapezoidal configuration to be loaded into a trapezoidal canister.

Nuclear Assurance Corporation is responsible for engineering, designing, manufacturing, certifying, testing, and inspecting a prototype 100-ton rail/barge spent-fuel cask to transport waste from reactors to a federal facility.

Nuclear Packaging Incorporated is responsible for engineering, designing, manufacturing, certifying, testing, and inspecting a prototype 100-

ton rail/barge spent-fuel cask to transport waste from reactors to a federal facility.

Ralph M. Parsons Company is the architect/engineer for the Monitored Retrievable Storage (MRS) facility. This contract, scheduled to expire on June 30, 1989, has been extended through December 1989.

Roy F. Weston, Incorporated is responsible for supporting OCRWM in the technical management of the repository, monitored retrievable storage, and transportation components of the radioactive waste program. This support consists of advice, assistance, and recommendations in the areas of (1) design, engineering, and systems integration; (2) facilities siting and licensing; (3) management economy and efficiency; (4) institutional affairs and outreach; and (5) program planning, scheduling, and policy.

SKB (Swedish Nuclear Fuel Supply) is cooperating with DOE on site characterization and site validation tasks in a project being conducted in Sweden supporting the Yucca Mountain repository project.

SRA Technologies, Incorporated is responsible for providing assistance in coordinating and integrating information necessary for conducting the Environmental Impact Statement for the first geologic repository. This work involves environmental compliance planning and integration, including such activities as (1) preparing guidance documents on environmental program planning consistency; (2) reviewing Project Office environmental field activity plans; and (3) providing support for an environmental planning working group.

Science Applications International Corporation is responsible for designing and developing a prototype Licensing Support System for the nuclear waste program. The purpose of the system is to provide records needed for the Nuclear Regulatory Commission to license the geologic repository.

The University of Chicago operates Argonne National Laboratory. Argonne's nuclear waste program activities include (1) reviewing and assisting in responding to and resolving comments on the Environmental Program Overview Plan, the Socioeconomic Monitoring and Mitigation Plan and subsequent progress reports prepared by the Yucca Mountain Project Office; (2) preparing site characterization reclamation plans; (3) reviewing Environmental Field Activity Plans prepared by the Yucca Mountain Project Office; (4) preparing reports on specific environmental

Appendix II
Activities of Major Active Nuclear Waste
Program Contractors

issues, such as ecological sampling techniques and modeling and reclamation technology; and (5) reviewing site characterization study plans.

Westinghouse Electric Corporation is responsible for engineering, designing, manufacturing, certifying, testing, and inspecting (1) a legal weight truck cask and (2) an overweight truck cask for waste transportation.

Westinghouse Hanford Company is responsible for Pacific Northwest Laboratories' reclamation/restoration activities for the Basalt Waste Isolation Project, including (1) environmental reclamation of the Near Surface Test Facility, exploratory shaft, boreholes, and waste ponds; (2) laboratory restoration involving transuranic waste disposal; (3) equipment disposition; (4) revegetation; (5) records management; and (6) support for preparation of a final project report.

Objectives, Scope, and Methodology

Our principal objective was to determine how the numbers and costs of contracts in the nuclear waste program have changed since the Nuclear Waste Policy Amendments Act became law in December 1987. A secondary objective was to obtain current information on contract issues addressed in our previous quarterly report on DOE's nuclear waste program.

To accomplish our primary objective, we obtained information on the numbers and costs of contracts in two waste program areas: (1) the Yucca Mountain (first repository) Project and (2) all other nuclear waste program activities, including activities relating to waste transportation, systems integration, and monitored retrievable storage. The second category also included activities investigating two additional sites for a first repository and sites for a second repository. (As indicated in our reports issued in February and May 1989,¹ some of these activities have been completely terminated and others are being phased-out in accordance with the 1987 amendments.) To determine how the number of waste program contracts and their costs changed after the amendments were enacted, we obtained information on waste program costs and contracts as of September 30, 1987—the end of the last full quarter prior to enactment of the amendments—and June 30, 1989.

We identified (1) individual contractors performing work for the nuclear waste program, (2) the type of work being performed by each contractor, and (3) the cumulative costs of these activities. In order to identify waste program contractors, we interviewed officials of OCRWM and reviewed information from DOE's procurement and program funding data bases. We also obtained information on contract costs and contractor's activities from these data bases. We did not verify the accuracy of the information from these data bases. In addition, for more detailed and current information on individual contractors' work, we obtained and reviewed copies of (1) major contracts governing nuclear waste program activities, (2) recent modifications to these contracts, and (3) revisions to contractors' statements of work.

To accomplish our secondary objective, we obtained and reviewed the U.S. Claims Court decision on the challenge to DOE's proposed award of a systems engineering, design, and management contract and the DOE IG's

¹Nuclear Waste: Termination of Activities at Two Sites Proceeding in an Orderly Manner (GAO/RCED-89-66, Feb. 6, 1989), and Nuclear Waste: DOE Has Terminated Research Evaluating Crystalline Rock for a Repository (GAO/RCED-89-148, May 22, 1989).

**Appendix III
Objectives, Scope, and Methodology**

September 1989 report on indemnification of DOE's management and operating contractors.

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