U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL

REPORT ON AUDIT OF COSTS AND MANAGEMENT OF
THE YUCCA MOUNTAIN PROJECT

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Capital Regional Audit Office
Germantown, MD 20874

United States Government

Department of Energy

memorandum

DATE: June 23, 1994

REPLY TO
ATTN OF: IG-1

SUBJECT: INFORMATION: Report on "Audit of Costs and Management of the Yucca Mountain Project"

TO: The Secretary

BACKGROUND:

The Nuclear Waste Policy Act of 1982, as amended, required the Department, through the Office of Civilian Radioactive Waste Management, to perform site characterization at Yucca Mountain. The Yucca Mountain Project is a formidable scientific challenge since the Department must determine if high-level radioactive waste can be stored safely for 10,000 years. To date, the Department and its contractors have spent about \$1.5 billion on site characterization activities. The purpose of our audit was to examine the costs and management of the project, and to determine how effectively these funds were spent.

DISCUSSION:

The audit found that, if procurement and fund allocation practices were streamlined, significant savings in overhead costs could be achieved over the remaining life of the project. Also, 2 1/2 years after an integration contract was awarded, the anticipated reductions in the number of project participants had not materialized, nor had management and integration of the project been effectively implemented. Further, sound cost reduction ideas advanced by the project's participants were not evaluated and implemented in a timely manner.

We concluded that a greater degree of Federal control of the project and a stronger role for the Project Office is needed. Management agreed with the report's recommendations, and management is in the process of developing a program-wide strategic plan and has implemented a reorganization at the Project Office.

John C. Layton
Inspector General

Attachment

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cc: Deputy Secretary
Under Secretary
Director, Office of Civilian
Radioactive Waste Management

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AUDIT OF COSTS AND MANAGEMENT OF
THE YUCCA MOUNTAIN PROJECT

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U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDITS

AUDIT OF COSTS AND MANAGEMENT OF THE YUCCA MOUNTAIN PROJECT

Audit Report Number: DOE/IG-0351

SUMMARY

The Department of Energy (Department) is responsible for establishing an underground waste repository to store high-level nuclear waste. To carry out this responsibility, the Department of Energy established the Office of Civilian Radioactive Waste Management (Waste Management Office). The Waste Management Office began characterization of the Yucca Mountain site to assess the feasibility of safely storing spent fuel and high level waste for 10,000 years. To date, the Department had spent about \$1.5 billion on site characterization activities. The purpose of our audit was to examine how effectively these funds were spent and to examine the costs and management of contracting for the project.

Our audit found that if procurement and fund allocation practices were streamlined, significant savings could be achieved over the remaining life of the project. Also, the anticipated reductions in the number of project participants had not materialized, nor had management and integration of the project been effectively implemented. In addition, the Waste Management Office's efforts to make major staffing reductions had not met the original goals, and sound cost reduction ideas advanced by the project's participants were not evaluated and implemented in a timely manner.

Management agreed with our recommendations and is in the process of developing a program-wide strategic plan that recognizes funding constraints and has implemented a reorganization of the management structure at the Project Office.

Office of Inspector General

PART I

APPROACH AND OVERVIEW

INTRODUCTION

Since the first U.S. nuclear power plant went on line in 1957, more than 20,000 metric tons of spent fuel and high-level radioactive waste have accumulated. This waste will remain radioactive and hazardous for thousands of years. Presently, the waste, which is accumulating at a rate of 2,000 metric tons a year, is stored at over 100 nuclear power plants located across the U.S.

Based upon a scientific study, the Congress decided in 1982 that the best solution was to store the nuclear waste in rock, deep underground. The process for establishing an underground waste repository is being implemented by the Department of Energy's (Department) Office of Civilian Radioactive Waste Management (Waste Management Office). The on-site work is under the direction of the Department's Yucca Mountain Project Office (Project Office). This office was renamed the Yucca Mountain Site Characterization Office on February 28, 1994.

As directed by Congress, the Department is to conduct extensive scientific studies at the Yucca Mountain site. These site characterization studies--which the Department estimates will cost \$6.3 billion, and take until the year 2001 to complete--will determine if Yucca Mountain is a suitable site to isolate high-level waste from the environment.

When these studies are complete, and if the data indicates that Yucca Mountain is suitable, the Department will apply to the Nuclear Regulatory Commission for a license to construct a repository. The repository is expected to cost about \$9 billion (in 1988 dollars) to design, construct, operate, and decommission.

From 1983 to 1993, the Department spent about \$1.5 billion on site characterization activities. The purpose of our audit was to examine how effectively these funds were spent and to examine the costs and management of contracting for the project.

SCOPE AND METHODOLOGY

To evaluate project spending, we reviewed site characterization plans, budgets and costs. We also reviewed the project's organizational structure, management processes, and contracts and agreements with the nine key entities participating in the project.

In our analysis of the project management structure and processes, we analyzed activities performed by the management and operating contractor and the other participating entities. We visited the Headquarters Waste Management Office in Washington, D.C.; the Project Office in Las Vegas, Nevada; and the Las Vegas offices of the project's two principal contractors. These two contractors received more than 35 percent of the project's current funding levels. TRW Environmental Safety Systems (TRW), one of these contractors, serves as the operating contractor and is responsible for integrating the work of the other participants.

To evaluate the project's controls and the reasonableness of scientific costs, we made on-site reviews at U.S. Geological Survey (Geological Survey) offices in Denver and the Department laboratories at Sandia, Los Alamos, and Livermore. These four participants accounted for about 25 percent of current funding. For audit purposes, we considered costs reasonable if they appeared to be necessary, were adequately documented and were not specifically unallowable in the Federal Acquisition Regulation.

We audited costs incurred during Fiscal Years 1983-1993, with primary emphasis on current transactions. At the Geological Survey and the four Departmental laboratories we visited, we judgmentally sampled 109 procurement actions totaling \$31.3 million; 60 travel vouchers totaling approximately \$50,000; and 50 time cards for Fiscal Years 1992 and 1993. We also reviewed documentation and reports from other organizations and activities that review the Yucca Mountain Project.

The audit was made in accordance with generally accepted government auditing standards for performance audits and included selective tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the objective of the audit. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit.

The field work was conducted during the period March through October 1993 and included transactions current as of September 30, 1993. The firm of Irving Burton Associates, Inc. participated with the Department's Office of Inspector General in conducting this audit. We discussed our findings with the Deputy Director of the Waste Management Office and members of his staff on March 30, 1994.

BACKGROUND

As part of the 1982 Nuclear Waste Policy Act, the Congress required nuclear power plant operators to pay for waste disposal and storage costs. Collections from these operators are deposited in an account with the U.S. Treasury called the Nuclear Waste Fund. As of 1992, over \$7 billion had been collected and approximately \$3.5 billion had been spent by the Department. About \$1.5 billion of these funds were spent on site characterization activities, and the other funds were spent on a variety of related programs not within the scope of this review.

The approved timeline for getting the Yucca Mountain repository characterized, licensed, constructed, and operating began in 1982, with site characterization scheduled for completion by the year 2001, followed by Nuclear Regulatory Commission review for licensing, and then construction and operation of the repository by 2010.

In 1991, a \$6.3 billion baseline was approved to complete the site characterization portion of the project by the year 2001. However, as depicted in the graph below, approved funding for the project has fallen short of planned levels. Recognizing the funding shortfall, the Secretary of Energy has initiated a re-evaluation of the project which will consider funding constraints.

Yucca Mountain Planned and Actual Site Characterization Funding

To meet mission requirements within current funding levels, considerable emphasis has been placed on reducing overhead and related costs. The Project Office has, at Headquarters' request, initiated several overhead reduction studies, most of which were still ongoing when we conducted our audit.

OBSERVATIONS AND CONCLUSIONS

The Yucca Mountain Project is a formidable scientific challenge. It must determine if high-level radioactive waste can be stored safely for 10,000 years, and do so with no previous experience to draw on. Our audit of the costs of this project did not disclose patterns of unnecessary expenditures, but noted that overhead had not been reduced as planned. The audit identified several areas where significant overhead savings could be achieved.

We estimated that, over the planned 8-year life of the project, significant savings could be achieved if procurement and fund allocation practices were streamlined. We found that participants did not directly perform all the work assigned but, instead, procured much of it (as well as goods) from outside sources, including other Departmental laboratories and contractors that were already project participants. In the process, fees for the "buying service" were added to the cost. This was a costly procedure that stemmed from the Waste Management Office following standard procedures rather than making a specific decision to centralize the procurement function.

We also found that, 2 1/2 years after the integration contractor was brought on, the anticipated reduction in the number of participants had not materialized, nor had management and integration of the project been effectively implemented. Also, the Waste Management Office's efforts to make major staffing reductions had not met the original goals, and sound cost reduction ideas advanced by the project's participants were not evaluated and implemented in a timely manner.

In this report, we recommend a greater degree of Federal control of the project and a stronger role for the Project Office. We also recommend that the integration contractor's role be reassessed during the Waste Management Office's performance assessment of the management and operating contract.

The Project Office's need to reduce overhead costs constitutes a potential internal control weakness that management should consider when preparing its yearend assurance memorandum on internal controls.

MANAGEMENT REACTION

The Office of Civilian Radioactive Waste Management concurred with the recommendations contained in the report. The office is developing a program-wide strategic plan that recognizes funding constraints and has implemented a reorganization of the management structure at the Project Office. Details of management's position are discussed in Part III of this report.

PART II

FINDINGS AND RECOMMENDATIONS

1. Project Procurement Efforts

FINDING

Acquisition regulations require Federal agencies to obtain goods and services at reasonable prices. We found that the Project Office's use of the Geological Survey and Departmental laboratories procurement offices, often buying from other Departmental laboratories or program participants, was not cost effective. Specifically, the Geological Survey and the Department's laboratories charged overhead for performing subcontracting functions, and they issued separate contracts for similar services. The need to use these entities as buying services resulted from the absence of a centralized procurement function at the Project Office. In the procurements we reviewed, the Project Office could have saved at least 15 percent by using centralized procurement. As these types of procurements are expected to total about \$300 million over the project's life, we believe significant savings can be achieved through centralized procurement. In addition, centralization would also provide the project with fewer subcontracts, more uniformity, and improved control over what is actually being procured.

RECOMMENDATIONS

We recommend that the Director, Office of Civilian Radioactive Waste Management, in coordination with the appropriate Departmental Headquarters elements, direct the Project Office staff to:

1. Provide funds directly to Departmental laboratories and universities that perform Yucca Mountain subcontract work for other Departmental laboratories and the U.S. Geological Survey.
2. Implement centralized procurement procedures at a Federal procurement office for project participants where practical.
3. Examine the feasibility of consolidating present multiple subcontracts at different locations for common functions. These procurements should be in the form of single contracts, competitively bid, with provisions for service at necessary locations.

4. Clearly define roles and responsibilities of participants to ensure that future charges to the project are appropriate and well documented.

MANAGEMENT REACTION

The Director, Office of Civilian Radioactive Waste Management, concurred with the recommendations and has taken or initiated actions designed to reduce overhead costs. Details are provided in Part III of this report.

DETAILS OF FINDING

REQUIREMENTS FOR ECONOMY IN PROCUREMENT

The Federal Acquisition Regulation requires that the Project Office obtain supplies and services in an effective and economical manner. Further, the Regulation requires the development of an acquisition plan and a determination of the resources to be used to acquire supplies and services. The acquisition plan must (1) consider prospective sources of supplies and services that will meet the identified needs, and (2) determine how competition will be sought, promoted, and sustained throughout the course of the acquisition. Finally, the Regulation as well as Departmental orders requires the use of prudent business judgment in carrying out procurement actions.

ACTIVITY AT THE GEOLOGICAL SURVEY AND DEPARTMENTAL LABORATORIES

The Geological Survey and Departmental laboratories represent the scientific portion of the project and have been assigned responsibilities for studies and tests relating to such technical areas as hydrology, geochemistry, and waste packaging. The responsibilities also include related quality assurance, project management, environmental, safety, and health issues. Each participant had a technical project officer who was responsible for the technical work performed by their activities for the project. The technical project officers reported both to the Department's project manager and to their own internal management. They kept the Project Office advised of costs and work progress, and they participated in the project planning.

Of the \$1.5 billion spent on site characterization activities, the principal scientific participants in the project will have incurred costs of \$688.4 million through Fiscal Year 1994. A breakdown of these costs follows:

PROJECT COSTS AT DEPARTMENTAL LABORATORIES AND GEOLOGICAL SURVEY

BY FISCAL YEAR (\$ in millions)

	<u>1983-1990</u>	<u>1991</u>	<u>1992</u>	<u>1993 *</u>	<u>1994 *</u>	<u>TOTAL</u>
Los Alamos	\$ 84.4	\$ 15.1	\$ 12.3	\$ 14.8	\$ 15.7	\$ 142.3
Livermore	87.8	14.4	8.7	12.2	12.7	135.8
Sandia	133.1	22.0	14.6	15.1	17.8	202.6
USGS	<u>113.6</u>	<u>20.6</u>	<u>21.7</u>	<u>25.9</u>	<u>25.9</u>	<u>207.7</u>
TOTAL	<u>\$ 418.9</u>	<u>\$ 72.1</u>	<u>\$ 57.3</u>	<u>\$ 68.0</u>	<u>\$ 72.1</u>	<u>\$ 688.4</u>

* Budgeted amounts from the Yucca Mountain Project Office

The Project Office assigns particular tasks to the Geological Survey and Departmental laboratories, provides them with funding, and expects them to accomplish the tasks. The participants often obtain goods and services outside their organizations to support the completion of these tasks. Those types of indirect procurements in Fiscal Year 1992 accounted for about \$14 million, or about 25 percent of the Geological Survey and laboratories' \$57.3 million in total project costs. During our audit, we found that the types of goods and services being purchased separately by the laboratories and the Geological Survey could be purchased through a centralized system. In addition, we found that procurements of goods and services in this manner had resulted in excessive overhead costs.

Types of Purchases

The Geological Survey and Departmental laboratories obtained some of their project needs, such as supplies and shop work at their own facilities. However, when these items could not be obtained at their facility, they procured the goods or services from a variety of sources, including universities, other Departmental laboratories, other government agencies, and commercial firms.

Our review of the purchases made by the activities visited disclosed that many of the services and items purchased were similar at each activity. They included such common items and services as computer hardware and software, office and laboratory supplies and equipment, quality assurance support, records management, training, and administrative/computer/technical support.

The purchases made between Departmental laboratories and other integrated Departmental contractors (including some major project participants) were not generally considered by the laboratories to be procurement actions. Instead, these transactions were characterized as streamlined procurements and commonly referred to as "funds transfers." As such, they bypassed normally required procurement procedures, such as sole-source justifications, and cost/price analyses. Therefore, there was no analysis performed to ensure that the purchases were economically advantageous.

Overhead Costs Applicable to Purchases

There were overhead costs applied to all purchases. The overhead charges were generally applicable to all project funds received by the laboratories, including the "fund transfers" to other Departmental laboratories. The overhead, charged on outside purchases, included charges for the procurement services, as well as for such items as general and administrative costs and laboratory-directed research and development costs. This overhead, charged on outside purchases, was over and above the fixed costs of the Technical Project Officer staff at each laboratory. The overhead was applied to purchases of goods as well as services.

Overhead charges were different at each laboratory, and they were applied and reported differently. Procurement reports on purchases and costs varied among the various laboratories. Some activities reported separate general and administrative costs, and others simply reported overhead. All of the laboratories included indirect costs that were not visible on cost reports. Some cost and purchase details were not readily available, and those that were available were configured differently at each of the laboratories. Due to these differences and the complexity of cost allocations, it was extremely difficult for project management to identify costs involved or make meaningful comparisons of costs incurred or purchases made. However, where such comparisons were possible, they showed large overhead allocations that could have been avoided.

For purposes of the examples which follow, we have identified the different laboratories by an alphabetical designation.

Example 1 - Laboratory "A" had been assigned and funded to do certain technical work it did not have the capability to do itself. Laboratory "A" had Laboratory "B" perform this work and arranged a fund transfer. Laboratory B charged \$988,000 for the work, including the following overhead charges:

General and Administrative	\$ 184,382
Institutional Support	42,853
Service Assessment	33,639
Office of Civilian Waste Programs	22,124
Nuclear Assessment	17,397
Purchasing Service Charge	1,837
Purchasing Overhead	652
Stores Overhead	<u>294</u>
Total	<u>\$ 303,178</u>

In return for arranging the funds transfer, Laboratory A applied overhead charges to the work performed by Laboratory B as shown below.

General and Administrative	\$ 68,172
Lab Research and Development	67,085
Program Administrative Support	<u>59,280</u>
Total	<u>\$ 194,537</u>

Of the total \$1,182,537 spent, only \$684,822 (58 percent) was spent on technical work. Overhead (\$303,178 plus \$194,537) consumed 42 percent of project costs. If the Project Office had contracted directly with Laboratory B, \$194,537 in cost could have been avoided. The overhead charged by Laboratory A raises questions as to whether the use of alternative sources might have been cost effective. Our concerns were increased by the fact that there were no competitive bids for the work and no determination of price reasonableness.

Example 2 - As discussed, each facility was purchasing many similar items such as computers, laboratory supplies, and quality assurance support, but each had different overhead charges applied, and therefore, widely different costs for the same items. For example:

- Laboratory A applied a 6.9 percent rate for general and administrative costs, whereas Laboratory B had an 18.7 percent rate, and Laboratory C charged 12 percent.
- The laboratory-directed research and development charge for Laboratory A was 6.79 percent, and the Laboratory C rate was 17 percent. Although the Laboratory C rate of 17 percent was applied only to salaries rather than to all costs, the rate was, in effect, passed through to purchases it made from others.

An analysis of these rates shows that Laboratory A had a combined rate (general and administrative and laboratory-directed research and development) of 13.69 percent, compared to Laboratory C's combined rate of 29 percent. Therefore, the same item purchased by each laboratory would have at least 15 percent less overhead applied at Laboratory A than at Laboratory C in just these two categories. By centralizing procurement activity, it would be possible to take advantage of the most favorable overhead rates, or avoid them all together where less costly alternatives are available.

Example 3 - For Fiscal Year 1993, Laboratory C procured technical services from Laboratory D at a cost of \$350,000 annually. Laboratory C charged the project 16 percent (\$56,000) for what was, essentially, only a transfer of funds. As in Example 1, the charge could have been avoided if the Project Office had funded Laboratory D directly.

We did not challenge specific rates charged by individual laboratories. The audit results demonstrated, however, that the project is paying overhead rates for goods and services that vary dramatically depending upon which laboratory is doing the purchasing. By exploring alternative sources of supply, using competition, and being aware of the diversity of overhead costs and charges, the Project Office will be in a position to ensure that goods and services are obtained at the most cost-beneficial price.

Need to Streamline Procurement, Contracting, and Funding Practices

The decentralized procurement by each participant has resulted in shortcomings that could be eliminated by having the Project Office provide funds directly to the activities that will accomplish the work, centralizing the procurement activity, and consolidating multiple contracts where practicable.

Direct Funding. The Project Office has the capability to fund laboratories directly for work rather than funneling funds through other Departmental laboratories. Direct funding would avoid the unnecessary overhead costs of an intermediary. Some officials expressed the concern that a laboratory might lose control over the work assigned to it if it relinquished fund control. However, we found that the Project Office sent funds directly to several Departmental laboratories for work that was the responsibility of the Geological Survey. Officials at the Geological Survey indicated that the procedure worked well with no loss of technical control.

Centralizing Procurement and Contracting. Based on the audit findings, centralizing procurement and contracting to a single

existing source with the least amount of overhead would lower costs. Requisitions would be routed through the Project Office's staff for oversight, control, and consolidation of similar needs by participants. The Project Office already has managers assigned to each element of the project, and oversight by these managers would be a logical part and extension of their current responsibilities.

Consolidating Multiple Contracts. In the process of centralizing procurement, contracts should be consolidated where practicable. For example, four of the five facilities we visited had subcontracts for quality assurance activities. One was procured on a sole-source basis, one was termed a "fixed-rate purchase order," and the other two were cost-plus-fixed-fee arrangements. A single procurement action would have precluded multiple solicitations, and the administration of four different contract arrangements with different overhead rates. Use of competitive bidding on a single contract would also provide more uniformity and lower costs, especially since quality assurance requirements were essentially the same for all project participants.

Although there may be situations in which consolidation is not practicable, a centralized procurement source controlled by the Project Office should have the capability of pursuing those cases where it is practicable and thereby reduce costs and better meet program objectives.

BENEFITS OF STREAMLINING PROCUREMENT, CONTRACTING AND FUNDING

The audit disclosed that funding all participants directly, centralizing procurement, and consolidating subcontracts would give the Project Office improved control over what was actually being purchased. Most important, it would save money, which could be allocated to technical work rather than overhead.

In estimating possible savings to the project, we analyzed various overhead charges by the participants and found that the overhead amounts were different at each activity and that the overhead rates were applied differently. These differences, and the complexity in which the rates were applied, did not provide easily measurable and comparable results. However, the rates as shown in the following examples demonstrate where savings are possible.

- Applied overhead on one outside purchase totalled a combined 42 percent for Laboratories A and B, and overhead of 16 percent could have been avoided had the Project Office directly funded Laboratory B (Example 1).

- Laboratory C charged 15 percent more overhead on outside purchases than Laboratory A (Example 2).
- Laboratory C charged 16 percent for a purchase from Laboratory D. The charge could have been avoided entirely if the Project Office had directly funded Laboratory D (Example 3).

Based on these examples and other procurements we looked at, we concluded that a reduction of at least 15 percent in overhead fees should be possible by using the least-cost procurement source. Since such outside procurements are currently projected to total over \$300 million during the life of the project, we believe significant savings can be achieved through centralized procurement. In addition, centralization would also provide the project with fewer subcontracts, more uniformity, and improve control over what is being procured.

2. Management and Operating Contractor Structure

FINDING

In early 1991, the Waste Management Office awarded a management and operating contract to manage and integrate its overall program to safely transport and store the nation's high-level radioactive waste in a permanent underground repository. The contract was originally justified on the basis that the contractor would significantly reduce the large number of participants, and better integrate the diverse work being done, thereby reducing overall costs. Instead we found that, in the 2 1/2 years since the contract was awarded, little reduction took place and only limited progress was made in the integration role. The primary reasons were that the Waste Management Office did not have a clear plan to consolidate and streamline contractor support functions, and the operating contractor was not given the necessary authority to carry out the role envisioned in the contract. Until the management structure is reevaluated and streamlined, the original objective of the contract will remain unfulfilled.

RECOMMENDATIONS

We recommend that the Director, Office of Civilian Radioactive Waste Management:

1. As part of the performance assessment of the management and operating contractor, reevaluate the contractor's responsibility for the management and integration of project work.
2. Consider making the Project Office responsible for management and integration of the project, which would include:
 - a. Having all prime contractors/participants report directly to the Project Office for management, direction, and control.
 - b. Ensuring that the Project Office is appropriately staffed and funded to carry out the management and integration function.

MANAGEMENT REACTION

The Director, Office of Civilian Radioactive Waste Management, concurred with the recommendations and has taken or initiated several significant management and integration actions. Details are provided in Part III of this report.

DETAILS OF FINDING

MANAGEMENT AND INTEGRATION REQUIREMENTS

In 1987, the Director of the Waste Management Office determined that the nuclear waste management program needed stronger centralized management. The inability to integrate the various contractors was preventing the work from proceeding as expeditiously as possible. At that time there were three sites being characterized (in the states of Washington, Texas, and Nevada). This was in addition to the development of a monitored retrievable storage site for temporary storage and treatment of the waste prior to its being sent to a repository for long-term storage. There was also a separate program to develop shipping casks for transportation of the waste to a repository site.

The Director felt that a management and operating contractor was needed to streamline the program and ensure that coordination among the program elements was clearly specified and controlled. The contractor's responsibilities were to have included (1) integrating the work of various program participants, such as the Departmental laboratories, other Federal agencies, and other Department prime contractors; and, (2) conducting work in support of the program. All responsibilities to be assigned to the operating contractor were subject to the Waste Management Office's program authorization and technical direction. A request for proposal on the contract was sent out in October 1987.

Prior to the award of the operating contract, the Office of Inspector General questioned the continued need for the contractor because the site characterization project had been reduced to characterizing just one site. We expressed concerns that the addition of an operating contractor would add another layer of management. We concluded that the requirements should be reevaluated and, if there was still a need, the request for proposal should be revised to reflect the major change made to the program.

Waste Management officials, however, continued to justify the need for the contract on the basis that the program still needed strong centralized management, particularly at the Project Office. They stated that the contractor was required to consolidate and streamline contractor support and reduce the number of contractors and the Departmental laboratories by almost two-thirds. These officials gave assurances, at that time, that the operating contractor would accomplish the reductions and would achieve further efficiencies through improved management and integration of the project. They also stated that if the contract did prove unnecessary, it could be terminated after 3 years at minimal cost or risk to the Department.

In February 1991, the Department awarded the operating contract to TRW to perform systems engineering, development, and management of the radioactive waste management system. As part of the management and operating contract, TRW was also required to integrate the work of the other participants.

The management and operating contract required the Department to evaluate the contractor's performance 3 years after award. Based on that review, the Department was to determine whether the contract should continue beyond 5 years from the date of award. In the event a decision was made not to continue the contract beyond 5 years, the contract was to be terminated. The initial 3 year period for the contract ended in February 1994.

MANAGEMENT AND OPERATING CONTRACTOR ACTIVITY

Our audit showed that, as of October 1993, the number of contractors and Departmental laboratories working on the program had not been reduced as planned. Further, there was not a consensus that this reduction was desirable.

The management and operating contract required the contractor to develop a plan for consolidating work. The contractor's transition plan was finalized in June 1991. In this plan, the contractor stated that when the transition was fully implemented, the program would have a distinctly different look. After restructuring, there would be 8 contractors and 3 national laboratories involved as participants in the project, which was the same as the Waste Management Office's goals in the justification for award of the operating contract. According to the contractor, "...At the end of the ramp-up period most essential work within the M&O Contractor's work scope will have been transferred from existing contractors; indispensable technical work will remain at selected national laboratories; and the M&O will have assumed its full management and integration role...."

The potential work scopes chosen by the Waste Management Office for transition and the respective contractors responsible for this work were specified in the contract. For example, work performed by the Department's laboratories at Sandia (Albuquerque) and Lawrence Berkeley was designated for transition to the operating contractor. At the Department Headquarters level, the transition plan was carried out for program components (program management, monitored retrievable storage, transportation, and waste acceptance). The plan met opposition by the Project Office, and some participants strongly opposed it.

REDUCTION IN CONTRACTOR SUPPORT

Through Fiscal Year 1993, actual reductions in the number of contractors and Departmental laboratories working on the program did not approach the goals contained in the justification to the Secretary.

- o At the overall program level, the Waste Management Office expected to reduce the number of contractors from 26 to 8 and to reduce the number of laboratory participants from 8 to 3. The actual reduction was to 17 contractors and 7 Departmental laboratories, respectively.

- o At the Yucca Mountain Project level, the reduction of participants was even less. When the operating contractor was hired in February 1991, 9 contractors and 5 Departmental laboratories were working on the project. As of October 1993 there was 7 contractors and 5 Departmental laboratories participating in the project. The number of participants (i.e., contractors and laboratories) working on the project exceeded the number that the Waste Management Office planned for the entire program. Furthermore, it was uncertain whether any future reductions would occur.

The expected reduction in total staffing also failed to materialize. According to the June 1991 transition plan, the projected total staffing for the project, as of September 1992, would be reduced to 925 (380 operating contractor; 545 all other participants), down from 1,057 in July 1991. Actual staffing on that date instead grew to 1,244. By June 1993, the total had increased to 1,578 (446 operating contractor; 1,132 all others). Part of personnel growth could be attributed to the State of Nevada issuing required permits that allowed the characterization activities to proceed. For this and other reasons, the reductions called for in the transition plan were not realized.

The need for a management and operating contractor was also justified based on the desire to "...consolidate and improve integration and direction of RW [Waste Management Office] program resources, and allow work to begin expeditiously on new program priorities...." The Waste Management Office's inability to integrate the work of 26 contractors and 8 Departmental laboratories was seen at that time as impeding the progress of the program. By using the contractor to manage and integrate all program work, it was expected that overall management would be improved and that the cost of adding the contractor would be offset in part by a decrease in the cost of the other participants.

Performance of Management and Integration Role

The management and integration role entails the overall management of system activities such as planning, scheduling, budgeting, and reporting. Additionally, the role requires interaction and coordination among all participants such as gathering budget information, planning, and monitoring.

On June 2, 1993, the Waste Management Office issued an Award Fee Determination letter to TRW, giving the Department's assessment of the contractor's performance for the period October 1, 1992, through March 31, 1993. In the Award Fee Board Report that accompanied the letter, the contractor received an overall satisfactory rating, with a slightly lower point score for the Yucca Mountain Project. The contractor's inability to provide integration across the project on its own initiative was rated a "significant deficiency." Communication among the management and operating contractor and other project participants, from whom TRW had aggressively tried to transition work, was rated a "notable deficiency." In summary, the contractor was told it needed "to improve and expand integration efforts both across the program and at (Yucca Mountain Project Office) YMPO...."

The Award Fee Board Report also cited TRW's dual role in having responsibilities for both management and integration, as well as line or participant functions, as a continuing problem. An example given in the letter was a recommendation by TRW, as project integrator, to reduce another participant's budget while increasing the budget for its own line functions. The report stated that the TRW team needed to continue to make concerted efforts to rebuild a team spirit for the project that was interrupted. "Integration across project WBS (work breakdown structure) elements is marginal and must improve." The contractor was urged to begin to expand its integration efforts to encompass all aspects of the project.

The Project Office recognized that improvements were needed to allow the operating contractor to become more effective in the management and integration role. The Project Office manager, in a March 1993 letter to the contractor, defined the roles of manager and integrator. The role included assisting the Project Office in developing fiscal year work scopes; integrating and coordinating all work, both horizontally and vertically; monitoring and evaluating progress of each of the work elements to ensure program priorities are being met; and recommending changes to improve the implementation of work scope, budget, etc. In this regard, a second Award Fee Board Report was issued on December 1, 1993, which noted a marked improvement in the contractor's performance.

Also, recognizing that the contractor must be as objective as possible, the Project Office manager suggested that the contractor

separate its management and integration and line (participant) functions to achieve maximum objectivity. The contractor created a separate management and integration department headed by a Deputy Site Manager. This department was to serve as an extension of the Project Office and to treat the TRW line departments as objectively as possible.

TRW, in submitting its proposal for the new management and integration department, indicated that it planned to start the effort with existing staff. The contractor added that successfully integrating the functions would be a very difficult undertaking and that others had limited success in carrying out that objective.

LIMITATIONS OF OPERATING CONTRACT

We concluded that the anticipated benefits of the management and operating contract were not realized. We found that the Waste Management Office's concept for consolidating and streamlining the contractor support structure lacked a clear focus. In addition, because of internal opposition, the contractor was constrained from implementing its entire plan. Without a clear measurable objective, the contractor was unable to bring about the intended restructuring. Also, according to the Waste Management Office appraisal, the contractor did not give adequate management emphasis or resources to the management and integration function. Finally, we were informed by the various project participants as confirmed in the Waste Management Office appraisal, that the contractor's dual role as integrator and participant was perceived by the other participants as a "conflict of interest." Transferring work scopes from other project participants restricted the teamwork concept and caused friction with the participants. Subsequently, the Project Office addressed these concerns by directing TRW to cease taking further tasks from other participants. This action improved the cooperation between participants.

We also noted that the contract required the contractor to develop a transition (ramp up) plan, and offered a table to transition potential work scopes. However, due to concerns of project participants, the Waste Management Office did not implement the plan in its entirety.

PLANNED MANAGEMENT ACTIONS

As it was structured at the time of the audit, TRW was tasked to perform administration, integration, and participant functions in support of the Yucca Mountain Project. During the planned restructuring of the Project Office and the evaluation of the

management and operating contractor's performance there is a unique opportunity to streamline the project and better define the roles of the participants, and achieve cost savings.

Subsequent to the completion of our audit work, the Director of the Waste Management Office, on March 1, 1994, gave testimony before the United States Senate, Committee on Energy and Natural Resources. In that testimony, the Director listed recent reorganizational changes to the program. He stated that they were developing a program-wide strategic plan that will consider past and present funding constraints and address many of the concerns and criticisms that had been made. He further stated that the program has shifted funds and staff allocations from Headquarters to the Yucca Mountain Project, and had approved a reorganization of the Federal management structure at the Project Office. It was designed to formalize and clarify lines of responsibility and accountability, and to move the Project Office towards a task-oriented organization focused on determining the suitability of Yucca Mountain as a repository site. Also, a clarification of the roles and responsibilities of the contractors currently supporting the Yucca Mountain Project was to be reviewed for appropriate integration with this new Federal staffing reorganization. In addition to these changes, the Director stated that further management improvements both in the Federal structure and contractor support would be made.

3. Overhead Reduction Effort

FINDING

The Project Office has been required to reduce its overhead costs, as oversight groups (both external and internal to the Department) have determined that those costs were too high. The Project Office responded to this requirement by initiating studies that identified \$50 million in potential overhead cost reductions over the life of the project. Most of the 30 candidate items, however, were not scheduled for evaluation and implementation for 2 years or more. Another 46 overhead reduction items had not been scheduled for study. The principal reason for the slow progress was that the Project Office had not provided sufficient resources to get the cost reduction actions studied, approved, and in place within a reasonable time frame. Maintaining a high overhead structure increases costs and adversely affects the scientific and technical work needed to determine whether Yucca Mountain is a suitable repository site.

RECOMMENDATION

We recommend that the Director, Office of Civilian Radioactive Waste Management, direct the Project Office to (1) implement the 30 identified potential cost reduction items; (2) complete the study of the remaining 46 items that have potential for savings; and (3) implement additional cost reduction items as they are identified.

MANAGEMENT REACTION

The Director, Office of Civilian Radioactive Waste Management, concurred with the recommendation and has taken action to implement identified potential cost reduction items. Details are provided in Part III of this report.

DETAILS OF FINDING

REQUIREMENTS FOR OVERHEAD REDUCTION

In mid-1992, project oversight activities started recommending that the Project Office reduce overhead costs. These activities all reported that the project's overhead ratio was too high in relation to direct science and technical expenditures. For example:

- o In August 1992, a Headquarters team did an independent cost estimate for the project and reported that its organizational structure and participant responsibilities should be streamlined and simplified. The team concluded

that fewer participants, each with unique and better defined roles, would reduce infrastructure costs.

- o The Edison Electric Institute, in November 1992, reported that the number of contractors and other participants should be reduced to lower overhead costs.
- o The Nuclear Waste Technical Review Board, in a March 1993 report, also recognized that the project's overhead was too high. Specifically, the Board said that Fiscal Year 1993 funding for overhead and infrastructure accounted for about 56 percent of total project funds.
- o In May 1993, the U.S. General Accounting Office (GAO) reported that too little of the funds available for Yucca Mountain were being spent for essential scientific investigation activities. GAO stated that, even though budgets were being significantly reduced, funds allotted to the project were being used to maintain a project infrastructure large enough to support the Department's objective of completing the site investigation in the year 2001, rather than paring it down to the amounts needed to support the current reduced science and technical effort.

OVERHEAD REDUCTION ACTIVITY

The Waste Management Office responded to these studies by directing the Project Office to cut overhead and maintain the scientific thrust by "...minimizing the effort required to meet Project goals while minimizing the number and scope of project participants consistent with cost-effective management and maintaining required scientific/engineering expertise." In addition, management analyzed the characterization of overhead costs to identify those most susceptible to reduction.

In response to the Waste Management Office's September 1992 direction, the Project Office established a cost reduction team, led by TRW and including all major participants. The team defined infrastructure costs as project management, including quality assurance, records management, financial and technical assistance, and all aspects of administrative services provided as part of the program. On April 1, 1993, the study team issued their report. It identified 30 cost reduction items that could save about \$50 million, over the life of the project, together with milestones for implementation.

We found that limited progress had been made in implementing the 30 identified potential cost reduction items in a timely manner. For example:

- o One cost reduction item recommended combining staffing, supervision, and space used for tracking capital equipment, sensitive items, and furniture. One contractor had five and another had two staff members performing these functions. The consolidation, as proposed, would have resulted in a reduction of four of the seven personnel and related office space for an annual savings of \$353,224. Implementation was not scheduled until April 1996.
- o Another cost reduction action related to graphics work that was being carried out independently by four contractor or laboratory participants in the Las Vegas area. A study team determined that combining all project graphics production would save two staff years of effort. Another 1/2 staff year could be saved by eliminating redesign (duplication of work), due to the participants not using common software. Although this consolidation was considered easy to implement and was expected to save \$125,000 annually, implementation was not scheduled until 1995.
- o A study team also recommended consolidating the procurement and distribution of office supplies. Two major contractors each had four persons doing that function. Consolidating these functions would eliminate two positions with annual savings of \$114,000. The consolidation, though, was not scheduled until April 1996.
- o Centralizing travel services in one center was expected to eliminate duplication and gain volume discounts at an estimated savings of \$152,000 annually. Again, implementation was not scheduled until April 1996.
- o Another cost reduction item identified was reducing the number of and attendance at meetings. Meeting attendance was usually large with one organization or function being represented by several people (an estimated average of 12 people attend each meeting). This attendance is costly to the project particularly in terms of travel and manpower. The estimated annual cost savings for a 20 percent reduction of meetings and attendance would be \$1.6 million. While the study team considered the recommendation easy to implement, it was not scheduled for implementation until May 1994.

In addition, management identified an additional 46 action items as having potential for savings. However, these items were not studied in enough detail to obtain approval and subsequent implementation. The items dealt with the administrative activities in the Project Office. Two examples were reducing participant secretarial costs by creating secretarial pools and

the consolidation of mailrooms, which each of the participants had in operation. These two actions, as well as the remaining 44 suggestions, needed further study.

The Project Office also initiated an effort to characterize overhead costs to identify those most susceptible to reduction. In the past, the oversight activities characterized all project costs that do not relate directly to scientific or technical work as overhead costs. Under this characterization, overhead costs were running over 50 percent of project costs. Management determined that many of the so-called "overhead" activities were just as critical to the project's success as the scientific and technical site work, and some are required by laws or regulations. For example, expenditures in this category included quality assurance, environmental safety and health and licensing. The Project Office's analysis shows that cost reductions in some of these areas, which were traditionally characterized as overhead, may be difficult to realize.

REASONS FOR DELAYS IN COMPLETING COST REDUCTION ACTIONS

The reason that more progress was not made on implementing the cost reduction studies was that the Project Office had not placed a high enough priority on this activity. It had not dedicated sufficient Federal and contractor personnel to enable the timely completion of cost reduction studies and subsequent implementation of approved recommendations. Despite the potential savings benefits, cost reduction efforts were assigned to personnel only as secondary duties. According to management officials, the 46 areas that were identified were not pursued for various reasons including lack of time to fully develop cost reduction candidates; or, the length of time it would take to implement action. Higher priority and increased management emphasis was needed to expedite implementation of cost reduction actions.

POTENTIAL IMPACT OF DELAYS

Maintaining a high overhead structure is costly and potentially slows the progress of the project. In the absence of full funding, implementing cost reduction initiatives has become increasingly more important to the success of the project. By not implementing the actions identified in the cost reduction study, in a timely manner, the Project Office is not taking advantage of opportunities to lower overhead and reduce cost.

PART III

MANAGEMENT AND AUDITOR COMMENTS

The Director, Office of Civilian Radioactive Waste Management, concurred with the report findings and recommendations. The Office is developing a program-wide strategic plan that recognizes funding constraints, and it has implemented a reorganization of the management structure at the Yucca Mountain Project Office. In addition to the details provided in Part II of the report, management provided the following specific responses to the report recommendations.

Finding 1 - Project Procurement Efforts

RECOMMENDATIONS

We recommend that the Director, Office of Civilian Radioactive Waste Management, in coordination with the appropriate Departmental Headquarters elements, direct the Project Office staff to:

1. Provide funds directly to Departmental laboratories and universities that perform Yucca Mountain subcontract work for other Departmental laboratories and the U.S. Geological Survey.
2. Implement centralized procurement procedures at a Federal procurement office for project participants where practical.
3. Examine the feasibility of consolidating present multiple subcontracts at different locations for common functions. These procurements should be in the form of single contracts, competitively bid, with provisions for service at necessary locations.
4. Clearly define roles and responsibilities of participants to ensure that future charges to the project are appropriate and well documented.

Management Comments. Management concurred in the recommendations and initiated action to provide funds directly to Departmental laboratories and universities. This will be done by providing technical direction through existing contracts and more direct use of financial plans. The specifics of implementing the strategy were being analyzed.

Management also stated that the feasibility of centralized procurement functions at the Project Office, the Nevada Operations Office, or another Federal entity was being evaluated. The Waste Management Office is currently performing a review of all project prime contractor/participant buying activities for Fiscal Year 1993. The review is intended to elicit areas where funding processes can be streamlined and procurement practices consolidated to provide more efficiency. The review was initiated in mid-March 1994 and all participants should be visited prior to the end of May. It is anticipated that the resulting recommendations which are determined to be cost effective and contractually proper will be implemented. Management stated that significant savings are expected from implementation of all the recommendations associated with finding 1, not just from the review.

Plans for consolidation of subcontracts, where practicable, were being developed as part of the restructuring of the Project Office. Management stated that the potential for savings, especially in the case of one-time purchases such as software, with centralized purchasing, could reduce costs. However, in other cases, where such consolidation would result in Departmental contracting to obtain services not for itself, but to support a third party contractor's internal management activities that are governed by Federal regulations, consolidation may not be feasible. As part of the restructuring effort, a high priority was placed on clarifying organizational roles and responsibilities as well as making changes that enable Federal leadership to exercise greater control and make participants more responsible and accountable for their work.

Auditor Comments. Management actions are considered responsive to our recommendations. As stated in the report, the potential for savings in overhead fees is dependent upon effective management action.

Finding 2 - Management and Operating Contractor Structure

RECOMMENDATIONS

We recommend that the Director, Office of Civilian Radioactive Waste Management:

1. As part of the management and operating contractor performance assessment, reevaluate the contractor's responsibility for management and integration of project work.
2. Consider making the Project Office responsible for management and integration of the project, which would include:

- a. Having all prime contractors/participants report directly to the Project Office for management, direction, and control.
- b. Ensuring that the Project Office is appropriately staffed and funded to carry out the management and integration function.

Management Comments. Management concurred with the recommendations and stated that the Project Office is and has been responsible for management and integration of the project. Headquarters retains responsibility for integration of the various program elements. All participants at the Project level report to the Project Office for technical direction. However, contractual authority is retained by the cognizant DOE office that awarded and administers each contract. Within the current DOE structure, this is the most cost-effective way to obtain the technical expertise required to support the Project Office. Management agreements assure that the Project Office has adequate technical and administrative control. Management also advised that since the conclusion of the audit, several significant management actions have been taken or are underway that should be noted. These management actions included:

- Initiating an interdisciplinary working group that includes Headquarters and Project Office representatives to evaluate the 3-year performance of the M&O, as provided for in the contract. In order to ensure that every important aspect of each area is thoroughly examined, a uniform, structured approach is being employed. The working group's report will be used by the Director, Waste Management Office, to determine what changes to the M&O's role, if any, should be made in the future. The Director has committed to a rationalization of the program's contractor arrangement by December 1994.
- Restructuring the Project Office to delegate authority and responsibility to Assistant Managers and to create a separate project management organization. The Assistant Managers have the responsibility and command the authority to plan for and systematically implement the business of the project which will result in more efficient operations. All Project participants will report to the Project Management Organization for management and direction. Departmental employees will make all decisions on contractor direction. There is explicit separation of functions. This project management organization articulates, plans, facilitates appropriate resource allocation, and helps ensure the implementation of the project's collective vision and goals.

Auditor Comments. Management actions are considered responsive to our recommendations. Several management actions have been taken or are underway since the conclusion of our audit.

Finding 3 - Overhead Reduction Effort

RECOMMENDATION

We recommend that the Director, Office of Civilian Radioactive Waste Management, direct the Project Office to: (1) implement the 30 identified potential cost reduction items; (2) complete the study of the remaining 46 items that have potential for savings; and (3) implement additional cost reduction items as they are identified.

Management Comments. Management concurred in the recommendations but stated that many of the identified potential cost reduction actions recommended were beyond the control of the Waste Management Program and would require regulatory or legislative changes. Management advised that the following actions were taken or initiated:

- A Cost Reduction Steering Committee working directly with the Deputy Project Manager was formed to complete cost reduction studies and to properly implement the recommended actions. The Committee, which has representatives from each participant, is facilitated by the M&O contractor, to serve as a follow-on to an earlier cost reduction study performed in Fiscal Year 1993. The Committee has identified eight (8) areas from the earlier study believed to have the potential for significant savings. Action teams were formed for each area and were directed to conduct a more detailed investigation and recommend implementation actions, if deemed appropriate.
- Other cost reduction initiatives are proceeding under the direction of the Department. For example, a number of value engineering studies were completed over the last several months, the results of which have been implemented with cost savings of \$3.7 million related to the Exploratory Studies Facility.
- Another cost reduction initiative is the infrastructure reduction assessment that has the objective of reducing infrastructure costs and streamlining the processes involved in conducting work in the field. Efforts to date have resulted in a recommendation that the Department consolidate three procedures into one and simplify the work authorization process.

Auditor Comments. We recognize that the Yucca Mountain Project is a significant scientific challenge and agree that, in some cases, regulatory and legislative changes may be required to minimize costs. Management planned actions are considered responsive to our recommendations.

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