DOE/IG-0424

AUDIT REPORT

ARCHITECT AND ENGINEERING COSTS AT LOS ALAMOS AND SANDIA NATIONAL LABORATORIES

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

AUGUST 1998

August 7, 1998

MEMORANDUM FOR THE ACTING SECRETARY

FROM: Gregory H. Friedman
Acting Inspector General

SUBJECT: INFORMATION: Audit Report on "Architect and Engineering Costs at Los Alamos and Sandia National Laboratories"

BACKGROUND

The 1993 National Performance Review Report recommended performance measurement and benchmarking against industry standards as tools to help improve Government operations. This recommendation was one of the bases for the Department's development of its *Improvement Plan for Reducing Architect-Engineering Costs*. This plan directed operations offices to manage to a standard architect and engineering (A-E) cost as a percentage of construction. Based on this initiative, the objective of our audit was to determine whether A-E costs at Los Alamos National Laboratory (Los Alamos) and Sandia National Laboratories (Sandia) were reasonable in comparison with industry standards.

RESULTS OF AUDIT

After adjusting published industry standards to accommodate special design requirements associated with Department of Energy projects, we found that Sandia's A-E costs were reasonable in relation to these standards but that Los Alamos' costs were not. In fact, A-E costs for the Los Alamos projects included in our review were 65 percent, or $2.5 million, over the adjusted standard. Los Alamos incurred these high costs because controls and performance measures were inadequate. If these controls and performance measures are not improved, we estimate that $8 million will be spent in excess of the adjusted industry standards on projects planned for funding at Los Alamos over the next three years. We recommended that the Albuquerque Operations Office require Los Alamos to (1) establish performance measures for A-E costs as a percentage of construction with an expected level of performance and weight for performance evaluation purposes and (2) award contracts for A-E services (including design orders) competitiely based on technical competence and price.

MANAGEMENT REACTION

The Albuquerque Operations Office agreed with our finding and recommendations. The Los Alamos Area Office has been tasked to generate a corrective action plan to address the recommendations.

Attachment

cc: Deputy Secretary
Under Secretary

ARCHITECT AND ENGINEERING COSTS AT LOS ALAMOS AND SANDIA NATIONAL LABORATORIES

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OVERVIEW

INTRODUCTION AND OBJECTIVE

A number of initiatives include focusing on the need to establish objective goals and measuring performance against those goals. The Government Performance and Results Act of 1993 stated that goals should be set by agencies, results should be measured against those goals, and agencies should be held accountable for achieving results. The *Improvement Plan for Reducing Architect-Engineering Costs* issued by the Department of Energy (DOE) to its operations offices in 1993 recognized the need for a standard of performance. It required operations offices to implement a standard architect-engineering (A-E) cost as a percentage of construction on projects.

In addition to these initiatives, the Office of Inspector General (OIG) has issued three audit reports in the last several years that identified problems with high A-E costs at DOE's facilities. In September of 1990, the OIG issued report *Departmentwide Audit of Architect and Engineering Design Costs* (DOE/IG-0289) which concluded that A-E costs at six locations averaged more than twice that of industry on comparable projects. In July of 1992, the OIG issued report *Department of Energy's Superconducting Super Collider (SSC) Conventional Construction Program* (DOE/IG-0313) that stated costs for designing certain facilities at the SSC were running at least twice as much as planned. Last, in March of 1996, the OIG issued report *Audit of Architect and Engineering Costs at the Idaho National Engineering Laboratory* (DOE/IG-0387) that found A-E costs for 65 conventional construction projects to be $5.8 million higher than comparable industry standards.

In light of the initiatives and prior OIG audits, the objective of our audit was to determine whether A-E costs at Los Alamos National Laboratory (Los Alamos) and Sandia National Laboratories (Sandia) were reasonable in comparison to industry standards that were adjusted upward to accommodate additional design requirements associated with DOE projects.

CONCLUSIONS AND OBSERVATIONS

We found that Sandia's A-E costs were reasonable in comparison with the adjusted industry standards and Los Alamos' costs were not. Although Albuquerque Operations Office (Albuquerque) did not give either laboratory a standard of performance, Sandia's controls over A-E costs, including competition among firms for A-E procurements, kept its performance at a level comparable to adjusted standards. Los Alamos' A-E costs were 65 percent, or $2.5 million, over the adjusted standards for the seven projects reviewed. This occurred at Los Alamos because

Alamos because cost controls and performance meausres were inadequate and ineffective. If controls and performance measures are not improved at Los Alamos, DOE could spend as much as $8 million in excess of adjusted industry standards on projects planned there for the next three years.

In our opinion, the matters discussed in this report represent material internal control weaknesses within DOE that should be considered when preparing the yearend assurance memorandum on internal controls.

/s/

Office of Inspector General

COSTS COMPARED TO INDUSTRY STANDARDS

Adjusted Industry Standards Used

To determine the reasonableness of A-E costs, we compared line item projects at Los Alamos and Sandia to industry benchmarks published in *Building Construction Cost Data* by R.S. Means Company (Means), a leading provider of construction cost information. This publication provides standard A-E costs as a percentage of construction for various types of projects. For example, a new $5 million municipal building has a standard of 6.4 percent while a new $10 million laboratory or research facility has a standard A-E to construction ratio of 7.8 percent. If the project is an alteration or modification to an existing facility, Means increases the standard ratio by 50 percent for the first $500,000 of construction and 25 percent for the amount of construction over $500,000. Thus, if a laboratory or research facility was being altered or renovated by $10 million, the standard would rise from 7.8 percent to 9.85 percent.

We adjusted the Means standards upward by a factor of 25 percent to be consistent with the 1990 OIG report *Departmentwide Audit of Architect and Engineering Design Costs* and to accommodate special requirements related to DOE projects. These requirements include additional security associated with hazardous materials, additional worker safety measures, and more detailed design requirements. When we applied the adjusted standards to three projects at Sandia, we found that the A-E costs compared favorably even though two of the projects involved highly detailed designs. One of these was a Nonnuclear Reconfiguration project for processing hazardous material used in nuclear weapons. Another was a highly secure facility designed to provide large areas for performing classified work. Based on this favorable comparison between our adjusted standards and Sandia's A-E costs, we concluded that Sandia's A-E costs were reasonable.

Los Alamos A-E Costs Not Reasonable

Although Sandia's A-E costs compared favorably with the adjusted standards, Los Alamos' A-E costs averaged 65 percent over the standards for the seven projects reviewed. While A-E costs for two of the seven projects reviewed were below the adjusted standards, the A-E costs for the other five projects were higher, as shown in the following table. A-E costs in the table include direct costs but exclude Los Alamos' oversight costs.

COMPARISON OF LOS ALAMOS
A-E COSTS TO STANDARDS
(In Thousands)

Project	Actual A/E Cost	Adjusted Standard A/E Cost	Difference
ATLAS	$750	$486	$264
Beryllium Technology	1,041	827	214
Fire Protection	653	409	244
High Power Detonators	447	128	319
Neutron Tube Target	2,470	792	1678
Pit Support	346	395	(49)
Water Well Replacements	765	887	(122)
TOTALS	$6,472	$3,924	$2,548

As the table shows, the A-E costs for five projects exceeded the adjusted standards in amounts ranging from $214,000 for the Beryllium Technology Project to $1.68 million for the Neutron Tube Target Project.

Importance of Benchmarking

Throughout Government, the importance of using benchmarks to measure performance and assess results has been noted. The 1993 National Performance Review encouraged benchmarking an agency's performance against standards used by private industry and other Government agencies. DOE Order 430.1, *Life Cycle Asset Management* requires that the planning, design, construction, and management of physical assets incorporate industry standards and performance objectives. This Order is to be implemented on a site-by-site basis through the establishment of site-specific performance expectations and measurements.

DOE acknowledged a problem with high A-E costs in response to the prior Departmentwide OIG audit of A-E costs and in 1993 issued the *Improvement Plan for Reducing Architect-Engineering Costs*. In this plan, DOE directed operations offices to manage to a standard A-E cost as a percentage of construction. Any projects that might exceed the standard were to have advance approval. The plan also required that operations offices use competition in procurement of A-E services. This plan required a commitment from the operations offices to oversee its implementation.

Controls Over Design Costs

In spite of the importance of benchmarking, Albuquerque and Los Alamos had not measured performance against benchmarks. Although Los Alamos implemented a performance measure in 1996 that required it to "track and trend" A-E costs as a percentage of construction, the measure was given zero weight for performance evaluation purposes and a target percentage was not established. In 1997, the measure was still in effect, but the percentage was not tracked because Albuquerque and Los Alamos did not agree on which projects should be tracked. A performance measure that does not involve weight for performance evaluation purposes, that does not have an expected level of performance, and that is not tracked achieves no tangible result.

Albuquerque set aside and did not use the *Improvement Plan for Reducing Architect-Engineering Costs*. Albuquerque officials told us that the plan was not policy and did not have to be followed. Further, they stated that under DOE Order 430.1, *Life Cycle Asset Management*, Albuquerque is required to rely on its "Best in Class" contractors to use best industry practices. Although we agree that it is desirable to rely on contractor expertise, such reliance does not preclude the need for benchmarking and measuring performance.

Difference in Procurement Methods

A comparison of methods and approaches to A-E procurement between Los Alamos and Sandia revealed an additional reason for the higher costs at Los Alamos. Los Alamos, unlike Sandia, did not use competition in selecting A-E contractors for the seven projects reviewed. Los Alamos had negotiated labor rate contracts with four prequalified A-E contractors. A Los Alamos project manager could then choose any one of these prequalified A-E firms to design a project. The project manager and staff negotiated the hours required to perform the design with the selected A-E contractor and a design order was prepared. There was no competition among the qualified A-E contractors for design of these projects. Thus, it is questionable whether the Government is getting the best cost. In addition, the door is opened for possible abuses because the project managers work directly with the A-E contractors and have the ability to directly select the contractor they want. Therefore, the justification for selection of an A-E firm may not be objective.

Potential Savings on A-E Costs

Based on the results of this audit, we believe that better controls are needed over A-E costs on future projects and that costs can be avoided on planned projects. For example, eight line item projects planned for funding in the next three years have estimated total project costs of $372.6 million. Based on our estimate of $107.3 million of construction costs, Los Alamos could spend about $8 million in excess of the adjusted industry standards on these projects if controls are not improved.

RECOMMENDATIONS

We recommend that the Manager, Albuquerque Operations Office, together with the Los Alamos Area Office and Los Alamos, take aggressive action to control the excessive cost of A-E services. Specifically, Albuquerque should require Los Alamos to:

1. establish performance measures to track A-E costs as a percentage of construction with an expected level of performance and weight for performance evaluation purposes; and

2. award contracts for A-E services (including design orders) competitively based on technical competence and price.

MANAGEMENT REACTION

Albuquerque concurred with the recommendations and stated that the Los Alamos Area Office had been tasked with development of a formal action plan related to the two recommendations. Therefore, neither specific corrective actions nor associated target dates were provided.

In responding to the first recommendation, Albuquerque stated that a "track-and-trend" performance measure for A-E costs is incorporated in the Los Alamos contract's Fiscal Year 1999 performance measures, and that it will work with Los Alamos to determine if sufficient data exists from the earlier and current "track-and-trend" efforts to establish sound goals. If it is determined that sufficient data does not exist, Albuquerque stated that it would continue the "track-and-trend" effort and any other benchmarking opportunities would be pursued to develop a sufficient data base to allow the establishment of a weighted measure.

In responding to the second recommendation, Albuquerque stated that Los Alamos is preparing new procedures for A-E selection that will incorporate technical competence and price.

AUDITOR COMMENTS

Management's overall response is positive in recognizing the need to better control A-E costs even though specific actions are still pending. If the Los Alamos Area Office action plan clearly addresses the recommendations and establishes reasonable target dates for completion, the concerns raised in the report will be adequately addressed.

Appendix

SCOPE

The audit was performed at Albuquerque, Los Alamos, and Sandia from September 23, 1997 to April 8, 1998. The following table shows the nine Los Alamos and three Sandia projects reviewed with their associated total project cost estimates.

TOTAL PROJECT COST ESTIMATES

PROJECT	SANDIA	LOS ALAMOS
ATLAS		$48,500,000
Beryllium Technology		12,941,000
DARHT		114,760,001
Fire Protection		17,460,000
HE Wastewater Treatment		6,124,000
High Power Detonator		4,413,000
Neutron Tube Target Loading		15,126,000
Pit Support		3,337,000
Water Well Replacement		17,200,000
CNSAC	$35,455,000	
Neutron Generator	48,911,000	
Technology Support Center	33,327,000	
TOTALS	$117,693,000	$239,861,001

Although we initially reviewed nine projects at Los Alamos, we later excluded the DARHT and the HE Wastewater Treatment Facilities from the report. These projects' high A-E costs were caused by events beyond Los Alamos' control, or a small amount of redesign drastically reduced the construction cost which had inflated the A-E percentage of construction.

METHODOLOGY

To accomplish the audit objective, we:

- determined the universe of open active line item projects;
- selected all projects from the list that followed the normal A-E procurement process, that is, the projects were not designed and built by one contractor;
- determined the A-E cost for the selected projects as a percentage of construction;

- compared the A-E percentage of construction cost to the appropriate Means industry standard adjusted for DOE's special requirements;

- obtained and reviewed the project history and procurement process for projects with high percentages compared to standards to determine why costs were high; and

- calculated the projected A-E costs that may be spent in excess of adjusted industry standards in the future.

The audit was conducted in accordance with generally accepted Government auditing standards for performance audits and included 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. We performed limited testing of the reliability of computer-processed data in the cost reports used in our audit to ensure the cost reports represented actual expenditures.

Albuquerque waived the exit conference.

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