

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL

AUDIT OF ENVIRONMENTAL MONITORING AND HEALTH PHYSICS
LABORATORIES AT THE SAVANNAH RIVER SITE

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OFFICE OF AUDIT SERVICES

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SUMMARY

The Environmental Monitoring and Health Physics Laboratories at the Department of Energy's (Department) Savannah River Site are over 40 years old and are approaching the end of their useful lives. The managing and operating contractor, Westinghouse Savannah River Company (Westinghouse), and the Savannah River Operations Office (Operations Office) proposed to build two new facilities to replace them. We conducted this audit to determine whether the construction of new laboratories was the most cost-effective alternative to accomplish the site's environmental monitoring and health physics missions.

Westinghouse did not perform life-cycle cost analyses or properly reassess construction projects and could not ensure that the construction of new laboratories was the most cost-effective alternative available to accomplish the site's environmental monitoring and health physics missions. Department and Federal regulations require that life-cycle cost analyses be prepared to compare the costs and benefits of various project alternatives. However, the Operations Office approved plans to construct these laboratories without ensuring that Westinghouse had properly performed the required analyses. As a result, the Department planned to spend at least \$30 million to build laboratories that may not be needed. Based on current cost and pricing data, we determined that the Department could save \$25 million over the life of the project by contracting the environmental monitoring activities to outside vendors.

We recommended that the Department (1) direct Westinghouse to perform cost and benefit analyses to determine whether constructing the new environmental monitoring and health physics laboratories is more beneficial than contracting out those activities, and (2) develop procedures to ensure that future validation of construction projects at the Savannah River Site include a thorough evaluation of all viable alternatives.

Management did not concur with the finding and with Recommendation 1; however, management did concur with Recommendation 2. Management stated that a plan to combine the two laboratories into one represents the most cost effective alternative available. In addition, most of the environmental monitoring workload was already being contracted to commercial laboratories, and it was not feasible to contract for the remainder of that workload or for any of the bioassay analyses because commercial laboratories were either not qualified or could not meet turnaround requirements. However, management did not provide any documented studies or requests for proposals to support its position.

(Signed)
Office of Inspector General

PART I

APPROACH AND OVERVIEW

INTRODUCTION

Laboratory facilities currently used in performing the Savannah River Site's (SRS) environmental monitoring and health physics missions are at the end of their useful lives. Congress approved two separate line-item projects, a \$30 million Environmental Monitoring Laboratory (EML) and a \$17 million Health Physics Site Support Facility (HPF), to replace them. We conducted this audit to determine whether the construction of new laboratories was the most cost-effective alternative available to accomplish SRS's environmental monitoring and health physics missions.

SCOPE AND METHODOLOGY

The audit was performed from November 13, 1996, through July 2, 1997, at the SRS in Aiken, South Carolina. To accomplish our objective, we:

- Toured existing laboratory facilities;
- Reviewed the construction planning and approval process;
- Evaluated the budget validation and construction project documentation;
- Interviewed key project management officials; and
- Reviewed previous audit reports related to construction and project management.

The audit was performed 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 audit objective. Accordingly, we assessed significant internal controls related to the Department of Energy's (Department) construction management practices. Because our review was limited, it would not necessarily have identified all internal control deficiencies that may have existed. Also, we did not conduct a reliability assessment of computer-processed data because no computer-processed data was used during the audit.

In our opinion, the matters discussed in this report identified material internal control weaknesses within the Department that should be considered when preparing the yearend assurance memorandum. Internal control weaknesses identified in the report are discussed in Part II.

Savannah River Operations Office management waived an exit conference.

BACKGROUND

The SRS, located near Aiken, South Carolina, is owned by the Department and is managed and operated by the Westinghouse Savannah River Company (Westinghouse). Over the past 40 years, SRS used nuclear reactors to fulfill its primary mission of producing tritium and other radioisotopes for use in defense related activities. In August 1988, the Department shut down the last of the SRS's three operating reactors and did not anticipate restarting any of these reactors. Subsequently, SRS's primary mission was changed from producing nuclear materials to managing the waste products generated during the era of weapons production and restoring the environment to a level acceptable under current laws and regulations. Environmental monitoring and health physics activities are an integral part of this new mission.

Laboratory facilities currently used to perform the environmental monitoring and health physics missions are over 40 years old and approaching the end of their useful lives. The proposed EML would provide 54,000 square feet of laboratory, computer, storage, and administrative space at a total cost of \$30 million. The EML mission includes programs for sampling and analyzing air, water, flora, and fauna from the local area to determine levels of radioactive and non-radioactive pollutants. The \$17 million HPF would be a radiobioassay laboratory and external dosimeter facility of approximately 25,000 square feet, with another 10,000-square-foot partial basement to house wash-down facilities for the hood exhaust duct and mechanical fans. The proposed HPF would provide the SRS an up-to-date facility with the capability to evaluate and document personnel exposure to radioactive hazards. These two projects are related in that they would share a waste water facility which is scheduled to be built as part of the overall EML project and then connected to the HPF.

The Department is going through a period of rapid transformation with changes in requirements for facilities to support program responsibilities. Priorities have changed from weapons production to reducing stockpiles, dismantling weapons, ensuring the continued viability of the enduring stockpile and disposing of waste. These new priorities come at a time of increasing attention to cutting the cost and size of Government. Ensuring that ongoing or planned construction projects will meet mission needs becomes more important because of these changes. A specific objective of the planning process is to ensure that construction projects are needed to support the mission of the organization and are cost-effective. In initially establishing the mission need and developing the conceptual design for the project, the planning process requires program managers to identify and evaluate alternatives to satisfy the identified need.

PRIOR AUDIT REPORTS

In November 1996, the Office of Inspector General (OIG) issued Report DOE/IG-0398, *Special Report on the Audit of the Management of Department of Energy Construction Projects*. The audit summarized the two primary themes associated with six previous OIG reports that dealt with the Department's construction process. The report illustrated that construction plans were not always reassessed when mission needs changed and that there were several cases where projects were not needed or alternatives to construction were not fully evaluated prior to proceeding with the construction of new facilities.

PART II

FINDING AND RECOMMENDATIONS

Inadequate Alternative Evaluation

FINDING

The Department is responsible for examining all options before acquiring new facilities to ensure that funds and existing facilities are used effectively. However, alternatives to on-site construction were not fully evaluated before Westinghouse proposed and the Savannah River Operations Office (Operations Office) approved construction of new environmental monitoring and health physics laboratories. Specifically, Westinghouse did not perform life-cycle cost analyses and periodic reassessments to determine the most cost-effective approach to accomplishing its environmental monitoring and health physics missions. The Operations Office approved plans to construct these laboratories without ensuring that Westinghouse had properly performed the required analyses. As a result, the Department planned to spend at least \$30 million to build laboratories that may not be needed.

RECOMMENDATIONS

We recommend that the Manager, Savannah River Operations Office:

1. Direct Westinghouse to perform cost and benefit analyses to determine whether constructing the new environmental monitoring and health physics laboratories is more beneficial than contracting out those activities; and
2. Develop procedures to ensure that future validation of construction projects at the Savannah River Site include a thorough evaluation of all viable alternatives.

MANAGEMENT REACTION

Management did not agree with the finding and Recommendation 1; however, management did concur with Recommendation 2. Following the completion of the audit, management decided to combine the two laboratories into one new facility. Management stated that the new facility was the most cost effective alternative available. Management also stated that most of the EML sample analyses were already being contracted to commercial laboratories, and it was not feasible to contract for the remainder of the EML workload or for any of the bioassay analyses because commercial laboratories were either not qualified or could not meet turnaround requirements. Management's comments are summarized and addressed in Part III.

DETAILS OF FINDING

REQUIREMENTS FOR PROJECT EVALUATIONS AND REASSESSMENTS

Under management streamlining of the construction planning process, Departmental Order 4700.1, *Project Management System*, was replaced by Departmental Order 430.1, *Life Cycle Asset Management*. Both orders require the program manager and the project manager to (1) verify that planned construction is necessary to meet a valid mission need; (2) independently identify and consistently evaluate all competing project alternatives; and (3) reassess the need for planned construction projects when significant events occur, such as a mission change, program redirection, or program downsizing.

Also, Office of Management and Budget (OMB) Circulars A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, and A-131, *Value Engineering*, prescribe methods to ensure that the decisions relative to acquisitions of facilities are based on the most cost-effective alternatives available. The circulars imply that proper cost and benefit analyses should include determining the life-cycle costs of each alternative and discounting them to include the time value of money.

INADEQUATE ALTERNATIVE EVALUATIONS

Westinghouse's cost and benefit comparisons for the proposed construction projects did not include all life-cycle costs nor were they periodically revised to assess other alternatives when conditions affecting workload changed. To perform a proper evaluation of each practical alternative to constructing the EML and HPF on site, Westinghouse should have determined all relevant costs associated with acquiring, owning, operating, maintaining, and disposing of the facilities. Upon determining life cycle costs, Westinghouse should have applied a discount rate to reflect the time value of money. Also, periodic project reassessments should include reevaluation of alternatives especially when workload conditions change. Although these projects went through the Departmental and Operations Office's approval process, eventually becoming "line-item" projects, Westinghouse did not perform cost and benefit comparisons that took into account the life-cycle costs of each alternative.

EML

Westinghouse provided the Operations Office with data that understated the construction and operating costs of the EML and overstated the costs of contracting with outside vendors. For example, in comparing the costs of constructing a new EML to contracting those activities to outside vendors, Westinghouse did not include the costs of out-year equipment or the eventual disposal of the new facilities. In addition, Westinghouse did not use the Government discount rate to account for the cost of money. Instead, Westinghouse estimated that the annual laboratory cost would be about \$5 million based on historical direct costs and estimates of future overhead and facility costs. If Westinghouse had performed proper life-cycle cost analyses, the annual cost for building and operating the EML would have been greater.

Besides understating the cost of the new EML facility, Westinghouse overstated the cost of contracting out EML activities by not up-dating workload and pricing data. Westinghouse estimated that it would cost about \$5.6 million to contract its current EML workload to outside vendors based on workload and pricing data obtained in August 1993. Throughout the Operations Office's annual validation process, Westinghouse used the same workload and pricing data it used in August 1993 even though it could have been up-dated. We determined that the workload requirements and the price of most testing had decreased over time. Our analysis of 1996 workload and 1997 pricing data, provided by Westinghouse, showed that the annual cost of testing decreased by about \$1.9 million from \$5.6 million to \$3.7 million. Table 1 shows a comparison of estimated costs using 1993 and current data.

Table 1
Comparison of Costs Using 1993 and Current Data

<u>Sample Type</u>				<u>Cost Using Current Data</u>		
	<u>Quantity</u>	<u>Price</u>	<u>Total</u>	<u>Quantity</u>	<u>Price</u>	<u>Total</u>
Gamma Analyses	8,752	\$128	\$1,120,256	8,130	\$ 95	\$ 772,350
Gross Alpha/Beta	10,090	152	1,533,680	8,596	67	575,932
Tritium	7,681	60	460,860	6,202	52	322,504
Plutonium	788	128	100,864	585	147	85,995
Strontium-89, 90	1,003	212	212,636	0	190	0
Total Strontium	3,042	106	322,452	2,554	117	298,818
Americium/Curium	318	182	57,876	1,064	242	257,488
Uranium/Plutonium	1,417	256	362,752	1,396	271	378,316
Promethium-147	238	130	30,940	159	103	16,377
Sulfur-35/ Phosphorus-32	440	130	<u>57,200</u>	0	260	<u>0</u>
Total Annual Testing			\$4,259,516			\$2,707,780
Add 20 Percent for Quality Control			851,903			541,556
Sample Administration			<u>500,000</u>			<u>500,000</u>
Total			<u>\$5,611,419</u>			<u>\$3,749,336</u>

Contrary to Westinghouse's cost justification, the annual cost of operating a new EML on-site would be more than \$5 million while the annual cost of contracting out the current EML workload would be \$3.7 million. Using workload and costing data provided by Westinghouse and discounting for the time value of money, we calculated that the Department would save at least \$25 million over the 40-year life of the project by contracting EML activities to off-site vendors.

HPF

Westinghouse did not perform a life-cycle cost analysis that demonstrated building a new HPF on-site was more cost effective than contracting with outside vendors. The HPF Conceptual Design Report only contained a narrative that stated contracting out was more expensive and less attractive due to time constraints and the personal nature of the testing results. Neither Westinghouse nor the Operations Office could provide adequate quantifiable documentation to support the claim that building a new HPF was less expensive than contracting out. Moreover, as time passed, the HPF workload decreased and the current workload requirements were never checked against current prices for contracting out.

Project management officials performed some analyses to compare on-site testing versus off-site testing for the HPF. However, as with the EML, there was no analysis of the life-cycle cost of the new facility, no use of a discount rate, and no meaningful examination of contracting with off-site laboratories. Management acknowledged that a complete cost and benefit analysis comparing the cost of building a new HPF versus contracting with off-site vendors had not been performed. In addition, management acknowledged that circumstances had changed since the HPF was first submitted as a line-item project.

CONSOLIDATED FACILITY

Following the audit, the Operations Office determined that it could reduce construction costs by about \$17 million if it consolidated the EML and HPF into a single facility. Management stated that it would proceed with plans to consolidate the laboratories and seek the approval of Departmental Headquarters, the Office of Management and Budget, and Congress.

We agree that the Department could significantly reduce construction costs by consolidating the EML and HPF into a single laboratory rather than constructing two separate facilities. However, management did not perform a cost and benefit analysis using life-cycle costs to determine whether construction of the new facility would be more beneficial than contracting all or a portion of the effort to off-site vendors. The Operations Office merely compared the cost of constructing a single facility to the cost of constructing two separate facilities. Without determining the life-cycle cost of the newly combined laboratory, the Operations Office cannot be certain that this approach is more cost effective than contracting with off-site laboratories.

PROJECT VALIDATION

This condition occurred because the Operations Office initially validated the two laboratory projects in 1993 and 1994 without requiring Westinghouse to perform life-cycle cost analyses. Also, SRO revalidated them in subsequent years without ensuring that Westinghouse had properly evaluated each alternative. Operations Office management stated that the validation process did not require that alternative evaluations be addressed. The validation merely concluded that the chosen alternative was feasible and ready for initial design work. Although a project normally went through the validation process several times, the Operations Office did not require each alternative to be thoroughly evaluated.

POTENTIAL COSTS

As a result, the Department plans to spend at least \$30 million to construct new laboratory facilities that may not be needed. Based on our review of workload and costing information provided by Westinghouse, the Department could save up to \$25 million over the life of the project by contracting EML activities to off-site vendors. We did not perform a similar life cycle analysis of the HPF because Westinghouse was unable to provide sufficient cost data to allow us to perform one.

PART III

MANAGEMENT AND AUDITOR COMMENTS

Management did not concur with the audit finding and the recommendation that Westinghouse be required to perform cost and benefit analyses to evaluate all viable alternatives for the construction of the new laboratories. Management did concur, however, with the recommendation that it develop procedures to ensure that all viable alternatives are thoroughly evaluated for future construction projects. Management's specific comments are summarized and addressed below.

Recommendation 1: Direct Westinghouse to perform cost and benefit analyses to determine whether constructing the new environmental monitoring and health physics laboratories is more beneficial than contracting out those activities.

Management Comments. Management did not concur with the recommendation, stating that the plan to combine the two laboratories into one was the most cost-effective approach available. In addition, management stated that 85 to 90 percent of the EML sample analyses are already contracted out, and it is not feasible to contract out the remaining workload. Management stated that the analyses must be performed on-site due to the quick response times required to meet the demands of environmental regulators and Westinghouse's subcontractors and to perform specialized analyses. The Operations Office considered outsourcing the HPF workload, but determined that acceptable turnaround times for incident or job related bioassay analyses could not be achieved under any known long-term agreement with an existing commercial laboratory. Also, management stated that the EML and HPF projects were planned in accordance with Departmental policy and were the subject of many studies, including reviews by the Office of Inspector General, the General Accounting Office, the Office of Management and Budget, and Congressional staff.

Auditor Comments. Management cannot be certain that constructing and operating the combined EML and HPF is more cost-effective than contracting out those activities because it did not perform the required life-cycle cost analysis and compare it to the life-cycle cost of contracting out. Management did not provide any documented analyses or requests for proposals to support its position that no commercial laboratories could achieve acceptable turnaround times for either the EML or HPF workload. Furthermore, documents provided by management indicated that there are commercial laboratories that can perform the EML and HPF workload, but were not considered due to perceived problems with turnaround times and quality. Also, although several internal and external reviews of the Site's construction projects were performed in recent years, the reviews were not an acceptable substitute for a life-cycle cost and benefit analysis for the construction of the EML and HPF laboratories. Finally, the new laboratory project, initiated in July 1997, falls under the authority of Department Order 430.1 which requires that a life-cycle analysis be performed prior to commencement of the project.

Recommendation 2. Develop procedures to ensure that future validation of construction projects at the Savannah River Site include a thorough evaluation of all viable alternatives.

Management Comments. Management concurred, stating that the Operations Office will assure that the current draft *Savannah River Implementation Plan for Life-Cycle Asset Management* will contain specific requirements relative to the need for evaluation of all viable alternatives.

Auditor Comments. Management's comments are partially responsive to the recommendation. Management's action will be fully responsive to the recommendation provided the draft policy requires Westinghouse to compare the life-cycle cost of each viable alternative to the life-cycle cost of the chosen alternative during the annual validation process. In addition, management should establish a target date for issuing the new policy.

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