

DOE/IG-0458

AUDIT
REPORT

IN-VITRO BIOASSAY SERVICES
AT DEPARTMENT OF ENERGY
FACILITIES



FEBRUARY 2000

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

February 15, 2000

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "In-Vitro Bioassay Services at
Department of Energy Facilities"

BACKGROUND

Federal regulations require that routine bioassay programs be established for workers likely to receive internal radiation doses. Bioassay programs determine kinds, quantities, or concentrations, and, in some cases, locations of radioactive material in the body. The Department of Energy's (Department) bioassay programs consist of two parts. In-vivo (inside the body) measurements include activities like whole-body, lung, and thyroid counting. In-vitro (outside the body) monitoring, on the other hand, includes radiochemical analyses of workers' urine and fecal samples. Our audit was limited to bioassay analyses of urine samples, which represent 98 percent of all in-vitro analyses. In Fiscal Year (FY) 1999, the Department performed about 69,500 bioassay analyses at the 7 sites reviewed at an estimated cost of \$7.7 million. The objective of this audit was to determine whether the Department's contractors obtained bioassay analyses at the lowest prices available.

RESULTS OF AUDIT

The Department's contractors did not obtain bioassay analyses at the lowest prices available. Although discounts were available under Departmentwide subcontracts, two of the Department's contractors issued their own subcontracts for bioassay analyses with rates that were higher than the Departmentwide rates. Also, three contractors paid substantially different rates for similar or identical analyses performed by the same subcontractor. These conditions occurred because the Department did not require contractors to use the Departmentwide subcontracts and consolidate requirements into a single, cost-effective basic ordering agreement. As a result, the Department incurred unnecessary costs of about \$495,000 during FYs 1998 and 1999.

Also, we could not determine if the Department obtained bioassay analyses at the lowest prices available for 74 percent of the analyses reviewed because the three in-house laboratories were not required to capture the actual cost of specific analyses performed. As a result, the Department cannot determine whether it is more cost-effective to continue performing bioassay analyses in-house or subcontract the work to commercial laboratories.

MANAGEMENT REACTION

Management agreed with the audit findings and recommendations and initiated corrective actions.

Attachment

cc: Deputy Secretary
Under Secretary

IN-VITRO BIOASSAY SERVICES AT DEPARTMENT OF ENERGY FACILITIES

TABLE OF CONTENTS

Overview

Introduction and Objective	1
Conclusions and Observations.....	3

Bioassay Subcontracts

Details of Finding	4
Recommendation and Comments	5

Departmental Laboratories

Details of Finding	7
Recommendations and Comments	8

Appendix

Scope and Methodology.....	10
----------------------------	----

OVERVIEW

INTRODUCTION AND OBJECTIVE

Title 10 of the Code of Federal Regulations, Part 835, *Occupational Radiation Protection*, requires that routine bioassay programs be established to monitor workers likely to receive internal radiation doses. The Assistant Secretary for Environment, Safety and Health has the overall responsibility for developing and maintaining policies, standards, and guidance related to radiological protection within the Department. The Department sets overall radiation exposure limits and allows each site to develop a unique bioassay program based on local conditions and preferences. In most cases, a worker receives an annual bioassay analysis.

Numerous factors affect the cost of performing bioassay analyses. One factor is the minimum detectable amount (MDA). The MDA is the smallest amount of activity that will be detected in a urine sample with a 5-percent probability of false detection while accepting a 5-percent probability of non-detection. The lower the MDA, the more costly the analysis. Other factors which affect the cost include urine volume, count time,¹ turnaround time,² and data reporting requirements.

Four of the sites reviewed subcontracted their bioassay services, while three sites performed their bioassay analyses at in-house Departmental laboratories. Kaiser-Hill Company, LLC (Kaiser-Hill), the management and integration contractor at the Rocky Flats Environmental Technology Site, subcontracted their bioassay services with two commercial laboratories. The subcontracts were modified in February 1998 to make the rates available for Departmentwide use. Pacific Northwest National Laboratory Division of Battelle Memorial Institute (PNNL), Bechtel Jacobs Company, LLC (Bechtel Jacobs), and West Valley Nuclear Services Company, Inc. (West Valley) each awarded a subcontract for their bioassay services to the same commercial laboratory. This laboratory was one of the two laboratories included in the Departmentwide subcontracts. The Oak Ridge National Laboratory (ORNL), the Y-12 Plant (Y-12), and the Savannah River Site (Savannah River) performed their bioassay analyses at in-house Departmental laboratories.

¹ Count time is the period of time a sample is placed in a counting instrument to detect and quantify radioactivity. The longer the count time, the more costly the analysis.

² Turnaround time is the elapsed time from the date the laboratory receives a sample to the date the site receives the analyzed results. The shorter the turnaround time, the more costly the analysis.

The Office of Inspector General (OIG) has issued several reports related to obtaining bioassay and environmental monitoring services. Report DOE/IG-0375, *Audit of the Department of Energy's Commercial Laboratory Quality Assurance Evaluation Program* (June 1995), concluded that Departmental contractors conducted redundant quality assurance evaluations of commercial laboratories, applied standards inconsistently, and did not effectively communicate the results of these reviews. Also, Report ER-B-98-02, *Audit of Environmental Monitoring and Health Physics Laboratories at the Savannah River Site* (October 1997), concluded that the Westinghouse Savannah River Company 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. Report ER-B-98-03, *Audit of the Union Valley Sample Preparation Facility at Oak Ridge* (November 1997), concluded that Lockheed Martin Energy Systems did not base the acquisition of the Union Valley Sample Preparation Facility on valid mission requirements, and the contractor restricted the location of the new facility to an approximate 16-square-mile area without establishing a programmatic need for the restriction.

In addition, the OIG issued a report on the use of Departmentwide subcontracts in December 1997. Report ER-B-98-05, *Audit of the Department of Energy's Contracts with Envirocare of Utah, Inc.*, concluded that the Department's contractors did not always use the most favorable rates available when disposing of contaminated waste. Although volume discounts were available under Departmentwide subcontracts, two of the Department's contractors awarded subcontracts to Envirocare of Utah (Envirocare) with rates that were higher than the Departmentwide rates. During the audit, one of the contractors reopened negotiations with Envirocare and obtained a lower rate, thereby saving the Department about \$3.2 million over 3 years. In response to this report, the Office for Environmental Management distributed a list of available Departmentwide subcontracts and rates and directed field activities to require all contractors to use the most favorable rates available to the Department.

The objective of this audit was to determine whether the Department's contractors obtained bioassay analyses at the lowest prices available.

**CONCLUSIONS AND
OBSERVATIONS**

The Department's contractors did not obtain bioassay analyses at the lowest prices available. Although discounts were available under Departmentwide subcontracts, two of the Department's contractors issued their own subcontracts for bioassay analyses with rates that were higher than the Departmentwide rates. Also, three contractors paid substantially different rates for similar or identical analyses performed by the same subcontractor. These conditions occurred because the Department did not require contractors to use the Departmentwide subcontracts and consolidate requirements into a single, cost-effective basic ordering agreement. As a result, the Department incurred unnecessary costs of about \$495,000 during FYs 1998 and 1999.

Also, we could not determine if the Department obtained bioassay analyses at the lowest prices available for 74 percent of the analyses reviewed because the three in-house laboratories were not required to capture the actual cost of specific analyses performed. As a result, the Department cannot determine whether it is more cost-effective to continue performing bioassay analyses in-house or subcontract the work to commercial laboratories.

The audit identified issues that management should consider when preparing its yearend assurance memorandum on internal controls.

(Signed)

Office of Inspector General

BIOASSAY SUBCONTRACTS

Bioassay Analyses Were Not Obtained at the Lowest Prices Available

The Department's contractors did not obtain bioassay analyses at the lowest prices available. Although discounts were available under Departmentwide subcontracts, two of the Department's contractors issued their own subcontracts for bioassay analyses with rates that were higher than the Departmentwide rates. Also, three contractors paid substantially different rates for similar or identical analyses performed by the same subcontractor.

PNNL and Bechtel Jacobs issued subcontracts with rates that were higher than those included in Departmentwide subcontracts. For example, PNNL and Bechtel Jacobs paid \$470,514 for analyses of isotopic plutonium. By using the Departmentwide subcontract, PNNL and Bechtel Jacobs could have obtained the analyses for only \$314,090. Similarly, for the analysis of isotopic uranium, Bechtel Jacobs paid \$253,188. Under the Departmentwide subcontract, Bechtel Jacobs could have obtained the analyses for only \$198,818. In both of these examples, the MDA and reporting requirements included in the Departmentwide subcontracts were identical or more stringent than those included in the PNNL and Bechtel Jacobs subcontracts.

Additionally, three contractors, PNNL, Bechtel Jacobs, and West Valley, paid substantially different rates for similar or identical analyses performed by the same subcontractor. Sixteen types of bioassay analyses were performed for the contractors but not included in the Departmentwide subcontracts. For example, the three contractors engaged the same outside firm for a bioassay analysis of A³. The subcontract price per unit ranged from \$81 for West Valley to \$177 for Bechtel Jacobs. Thus Bechtel Jacobs paid twice the cost per unit that was incurred by West Valley for the same bioassay test. In a second example, the three contractors subcontracted for a bioassay analysis of B³. Although using the same subcontractor, West Valley obtained a more favorable rate than PNNL for the second analysis. The analysis cost \$297 under the PNNL subcontract and only \$171 under the West Valley subcontract. In each of these examples, the MDA included in the West Valley subcontract was more stringent than the MDA in the PNNL and Bechtel Jacobs subcontracts.

³The specific name of the sample is not included because it is business sensitive pricing information.

Centralized Contracting Is Cost-Effective

Title 48 of the Code of Federal Regulations, Section 970.7103 states that Government contractors should apply the best in commercial purchasing practices. To this end, contractors are required to evaluate cost-effective alternatives when purchasing services.

The Department has recognized that contract costs can be reduced through centralized contracting. An Integrated Contractor Purchasing Team (ICPT) was established by the Department to aggressively pursue opportunities that leverage the Department's buying power in order to achieve the most favorable pricing available. One of the goals of the purchasing team was to develop basic ordering agreements with commercial laboratories for analytical services. The purchasing team successfully established agreements for a variety of analytical services, including environmental radiochemical analyses. However, the agreement did not address bioassay services.

Contractors Were Not Required to Use the Departmentwide Subcontracts or Consolidate Requirements

The Department incurred unnecessary bioassay costs because it did not require contractors to use the Departmentwide subcontracts and consolidate bioassay requirements into a single, cost-effective basic ordering agreement. PNNL, Bechtel Jacobs, and West Valley personnel stated that they were unaware of the rates included in the Departmentwide subcontracts. Also, the ICPT discussed the merits of establishing an agreement for bioassay services; however, it had no immediate plans to establish an agreement covering these services.

Department Incurred Unnecessary Bioassay Costs

As a result of not using Departmentwide subcontracts and not consolidating requirements, the Department incurred unnecessary costs of \$495,000 for FYs 1998 and 1999. The Department incurred \$255,000 in unnecessary costs because PNNL and Bechtel Jacobs did not use the lower rates available in Departmentwide subcontracts. An additional \$240,000 could have been avoided if the Departmentwide subcontracts had been negotiated to include four commonly used analyses and the most favorable rates were used by PNNL and Bechtel Jacobs.

RECOMMENDATION

We recommend that the Director, Office of Management Systems, Office of Procurement and Assistance Management, in conjunction with the ICPT, develop a procurement strategy to award one or more Departmentwide purchasing agreements that will assure the availability and accessibility of the fullest range possible of high quality, timely, and cost-effective bioassay services.

**MANAGEMENT
REACTION**

Management agreed with the finding and recommendation. The Office of Procurement and Assistance Management will request that the ICPT undertake an effort to award such agreement; participate in the development of the procurement strategy for the proposed award; assist in the implementation of that strategy; provide Departmentwide endorsement of the resulting agreements; and, assure that the agreements receive Departmentwide notice of their availability. It is anticipated that these agreements will be awarded by January 2001.

AUDITOR COMMENTS

We consider management's comments to be responsive to the recommendation.

DEPARTMENTAL LABORATORIES

The Cost of Analyses Performed at In-House Laboratories Could Not Be Determined

We could not determine if the Department obtained bioassay analyses at the lowest prices available for 74 percent of the analyses reviewed because the three in-house laboratories were not required to capture the actual cost of specific analyses performed. The following chart shows the cost per analysis in FY 1999 as estimated by the Departmental laboratories.

Element	Site	Cost
Uranium	ORNL	\$210
	Y-12	96
	SRS	197
Plutonium	ORNL	210
	Y-12	109
	SRS	197
Americium	ORNL	280
	Y-12	156
	SRS	197

The cost estimates vary significantly among the three laboratories because each laboratory includes different cost categories in their estimates. ORNL includes direct labor, direct materials, other indirect costs, and site overhead in its estimates. Y-12 includes direct labor, mission support costs, and site overhead, but it does not include direct materials in its estimates. In contrast, SRS estimates the same average price for all analyses based on budgetary data. Therefore, we could not perform a valid comparison between the costs of analyses performed by in-house laboratories and those performed by commercial laboratories.

Contractors Required to Study Subcontracting Services

In 1994, a Department Contract Reform Team concluded that the Department and its management and operating contractors could achieve significant savings by subcontracting some of the contractors' services. The

team recommended that studies be prepared to ensure that all services were performed at the least cost commensurate with quality results. In June 1997, the Department amended the Department of Energy Acquisition Regulation (DEAR) to require comparisons between the cost of in-house services and the cost of outsourcing. Accordingly, the Department's contracts at ORNL, Y-12, and the Savannah River Site require that cost studies be performed for various functions including bioassay services.

Department Did Not Require Contractors to Capture Actual Costs

Despite the DEAR and contractual requirements, the contractors did not capture the actual costs of bioassay analyses performed and compare actual in-house costs to the costs of outsourcing. Consequently, each site developed a unique method for estimating the costs of bioassay analyses performed in-house.

Department Cannot Ensure Departmental Laboratories Are Cost-Effective

In the absence of actual cost data, the Department cannot accurately determine whether it is more cost-effective to continue performing bioassay analyses in-house or subcontract the work to commercial laboratories.

RECOMMENDATIONS

We recommend that the Director, Office of Management Systems, Office of Procurement and Assistance Management:

1. Assure that contractors include bioassay services in their make-or-buy plans and maintain cost records sufficient to determine, in accordance with the DEAR and contractual make-or-buy requirements, whether bioassay services should be performed in-house or subcontracted out; and
2. In conjunction with the ICPT, establish a standard schedule of cost elements to use in comparing the cost of performing bioassay services in-house against the cost of subcontracting for bioassay services.

MANAGEMENT REACTION

Management agreed with the finding and recommendations. The DEAR states that services estimated to cost less than 1.0 percent of the estimated operating cost for a year or \$1 million for the same year, whichever is less, are not required to be included in contractor make-or-buy plans. The Office of Procurement and Assistance Management will reemphasize to contractors whose bioassay services purchases meet the threshold for make-or-buy plans their responsibility to perform required make-or-buy analyses concerning these services.

The DEAR states that adjustment may be made to the threshold where programmatic or cost considerations would indicate that a particular service should be included in the make-or-buy plan. For those contractors who do not meet the threshold for inclusion in their make-or-buy plans, the Office of Procurement and Assistance Management will direct contractors needing bioassay services to perform make-or-buy analyses for these services whenever a change from subcontracting out to in-house performance, or an expansion on in-house performance, is contemplated. The foregoing actions will necessitate the maintenance of cost records sufficient to determine whether bioassay services should be performed in-house or subcontracted out for all contractors acquiring these services. It is anticipated that this effort will be completed by July 2000.

In addition, the Office of Procurement and Assistance Management will request that the ICPT develop a standard set of cost elements for bioassay services in the course of their effort to establish Departmentwide purchase agreements, and will assure that the resulting schedule of costs is promulgated throughout the Department. It is anticipated that this effort will be completed January 2001.

AUDITOR COMMENTS

We consider management's comments to be responsive to the recommendations.

Appendix

SCOPE

The audit was performed from April 5, 1999, to December 16, 1999, at Department Headquarters and the following seven sites: ETTP, Y-12, and ORNL in Oak Ridge, Tennessee; Savannah River Site near Aiken, South Carolina; Hanford Site near Richland, Washington; Rocky Flats Environmental Technology Site in Golden Colorado; and the West Valley Demonstration Project in West Valley, New York. The scope of the audit included routine bioassay analysis of urine samples performed during FYs 1998 and 1999.

The table below identifies the number of routine bioassay analyses performed and the estimated cost for each of the seven sites reviewed in FY 1999. Because of the wide range of analyses and cost per analysis, the average price per analysis does not provide a valid comparison between sites.

Site	Number of Routine Analyses	Estimated Cost
Savannah River	34,468	\$2,657,000
Y-12	13,190	1,444,000
Rocky Flats	6,984	946,000
ETTP	4,935	914,000
Hanford	4,915	903,000
ORNL	3,694	690,000
West Valley	1,266	120,000
	69,452	\$7,674,000

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed technical basis documents for internal dosimetry programs;
- Reviewed test parameters and cost data for various analyses performed in FYs 1998 and 1999;
- Reviewed current and future subcontracts for bioassay services awarded

by Kaiser-Hill, PNNL, Bechtel Jacobs, and West Valley; and

- Held discussions with Departmental and contractor personnel regarding bioassay programs and the establishment of a Departmentwide subcontract for bioassay services.

The Department has developed and is in the process of implementing performance measures for bioassay programs in accordance with the *Government Performance and Results Act* of 1993. For example, the Department has established a measure which requires all bioassay programs to be accredited by January 2002. Accreditation is awarded based on successful completion of performance testing and an in-house evaluation by technical experts. The Department has established a laboratory accreditation program to perform this function. Of the seven sites reviewed, ORNL had already received accreditation, and Y-12, PNNL, and Savannah River were recommended for accreditation.

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, the assessment included reviews of Departmental and contractor policies, procedures, and performance measures related to bioassay services. 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 did not assess the reliability of computer-generated data because only a very limited amount of computer-generated data was used during the audit.

We held an exit conference with the Director, Office of Management Systems, Office of Procurement and Assistance Management, on January 13, 2000.

CUSTOMER RESPONSE FORM

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We wish to make our reports as responsive as possible to our customers' requirements, and, therefore, ask that you consider sharing your thoughts with us. On the back of this form, you may suggest improvements to enhance the effectiveness of future reports. Please include answers to the following questions if they are applicable to you:

1. What additional background information about the selection, scheduling, scope, or procedures of the audit would have been helpful to the reader in understanding this report?
2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?
3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?
4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name _____ Date _____

Telephone _____ Organization _____

When you have completed this form, you may telefax it to the Office of Inspector General at (202) 586-0948, or you may mail it to:

Office of Inspector General (IG-1)
Department of Energy
Washington, DC 20585

ATTN: Customer Relations

If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact Wilma Slaughter at (202) 586-1924.

The Office of Inspector General wants to make the distribution of its reports as customer friendly and cost effective as possible. Therefore, this report will be available electronically through the Internet at the following alternative address:

Department of Energy Management and Administration Home Page
<http://www.ig.doe.gov>

Your comments would be appreciated and can be provided on the Customer Response Form attached to the report.