May 20, 1997

MEMORANDUM FOR: THE SECRETARY

FROM: John C. Layton
Inspector General

SUBJECT: INFORMATION: Report on "Audit of the Savannah River Site's Quality Control Program for Groundwater Sampling"

BACKGROUND

The Savannah River Site's groundwater remediation program was managed by the Department of Energy's (Department) management and operating contractor for the site, Westinghouse Savannah River Company (Westinghouse). One component of the remediation program was the quality control program. The goal of the groundwater quality control program was to ensure that the results of laboratory analyses of groundwater samples were accurate and precise so that they could be relied upon for making remediation decisions. The objective of this audit was to determine whether Westinghouse acquired the minimal number of laboratory analyses required to ensure that groundwater sampling results met this criteria.

DISCUSSION

Westinghouse required more quality control analyses than necessary to ensure that groundwater sampling results were accurate and precise. This occurred because Westinghouse originally designed its groundwater quality control program to secure Departmental acceptance, and it did not periodically review program requirements to identify and eliminate unnecessary analyses. As a result, about $500,000 of the $859,000 spent on the program in Calendar Year 1995 was unnecessary. During the audit, Westinghouse discontinued two types of laboratory analyses, resulting in annual savings to the Department of about $200,000. While acknowledging Westinghouse's accomplishments, we determined that it could save the Department an additional $300,000 annually by eliminating the requirement for other nonessential analyses.

Based on audit results, we recommended that the Manager of Savannah River Operations Office: (1) require Westinghouse to eliminate split sample analyses from its groundwater quality control program unless a clear requirement can be demonstrated; (2) require Westinghouse to periodically review the effectiveness

of the groundwater quality control program and modify the types and numbers of laboratory analyses required based on review results; and, (3) perform a "for cause" review of Westinghouse's other quality control programs to evaluate the appropriateness of quality control analyses being performed.

The Manager, Savannah River Operations Office, concurred with the finding and recommendations.

Environmental remediation quality control programs and programs for testing and sampling have been the subject of numerous recent Office of Inspector General audit reports. In these reports, we raised concerns about the Department's implementation of quality control programs. We recognize the importance of quality control programs as a means of ensuring that the Department's environmental remediation efforts are properly focused and that the Department is getting value for the resources it applies to testing and sampling. As noted in this report, however, despite the importance of quality control programs, the cost of such programs should be reasonable and commensurate with existing requirements.

Attachment

cc:Deputy Secretary
Under Secretary
Manager, Savannah River Operations Office

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL

AUDIT OF THE

SAVANNAH RIVER SITE'S QUALITY CONTROL PROGRAM

FOR GROUNDWATER SAMPLING

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 five to seven days after publication at the following alternative addresses:

Department of Energy Headquarters Gopher
gopher.hr.doe.gov

Department of Energy Headquarters Anonymous FTP
vm1.hqadmin.doe.gov

Department of Energy Human Resources Administration Home Page
http://www.hr.doe.gov/ig

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

This report can be obtained from the
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, Tennessee 37831

Report Number: DOE/IG-405 Eastern Regional Audit Office
Date of Issue: May 20, 1997 Oak Ridge, TN 37830

AUDIT OF THE SAVANNAH RIVER SITE'S QUALITY CONTROL PROGRAM FOR GROUNDWATER SAMPLING

TABLE OF CONTENTS

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

AUDIT OF THE SAVANNAH RIVER SITE'S QUALITY CONTROL PROGRAM FOR GROUNDWATER SAMPLING

Audit Report Number: DOE/IG-0405

SUMMARY

The Savannah River Site's (Site) groundwater remediation program was managed by the Department of Energy's (Department) management and operating contractor for the Site, Westinghouse Savannah River Company (Westinghouse). The goal of the groundwater quality control program, a component of the remediation program, was to ensure that the results of laboratory analyses of groundwater samples were accurate and precise so that they could be relied upon for making remediation decisions. The objective of this audit was to determine whether Westinghouse acquired the minimal number of laboratory analyses required to ensure that groundwater sampling results were sufficiently accurate and precise.

We found that Westinghouse required more quality control analyses than necessary to ensure that groundwater sampling results were accurate and precise. This occurred because Westinghouse originally designed its groundwater quality control program to secure Departmental acceptance, and it did not periodically review program requirements to identify and eliminate unnecessary analyses. As a result, about $500,000 of the $859,000 spent on the program in Calendar Year 1995 was unnecessary. During the audit, Westinghouse discontinued two types of laboratory analyses, resulting in annual savings to the Department of about $200,000. While acknowledging Westinghouse□s accomplishments, we determined that the Department could save an additional $300,000 annually if other nonessential analyses were discontinued.

Management concurred with the finding and recommendations in the report.

(Signed)_____
Office of Inspector General

PART I

APPROACH AND OVERVIEW

INTRODUCTION

One of the primary missions at the Site was the remediation of contaminated groundwater which was carried out by the Site's manage-

ment and operating contractor, Westinghouse. Westinghouse obtained information about the level of contamination in the groundwater from the analyses of groundwater samples performed by three subcontractor laboratories. In order to make informed remediation decisions, Westinghouse needed confidence in the accuracy and precision of the analyses reported by the subcontractor laboratories. That assurance was obtained through Westinghouse's groundwater quality control program. The objective of the audit was to determine whether Westinghouse acquired the minimal number of laboratory analyses required to ensure that the sampling results were sufficiently accurate and precise.

SCOPE AND METHODOLOGY

The audit was performed at the Site from June 24, 1996, through December 9, 1996. To accomplish the audit objective, we:

- Reviewed applicable Federal, State, and Department regulations regarding groundwater analysis;
- Evaluated current operating costs for the groundwater sampling program;
- Interviewed the Savannah River Operations Office (Savannah River) and Westinghouse project managers assigned to the quality control program for groundwater sampling; and
- Reviewed documentation pertaining to the history and development of the groundwater quality control program.

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 relied on computer-generated data during this audit and, thus, tested its reliability. Specifically, we used Westinghouse□s data base containing the results of groundwater analyses. We verified the types and numbers of analyses performed by comparing the data base to another independently generated record of the analyses.

We held an exit conference with the Deputy Assistant Manager for Environmental Quality, Savannah River and his staff on March 5, 1997. Management's comments are summarized in Part III of the report.

BACKGROUND

For over 40 years, the Site used five 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 Site's three operating reactors. Subsequently, the Site's primary mission was changed from producing nuclear materials to managing waste products generated during weapons production and restoring the environment to a level acceptable under

current laws and regulations. One of the contaminated areas needing environmental remediation was the groundwater under the Site.

In Calendar Year (CY) 1995, Westinghouse spent about $3.2 million to have 3 subcontractor laboratories analyze about 69,000 groundwater samples in support of the remediation mission at the Site. The Department needed confidence in the accuracy and precision of that information in order to make the best remediation decisions possible. As a result, a quality control program was established.

To evaluate the accuracy and precision of the laboratories' analyses of groundwater samples, Westinghouse required the laboratories to analyze quality control samples and report the results back to Westinghouse. In CY 1995, Westinghouse paid the laboratories about $859,000 to analyze and report on more than 17,000 groundwater quality control samples.

Westinghouse's quality control program confirmed that the three laboratories' analyses of groundwater samples were sufficiently accurate and precise for decision-making purposes. In addition to Westinghouse's program, the laboratories also participated in several other quality control programs, including evaluations by other elements of the Department, the U.S. Environmental Protection Agency, and the laboratories' own internal quality control activities. Therefore, Westinghouse could be confident about the results of the laboratories' analyses of groundwater samples.

PRIOR AUDIT REPORTS

The Office of Inspector General (OIG) previously issued a report dealing with groundwater remediation at the Site. In report ER-B-96-02, Audit of Groundwater Remediation Plans at the Savannah River Site, dated June 11, 1996, we concluded that the Department entered into a remediation agreement with regulatory agencies based on unreasonable clean-up standards. The agreement required that the Department remediate groundwater in the F and H Areas to drinking-water standards.

In addition, the OIG issued several audit reports dealing with groundwater remediation at other Departmental sites. In report WR-B-97-03, Audit of Groundwater Monitoring at Hanford, dated November 15, 1996, we determined that Hanford's contractors duplicated each other's work in sampling and analyzing groundwater and in reporting results. In report DOE/IG-0374, Audit of the Department of Energy's Commercial Laboratory Quality Assurance Evaluation Program, dated June 20, 1995, we concluded that the Department's contractors conducted redundant quality assurance evaluations of some commercial laboratories, did not evaluate others, applied standards inconsistently, produced inconsistent results, and did not communicate the results among contractors. Finally, in report DOE/IG-0293, Audit of Testing Laboratory Support to the Environmental Survey Program, dated December 21, 1990, we determined that samples were not always analyzed by Departmental laboratories within required time frames and laboratories continued to analyze samples after failing performance evaluation tests.

Our audit disclosed a material internal control weakness that management should consider when preparing its yearend assurance memorandum on internal controls.

PART II

FINDING AND RECOMMENDATIONS

Laboratory Analyses of Quality Control Samples

FINDING

Departmental regulations require that Westinghouse develop a cost-effective quality control program, including programs for groundwater sampling. Although Westinghouse developed a program that ensured laboratory analyses of groundwater samples were accurate and precise, the program was not cost-effective. Specifically, Westinghouse required more quality control analyses than necessary to ensure the accuracy and precision of sample results. This occurred because Westinghouse designed the program to secure Departmental acceptance and did not periodically assess program effectiveness. As a result, about $500,000 of the $859,000 spent on the program in CY 1995 was unnecessary. During the audit, Westinghouse discontinued two types of laboratory analyses, resulting in annual cost savings of about $200,000. We determined that an additional $300,000 could be saved each year if other nonessential analyses were eliminated.

RECOMMENDATIONS

We recommend that the Manager, Savannah River Operations Office:

Require Westinghouse to eliminate split-sample analyses from its groundwater quality control program unless a clear requirement can be demonstrated,

Require Westinghouse to periodically review the effectiveness of the groundwater quality control program and modify the types and numbers of laboratory analyses required based on review results, and

Perform a "for cause" review of Westinghouse's other quality control programs to evaluate the appropriateness of quality control analyses being performed.

MANAGEMENT REACTION

Management concurred with the finding and recommendations. Comments received from the Manager, Savannah River Operations Office, are summarized and addressed in Part III of this report.

DETAILS OF FINDING

DEPARTMENTAL REQUIREMENTS

Departmental Order 5700.6C, Quality Assurance, requires management and operating contractors to develop cost-effective quality control programs, including programs for groundwater sampling. Contractors are required to periodically assess the effectiveness of their programs, including the types and numbers of analyses required. The order provides general guidelines for contractors to follow in developing effective programs. However, it does not specify the types or numbers of analyses required for an effective groundwater quality control program.

WESTINGHOUSE'S QUALITY CONTROL PROGRAM

Westinghouse's quality control program was not cost-effective. Westinghouse required more quality control analyses than necessary to ensure the accuracy and precision of sample results. During the audit, Westinghouse performed a partial assessment of its groundwater quality control program and eliminated requirements for laboratories to perform (1) gas chromatographic mass spectrometric volatile organic analysis (VOA) of field-blank samples1 and (2) quality control analyses of split2 field-blank samples. In CY 1995, the laboratories performed about 1,000 VOAs of field blanks and about 3,300 quality control analyses of split field-blank samples.

While acknowledging Westinghouse's efforts to eliminate unnecessary quality control analyses, we believe Westinghouse could do more. Specifically, Westinghouse could eliminate quality control analyses for all split samples, not just the split field-blank samples, without adversely affecting program results.

Split samples added little or no value to Westinghouse's groundwater quality control program. Westinghouse used the analyses of split samples to compare the results reported by two laboratories for identical samples. The comparison was unnecessary because Westinghouse already had confirmation from other quality control tests that the laboratories were sufficiently accurate and precise. Further quantification of how the acceptable results of one laboratory compared to the acceptable results of another laboratory did not increase the Department's ability to rely on groundwater sampling data.

During CY 1995, Westinghouse sent about 9,900 split samples to the laboratories for analysis. As a result of our audit inquiries, Westinghouse reviewed the analyses of split samples and determined that it could eliminate the analyses of about 3,300 split field-blank samples. Westinghouse's determination was based on its observation that (1) the analyses were not required by regulatory agencies, and (2) the loss of information about the comparability of laboratories' analyses of field-blank samples would have no impact on the quality control program for groundwater sampling. As explained above, we believe that Westinghouse could eliminate quality control analyses for all split samples, not just the split field-blank samples, without adversely affecting the groundwater quality control program.

PROGRAM DEVELOPMENT AND PERIODIC REVIEW

Westinghouse acquired more laboratory analyses than needed because it designed the groundwater quality control program to secure Departmental acceptance, and it did not periodically review the program to identify and eliminate unnecessary analyses. In the absence of specific guidelines as to the types and numbers of quality control analyses required by the Department, Westinghouse designed its program to be certain that the Department would approve the level of testing performed. After the program began, Westinghouse did not periodically review and modify its requirements as required by Departmental Order 5700.6C. Although the program began in CY 1991, Westinghouse performed its first internal assessment of a portion of its quality control program during our audit. That assessment resulted in the elimination of some VOAs and quality control analyses of split field-blank samples.

COST OF UNNECESSARY QUALITY CONTROL ANALYSES

We determined that about $500,000 of the $859,000 spent on Westinghouse's quality control program in CY 1995 was unnecessary. During the audit, Westinghouse eliminated annual requirements for about 4,300 analyses, thereby saving the Department about $200,000 each year. However, we believe Westinghouse could save the Department another $300,000 annually by completely eliminating requirements for analyses of split samples.

In addition to procurement costs, reducing the number of quality control analyses would reduce other Westinghouse costs, such as the cost of preparing and handling unnecessary samples and the cost of shipping the samples to the laboratories. We could not quantify these additional savings because Westinghouse's accounting system did not separately identify these costs.

PART III

MANAGEMENT AND AUDITOR COMMENTS

In responding to the initial draft of this report, the Manager, Savannah River Operations Office concurred with the finding and recommendations. Management's comments are summarized and addressed below.

Recommendation 1. Require Westinghouse to eliminate split-sampling analyses from its groundwater quality control program unless a clear requirement can be demonstrated.

Management Comments. Concur. Savannah River Site will follow external requirements like Environmental Protection Agency (EPA) guidance cited in Handbook for Analytical Quality Control in Water and Waste-water Laboratories (EPA-600/4-79-019).

Auditor Comments. Management's proposed actions are responsive to the recommendation.

Recommendation 2. Require Westinghouse to periodically review the effectiveness of the groundwater quality control program and modify the types and numbers of laboratory analyses required based on review results.

Management Comments. Concur. Westinghouse will be directed to review and report on the effectiveness of its groundwater quality control program for FY 1996 within 120 days from the date of this report, with subsequent annual reviews and reports for each fiscal year by the first of February of the following year.

Auditor Comments. Management's proposed actions are responsive to the recommendation.

Recommendation 3. Perform a "for cause" review of Westinghouse's other quality control programs to evaluate the appropriateness of quality control analyses being performed.

Management Comments. Concur. Savannah River will direct Westinghouse to determine the appropriateness of the quality control analyses being performed and to look for cost effective approaches in complying with these requirements.

Auditor Comments. Management's proposed actions are responsive to the recommendation.

IG Report No._IG-0405

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 or inspection 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)
U.S. Department of Energy
Washington, D.C. 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.

---

1 Field-blank samples were bottles of deionized water that were transported to the wells, opened and closed at the wells, and sent to laboratories to be analyzed. If a field-blank sample was analyzed and determined to be contaminated, management would suspect that contaminants were introduced to the groundwater samples during extraction at the site.
2 Split sampling involved physically dividing a single sample into two samples and sending each sample to a different laboratory for analysis. Split samples were used to compare the results reported by two laboratories for identical samples.