



U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

Reestablishment of Enriched Uranium
Operations at the Y-12 National Security
Complex



Department of Energy

Washington, DC 20585

February 24, 2004

MEMORANDUM FOR THE SECRETARY

FROM:

Greg Friedman
Gregory H. Friedman
Inspector General

SUBJECT:

INFORMATION: Audit Report on "Reestablishment of Enriched Uranium Operations at the Y-12 National Security Complex"

BACKGROUND

The Department of Energy's enriched uranium operations recover and purify uranium for use in nuclear weapons. These operations – including wet chemistry, oxide conversion, reduction, casting, machining and forming, and salvage treatment – are critical to support national security as well as other Department missions. The Y-12 National Security Complex, operated by the National Nuclear Security Administration, is the only U.S. facility that possesses these capabilities. In the early 1990s, an accidental release of hydrogen fluoride resulted in a shutdown of the oxide conversion process. As a result of other safety concerns, essentially all of the remaining processes at the Y-12 facility were shut down as well.

The Department began reestablishing the enriched uranium processes at Y-12 in 1994. The reestablishment effort was originally scheduled to be complete by December 1998 at an expected cost of about \$119 million. We conducted the audit to evaluate Y-12's efforts to reestablish its enriched uranium operations.

RESULTS OF AUDIT

We found that there had been significant delays in aspects of the reestablishment project and that the overall cost of the project had grown dramatically. While Y-12 had successfully reestablished three of the key enriched uranium operations components, several of the remaining processes will not be operational until at least July 2004, more than five years later than originally planned. Further, management estimated that total project costs could exceed \$400 million, about three times the original estimate.

In our view, the Department had not made full use of available project management controls, placing at risk the completion of the project within scope, cost, and schedule parameters. Specifically, it had not established:

- a valid plan for reestablishing enriched uranium operations;
- a funding plan consistent with sound financial management practices; and,
- an effective quality assurance program.



Throughout the review, responsible NNSA officials described to us the inherent difficulties in defining the scope of the reestablishment effort. They also asserted that contractor turnover presented additional challenges in this process.

In several other recent audits, the Office of Inspector General identified similar project management weaknesses in efforts critical to NNSA's stockpile stewardship mission. For example, our report on *The Department of Energy's Tritium Extraction Facility* (DOE/IG-0560, June 2002) noted that NNSA had substantially exceeded its cost and schedule for ensuring an adequate supply of tritium for nuclear weapons. Likewise, our report on the *Dual Axis Radiographic Hydrodynamic Test Facility* (DOE/IG-0599, May 2003) noted significant financial management weaknesses in NNSA's efforts to construct an experimental facility designed to evaluate the effects of aging on the nuclear weapons remaining in the stockpile.

To its credit, NNSA has recognized the need for greater emphasis on project and program management and has initiated efforts to increase relevant staff competencies through enhanced training. We believe our recommendations regarding enriched uranium operations are consistent with NNSA's efforts in this regard.

MANAGEMENT REACTION

NNSA's Associate Administrator for Management and Administration generally concurred with our finding and recommendations, stating that the report accurately identified the difficulties in adequately defining the scope of the restart effort, which resulted in the overall cost and schedule delays noted in the report. The Associate Administrator added that the new contractor, which took over Y-12 operations in September 2000, was adequately addressing the challenges of restarting enriched uranium processes at the site and had gotten the program back on track. Accordingly, management believed that Y-12 will be able to meet future mission needs. NNSA's verbatim comments have been included as Appendix 2.

The Office of Inspector General recognizes that the issues identified in the report began with the prior contractor and that improvements in enriched uranium operations project management have been made under the current contractor. However, we concluded that additional project management enhancements will advance Y-12's ability to meet future mission requirements.

Attachment

cc: Deputy Secretary
Administrator, National Nuclear Security Administration

REESTABLISHMENT OF ENRICHED URANIUM OPERATIONS AT THE Y-12 NATIONAL SECURITY COMPLEX

TABLE OF CONTENTS

Status of Enriched Uranium Operations

Details of Finding 1

Recommendations and Comments 4

Appendices

Objective, Scope, and Methodology 6

Management Comments 7

STATUS OF ENRICHED URANIUM OPERATIONS

Enriched Uranium Processes

As of November 2003, Y-12 had successfully reestablished enriched uranium operations processes for reduction, casting, and machining and forming. However, at least three other key components necessary for the resumption of enrichment activities were significantly delayed. Management's latest estimates were that all the processes would not be fully operational for at least three years. The following is a brief description of the processes that have been delayed, along with an indication of the current status:

- Wet Chemistry. This is the process by which Y-12 recovers and purifies enriched uranium byproducts from operations. It received authorization to restart in March 2003; however, as of November 2003, it was still not fully operational. In particular, Y-12 continued to assess and correct issues identified during initial startup, which was scheduled to take about twelve months. Y-12 has estimated the system will be fully operational by February 2004.
- Oxide Conversion. This process continues the lifecycle of metal production, whereby materials produced through wet chemistry are converted to the form necessary for reduction. A required operational readiness review had not been performed. Accordingly, authorization to start had not been received and the process was not operational. Management estimated that the authorization to start would be granted by July 2004.
- Salvage Treatment. This process prepares salvageable materials for processing through wet chemistry. It has not received authorization to restart and is not operational. Further, a baseline has not been developed that supports reestablishment of the six elements of the salvage treatment process. Management does not plan to begin work on reestablishing one of these processes until Fiscal Year 2005.

Until each of these processes is fully functioning, the Department of Energy will be unable to restart its enriched uranium operations in their entirety.

At the time of our audit, Y-12 had spent or planned to spend about \$337 million on the reestablishment effort, exclusive of salvage treatment. Estimates to complete the salvage treatment processes had not been finalized, but were expected to approach \$70 million.

As such, total estimated reestablishment costs could exceed \$400 million. Aspects of the program to reestablish enriched uranium operations had already been delayed for over five years, and there was no definitive plan in place to reestablish salvage treatment operations in their entirety.

Project Management System

Department efforts to reestablish enriched uranium operations within technical scope, cost, and schedule were hindered because an effective project management system was not utilized prior to or during the project. Departmental guidance on project management systems requires that all projects should have several specific ingredients including: a clear definition of the work scope, an integrated schedule with supportable milestones, budget planning, and execution, including consideration of the overall funding availability within the Department and project execution in accordance with the overall project plan. Although the form of the guidance issued by the Department on this subject has changed over time, the basic precepts have remained constant — establishment of a baseline and close monitoring of performance against that baseline. Y-12 experienced challenges with planning, financial management, and quality assurance.

Project Planning

The planned scope of reestablishing the processes was not fully defined or understood. For example, as late as January 2001, two years after wet chemistry was originally scheduled to be operational, an enriched uranium operations corporate assessment report (assessment report) stated that an evaluation of the relevant systems needed to be conducted and approved by Department management. The evaluation would define the systems that were in need of a technical baseline. The assessment report also stated that a plan needed to be developed to handle and dispose of the material that was left in the wet chemistry process.

The oxide conversion process also experienced problems, in part, because management did not fully define the technical scope. Specifically, project management officials were not aware of the significant amount of additional work that would be needed to complete the project until 95 percent of the funding was spent. At that time, an effort to identify the remaining work was organized, and it quickly became evident that the costs would exceed the remaining funding and the schedule would be delayed.

Valid schedules were also not developed for the overall reestablishment effort. The Department recognized this fact early on in the project. For example, in July 1996, local Department management stated that the schedule developed by the contractor did not include certain considerations that could have a serious impact on its viability. In particular, the Department noted that a number of major workload components and resource needs were not considered in the schedule. Despite its early awareness that schedules for various program components were not valid, at the time of our audit, Y-12 still did not have a valid plan for the entire reestablishment effort.

Financial Management

Funding for at least one of the program elements – oxide conversion – was fractured. The effort was initially managed as a line-item project but was later funded from Y-12's program budget for physical and operational infrastructure. Specifically, in Fiscal Year 1993, a line-item project was established to replace the existing oxide conversion process. Although the replacement of the oxide conversion process was not complete, the line-item project ended in March 1999. At that time, funding for the remaining construction activities, as well as for component and system testing, was switched to Y-12's program budget for physical and operational infrastructure. This program budget was already tasked with providing facilities and infrastructure support to 15 subprograms at Y-12 including manufacturing processes, infrastructure reduction, modernization, nuclear material management, and storage.

The lack of dedicated funding had an adverse impact on the overall project. In some cases, resources were transferred from one process to another. For example, the assessment report stated that resources, both personnel and capital, were stripped from wet chemistry to support other restart efforts. Further, salvage treatment operations such as the recovery furnace, ash leaching, and filter teardown were completely deleted from the original reestablishment plan.

Additionally, we noted that even though the reestablishment of enriched uranium operations was not complete, in Fiscal Year 2000, the Department failed to request funding for the reestablishment effort. Instead, the project was funded by using core stockpile management contingency funds. Due to funding shortages, reestablishment activities were suspended for about a month mid-way through the fiscal year, causing delays in the overall effort to reestablish enriched uranium operations.

Quality Assurance

Finally, an effective quality assurance program was not implemented. The quality assurance program was intended to incorporate design analysis and physical inspections into the reestablishment process. However, the oxide conversion replacement line-item project experienced numerous quality assurance deficiencies. Specifically, a lack of inspections prevented the timely discovery of faulty welds and may have contributed to the failure to identify the use of an improper type of electrical cabling. These issues added to the cost and schedule slippage in reestablishment of the oxide conversion process. Further, a contractor official stated that the key to quality assurance is to have the systems in place to assess and prevent failures. However, the official noted that during the oxide conversion replacement project, there was minimum oversight in the field. In fact, the official reported that in almost all cases, quality assurance was not called on until after failures occurred.

Availability of Processes to Meet Future Mission Needs

Without the appropriate project management system in place, the Department has been unable to complete the reestablishment effort. As a result, the enriched uranium operations necessary for national security are not available to meet future mission needs. In particular, enriched uranium is used in the Nation's nuclear weapons. Without enriched uranium, these nuclear weapons will not work as designed. Additionally, salvageable material has continued to build up at Y-12, thereby placing enormous pressure on its storage facilities.

Also, in our opinion, implementation of the recommendations contained in this report is essential to the timely and cost-effective completion of the remaining enriched uranium processes to be reestablished in the future. Further, the lessons learned identified in this report may help ensure the success of future projects. Specifically, Y-12 and other Department sites are currently pursuing billions of dollars in modernization initiatives.

RECOMMENDATIONS

We recommend that for the remaining components of the enriched uranium operations reestablishment project the Manager, Y-12 Site Office:

1. Establish project plans that include a well-defined scope and supportable schedules;

-
2. Develop schedules so that line-item projects will be completed in accordance with Department guidance;
 3. Request adequate funding for projects; and,
 4. Incorporate quality assurance throughout the execution of each project.

We recommend that the Deputy Administrator for Defense Programs:

5. Implement the lessons learned identified in this report as part of the modernization initiatives currently being pursued by the Department.

MANAGEMENT REACTION

Management generally concurred with our finding and recommendations, stating that the report accurately identified the difficulties in adequately defining the scope of the restart effort, which resulted in the overall cost and schedule delays noted in the report.

However, management stated that the new contractor, which took over Y-12 operations in September 2000, was adequately addressing the challenges of restarting enriched uranium processes at the site and had gotten the program back on track. Accordingly, management believed that Y-12 will be able to meet future mission needs.

AUDITOR COMMENTS

Management's comments are responsive to the intent of the report's recommendations and the planned corrective actions appear to be appropriate. However, due to the inherent nature of enriched uranium processes as well as funding uncertainties, we believe that the Department must continue to be vigilant to ensure Y-12's ability to meet future mission requirements.

Appendix 1

OBJECTIVE	The objective of the audit was to evaluate Y-12's efforts to reestablish its enriched uranium operations.
SCOPE	The audit was performed from January 2003 to November 2003, at the Y-12 National Security Complex, in Oak Ridge, Tennessee. The audit included a review of various enriched uranium operations restart plans and related cost data.
METHODOLOGY	<p>To accomplish the audit objective we:</p> <ul style="list-style-type: none">• Reviewed restart plans and related baseline change proposals;• Analyzed enriched uranium cost data;• Assessed available project line-item documents and compared the data to work completed;• Identified project management system requirements specified in Departmental orders;• Interviewed personnel from the Y-12 National Security Complex; and,• Toured various enriched uranium operations facilities.

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 audit included a review of the project management activities associated with the reestablishment of enriched uranium operations. 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. As part of our review, we also evaluated the Department's implementation of the Government Performance and Results Act of 1993. We found that the Department established specific performance objectives related to the reestablishment of enriched uranium operations. Based on audit work performed as part of the Department's financial statement audit, we found the computer processed data used to support our analyses to be sufficiently reliable.

Management waived an exit conference.




Department of Energy
National Nuclear Security Administration
Washington, DC 20585



JAN 21 2004

MEMORANDUM FOR Frederick D. Doggett
Assistant Inspector General
for Audit Services

FROM: Michael C. Kane 
Associate Administrator
for Management and Administration

SUBJECT: Comments to Draft Y-12 Enriched Uranium
Operations Report

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review and comment on the Inspector General's (IG) draft report "Reestablishment of Enriched Uranium Operations at the Y-12 National Security Complex." We understand that the purpose of the audit was to evaluate Y-12's efforts to reestablish its enriched uranium operations. Y-12 began reestablishing the enriched uranium processes in 1994 and was originally scheduled to be completed by December 1998 at a cost of about \$119 million.

NNSA generally agrees with the report and has provided detailed comments separately related to the report. We concur with the recommendations and either have, or are implementing, corrective actions.

As stated in the report, the Y-12 Site Office recognized as early as 1996 that valid schedules and budgets had not been developed for the overall Enriched Uranium Operations. The then Y-12 Management and Operating Contractor did not deliver a resource-loaded schedule to the Site Office until January 2000. The difficulties that were encountered in establishing adequate schedules and budget planning for the restart of enriched uranium operations were a key element considered in the re-solicitation of the Y-12 contract. The new contractor was selected, in part, due to their expertise in project management and their overall plan to manage the enriched uranium operations restart efforts as a project. We believe that the new contractor, who took over Y-12 operations September 2000, is adequately addressing the challenges of restarting enriched uranium processes at the site and has gotten the program back on track. NNSA believes it is important to provide a discussion of the change in contractor and their subsequent use of project management techniques to keep the report complete.



Appendix 2 (continued)

2

The restart of enriched uranium operations was a management concern throughout the restart effort. Y-12 mission requirements were consistently factored into the budgetary planning and decision making, as well as the overall enriched uranium operations restart priorities. The report accurately identified the difficulties in adequately defining the scope of the restart effort, which resulted in the overall cost and schedule delays noted in the report. The Department has consistently evaluated the need to start-up/restart the enriched uranium operations processes in support of mission requirements, and has based funding levels upon priority tradeoffs that are necessary with the constraints of the overall budgeting process. Y-12 has consistently achieved meeting 100% of current program requirements and product deliverables. We believe the report does a disservice to Y-12 management by questioning their ability to meet future mission needs.

The report mentions that the total project cost could exceed \$400 million. These funds have largely been included in appropriated funds over the period of Fiscal Years 1995 through 2004. All activities, with the exception of Salvage Operations will have been funded and restarted by the end of Fiscal Year 2004 for an estimated \$337 million. The estimate for the restart of Salvage Operations has not yet been finalized even though the Fiscal Year 2005 Congressional Budget request includes a small amount of funding for this activity. Once the total requirement for Salvage Operations is defined, the required funding will be requested in subsequent budget requests.

We appreciate your observation that NNSA is working to improve project management generally in the weapons complex. Correcting weaknesses in project management and increasing accountability in the line organization have been driving forces in NNSA's reorganization, which was implemented last year.

I have attached specific comments related to the recommendations. Should you have any questions related to this response, please contact Richard Speidel, Director, Policy and Internal Controls Management. He may be reached at 202-586-5009.

Attachments

cc: Dr. Everet Beckner, Deputy Administrator for Defense Programs, NA-10
William Brumley, Manager, Y-12 Site Office
David Marks, Field Chief Financial Officer, SvcCen/NV

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 fax 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.

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 address:

U.S. Department of Energy Office of Inspector General, 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.