



OFFICE OF INSPECTOR GENERAL  
U.S. Department of Energy

# INSPECTION REPORT

OAI-M-17-07

May 2017

## CONSTRUCTION REWORK AT THE MIXED OXIDE FUEL FABRICATION FACILITY



**Department of Energy**  
Washington, DC 20585

May 19, 2017

**MEMORANDUM FOR THE ASSOCIATE ADMINISTRATOR FOR ACQUISITION AND  
PROJECT MANAGEMENT**

*Michelle Anderson*

**FROM:** Michelle Anderson  
Deputy Inspector General  
for Audits and Inspections  
Office of Inspector General

**SUBJECT:** INFORMATION: Inspection Report on "Construction Rework at the  
Mixed Oxide Fuel Fabrication Facility"

**BACKGROUND**

In 1999, the National Nuclear Security Administration (NNSA) contracted with a consortium, now named CB&I AREVA MOX Services LLC (MOX Services), to design, build, and operate a Mixed Oxide Fuel Fabrication Facility (MOX Facility). This facility is intended to be a major component in the United States' program to dispose of surplus weapons-grade plutonium. The MOX Facility is envisioned to take surplus weapons-grade plutonium, remove impurities, and mix it with uranium oxide to form mixed oxide fuel pellets for reactor fuel assemblies. These assemblies will be irradiated in commercial nuclear power reactors. MOX Facility construction started in August 2007. At that time, the MOX Facility had an estimated total project cost of almost \$5 billion with a projected completion date of September 2016. According to the *2016 Updated Performance Baseline for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site*, issued in September 2016, the MOX Facility is expected to cost \$17 billion with a completion date as late as 2048.

Over the last several years, the MOX Facility has been the focus of several audits and reviews to evaluate project cost increases and schedule delays. Additionally, the Office of Inspector General (OIG) Hotline received and referred to NNSA an allegation that construction rework contributed to the cost issues at the MOX Facility and resulted in a waste of Department of Energy funds. In response to the OIG Hotline referral, NNSA performed an assessment that substantiated the allegation. We initiated this inspection to determine whether NNSA had responded to concerns regarding construction rework at the MOX Facility.

**RESULTS OF INSPECTION**

We found that NNSA had directed MOX Services to establish an effective management system to address construction rework at the MOX Facility. As a result, MOX Services developed and implemented a comprehensive new desktop procedure. NNSA also increased its oversight of

rework. Because the construction rework procedure and oversight processes were recently implemented, we determined that it was too early to fully assess their effectiveness. However, we noted that NNSA was still in the process of resolving the alleged waste of Department funds related to construction rework substantiated in its assessment.

### **Construction Rework Management**

NNSA directed the development of an effective management system to address construction rework<sup>1</sup> at the MOX Facility in fiscal year (FY) 2014. According to an NNSA Headquarters official, prior to that date, the time and cost of rework was only tracked after nonconformance issues were identified for a major segment of the MOX Facility project. As such, NNSA lacked knowledge, and we were unable to establish, the total cost of rework at the MOX facility. Our review of NNSA documentation, however, showed that officials had noted out-of-sequence work, poor work planning, and anecdotal evidence of costly incidents of construction rework since FY 2012. In June 2014, due to these issues, NNSA sent a letter to MOX Services expressing concern that it was not systematically managing the reduction of rework and directed MOX Services to establish an effective management system to address the rework issue. In response, in September 2014, MOX Services developed and implemented a desktop procedure to consistently categorize rework; identify rework causes; accurately report percentages; and track progress toward minimizing rework occurrences. Also, as part of its efforts to monitor rework, NNSA stated that it had incorporated oversight assessments of MOX Services to assure prudent implementation of procedures and processes. In an assessment conducted in July 2016, NNSA found that improvement was still needed. For example, MOX Services did not track rework hours for all types of construction. Also, NNSA identified a practice where MOX Services did not track instances of rework where corrections were made before a quality control inspector performed an inspection and rejected the work. NNSA contends that regardless of when the rework is identified, it is still rework.

In addition, NNSA added performance criteria to the MOX Services Contract FY 2015 Award Fee Plan intended to enhance construction rework management and decrease its occurrence. Specifically, MOX Services was required to implement solutions needed to decrease rework to include assessments of work processes, uniformity of reporting rework, and comprehensive metrics to effect continual improvement. We confirmed NNSA received monthly reports from MOX Services identifying instances of rework and provided feedback on the reports. NNSA also informed us that it reviewed rework hours on a weekly basis and that it considered construction rework during its evaluation of MOX Services' FY 2015 contract award fee. Although rework was not assigned a specific award fee percentage, NNSA told us that this area negatively impacted MOX Services' overall performance rating. In particular, NNSA noted that although MOX Services was tracking and reporting rework, it had increased in areas such as conduits and piping. NNSA also found that MOX Services had not performed an analysis to understand the causes of rework and implement solutions.

We recognize that NNSA uses a number of documents to determine the amount of construction rework. However, after reviewing several years of nonconformance reports (NCR), we believe these documents may be useful to evaluate some of the causes of rework. An NCR identifies a

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<sup>1</sup> Per MOX Services' construction rework desktop procedure, rework is defined as rework caused by incorrect construction installation.

deficiency that renders the quality of an item or activity unacceptable or indeterminate. Rather than using NCRs, NNSA stated that it reviews the implementing documents that are developed to actually perform the rework such as inspection reports, field change requests, and revisions to work instructions in its efforts to manage rework. Our inspection noted that NCRs could, if used in conjunction with other available information, serve as a valuable data point for NNSA when analyzing construction rework. Specifically, in addition to identifying the deficiency, NCRs describe the cause of the deficiency, are easily retrievable, and are detailed regarding the specific nature of the issue. For example, some NCRs we reviewed identified deficiencies with causes such as incorrect installation, vendor or MOX Services noncompliance with procedures, and errors or omissions in product specifications. We noted the causal information contained in NCRs could potentially be useful to identify rework trends.

### **Hotline Allegation Resolution**

In October 2014, the OIG Hotline received an allegation that certain electrical work at the MOX Facility was not being completed in accordance with specifications and had to be repeatedly removed and reinstalled resulting in a waste of Department funds. The OIG referred the allegation to NNSA for review. NNSA performed an assessment that substantiated the allegation. The Contracting Officer told us that the construction rework costs related to that assessment have potentially been included in the interim provisional invoices submitted by MOX Services and paid by NNSA. The Contracting Officer also advised us that he had not made a final determination of allowability regarding the associated rework costs; however, he stated that NNSA intends to hold the contractor accountable for rework related to the allegation. Per the Contracting Officer, due to the large volume of relevant data available but not yet organized, the overlapping nature of acceptable rework versus the allegation, and the significant level of complexity of the issue generally, it may take some time for NNSA to develop a reasonably accurate estimate of any unreasonable incurred costs related to the allegation that would be subject to disallowance. While we recognize that it may take some time to develop an accurate estimate, we noted that NNSA had not developed a formal plan to resolve this issue. Further, while inquiring about NNSA's actions to date to resolve the allegation, an NNSA official informed us that the full scope of potential construction rework has yet to be determined because there is a backlog of work awaiting final inspection that theoretically could identify additional construction rework. Depending on the rework causes, the associated expenses could also result in unallowable costs.

### **RECOMMENDATIONS**

Because the construction rework procedure and oversight processes were recently implemented, we determined that it was too early to fully assess their effectiveness. We suggest NNSA continue to monitor construction rework and implement additional process improvements deemed necessary to mitigate future occurrences. However, to improve MOX Facility construction rework management, we recommend the Contracting Officer for the MOX Project Management Office:

1. Consider using MOX Services NCRs as an additional data point when analyzing rework; and

2. Develop a formal plan with milestones to quantify, to the extent possible, the NNSA assessment finding that substantiated certain electrical rework resulted in a waste of Department funds, and make a final allowability determination.

#### MANAGEMENT RESPONSE

Management concurred with the report's recommendations and provided a path forward to address the issues identified in the report. NNSA agreed to consider NCRs as an additional data point to enhance analysis of construction rework. Additionally, NNSA stated it expected the MOX Project Management Office Contracting Officer to make a final determination regarding the allowability of questioned costs related to rework referenced in the report by April 30, 2017. Management's formal comments are included in Attachment 3.

#### INSPECTOR COMMENTS

We consider management's comments and planned corrective actions to be responsive to our recommendations. However, we noted that the Contracting Officer did not make the final determination by the estimated date of April 30, 2017. NNSA informed us that it intends to make a final determination in the near future.

#### Attachments

cc: Deputy Secretary  
Chief of Staff  
Administrator, National Nuclear Security Administration

## OBJECTIVE, SCOPE, AND METHODOLOGY

### OBJECTIVE

The objective of this inspection was to determine whether the National Nuclear Security Administration (NNSA) had responded to concerns regarding construction rework at the Mixed Oxide Fuel Fabrication Facility (MOX Facility).

### SCOPE

This inspection was conducted between December 2015 and May 2017, at the Savannah River Site in Aiken, South Carolina. The scope of the inspection included policies and procedures NNSA used to manage construction rework at the MOX Facility. The inspection was conducted under Office of Inspector General (OIG) project number A16SR014.

### METHODOLOGY

To accomplish our objective, we:

- Reviewed CB&I AREVA MOX Services LLC (MOX Services) and NNSA policies, procedures, and reports regarding construction rework;
- Reviewed OIG Hotline allegation referrals and the associated NNSA and MOX Services responses;
- Reviewed MOX Services nonconformance reports;
- Held discussions with NNSA Savannah River Field Office and NNSA Headquarters officials;
- Reviewed prior audit reports issued by the OIG and the Government Accountability Office; and
- Reviewed various Department-commissioned reviews of the MOX Facility.

This inspection was conducted in accordance with the Council of the Inspectors General on Integrity and Efficiency's, *Quality Standards for Inspection and Evaluation*, dated January 2012. Those standards require that we plan and perform the inspection to obtain sufficient, appropriate evidence to provide a reasonable basis for our conclusions and observations based on our inspection objective. We believe the evidence obtained provides a reasonable basis for our conclusions and observations based on our inspection objective. Accordingly, the inspection included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the inspection objective. In particular, we assessed compliance with the *GPRA Modernization Act of 2010* and found that the Department had established performance measures

for construction rework. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our inspection. Finally, we did not rely on computer processed data to satisfy our objective.

An exit conference was waived by management.

## RELATED REPORTS

### Office of Inspector General Report

- Audit Report on [\*Cost and Schedule of the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site\*](#) (DOE/IG-0911, May 2014). The audit found that overall, the National Nuclear Security Administration (NNSA) and Shaw AREVA MOX Services LLC had been largely unsuccessful in controlling the cost and schedule for the Mixed Oxide Fuel Fabrication Facility (MOX Facility). In March 2012, NNSA found that Shaw AREVA MOX Services LLC was unlikely to complete construction of the MOX Facility according to the approved project baseline. NNSA concluded that total project costs were underestimated by up to \$900 million. NNSA directed Shaw AREVA MOX Services LLC to develop a baseline change proposal with updated cost and schedule projections. Shaw AREVA MOX Services LLC estimated that completing the MOX Facility would cost about \$7.7 billion and take until November 2019, representing a cost growth of \$2.9 billion and a schedule slippage of over 3 years.

### Government Accountability Office Report

- Report on [\*Plutonium Disposition Program DOE Needs to Analyze the Root Causes of Cost Increases and Develop Better Cost Estimates\*](#) (GAO-14-231, February 2014). NNSA identified various drivers for the close to \$3 billion increase in the estimated cost of the Plutonium Disposition Program's two construction projects—the MOX Facility and the Waste Solidification Building. The drivers included approval of the MOX Facility's cost and schedule estimates before design was complete and schedule delays in construction of Waste Solidification Building. According to NNSA, the cost of critical system components for the MOX Facility averaged 60 percent higher than estimated as a result of approval of estimates before the design was complete.

## MANAGEMENT COMMENTS



**Department of Energy**  
**Under Secretary for Nuclear Security**  
**Administrator, National Nuclear Security Administration**  
**Washington, DC 20585**



April 14, 2017

MEMORANDUM FOR APRIL STEPHENSON  
ACTING INSPECTOR GENERAL

FROM: FRANK G. KLOTZ *FKL 4/14/2017*

SUBJECT: Comments on the Office of Inspector General Draft  
Report Titled *Construction Rework at the Mixed Oxide  
Fuel Fabrication Facility (MOX)*  
[NNSA-2017-000619/A16SR014]

Thank you for the opportunity to review and comment on the subject draft report. The National Nuclear Security Administration (NNSA) appreciates the Office of Inspector General's (OIG) recognition of its recent actions to improve construction rework procedures and oversight processes at MOX. We agree with the Inspectors' recommendation to consider nonconformance reports as an additional data point to enhance our analysis of construction rework. As this is an ongoing activity, we consider this recommendation closed.

Consistent with the report's second recommendation, the MOX Contracting Officer is currently making a final determination regarding the allowability of questioned costs related to rework referenced in the report. The estimated completion date is April 30, 2017.

If you have any questions regarding this response, please contact Mr. Dean Childs, Director, Audits and Internal Affairs, at (301) 903-1341.



## **FEEDBACK**

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Washington, DC 20585

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