



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 24, 2012

Mr. Kelly D. Trice  
President and Chief Operating Officer  
Shaw AREVA MOX Services  
Savannah River Site  
P.O. Box 7097  
Aiken, SC 29804-7097

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT  
NO. 70-3098/2012-005

Dear Mr. Trice:

On June 27, 2012, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection pertaining to the construction of the Mixed Oxide (MOX) Fuel Fabrication Facility. The purpose of the inspection was to determine whether activities authorized by the construction authorization were conducted safely and in accordance with NRC requirements. The enclosed inspection report documents the inspection results. The inspection results were discussed with you and your staff on June 21 and June 27, 2012.

The inspection examined activities conducted under your construction authorization as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your authorization. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no violations or deviations were identified.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of NRC's "Rules of Practice," a copy of this letter, and its Enclosures, may be accessed through the NRC's public

K. Trice

electronic reading room, Agencywide Documents Access and Management System (ADAMS) on the Internet at <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this letter, please contact us.

Sincerely,

**/RA/**

Kathleen O'Donohue, Chief  
Construction Inspection Branch 2  
Division of Construction Inspection

Docket No: 70-3098

Construction Authorization No: CAMOX-001

Enclosure:

NRC Inspection Report 70-3098/2012-005

w/Attachment: Supplemental Information

cc: (See next page)

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cc: (See next page)

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cc:

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No: 70-3098

Construction  
Authorization No: CAMOX-001

Report No: 70-3098/2012-005

Applicant: Shaw AREVA MOX Services

Location: Savannah River Site  
Aiken, South Carolina

Inspection Dates: June 18 – June 27, 2012

Inspectors: Bradley J. Davis, Senior Construction Inspector, Construction Inspection  
Branch 2 (CIB2), Division of Construction Inspections (DCI), Region II  
Tony Ponko, Construction Inspector, CIB2, DCI, RII  
Jose Vasquez, Construction Inspector, CIB2, DCI, RII

Accompanying  
Personnel: None

Approved by: Kathleen O'Donohue, Branch Chief, CIB2, DCI, RII

Enclosure

## **EXECUTIVE SUMMARY**

Shaw AREVA MOX Services (MOX Services)  
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)  
NRC Inspection Report No. 70-3098/2012-005

The scope of the inspection encompassed a review of various MFFF activities related to Quality Level (QL)-1 construction for conformance to NRC regulations, the Construction Authorization Request (CAR), the MOX Project Quality Assurance Plan (MPQAP), and applicable industry standards. These activities included the following inspection attributes: Structural concrete and construction surveying.

The principle systems, structures, and components (PSSCs) discussed in this inspection report include PSSC-36, MOX Fuel Fabrication Building Structure. Non-PSSCs discussed in this inspection report include an evaluation of the adequacy of the applicant's methods of surveying for the layout and dimensional verification of various components within the facility.

### **PSSC Related Inspections**

#### **PSSC-036, MOX Fuel Fabrication Building Structure**

Construction procedures and specifications associated with concrete and reinforcing steel placement conformed to the commitments contained in the CAR. Construction activities related to PSSC-036 as described in Table 5.6-1 of the MFFF CAR were adequately performed in accordance with construction procedures and specifications. The material properties of installed concrete and reinforcing steel met the requirements of the construction specifications and relevant industry standards. No findings of significance were identified (Section 2a).

### **Non-PSSC Related Inspections**

#### **Geotechnical/Foundation Activities (IP 88131): Surveying Activities**

Surveying activities were performed in accordance with the commitments contained in the CAR. Surveying activities related to the settlement monitoring of the MFFF and dimensional tolerance verification of various components were performed in accordance with construction procedures and specifications. No findings of significance were identified (Section 3a).

## **REPORT DETAILS**

### **1. Summary of Facility Status**

During this inspection, the applicant continued construction activities of principle structures systems, and components (PSSCs). On-going construction activities included installation of reinforcing steel and embed plates in concrete placements within portions of the roof of the Mixed Oxide (MOX) Process Building (BMP). Shaw AREVA MOX Services continued installation of Quality Level (QL)-1 reinforcing steel during this inspection period.

### **2. PSSC Related Inspections**

#### **PSSC-036, MOX Fuel Fabrication Building Structure (Including Vent Stack)**

#### **a. Scope and Observations**

During the inspection, the inspectors observed the following activities associated with PSSC-036, MFFF building structure:

- 1) Installation of structural reinforcing steel in the BMP
- 2) Installation of embed plates in the BMP

The inspectors reviewed the applicable sections of the MPQAP and verified that installation of reinforcing steel and embed plates were in accordance with quality assurance programmatic requirements. Specifically, the inspectors verified that installation was in accordance with applicable industry standards, project procedures and construction specifications, field placement drawings, and the following construction design drawings: 1) MFFF Concrete and Reinforcing General Notes, DCS01-01352, Revision 16 (Sheet 1 of 2), and 2) MFFF Concrete and Reinforcing General Notes and Tolerance Details, DCS-01352, Revision 7 (Sheet 2 of 3), and Revision 0 (Sheet 3 of 3).

The inspectors reviewed project procedures and construction specifications associated with concrete work activities to determine whether the technical requirements were consistent with the commitments contained in the CAR. Procedures and specifications reviewed included those governing pre-placement testing, concrete and reinforcing steel placement, and inspection of QL-1 structural concrete construction. The inspectors evaluated Receipt Inspection Reports (RIR) associated with QL-1 reinforcing steel to determine if the material properties met the requirements of the construction specifications and applicable industry standards.

In-place reinforcing steel and embed plates associated with concrete placements R-15 and R-16 for the roof of the BMP were observed to be installed in accordance with the construction documents. The inspectors selectively checked placement of reinforcing steel, including bar sizes and spacing, lap splices, supports, and clear cover. The inspectors selectively verified that the sizes and locations of embed plates were consistent with the placement drawings.

The inspectors reviewed concrete cylinder break test records of tests performed and documented by Soil and Materials Engineers, Inc. The inspectors noted that the cylinder breaks met the acceptance criteria specified in American Concrete Institute (ACI), "Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-97)." The inspectors also reviewed the slump and air content and determined the acceptance criteria were met.

b. Conclusions

No findings of significance were identified.

**3. Non-PSSC related Inspections**

Geotechnical/Foundation Activities (IP 88131): Surveying Activities

a. Scope and Observations

The inspectors evaluated the adequacy of the applicant's surveying activities associated with settlement monitoring of the MFFF and dimensional verification of various components within the MFFF structure. The inspectors reviewed procedures and specifications used by survey technicians to verify dimensional tolerances for components within the facility such as fire barriers and tanks. The inspectors reviewed the specifications and procedures used by survey technicians to establish bench marks and control lines within facilities, and the use of the benchmarks and control lines by QC staff to verify the location of components. Some of these components included pipe supports, cable tray supports, and embed plates. The inspectors also reviewed the qualification records for survey technicians and the calibrations records for survey equipment being used.

b. Conclusions

No issues of significance were identified.

**4. Exit Interviews**

The inspection scope and results of this inspection were presented to you and members of your staff on June 21 and June 27, 2012. No dissenting comments were received. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes were not included in the report.

ATTACHMENT: SUPPLEMENTAL INFORMATION



## **SUPPLEMENTAL INFORMATION**

### **1. PARTIAL LIST OF PERSONS CONTACTED**

#### MOX Services

A. Anderson, Piper Fitter  
H. Baldner, Regulatory Compliance  
I. Farmer, Area Supervisor  
D. Fischer, Mechanical QC Inspector  
B. Gillham, Regulatory Compliance Manager  
K. Johnson, Pipe General Foreman  
D. Ivey, Quality Assurance/ Quality Control Manager  
S. Miller, Field Engineer/Survey Lead  
D. Pike, Area Construction Manager  
E. Schumpert, Pipe Fitter  
K. Trice, MOX President  
R. Woodward, Mechanical QC Inspector

### **2. INSPECTION PROCEDURES (IPs) USED**

IP 88131      Geotechnical/Foundation Activities  
IP 88132      Structural Concrete Activities

### **3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

None

### **4. LIST OF ACRONYMS USED**

ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System
BMF	MOX Fuel Fabrication Building
CA	Construction Authorization
CAP	Corrective Action Program
CAR	Construction Authorization Request
CFR	Code of Federal Regulations
CIB1, 2, 3	Construction Inspection Branch 1, 2, or 3
CMTR	Certified Material Test Report
CPB1	Construction Projects Branch 1
CR	Condition Report
DCI	Division of Construction Inspection
DCP	Division of Construction Projects
ECR	Engineering Change Request
IP	Inspection Procedure
IR	Inspection Report
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MOX Services	Shaw AREVA MOX Services

MPQAP	MOX Project Quality Assurance Plan
NCR	Non-conformance Report
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	Nuclear Regulatory Commission
PP	Project Procedure
PSSC	Principle System, Structure, and Component
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
Rebar	Reinforcing bar
RIR	Receipt Inspection Report
RII	Region II
WP	Work Package

**5. LIST OF PSSC's REVIEWED**

PSSC-036 MOX Fuel Fabrication Building Structure (including vent stack)

**6. RECORDS AND DOCUMENTS REVIEWED**

Procedures

PP3-5	Control of Non-Conforming Items, Rev. 8
PP3-26	Surveillance Activities, Rev. 2
PP9-1	SSC Quality Levels & Marking Design Documents, Rev. 12
PP9-39	Verification of Subcritical Dimensions for Criticality Safety, Rev. 0
PP10-14	Supplier/Subcontractor Technical Document Submittal Management, Rev. 7
PP11-03	Batch Plant Operating Instructions, Rev. 2
PP11-12	Placement of Concrete, Embedded Structural Items, and Accessories, Rev. 2
PP11-35	Construction Inspection and Acceptance Testing, Rev. 4
PP11-41	Construction Surveying, Rev. 1
PP11-44	Work Package Planning, Development, Approval, and Closure, Rev. 6
PP11-45	Bending Reinforcing Steel, Rev. 1
PP11-74	Piping Support Installation, Rev. 0

Construction Documents

08716-10888-P- 00002532\_-0581, Roof slab, Section R -15, Revision C  
 08716-10888-P- 00002532\_-0878, Roof slab, Section R -16,  
 08716-10888-P- 00002532\_-0582, Roof slab, Section R -15, Revision C  
 08716-10888-P- 00002532\_-0926, Roof slab, Section R -15, Revision B  
 08716-10888-P- 00002532\_-0854, Roof slab, Section R -16, Revision D  
 08716-10888-P- 00002532\_-0927, Roof slab, Section R -16, Revision B  
 08716-10888-P- 00002532\_-0583, Roof slab, Section R -16, Revision B  
 08716-10888-P- 00002532\_-0877, Roof slab, Section R -15, Revision B

Procurement Documents

RIR Inspection Summary, QC-RIR-12-33711, Rebar, Revision 7  
 RIR Inspection Summary, QC-RIR-12-33146, Rebar, Revision 7  
 RIR Inspection Summary, QC-RIR-12-31807, Rebar, Revision 7  
 RIR Inspection Summary, QC-RIR-12-33711, Rebar, Revision 7  
 RIR Inspection Summary, QC-RIR-12-34571, Rebar, Revision 7

Drawings

DCS01-BMF-DS-PLF-B-01352, General Notes, Revision 16  
 DCS01-BMF-DS-PLF-B-01352, General Notes, Tolerances, and Details, Revision 7  
 DCS01-BMF-DS-PLF-B-01705, Revision 1  
 DCS01-BMF-DS-PLF-B-31776, Embedded plate location, Revision 0  
     Sheet 1 of 69  
     Sheet 2 of 69  
     Sheet 53 of 69  
     Sheet 59 of 69  
     Sheet 61 of 69  
     Sheet 68 of 69  
     Sheet 69 of 69  
 DCS01-BMF-DS-PLF-B-01372, Concrete and Reinforcing Roof Plan View, Revision 3  
 DCS01-BMF-DS-PLF-B-11706, Embedded Plate locations, Revision 1  
 DCS01-BMF-DS-PLF-B-01352, Concrete and Reinforcement General Notes, Sheet 3 of  
     4, Revision 1  
 DCS01-BMF-DS-PLF-B-01352, Concrete and Reinforcement General Notes, Sheet 4 of  
     4, Revision 0  
 DCS01-BMF-DS-PLF-B-01353, Concrete and Reinforcement typical Details, Sheet 1 of  
     4, revision 10  
 DCS01-BMF-DS-PLF-B-01353, Concrete and Reinforcement typical Details, Sheet 2 of  
     4, Revision 7

Condition Reports (CR):

CR-10888-MOX-CR-12-341, Survey qualification records were not available through  
     training department.  
 CR-10888-MOX-CR-12-045, Criticality Dimensions  
 CR-10888-MOX-CR-12-332, Surveying Activities  
 CR-10888-MOX-CR-12-341, Survey Qualification Records

Engineering Change Request (ECR):

ECR-001228, Revision 2  
 ECR-000416, Revision 1  
 ECR-001792, Revision 0  
 ECR-002026, Revision 1  
 ECR-005259, Revision 1

ECR-005721, Revision 0  
 ECR-008280, Revision 0  
 ECR-014648, Revision 1  
 ECR-015050, Revision 0  
 ECR-017170, Revision 0  
 ECR-000415, Revision 1  
 ECR-016202, Revision 0  
 ECR-011832, Revision 4  
 ECR-003910, Revision 0  
 ECR-001316, Revision 1  
 ECR-014700, Revision 1  
 ECR-002519, Revision 2  
 ECR-001228, Revision 2  
 ECR-009672, Revision 0,  
 ECR-011896, Revision 1,  
 ECR-001138, Revision 0,  
 ECR-001428, Revision 0,  
 ECR-003283, Revision 0,  
 ECR-010168, Revision 0,  
 ECR-013415, Revision 1,  
 ECR-001228, Revision 2,  
 ECR-001792, Revision 0,  
 ECR-002026, Revision 1,  
 ECR-003910, Revision 0,  
 ECR-005259, Revision 1,  
 ECR-008280, Revision 0,  
 ECR-014648, Revision 1,  
 ECR-013704, Revision 0,

Field Change Requests (FCR):

FCR-000051, Revision 0  
 FCR-001393, Revision 0  
 FCR-000751, Revision 1  
 FCR-000385, Revision 1

Specifications

DCS01-BKA-DS-SPE-B-09330, Placing Concrete and Reinforcing Steel for Quality Level  
 1, 2, 3 & 4, Revision 6  
 DCS01-BKA-DS-SPE-B-09325-5, Section 03051 – Mixing and Delivering for Quality  
 Level QL-1 and QL-2 Concrete  
 DCS01-BKA-DS-SPE-B-09328-3, Section 03201 – Concrete Reinforcement for Quality  
 Level 1a (IROFS), 2, 3, & 4  
 DCS01-XGA-DS-SPE-B-09300-1, Section 0221 – Settlement Monitoring Program,  
 Quality Level 1  
 DCS01-ZMS-DS-SPE-M-15145-4, Field Fabrication and Installation of Pipe and  
 Electrical Raceway Supports, Quality Level 1

Miscellaneous Documents

DCS01-BKA-DS-SPE-B-09330, Placing Concrete and Reinforced Steel, Revision 6  
Form PP9-3A: Final Design Confirmation Checklist (QL-1 and Q-2 Documents only)

Document reviewed: BKA-DS-SPE-B-09330 FRMPP9-3A, Revision 6

Form PP9-3C: Design Verification Review and Summary

Document reviewed: DCS01-BKA-DS-SPE-B-09330, Revision 6