



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

May 10, 2017

EA-16-010

Mr. David Del Vecchio
President and Chief Operating Officer
CB&I AREVA MOX Services
Savannah River Site
P.O. Box 7097
Aiken, SC 29804-7097

**SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT
NUMBER 70-3098/2017-005 AND ASSESSMENT FOLLOWUP LETTER OF
AUTHORIZED ACTIVITIES**

Dear Mr. Del Vecchio:

During the period from April 10 – May 1, 2017, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection pertaining to the violations that were identified and documented in Nuclear Regulatory Commission (NRC) Inspection Report 70-3098/2016-006, issued on September 28, 2016 (ML16272A4444). The circumstances surrounding the violations are described in detail in NRC Inspection Report 70-3098/2016-005, issued on July 25, 2016 (ML16207A604).

The purpose of the inspection was to verify whether the corrective actions and associated activities as described in your letters dated August 17, 2016 (Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) and April 25, 2017 (Amended Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) were completed in accordance with the commitments in the referenced letters and in accordance with NRC requirements. The enclosed inspection report documents the inspection results. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

The inspectors reviewed selected procedures and records, observed construction activities, and interviewed personnel. Based on the results of this inspection, no violations or deviations were identified. In accordance with 10 CFR 2.390 of NRC's "Rules of Practice and Procedure," a copy of this letter and its enclosure may be accessed through the NRC's public electronic reading room, Agency-Wide Document Access and Management System (ADAMS) on the internet at <http://www.nrc.gov/reading-rm/adams.html>.

In addition, the NRC staff has completed a periodic performance review of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) construction activities authorized by NRC Construction Authorization Number (No.) CAMOX-001. The NRC reviewed inspection results and enforcement actions during the last quarter from January 1, 2017, through March 31, 2017 and the inspection results documented in this inspection report. This letter informs you of the NRC's

assessment of the safety performance at your facility during this period and any changes to our planned inspections at your facility.

In summary, the supplemental inspection enclosed in this letter was completed on May 1, 2017, in accordance with the NRC's Inspection Manual Chapter (IMC) 2630. Based on the results of this inspection, the NRC closed violations 70-3098/2016-06-01, Failure to Adequately Perform Measures to Verify the Validity of CoC for QL-1 Welded Components; and 70-3098/2016-06-02, Failure to Conduct Adequate Audits of SMCI, and updated its assessment of the MOX Fuel Fabrication Facility. This updated assessment transitioned the MOX Fuel Fabrication Facility to Licensee Response Column (Column 1) of the NRC's Construction Action Matrix described in IMC 2630 as of May 1, 2017. Therefore, as of the date of this letter, the NRC plans to conduct routine construction inspections at your facility.

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

Sincerely,

/RA/

Michael Ernstes, Chief
Construction Inspection Branch 3
Division of Construction Oversight

Docket No. 70-3098
Construction Authorization No.: CAMOX-001

Enclosure: NRC Inspection Report No. 70-3098/2017-005
w/attachment: Supplemental Information

cc w/encl: (See next page)

cc w/encl:

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SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT
NO. 70-3098/2017-005

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PUBLIC

PUBLICLY AVAILABLE NON-PUBLICLY AVAILABLE SENSITIVE NON-SENSITIVE
ADAMS: Yes ACCESSION NUMBER: **ML17130A830** SUNSI REVIEW COMPLETE FORM 665 ATTACHED

OFFICE	RII: DCO	RII: DCO	RII: DCO	NMSS:FCSE	NMSS:FCSE	RII: DCO
SIGNATURE	Via email	Via Email	Via Email	M. Diaz for	Via Email	ME
NAME	W. Gloersen	J. Fuller	D. Harmon	R. Johnson	D. Tiktinsky	M. Ernstes
DATE	05/04/2017	05/03/2017	05/04/2017	05/10/2017	05/08/2017	05/10/2017

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-3098

Construction Authorization No.: CAMOX-001

Report No.: 70-3098/2017-005

Applicant: CB&I AREVA MOX Services

Location: Savannah River Site
Aiken, South Carolina

Inspection Dates: April 10 – May 1, 2017

Inspectors: W. Gloersen, Senior Construction Project Inspector, Construction Inspection Branch 3 (CIB3), Division of Construction Oversight (DCO)
J. Fuller, Senior Resident Inspector, Construction Inspection Branch 1 (CIB1), DCO
D. Harmon, Construction Inspector, Construction Inspection Branch 2 (CIB2), DCO

Accompanying Personnel: W. Jones, Division Director, DCO
M. Ernstes, Branch Chief, CIB3, DCO
J. Hamman, Acting Senior Resident Inspector (MFFF), CIB3, DCO

Approved by: Michael Ernstes, Chief
Construction Inspection Branch 3
Division of Construction Oversight

Enclosure

EXECUTIVE SUMMARY

CB&I AREVA MOX Services (MOX Services)
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report (IR) Number (No.) 70-3098/2017-005

The scope of this inspection encompassed a review of various MFFF activities related to Quality Level (QL)-1 (safety-related) construction for conformance to U.S. Nuclear Regulatory Commission (NRC) regulations, the Construction Authorization Request (CAR), the MOX Project Quality Assurance Plan (MPQAP), applicable sections of the license application (LA) and applicable industry codes and standards. This inspection included, as applicable, a review of the corrective action program.

Follow-up of Previously Identified Items

The corrective actions and associated activities as described in MOX Services letters dated August 17, 2016 (Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) and April 25, 2017 (Amended Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) were completed in accordance with the commitments in the referenced letters and in accordance with NRC requirements. Therefore, (VIO) 70-3098/2016-06-01, Failure to Adequately Perform Measures to Verify the Validity of the Certificate of Compliance for QL-1 Welded Components and (VIO) 70-3098/2016-06-02, Failure to Conduct Adequate Audits of SMCI were closed. No findings were identified. (Section 2)

REPORT DETAILS

1. Summary of Facility Status

During the inspection period, the applicant CB&I AREVA MOX Services (MOX Services), continued construction activities of principal systems, structures and components (PSSCs). Construction activities continued related to closure of temporary construction openings (TCOs) of walls in the MOX Processing Building (BMP). Other construction activities included staging of process piping and installation of supports in the Aqueous Polishing Building (BAP) and BMP; installation of process piping in the BAP; installation of ventilation system ductwork and supports in the BAP and BMP; installation of drip trays in the BAP; installation of fire dampers in the BAP and BMP; and installation of various gloveboxes in the BAP and BMP. The applicant continued to receive, store, assemble, and test glove boxes and process equipment at the Process Assembly Facility (PAF).

2. Follow-up of Previously Identified Items

- a. (Closed) Violations (VIO) 70-3098/2016-06-01, Failure to Adequately Perform Measures to Verify the Validity of the Certificate of Compliance for QL-1 Welded Components; and (VIO) 70-3098/2016-06-02, Failure to Conduct Adequate Audits of SMC

(1) Scope and Observations

The inspectors reviewed MOX Services letters dated August 17, 2016, Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010 (DCS-NRC-000431) and April 25, 2017, Amended Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010 (DCS-NRC-000455) to verify that the corrective actions taken appropriately addressed the causes of the violations.

a) Root Cause Analysis

The inspectors reviewed Root Cause Analysis (RCA) 15-001, Ledger Plate Under-Sized Welds/Vendor, dated July 30, 2015. The inspectors noted the RCA clearly identified the problem and the reason why the root cause was performed. The inspectors reviewed the sequence of events listed and the root cause method used. The applicant used the barrier analysis to evaluate the root causes and the contributing causes. The inspectors verified that the root causes and contributing causes were clearly identified and documented. In addition, the inspectors verified that the RCA considered previous events. The inspectors noted that the applicant performed an extensive review of nonconformance reports to assess recurrent events. The review of recurrent events was documented in a spreadsheet but not in RCA 15-001. The inspectors verified that the applicability of this problem was reviewed by the applicant to determine if this event affected other processes, systems, or organizations. The inspectors verified that the root cause, extent of condition, and the extent of cause evaluations appropriately considered the safety culture. The applicant provided awareness training with emphasis on the reinforcement of questioning attitudes.

b) Potential consequences of ledger failures during operations

The inspectors reviewed the applicant's assessment of the potential consequences of ledger failures during operations in a letter dated August 17, 2016, Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010 (DCS-NRC-000431). The applicant acknowledged that the inadequate ledger plate welds would adversely affect the load bearing and structural capacity of the ledger plates. Although the impacted rooms where the ledger plates were located represented a small fraction of the rooms within the MFFF, the impacted rooms would contain items relied on for safety (IROFS) components during operations. The applicant did not perform an analysis of the consequences of operating with the as-found ledger plates since the design basis had been restored. The inspectors determined that this approach was acceptable. The applicant concluded that the health and safety of the public would not have been affected since the rooms with the inadequate ledger plate welds were interior rooms that did not impact the confinement safety function of the MFFF and the applicant did not identify any events that would impair the ventilation system's filtering safety function. The inspectors reviewed the applicant's determination that the performance requirements of 10 CFR 70.61 could potentially have been exceeded for the facility worker primarily based on the potential interaction between ventilation zones and the potential for facility workers to be located in these areas if a ledger plate failure were to occur. The inspectors noted that no actual consequences resulted from the inadequate ledger plate welds. The inspectors concluded that the applicant's response to the potential consequences of ledger failures during operations in the letter dated August 17, 2016 was acceptable.

c) Corrective steps that have been taken and the results achieved

The inspectors reviewed documentation related to enhancements made to the vendor oversight program in the spring of 2010. In the applicant's response to apparent violations, dated August 17, 2016, these enhancements are credited as corrective actions taken to address supplier performance issues. The inspectors reviewed these documents to determine whether they were relevant corrective actions for the root causes and contributing causes identified in Root Cause Analysis (RCA) 15 001. The inspectors reviewed organization charts and vendor shop surveillance schedules to verify that shop inspection resources and the number of in-process shop surveillances were increased in the spring of 2010. Specifically, the inspectors reviewed a document titled Shop Inspection Adjustments and the following attachments:

- Attachment A, MOX Quality Assurance Source Inspection Checklist, Revision (Rev.) 0, dated March 4, 2008 and Rev. 2, dated November 2011;
- Attachment B, Shop Inspection Expectations; and
- Attachment C, Email from Eric Radford dated May 28, 2010, Subject: Document Package Issues.

The inspectors reviewed a sample of shop inspection reports for SMCI to determine whether these inspections were performed in accordance with procedure PP3-29, Inspection at Supplier Facilities. The inspectors verified that the results of these shop inspections were appropriately documented and results evaluated to determine

the effectiveness of the control of quality by SMCI. Specifically, the inspectors reviewed the following shop inspection reports:

SMCI-15-FIR-041, Final Inspection Report, dated April 27, 2015;
SMCI-15-SIR-063, Shop Inspection Report, dated April 28, 2015;
SMCI-15-SIR-066, Shop Inspection Report, dated April 30, 2015;
SMCI-15-SIR-069, Shop Inspection Report, dated April 23, 2015;
SMCI-15-SIR-077, Shop Inspection Report, dated May 13, 2015;
SMCI-15-SIR-139, Shop Inspection Report, dated August 31, 2015

The inspectors reviewed a sample of internal audits and self-assessments of the MOX Services quality activities associated with source and receipt inspection. The inspectors reviewed a sample of audits from 2009 to 2016 to determine whether enhancements made to the vendor oversight program have been effective. Specifically, the inspectors reviewed the following quality assurance audit reports:

Audit Report Number DCS-09-A02, dated April 30, 2009;
Audit Report Number SA-10-A02, dated July 13, 2010;
Audit Report Number SA-11-A02, dated June 20, 2011;
Audit Report Number SA-12-A03, dated October 26, 2012;
Audit Report Number SA-13-A06, dated November 6, 2013;
Audit Report Number SA-14-A04, dated November 5, 2014;
Audit Report Number SA-15-A04, dated July 27, 2015;
Audit Report Number SA-16-A04, dated August 31, 2016

The inspectors reviewed completed actions associated with action numbers MOX-AT-15-1317, MOX-AT-15-1318, and MOX-AT-15-1319 and associated action tracking item closure verifications to determine whether an adequate sampling of vendor submittals was performed. Where MOX services had identified missing vendor submittals, the inspectors reviewed actions taken or justification provided to address the missing vendor information.

Under condition report 10888-MOX-CR-15-112, the applicant provided receipt and shop inspectors 8 and 10-hour training sessions as described in MOX Services response letter. The inspectors reviewed receipt inspectors' training records and personnel organization charts to determine if all of the applicable staff had received the described 8-hour course and 10-hour hands on training in weld inspection as described in the applicant's written response to the apparent violations.

The inspectors reviewed completed actions associated with action number MOX-AT-15-1325, which was associated with the development of a procedure for the conduct of vertical slice shop inspections. The inspectors reviewed procedure QOP-008, QC Program Vertical Slice Inspections, Rev. 0, dated June 24, 2016 to determine whether this procedure was adequate to address the action description stated in condition report 10888-MOX-CR-15-112. The inspectors also verified that the vendor oversight program includes requirements for record reviews and final receipt inspections.

The inspectors reviewed completed actions associated with action number MOX-AT-15-1315, which was associated with placing procurement restrictions on the vendor.

The inspectors reviewed supplier evaluation summary report numbers SMCI-15-VE50 and SMCI-16-VE76; to determine the vendor's current status on the MOX Services Approved Supplier List. The inspectors verified that the summary report contained the restriction that was described in the licensee's response to apparent violations, dated August 17, 2016. The inspectors reviewed items received since the approved suppliers list (ASL) restriction was placed on the vendor to determine whether the restrictions placed on the vendor in 2015 were effectively implemented.

The inspectors reviewed Quality Assurance Audit Report SMCI-15-VE50, which was performed June 2 – 5, 2015, at the SMCI facility in Lakeland, FL. The inspectors reviewed this audit report to determine whether the results of the audit were adequately documented and the identification and summary of deficiencies and were properly documented. Moreover, the inspectors reviewed the audit report to determine whether the audit results were sufficient to ascertain the general status of the vendor's quality assurance program implementation. The inspectors also reviewed MOX Services Supplier Deficiency Reports (SDRs) SMCI-15-VE50-01 through 12 to determine whether the deficiencies identified by MOX Services during audit number SMCI-15-VE50 were appropriately addressed and accepted by MOX Services.

Under condition report 10888-MOX-CR-15-112, the applicant revised the shop and receipt inspection plans as described in their response letter. The inspectors reviewed Appendix 44 of 10888-MOX-CR-15-112, Recommended Sample Inspections, and the revisions made to Q445, Receipt Inspection Plan and Q460, Vendor Shop Inspection Plan to determine if all required changes were made and if the changes made to the inspection plans were sufficient to prevent recurrence of violation 70-3098/2016-006-001.

In addition, the applicant performed weld inspections on a sample of other welded components supplied by SMCI. The inspectors reviewed the applicable parts of 10888-MOX-CR-15-112 to determine if MOX Services actions were adequate. The inspectors reviewed the sampling plans and the applicable procedure to determine if the sampling basis was statistically adequate. Additionally, the inspectors reviewed the inspection reports to determine if all the components in the plans had been inspected and found to be satisfactory. Lastly, the inspectors performed independent visual inspections of several of the components inspected by the licensee to verify that the welds made by SMCI did in fact meet the code and design requirements.

The applicant also performed weld inspections on a sample of welded components supplied by other vendors during the affected time period. The inspectors reviewed applicable portions of condition report 10888-MOX-CR-15-112 to determine if their actions were adequate. The inspectors reviewed the sampling plans and the applicable procedure to determine if the sampling basis was statistically adequate. Additionally, the inspectors reviewed the inspection reports to determine if all the components in the plans had been inspected and found to be satisfactory. Lastly, the inspectors performed independent visual inspections of several of the components inspected by the licensee to verify that the welds met code and design requirements.

(2) Conclusions

The corrective actions and associated activities as described in MOX Services letters dated August 17, 2016 (Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) and April 25, 2017 (Amended Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010) were completed in accordance with the commitments in the referenced letters and in accordance with NRC requirements. Therefore, (VIO) 70-3098/2016-06-01, Failure to Adequately Perform Measures to Verify the Validity of the Certificate of Compliance for QL-1 Welded Components and (VIO) 70-3098/2016-06-02, Failure to Conduct Adequate Audits of SMCI are closed. No findings were identified.

3. Exit Meeting

The inspection scope and results were summarized during this reporting period by the inspectors at an exit meeting with MOX Services management on May 1, 2017. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes was not included in this report.

DCO	Division of Construction Oversight
EA	Enforcement Action
FIR	Final Inspection Report
IR	Inspection Report
IROFS	Items Relied on for Safety
LA	License Application
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MOX Services	CB&I AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
NCR	Non-conformance Report
No.	Number
NRC	Nuclear Regulatory Commission
PAF	Process Assembly Facility
PP	Project Procedure
PSSC(s)	Principle System(s), Structure(s), and Component(s)
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
RCA	Root Cause Analysis
RII	Region II
Rev.	Revision
SDRs	Supplier Deficiency Reports
SIRs	Shop Inspection Reports
SMCI	Specialty Maintenance and Construction, Incorporated
SRs	Surveillance Reports
TCO	Temporary Construction Opening
VIO	Violation
WP	Work Package

5. **LIST OF PSSCs REVIEWED**

None

6. **RECORDS AND DOCUMENTS REVIEWED**

Condition Reports

10888-MOX-CR-15-112

Appendix 40, AT-15-1320 Action Completion Details

Appendix 44, Recommended Sample Inspections

Appendix 65, AT-15-1676 Action Completion Details

Appendix 59, Sample Plan for 118CD Embedded Plates

Appendix 60, Sample Plan for Exterior Wall Tie Backs

Appendix 61, Sample Plan for Precast Slab Support Beam in Room C-135

Appendix 62, Truck Bay Ventilation Assemblies

Appendix 63, Angle Frames

10888-MOX-CR-16-181

Inspection Reports

S561G-17-00276
 S561G-17-00671
 S561G-17-00703
 S561G-17-00731
 S561G-17-00682
 S561G-17-00679
 S561G-17-00680
 S561G-17-00732
 S561G-17-00171
 S561G-17-00681
 S561G-17-00683
 S561G-17-00684
 S561G-17-00686
 S561G-17-00687
 S561G-17-00688
 S561G-17-00689
 S561G-17-00690
 S561G-17-00704
 S561G-17-00705
 S561G-17-00706
 S561G-17-00707
 S561G-17-00708

Miscellaneous

10-hour hands on weld inspection training records for 15 receipt inspectors
 8-Hour weld inspection training certificates for 15 receipt inspectors
 Quality Control Department Organization Chart dated April 3, 2017
 Quality Control Department Organization Chart dated October 6, 2015
 Q445, Receipt Inspection Plan, Rev. 17
 Q460, Vendor Shop Inspection Plan Rev. 2
 Shop Inspection Adjustments and the following attachments:
 Attachment A, MOX Quality Assurance Source Inspection Checklist, Rev. 0,
 dated March 4, 2008 and Rev. 2, dated November 2011;
 Attachment B, Shop Inspection Expectations; and
 Attachment C, Email from Eric Radford dated May 28, 2010, Subject: Document
 Package Issues.
 DCS01-AAJ-DS-PRG-X-66038-2, MOX Fuel Fabrication Facility Commercial Grade
 Dedication (CGD) Program Plan, May 29, 2015
 Root Cause Analysis (RCA) 15-001, Ledger Plate Under-Sized Welds/Vendor

Nonconformance Reports (NCRs)

10888-MOX-NCR-17-7406
 10888-MOX-NCR-17-7343
 10888-MOX-NCR-16-7304

Project Procedures (PP)

PP3-29, Inspection at Supplier Facilities, Rev. 0, 1, 2, and 3

Quality Assurance Audit Reports

SMCI-15-VE50, Rev. 1, dated June 4, 2015
SMCI-16-VE76, Rev. 0, dated April 28, 2016
Audit Report Number DCS-09-A02, dated April 30, 2009
Audit Report Number SA-10-A02, dated July 13, 2010
Audit Report Number SA-11-A02, dated June 20, 2011
Audit Report Number SA-12-A03, dated October 26, 2012
Audit Report Number SA-13-A06, dated November 6, 2013
Audit Report Number SA-14-A04, dated November 5, 2014
Audit Report Number SA-15-A04, dated July 27, 2015
Audit Report Number SA-16-A04, dated August 31, 2016

Shop Inspection Reports (SIRs)

SMCI-15-SIR-041, Final Inspection Report, dated April 27, 2015;
SMCI-15-SIR-063, Shop Inspection Report, dated April 28, 2015;
SMCI-15-SIR-066, Shop Inspection Report, dated April 30, 2015;
SMCI-15-SIR-069, Shop Inspection Report, dated April 23, 2015;
SMCI-15-SIR-077, Shop Inspection Report, dated May 13, 2015;
SMCI-15-SIR-139, Shop Inspection Report, dated August 31, 2015

Supplier Deficiency Reports (SDRs)

SDR-SMCI-15-VE50-01 through 12

Surveillance Reports (SRs)

SR-QC-16-0256
SR-QC-16-0257
SR-QC-16-0258
SR-QC-16-0259
SR-QC-16-0260
SR-QC-16-0255
SR-QC-16-0261