



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

July 25, 2016

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 70-3098/2016-005 AND APPARENT VIOLATIONS**

Dear Mr. Del Vecchio:

This refers to an inspection completed on July 6, 2016, by the U. S. Nuclear Regulatory Commission (NRC) pertaining to the construction of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) by CB&I AREVA MOX Services (MOX Services). The purpose of the inspection was to determine whether activities authorized by the construction authorization and license application were conducted safely and in accordance with NRC requirements. The enclosed inspection report documents the inspection results. At the conclusion of the inspection, the findings were preliminarily discussed with those members of your staff identified in the enclosed report. A final exit with MOX Services' senior management was held on July 14, 2016.

The inspection examined activities conducted under your construction authorization and license application 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 the inspection, two apparent violations (AVs) were identified and are being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>.

The first AV involves MOX Services' failure to adequately perform measures to verify the validity of Certificates of Conformances (CoCs) for Quality Level-1 (safety-related) welded ledger assemblies purchased from Specialty Maintenance and Construction, Inc. (SMCI) between November 2008 and June 2010. Specifically, MOX Services failed to verify that the CoCs identified MOX Services' specific procurement requirements for the ledgers and that the purchased ledgers met the requirements.

The second AV involves MOX Services' failure to conduct adequate audits of SMCI. Specifically, the audit reports for the ledger assembly supplier (SMCI) did not document objective evidence of inspections or surveillances related to manual welding during their audits. These deficiencies resulted in the installation of approximately 100 ledger assemblies with the following weld deficiencies: undersize (leg and/or throat), less than specified length, undercut and code prohibited joint design. Full capacity repairs on the ledger assemblies were required in order to meet the design requirements for the facility. The two AVs appear to represent a breakdown in MOX Services' Quality Assurance program for construction related to a single work activity (structural welding), involve MOX Services' failure to provide adequate oversight to this activity, and entail multiple examples (approximately 100 ledgers) of deficient construction as the result of inadequate program implementation. However, no actual nuclear safety consequences resulted from the deficient ledger assembly welds.

The circumstances surrounding these apparent violations, your corrective actions, the significance of the issues, and the need for lasting and effective corrective action were previously discussed between members of your staff and the NRC. As a result, it may not be necessary to conduct a pre-decisional enforcement conference in order to enable the NRC to make an enforcement decision. In addition, because your facility has not been the subject of escalated enforcement within the past two years, and based on our understanding of your corrective actions, a civil penalty may not be warranted in accordance with Section 2.3.4 of the Enforcement Policy. The final decision will be based on you confirming on the license docket that the corrective actions previously described or discussed with the NRC staff have been or are being taken.

Before the NRC makes its enforcement decision, we are providing you an opportunity to (1) respond in writing to the AVs summarized in this letter within 30 days of the date of this letter, or (2) request a Pre-decisional Enforcement Conference (PEC). If a PEC is held, the NRC will issue a press release to announce the time and date of the conference, and the conference will be open to public observation. If you decide to participate in a PEC, please contact Michael Ernestes at (404) 997-4540, within 10 days of the date of this letter. A PEC should be held within 30 days of the date of this letter.

If you choose to provide a written response, it should be clearly marked as a "Response to Apparent Violations in NRC Inspection Report 70-3098/2016-005, EA-16-010, and should include (1) the reason for the AVs or, if contested, the basis for disputing the apparent violations; (2) the potential consequences of ledger failures during operations, including, but not limited to, the effects on worker safety and safety-related equipment in the impacted rooms and adjoining rooms, and any offsite consequences; (3) the corrective steps that have been taken and the results achieved; (4) the corrective steps that will be taken; and (5) the date when full compliance was or will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. Additionally, your response should be sent to the NRC's Document Control Center, with a copy mailed to William B. Jones, Director, Division of Construction Projects, Region II, 245 Peachtree Center Avenue NE, Atlanta, GA 30303, within 30 days of the date of this letter. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a PEC.

If you choose to request a PEC, the conference will afford you the opportunity to provide your perspective on these matters and any other information that you believe the NRC should take into consideration before making an enforcement decision.

The decision to hold a PEC does not mean that the NRC has determined that a violation has occurred or that enforcement action will be taken. This conference would be conducted to obtain information to assist the NRC in making an enforcement decision. The topics discussed during the conference may include information to determine whether a violation occurred, information to determine the significance of a violation, information related to the identification of a violation, and information related to any corrective actions taken or planned.

In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions concerning this matter, please contact Michael Ernstes at (404) 997-4540.

Sincerely,

/RA/

William B. Jones, Director
Division of Construction Projects

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

Enclosure:
NRC Inspection Report No. 70-3098/2016-005
w/attachment: Supplemental Information

cc w/encl: See next page

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William B. Jones, Director
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w/attachment: Supplemental Information

cc w/encl: See next page

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ADAMS: Yes ACCESSION NUMBER: SUNSI REVIEW COMPLETE FORM 665 ATTACHED

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SIGNATURE	/RA/	/RA via telephone/	/RA/	/RA/	/RA/	/RA via Email	/RA via Email
NAME	W. Gloersen	C. Huffman	D. Seymour	S. Price	D. Gamberoni	R. Sun	T. Marenchin
DATE	7/11/2016	07/11/2016	07/11/2016	7/13/2016	7/13/2016	7/20/2016	7/20/2016
E-MAIL COPY?	YES	YES					

OFFICIAL RECORD COPY: EA-16-010 IR 2016005rev4 CCI/DCP/CPB1/MOX/FFF/Inspection/IR/2015.docx

cc w/encl:

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NA-262.1
P.O. Box A
Aiken, SC 29802

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Defense Nuclear Facilities Safety Board
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Aiken, SC 29804-7097

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-3098

Construction
Authorization No.: CAMOX-001

Report No.: 70-3098/2016-005

Applicant: CB&I AREVA MOX Services

Location: Savannah River Site
Aiken, South Carolina

Inspection Dates: June 20-July 6, 2016.

Inspectors: C. Huffman, Senior Resident Inspector, Construction Projects Branch
(CPB) 1, Division of Construction Projects (DCP), Region II (RII)

Approved by: D. Seymour, Branch Chief, CPB1, DCP, RII

Enclosure

EXECUTIVE SUMMARY

CB&I AREVA MOX Services (MOX Services)
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report (IR) Number (No.) 70-3098/2016-005

An in-office inspection was conducted by regional staff from June 20 through July 6, 2016. The purpose of the in-office inspection was to disposition an unresolved item (URI) identified during inspections conducted between January 1 and June 30, 2015, and documented in NRC Inspection Report 70-3098/2015-002 as URI 70-3098/2015-002-001. The URI involved Principal Structures, Systems, and Component (PSSC)-036, MFFF Building Structure. The results of the in-office inspection are summarized below:

Review of Previously-Identified Items

The inspectors reviewed URI 70-3098/2015-002-001, Potentially Inadequate Welds on the Pre-cast Floor Panel Ledgers in the Aqueous Polishing Building (BAP). Based on the results of the review, URI 70-3098/2015-002-001 was closed and the following two apparent violations (AVs) were identified:

1. AV 70-3098/2016-005-001: Failure to Adequately Perform Measures to Verify the Validity of Certificates of Conformance (CoCs) for Quality Level-1 Welded Ledger Assemblies. The ledgers were purchased from Specialty Maintenance and Construction, Inc. (SMCI) between November 2008 and June 2010. Specifically, MOX Services failed to verify that the CoCs identified MOX Services' specific procurement requirements for the ledgers and that the purchased ledgers met the requirements (Section 2.a).
2. AV 70-3098/2016-005-002: Failure to Conduct Adequate Audits of SMCI. Specifically, the audit reports for the ledger assembly supplier (SMCI) did not document objective evidence of inspections or surveillances related to manual welding during their audits (Section 2.a).

REPORT DETAILS

1. Summary of Facility Status

During the inspection period, the applicant (CB&I AREVA MOX Services (MOX Services)) continued construction activities of principle systems, structures and components (PSSCs).

2. Review of Previously-Identified Items

a. Scope and Observations

During an earlier inspection in 2015, the inspectors observed construction activities related to PSSC-036, MOX Fuel Fabrication Building, as described in Table 5.6-1 of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) Construction Authorization Request. The inspection attributes observed were special processes (welding) and installation. Observations included the completed welding and installation of ledger assemblies that supported pre-cast floor panels in the Aqueous Polishing Building (BAP). Unresolved Item (URI) 70-3098/2015-002-001 was identified for potentially inadequate welds on approximately 100 of the ledger assemblies in the BAP.

After further review of the inadequate welds on the floor ledgers, the inspectors determined that, between November 2008 and June 2010, Specialty Maintenance and Construction, Inc. (SMCI) provided MOX Services' Quality Level-1 (QL-1) (safety-related) welded ledger assemblies which make up portions of the load bearing floor/ceiling supports in 25 rooms of the BAP that did not meet code, specification, and documentation requirements.

The inspectors determined that MOX Services failed to adequately perform measures to verify the validity of SMCI's Certificates of Conformance (CoCs) for the ledger assemblies. Specifically, MOX Services failed to verify that the CoCs identified MOX Services' specific procurement requirements for the ledgers and that the purchased ledgers met the requirements.

MOX Services also failed to conduct adequate audits of SMCI. Specifically, the audit reports for the ledger assembly supplier (SMCI) did not document objective evidence of inspections or surveillances related to manual welding during their audits.

These deficiencies resulted in the installation of approximately 100 ledger assemblies with the following weld deficiencies: undersize (leg and/or throat), less than specified length, undercut and code prohibited joint design. Full capacity repairs on the ledger assemblies were required in order to meet the design requirements for the facility

Extensive repair work was required to correct the welding issues in order for floor panels to meet their design requirements. MOX Services' Engineering designed a repair that required additional supports underneath the ledger assemblies. These additional supports were installed and, based on MOX Services' calculations, are capable of carrying the full design load.

Without correction of the ledger deficiencies, any failures during future operations of the facility could have affected worker safety for workers in the rooms, and could have caused the failure of safety-related equipment in the impacted rooms, as well as cause other potential consequences. No actual personnel safety or nuclear safety consequences resulted from the deficient ledger assembly welds.

The inspectors reviewed the root cause analysis performed by the applicant. The two root causes identified in the applicant's analysis point to deficiencies in the welding and quality control functions at the vendor. The contributing causes identified in the report are deficiencies in the MOX Services' scope of responsibility for procuring/receiving items.

In summary, the inspectors identified two apparent violations (AVs):

- (1) Condition 3.A of the NRC Construction Authorization No. CAMOX-001, Revision (Rev.) 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant in accordance with the statements, representations, and conditions of the MOX Project Quality Assurance Plan (MPQAP), dated March 26, 2002 and supplements thereto; (MPQAP, Rev. 6, dated May 22, 2008).

MPQAP, Section 7, Control of Purchased Material, Equipment, and Services, Section 7.2.7, Certificate of Conformance, allows for the use of a certificate of conformance (CoC) to accept material, equipment, or services from a supplier. MPQAP Section 7.2.7.F required, in part, that "measures shall be identified to verify the validity of supplier certificates and the effectiveness of the certification process (such as by audit of the supplier/subcontractor or by an independent inspection or test of the item)."

MOX Services' Specification DCS01-BAA-DS-SPE-B-09352, Metal Fabrications for Quality Levels 1, 2, 3, and 4, required vendor documentation submittals for welder qualifications, inspector qualifications, and certified welding inspection reports.

Contrary to the above, between June 2008 and November 2010, MOX Services accepted material, equipment, and services from a supplier, SMCI, without verifying the validity of supplier certificates and the effectiveness of the certification process (such as by audit of the supplier/subcontractor or by an independent inspection or test of the item). In this case, the MOX certification process and receipt inspections failed to identify that CoCs and related documentation for safety-related ledger assemblies did not meet MOX Service's specifications regarding welder qualifications, inspector qualifications, and certified welding inspection reports.

An apparent violation (AV) was identified for the failure to adequately perform measures to verify the validity of CoCs for QL-1 welded ledger assemblies purchased from SMCI between June 2008 and November 2010. Specifically, MOX Services failed to verify that the CoCs identified MOX Services' specific procurement requirements for the ledgers and that the purchased ledgers met the requirements (AV 70-3098/2016-005-001: Failure to Adequately Perform Measures to Verify the Validity of CoCs for QL-1 Welded Ledger Assemblies).

- (2) Condition 3.A of the NRC Construction Authorization No. CAMOX-001, Rev. 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant in accordance with the statements, representations, and conditions of the MPQAP, dated March 26, 2002 and supplements thereto; (MPQAP, Rev. 6, dated May 22, 2008).

MPQAP, Section 5, Instructions, Procedures, and Drawings, Section 5.1 General, states in part that "Quality-affecting activities are prescribed by and performed in accordance with documented, approved Quality Assurance (QA) procedures and other approved implementing documents (drawings, specifications, etc.) appropriate to the MOX Project workscope."

MOX Services' Project Procedure (PP) 3-12, Supplier Evaluation, Rev. 8, dated March 4, 2008, Section 3.8.10, specified that "the Lead Auditor shall perform the audit by examining objective evidence (e.g. records, work in progress, etc.), conducting interviews, and reviewing procedures and QA Program documents to ensure compliance with MOX Services' QA Program requirements established for the supplier or product."

MOX Services' Specification DCS01-BAA-DS-SPE-B-09352, Metal Fabrications for Quality Levels 1, 2, 3, and 4, required QL-1 items to be welded and inspected in accordance with American Welding Society (AWS) D1.1, Structural Welding Code - Steel.

Contrary to the above, between June 2008 and November 2010, MOX Services' audits of SMCI were inadequate in that the audits failed to ensure SMCI's compliance with the MOX Services' QA program requirements established for the supplier or product, as required by the MPQAP and PP3-12. MOX Services failed to perform and document adequate examination of objective evidence during audits preceding the fabrication and installation of the ledger assemblies. Specifically, MOX Services failed to provide objective evidence for the adequacy of manual welding performed by SMCI prior to procurement of the ledger assemblies.

As a result, approximately 100 ledger assemblies were obtained from SMCI with the following weld deficiencies: undersize (leg and/or throat), less than specified length, undercut and code-prohibited joint design. The ledger assemblies were also fabricated with material shapes that resulted in an intermittent partial joint penetration weld instead of the specified intermittent fillet weld. An intermittent partial joint penetration weld is prohibited by AWS D1.1. An AV was identified for the failure to conduct adequate audits of SMCI. Specifically, the audit reports for the ledger assembly supplier (SMCI) did not document objective evidence of inspections or surveillances related to manual welding during their audits (AV 70-3098/2016-005-002: Failure to Conduct Adequate Audits of SMCI).

The two apparent violations appear to represent a breakdown in MOX Services' QA program for construction related to a single work activity (structural welding), and involved MOX Services' failure to provide adequate oversight to this activity, and entails multiple examples (approximately 100 ledgers) of deficient construction as

the result of inadequate program implementation. No actual personnel safety nuclear safety consequences resulted from the deficient ledger assembly welds.

b. Conclusions

Based on the results of the in-office review, URI 70-3098/2015-002-001 was closed and the following two AVs were identified:

- (1) AV 70-3098/2016-005-001: Failure to Adequately Perform Measures to Verify the Validity of CoCs for QL-1 Welded Ledger Assemblies. The ledgers were purchased from SMCI between November 2008 and June 2010. Specifically, MOX Services failed to verify that the CoCs identified MOX Services' specific procurement requirements for the ledgers and that the purchased ledgers met the requirements.
- (2) AV 70-3098/2016-005-002: Failure to Conduct Adequate Audits of SMCI. Specifically, the audit reports for the ledger assembly supplier (SMCI) did not document objective evidence of inspections or surveillances related to manual welding during their audits.

3. Exit Interviews

The inspection scope and results were summarized throughout this reporting period and by the Senior Resident Inspector at an exit meeting with applicant senior management on July 14, 2016. Dissenting views were not expressed by the applicant. 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.

SUPPLEMENTAL INFORMATION

1. **PARTIAL LIST OF PERSONS CONTACTED**

Gwyn, D., Licensing/Nuclear Safety Manager
Radford, E., Regulatory Compliance Manager
Del Vecchio, D., President/ Project Manager
Gober, M., Vice President Engineering
Ivey, D., Director of Project Assurance
King, S., Vice President Operations
Moorer, R., Director, Construction Engineering
Nickel, C., Director, MOX Commissioning
Phillips, C., Vice President Construction
Radford, E., Regulatory Compliance
Reed, J. Director of Construction
Rousseau, G., MOX Deputy Project Manager
Thomas, E., Special Projects Manager
Whitley, R., CPSG Project Assurance

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

IP 88130 Resident Inspection Program For On-Site Construction Activities at the
Mixed-Oxide Fuel Fabrication Facility

IP 88132 Structural Concrete Activities

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

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
70-3098/2015-02-01	Closed	URI: Potentially Inadequate Welds on the Pre-cast Floor Panel Ledgers in the BAP (Section 2.a).
70-3098/2016-05-01	Open	AV: Failure to Adequately Perform Measures to Verify the Validity of CoCs for QL-1 Welded Ledger Assemblies (Section 2.a)
70-3098/2016-05-02	Open	AV: Failure to Conduct Adequate Audits of SMCI (Section 2.a)

4. **LIST OF ACRONYMS USED**

AV	Apparent violation
AWS	American Welding Society
BAP	Aqueous Polishing Building
CoC	Certificate of Conformance
IR	Inspection Report
MOX	Mixed oxide
MFFF	MOX Fuel Fabrication Facility
MOX Services	CB&I AREVA MOX Services

No.	Number
MPQAP	MOX Project Quality Assurance Plan
PEC	Pre-decisional Enforcement Conference
PP	Project Procedure
PSSC(s)	Principle System(s), Structure(s) and Component(s)
QA	Quality Assurance
QL-1	Quality Level 1
Rev.	Revision
SMCI	Specialty Maintenance and Construction, Inc.
URI	Unresolved Item

Letter to D. Del Vecchio from Deborah Seymour dated July 25, 2016.

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT
NO. 70-3098/2016-005

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