



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

April 13, 2017

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 70-3098/2017-001**

Dear Mr. Del Vecchio:

During the period from January 1, 2017, through March 31, 2017, the U. S. Nuclear Regulatory Commission (NRC) completed inspections pertaining to the construction of the Mixed Oxide Fuel Fabrication Facility. The purpose of the inspections 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 inspections, the findings were discussed with those members of your staff identified in the enclosed report.

The inspections 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 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>.

Thank you for your response dated March 16, 2017, to the Notice of Violation (NOV) issued on February 2, 2017, (70-3098/2016-004-001). The Notice of Violation was in regard to the inspection conducted October 1, 2016, through December 31, 2016 at your Mixed Oxide Fuel Fabrication Facility (MFFF). We acknowledge receipt of your reply to NRC Inspection Report No. 70-3098/2016-004. We have evaluated your response to the violation that was identified during the inspection and found that it meets the requirements of 10 CFR 2.201. Your proposed corrective actions appear to be adequate. The violation will remain open until we have verified implementation of your corrective actions during future inspections.

D. Del Vecchio

2

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. 70-3098/2017-001
w/attachment: Supplemental Information

cc w/encl: (See next page)

cc w/encl:

Mr. Scott Cannon, Federal Project Director
NA-262.1
P.O. Box A
Aiken, SC 29802

Ms. Joyce Connery, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Ave., NW, Suite 700
Washington, DC 20004

Mr. Joseph Olencz, NNSA/HQ
1000 Independence Ave., SW
Washington, DC 20585

Ms. Susan Jenkins
Division of Radioactive Waste Management
Bureau of Health and Environmental Control
2600 Bull St.
Columbia, SC 29201

D. Silverman
Morgan, Lewis, and Bockius
1111 Penn. Ave., NW
Washington, DC 20004

G. Carroll
Nuclear Watch South
P.O. Box 8574
Atlanta, GA 30306

Ms. Diane Curran
Harmon, Curran, Spielburg and Eisenberg, LLP
1726 M St., NW, Suite 600
Washington, DC 20036

L. Zeller
Blue Ridge Environmental Defense League
P.O. Box 88
Glendale Springs, NC 28629

Mr. Dealis Gwyn, Licensing Manager
CB&I AREVA MOX Services
Savannah River Site
P.O. Box 7097
Aiken, SC 29804-7097

Letter to D. Del Vecchio from Michael Ernstes dated April 13, 2017

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT
NO. 70-3098/2017-001

Distribution w/encl:

- R. Johnson, NMSS
- D. Tiktinsky, NMSS
- M. Diaz, NMSS
- W. Jones, RII
- M. Ernstes, RII
- R. Musser, RII
- R. Nease, RII
- J. Heisserer, RII
- W. Gloersen, RII
- J. Hamman, RII
- PUBLIC

PUBLICLY AVAILABLE NON-PUBLICLY AVAILABLE SENSITIVE NON-SENSITIVE
 ADAMS: Yes ACCESSION NUMBER: **ML17103A191** SUNSI REVIEW COMPLETE FORM 665 ATTACHED

OFFICE	RII: DCO	RII: DCO	RII: DCO	RII: DCO			
SIGNATURE	Via Email	Via Email	Via Email	/RA/			
NAME	W. Gloersen	J. Hamman	N. Karlovich	M. Ernstes			
DATE	4/05/2017	04/05/2017	04/05/2017	04/13/2017			

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-3098

Construction
Authorization No.: CAMOX-001

Report No.: 70-3098/2017-001

Applicant: CB&I AREVA MOX Services

Location: Savannah River Site
Aiken, South Carolina

Inspection Dates: January 1 – March 31, 2017

Inspectors: J. Hamman, Acting Senior Resident Inspector, Construction
Inspection Branch 3 (CIB3), Division of Construction
Oversight (DCO)
N. Karlovich, Senior Resident Inspector, CIB3, DCO

Accompanying Personnel: M. Ernstes, Branch Chief, CIB3, DCO
W. Gloersen, Senior Construction Project Inspector, 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.) 70-3098/2017-001

The scope of the inspections 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, the following inspection attributes: Corrective action program, test control, special processes, procedures, and installation.

The following principle systems, structures and components (PSSCs) are discussed in this inspection report:

- PSSC-011, Electrolyzer Structure
- PSSC-021, Fire Barriers
- PSSC-024, Glovebox
- PSSC-026, Guide Sleeves
- PSSC-039, Polytetrafluoroethylene (PTFE) Insulator
- PSSC-041, Process Cells

Routine Resident Inspections

The inspectors routinely reviewed the applicant's weekly construction status package, reviewed the status of work packages maintained at various work sites, conducted daily tours of work and material storage areas, observed installation of mechanical equipment, and reviewed various corrective action documents to assess the adequacy of the MOX Services' corrective action program. Construction activities were performed in a safe and quality-related manner. No findings were identified. (Section 2)

PSSC Inspections

PSSC-021, Fire Barriers

The inspectors reviewed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR for item relied on for safety (IROFS) fire damper HVV*DMPF0203D-03. This inspection was for the installation of concrete spacing material for the damper penetration. The inspection attribute reviewed was installation. The inspectors independently verified that concrete panel placement and orientation was in accordance with design drawings, proper torqueing of anchor bolts, torque wrench calibration, and QC installation verification measurements. No findings were identified. (Section 3.a)

PSSC-024, Glovebox

PSSC-011, Electrolyzer Structure

PSSC-026, Guide Sleeves

PSSC-039, Polytetrafluoroethylene (PTFE) Insulator

The inspectors reviewed construction activities related to PSSC-024, Glovebox as described in Table 5.6-1 of the MFFF CAR. As these inspections were related to the installation of the

Electrolyzer glovebox as a whole unit and the installation of trolley rails in the NTM glovebox. The internal components and structure of the electrolyzer were also within the scope of the inspection. The electrolyzer structure included PSSC-011 and the internal components of the electrolyzer included PSSC-026, Guide Sleeves, and PSSC 39, PTFE Insulator, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation. The inspectors independently measured the installation of the electrolyzer glovebox KDB *GB1000 in room C-322 and KDD*GB2000 in room C-335 to verify whether the location, placement, and orientation of the glovebox was in accordance with design drawings. The inspectors also reviewed a sample of welds for the glovebox seismic feet. The inspectors reviewed work activities for trolley rail placement in glovebox NTM*GB30000, including work package place keeping, QC hold point observation, foreign material exclusion controls, and material issue and control. No findings were identified. (Section 3.b)

PSSC-041, Process Cells

The inspectors reviewed construction activities related to PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS component was drip tray LGF*DRIP6900 in Room C-242. The inspectors reviewed work package content, place keeping, weld map, final weld size, and general channel layout. No findings were identified. (Section 3.c)

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. Routine Resident Inspection Activities

a. Inspection Procedure (IP) 88130, Construction: Resident Inspection Program for On-Site Construction Activities at the Mixed Oxide Fuel Fabrication Facility

(1) Scope and Observations

The inspectors routinely reviewed the applicant's construction weekly status meeting notes. The inspectors held discussions with MOX Services design engineers, field engineers, quality assurance (QA) and quality control (QC) personnel, and subcontractor construction personnel in order to maintain current knowledge of construction activities and any problems or concerns.

The inspectors reviewed the status of work packages (WPs) maintained at various work sites.

The inspectors reviewed various corrective action documents. The review included non-conformance reports (NCRs) and condition reports (CRs). The inspectors also reviewed the closure of NCR-17-7470. This NCR was related to loose flange bolts for emergency supply air ducts. Specifically, the licensee could not find objective evidence that the flanged connections received final QC inspection. The inspectors reviewed the completed action for the NCR, which was additional steps created for the work package that documented rework to assure snug tight requirements were met, construction engineer witnessing of snug tight requirements, and QC verification of snug tight requirements.

The inspectors routinely performed tours of the MOX Fuel Fabrication Facility (MFFF) work areas to observe ongoing work activities and communications.

(2) Conclusions

Construction activities were performed in a safe and quality-related manner. No findings were identified.

3. PSSC Inspections

a. PSSC-021, Fire Barriers (IP 88136, Construction: Mechanical Components)

(1) Scope and Observations

The inspectors reviewed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF Construction Authorization Request (CAR) for item relied on for safety (IROFS) fire damper HVV*DMPF0203D-03. This inspection was for the installation of concrete spacing material for the damper penetration. The inspection attribute reviewed was installation. The inspectors independently verified that concrete panel placement and orientation was in accordance with design drawings, proper torquing of anchor bolts, torque wrench calibration, and QC installation verification measurements.

(2) Conclusion

No findings were identified.

b. PSSC-024, Glovebox (IP 88136, Construction: Mechanical Components)
PSSC-011, Electrolyzer Structure (IP 88136, Construction: Mechanical Components)
PSSC-026, Guide Sleeves (IP 88136, Construction: Mechanical Components)
PSSC-039, Polytetrafluoroethylene (PTFE) Insulator (IP 88136, Construction: Mechanical Components)

(1) Scope and Observations

The inspectors reviewed construction activities related to PSSC-024, Glovebox as described in Table 5.6-1 of the MFFF CAR. As these inspections were related to the installation of the Electrolyzer glovebox as a whole unit, the internal components of the electrolyzer were also within the scope of the inspection. The internal components of the electrolyzer include PSSC-026, Guide Sleeves, and PSSC-039, Polytetrafluoroethylene (PTFE) Insulator, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation. The inspectors independently measured the installation of the electrolyzer glovebox KDB *GB1000 in room C-322 and KDD*GB2000 in room C-335 to verify whether the location, placement, and orientation of the glovebox was in accordance with design drawings. The inspectors also reviewed a sample of welds for the glovebox seismic feet. The inspectors reviewed the electrolyzer structure (PSSC-11) to ensure internal components of KDB *GB1000 and KDD*GB2000 were located and oriented in accordance with design drawings. The inspectors confirmed PTFE insulators were installed in accordance with design documents (PSSC-039). The inspectors also reviewed elementary tests on Glovebox KDD*GB1000, which documented completion of electrical insulation checks on the glovebox, thereby verifying electrolyzer insulation (PSSC-026). The inspectors also reviewed a sample of sections of the glovebox receiving inspection report for individual electrolyzer glovebox components.

The inspectors reviewed in-process work activities for trolley rail placement in glovebox NTM*GB3000, including work package place keeping, QC hold point observation, foreign material exclusion controls, and material issue and control. The inspectors also reviewed placement of a Quality Level 2 (QL-2) platform over Quality Level 1 (QL-1) glovebox NTM*GB3000 for proper fit and clearance.

(2) Conclusion

No findings were identified.

c. PSSC-041, Process Cells (IP 88136, Construction: Mechanical Components)

(1) Scope and Observations

The inspectors reviewed construction activities related to PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS component was drip tray LGF*DRIP6900 in Room C-242. The inspectors reviewed work package content, place keeping, weld map, final weld size, and general channel layout.

(2) Conclusions

No findings were identified.

4. Exit Meeting

The inspection scope and results were summarized throughout this reporting period by the Senior Resident Inspector at an exit meeting with applicant management on April 5, 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.

SUPPLEMENTAL INFORMATION

1. **PARTIAL LIST OF PERSONS CONTACTED**

D. Del Vecchio, President and Chief Operating Officer
M. Gober, Vice President, Engineering
D. Gwyn, Licensing/Nuclear Safety Manager
D. Ivey, Project Assurance Manager
J. Keklak, QA Manager
R. Morgan, System One
E. Radford, Regulatory Compliance
G. Rousseau, Executive Vice President, Deputy Project Manager
J. Starling, Nuclear Safety
B. Wood, Vice President, Construction and Project Management
D. Yates, Licensing

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

IP 88130	Resident Inspection Program For On-Site Construction Activities at the Mixed-Oxide Fuel Fabrication Facility
IP 88136	Mechanical Components

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

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
--------------------	---------------	--------------------

None

4. **LIST OF ACRONYMS USED**

ADAMS	Agency-Wide Document Access and Management System
BAP	Aqueous Polishing Building
BMP	MOX Processing Building
CAR	Construction Authorization Request
CIB3	Construction Inspection Branch 3
CR	Condition Report
DCO	Division of Construction Oversight
ECR	Engineering Change Request
GB	Glovebox
HVAC	Heating, Ventilation, and Air Conditioning
HVV	HVAC, Shipping & Receiving Building
IR	Inspection Report
IROFS	Items Relied on for Safety
KDB	Dissolution Unit
KDD	Dechlorination and Dissolution Unit
LA	License Application
LGF	Laboratory Liquid Waste Receipt Unit
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
NTM	Jar Storage and Handling
PAF	Process Assembly Facility
PP	Project Procedure
PSSC(s)	Principle System(s), Structure(s), and Component(s)
PTFE	Polytetrafluoroethylene
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
QL-2	Quality Level 2
RII	Region II
Rev.	Revision
TCO	Temporary Construction Opening
WP	Work Package

5. **LIST OF PSSCs REVIEWED**

PSSC-011, Electrolyzer Structure
PSSC-021, Fire Barriers
PSSC-024, Glovebox
PSSC-026, Guide Sleeves
PSSC-039, Polytetrafluoroethylene (PTFE) Insulator
PSSC-041, Process Cells

6. **RECORDS AND DOCUMENTS REVIEWED**

Condition Reports

10888-MOX-CR-16-181 QC hold point violation
10888-MOX-CR-17-066, (NRC Identified) Incorrect material storage level
10888-MOX-CR-17-083, Housekeeping and FME controls
10888-MOX-CR-17-086, Incomplete fusion of welds
10888-MOX-CR-17-092, Minimum weld size not met per code requirements
10888-MOX-CR-17-095, No objective evidence of QC inspection of HAS duct flanges in room B360 following remedial action
10888-MOX-CR-17-099, Condition Report investigation review
10888-MOX-CR-17-114, Marking and use of stainless steel tools
10888-MOX-CR-17-116, Improper storage
10888-MOX-CR-17-117, Grinding to repair base metal damage

Drawings

DCS01-HVV-DS-SCH-V-12511, Piping and Instrument Diagram HVAC Shipping and Receiving Building (HVV) Supply Air Handling Unit for 75 Deg F Rooms and Exhaust Fans, Rev 6 Sheet 1 of 1.

DCS01-KDD-MG-PLI-M-10150, KDD *GB1000 Electrolyzer Glovebox, Rev. 2

DCS01-KDD-MG-PLE-M-02101, Electrolyzer KDD*EZR1000 and KDD*EZR2000 Electrolyzer EZR Subassembly View, Rev. 1

DCS01-KDD-MG-PLE-M-10100, KDD*GB1000 Electrolyzer Glovebox General Arrangement, Rev. 2

DCS01-ZMU-MG-PLE-M-70674, Electrolyzer Glovebox Electrolyzer EZR Sub-Critical Geometry Drawing, Rev. 1

DCS01-ECB-DS-SCE-E-26009, MOX Fuel Fabrication Facility 480VAC AP Process Switchgear ECB-SWG-1300 & ECB-SWG-2300 One-Line Diagram, Rev 10

Engineering Change Requests (ECRs)

ECR 0030608 Revision to Concrete Testing Requirements, Rev. 1

Nonconformance Reports (NCRs)

10888-MOX-NCR-17-7406, Damaged Structocrete board

10888-MOX-NCR-17-7470, (Closure review) No Objective Evidence of QC final Inspection

Miscellaneous

DCS01-AAS-DS-ANS-H-38393, Nuclear Safety Evaluation of NPH and EMMH Events Rev. 6

Status of the CBI/AREVA MOX Services, LLC Quality Assurance Program, Reporting Period 042, 1 July 2015 through 31 December 2015

Status of the CBI/AREVA MOX Services, LLC Quality Assurance Program, Reporting Period 042, 1 January 2016 through 30 June 2016

Other IROFS Specific Documents

Damper HVV*DMPF0203D-03

Work Package 16-BSR0207-PEN0001-V-7973
Calculation DCS01-BMF-DS-CAL-B-01385-0, Fire Damper Penetration Barrier, Rev 0

Glovebox NTM*GB3000

Work Packet 14-CP-24-NTM-PE-M-1357-T53

Work Packet 15-NTM-GB-M-4592-T04

Drip Tray LGF*DRIP6900

Work Package 16-CP20-242DRIP-TRAY-C-8222-01

Project Procedures

PP04-10, Rev. 4, ICN01, Hot Work Activities

PP09-39, Rev. 5, Verification of Subcritical Dimensions for Subcriticality Safety

PP10-37, Rev. 3, ICN03, Control of Issued Material

PP10-38, Rev. 2, ICN01, Storage and Control of Material

PP11-33, Rev. 0, Housekeeping and Work Area Cleanliness

PP12-40, Rev. 0, Preventive Maintenance of in-storage or Installed Equipment during the Construction Phase

Specifications

DCS01-BKA-DS-SPE-B-09330-8, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3, and 4, Rev. 8

DCS01-BKA-DS-SPE-B-09325-6, Mixing and Delivering for Quality Level QL-1 and QL-2 Concrete, Rev. 6