

December 20, 2016

MEMORANDUM TO: Robert K. Johnson, Chief
Fuel Manufacturing Branch
Division of Fuel Cycle Safety, Safeguards,
and Environmental Review
Office of Nuclear Material Safety
and Safeguards

FROM: David H. Tiktinsky, Senior Project Manager /RA/
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Division of Fuel Cycle Safety, Safeguards,
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Office of Nuclear Material Safety
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SUBJECT: PRINCIPAL STRUCTURE, SYSTEM AND COMPONENT 047
“SINTERED SILICON NITRIDE BARRIER” COMPLETION
VERIFICATION REPORT FOR MIXED OXIDE FUEL
FABRICATION FACILITY UNDER CONSTRUCTION IN AIKEN,
SOUTH CAROLINA (DOCKET NUMBER 70-3098)

The regulatory requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 70.23(a)(8) states that an application for a license will be approved if the Commission determines that, where the proposed activity is the operation of a plutonium processing and fuel fabrication plant, construction of the Principal Structures, Systems and Components (PSSCs) approved pursuant to 10 CFR 70.23(b) has been completed in accordance with the application. PSSCs are safety controls that are identified in the design bases as providing protection against the consequences of accidents or natural phenomena.

As stated in the Final Safety Evaluation Report for the License Application To Possess and Use Radioactive Material at the Mixed Oxide Fuel Fabrication Facility (MFFF) in Aiken, South Carolina dated December 2010, “As applicable to the specific type of PSSC, U.S. Nuclear Regulatory Commission (NRC) construction inspection and/or the technical review programs will verify that the construction of each PSSC listed in Table 5.6-1 of the MFFF Construction Authorization Request (CAR) has been completed and the design basis safety function can be met”.

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R. Johnson

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On August 4, 2016, CB&I AREVA MOX Services submitted a letter notifying the NRC that PSSC-047 (Sintered Silicon Nitride Barrier) is complete in accordance with the application in support of the regulatory requirements in 10 CFR 70.23(a)(8).

As stated in the enclosed PSSC closure report, the staff has completed its verification of PSSC-47 and has concluded that, as per 10 CFR 70.23(a)(8), that it is completed in accordance with the application.

In accordance with 10 CFR Section 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

If you have any questions or comments, please contact me at (301) 415-8740 or via e-mail at David.Tiktinsky@nrc.gov.

Enclosure:
PSSC Completion Verification Report

cc: see next page

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**MOX FUEL FABRICATION FACILITY
PRINCIPAL STRUCTURES, SYSTEMS AND COMPONENTS
COMPLETION VERIFICATION REPORT**

PRINCIPAL STRUCTURE, SYSTEM AND COMPONENT-47

Sintered Silicon Nitride Barrier

1. CB&I AREVA MOX Services (MOX Services) Completion Letter

MOX Services submitted a letter to the U.S. Nuclear Regulatory Commission (NRC) on December 21, 2015 (ML15362A554) which committed to submitting Principal Structure, System and Components (PSSCs) completion letters to the NRC to provide timely notification to support the staffs finding as required in Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 70.23(a)(8). The PSSC completion letters were to be based on their internally prepared PSSC completion packages. This letter also included a crosswalk that correlated the Construction Authorization Request (CAR) PSSCs to the Items Relied on for Safety (IROFS) in the Integrated Safety Analyses Summary (ISAS).

On August 4, 2016, MOX Services submitted a letter notifying the NRC that that they believe that the PSSC-47 (Sintered Silicon Nitride Barrier) is complete in accordance with the application in support of the regulatory requirements in 10 CFR 70.23(a)(8) subject to verification by the NRC (ML16217A034).

Their basis for completion of PSSC-047 is that the safety functions derived from the CAR are not required to be credited in the ISAS in order to meet 10 CFR 70.61 requirements and that there are no IROFS components associated with PSSC-47.

2. Description of PSSC(s)

The Sintered Silicon Nitride Barrier PSSC-47, is associated with the CAR Event Group “AP Electrolyzer”. The safety function of Sintered Silicon Nitride Barrier as identified in the CAR was to prevent titanium fires in the electrolyzers.

MOX Services mapped this CAR event to the ISAS events F-05a (Fire in titanium electrolyzer in the Aqueous Polishing C3 glovebox areas) and F-05b (Administrative control on electrolyzer maintenance). The CAR/ISAS crosswalk submitted by MOX Services indicates that these safety functions were not required to be credited in the ISAS in order to meet 10 CFR 70.61.

3. NRC Independent Verification Plan (IVP) Discussion

Independent Verification Plan-26, entitled “Sintered Silicon Nitride Barrier was prepared to guide the NRC staff’s completion of the PSSC. The IVP stated that “The final SER issued by the staff evaluated the acceptability of assertions made by the applicant with regard to this PSSC and IROFS. FCSE staff will summarize its findings with regard to the sintered silicon nitride barrier and its IROFS status for verification of this PSSC.”

Enclosure

The ISAS Crosswalk submitted to the NRC on December 21, 2015, did not identify any IROFS components or administrative controls for PSSC-47.

4. IROFS Evaluated from IVP

The PSSC-47 safety functions are not required to be credited in the ISAS in order to meet 10 CFR 70.61 requirements. As stated in the CAR PSSCs to IROFS Summary Compliance Crosswalk, there are no IROFS components or administrative control IROFS associated with PSSC-47.

5. Review of Vendor activity(s)

N/A

6. Level of Inspection Effort

N/A

7. Inspection Activities

The following inspection activities were performed:

7.1. Regional Inspections

No Regional Inspection activities were necessary to verify this PSSC.

7.2. Resident Inspector Activities

No Resident Inspection activities were necessary to verify this PSSC.

7.3. Headquarters Verification Activities

No headquarters reviews of procedures were necessary to verify this PSSC.

8. Other Supporting activities

No other supporting activities were necessary to verify completion of this PSSC.

9. Summary of Verification Activities

As shown in the CAR PSSCs to IROFS Summary Compliance crosswalk submitted by MOX Services, the PSSC safety functions are not required to be credited in the ISAS in order to meet 10 CFR 70.61 requirements. Since the PSSC safety functions are not credited in the ISAS, there are no IROFS components or administrative controls associated with PSSC-47.

MOX Services had initially identified the Sintered Silicon Nitride Barrier as a credited IROFS component for preventing titanium fires in the electrolyzers in the 2006 ISAS. Subsequently, the applicant performed an analysis to determine that the Sintered Silicon Nitride barrier was not

necessary to prevent electrical arcing and the resulting titanium fire event. The barrier was determined to no longer be an IROFS component. The staff reviewed and approved the safety strategy as documented in Section 11.2.1.3.4 of the “Final Safety Evaluation Report for the License Application to Possess and Use Radioactive Material at the Mixed Oxide Fuel Fabrication Facility in Aiken, SC”.

Therefore, the staff has completed its verification of PSSC-47 and has concluded, as per 10 CFR 70.23(a)(8), that it is completed in accordance with the application.

10. References

- 10.1 CB&I AREVA MOX Services. “Mixed Oxide Fuel Fabrication Facility Integrated Safety Analysis Summary,” January 2016.
- 10.2 CB&I AREVA MOX Services. “Mixed Oxide Fuel Fabrication Facility License Application,” January 2016.
- 10.3 NRC Independent Verification Plan 26. “Sintered Silicon Nitride Barrier” (Revision 0),” September 25, 2011.
- 10.4 CB&I AREVA MOX Services letter entitled “10 CFR 70.23 (a)(8) Completion Process,” dated December 21, 2015.
- 10.5 CB&I AREVA MOX Services. “PSSC-47 Completion Letter,” dated June 16, 2016.
- 10.6 Construction Authorization Request, February 2005.
- 10.7 NRC Final Safety Evaluation Report for the License Application to Possess and Use Radioactive Material at the Mixed Oxide Fuel Fabrication Facility in Aiken, SC” dated December 2010.