October 6, 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, Sr. Project Manager ***/RA/***
Fuel Manufacturing Branch
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Office of Nuclear Material Safety
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SUBJECT: PRINCIPAL STRUCTURE, SYSTEM AND COMPONENT 029 "LABORATORY CONTROLS" 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, 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".

On May 26, 2016, CB&I AREVA MOX Services submitted a letter notifying the U.S. Nuclear Regulatory Commission (NRC) that PSSC-029 (Laboratory Material Controls) 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-29 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

As stated in the enclosed PSSC closure report, the staff has completed its verification of PSSC-29 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).

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PSSC Completion Verification Report

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Docket No. 70-3098

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

PSSC-29

LABORATORY MATERIAL CONTROLS

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 May 26, 2016, MOX Services submitted a letter notifying the NRC that that they believe that the PSSC-29 (Laboratory Material Controls) 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.

Their basis for completion of PSSC-029 is that the safety functions derived from the CAR are not required to be credited in the ISAS in order to meet 10 CFR Section 70.61 requirements and that there are no IROFS components associated with PSSC-29.

2. Description of PSSC(s)

The Laboratory Material Controls PSSC-29, is associated with the CAR Event Group "Laboratory Explosions". The safety functions of laboratory materials control as identified in the CAR were: a) Minimize quantities of hazardous chemicals in the laboratory; and b) Minimize quantities of radioactive materials in the laboratory. The CAR event description is entitled "Laboratory Explosion".

MOX Services mapped this CAR event to the ISAS events EXP14a (hydrogen event) and EXP14b (unintended chemical reaction). 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 (IVP) -20, entitled "Laboratory Material Controls" was prepared to guide the NRC staff's completion of the PSSC. The original draft MOX Services scoping document for PSSC-29, which was the basis for the IVP, credited the Administrative control of gas feed sequence IROFS to this PSSC. The Operators feed gases to the Fluorine and Chlorine Determination Lab Unit (LAC) furnace in the appropriate sequence required by procedures to ensure that the furnace is purged with argon between feeding air and hydrogen/argon.

The ISAS Crosswalk submitted to the NRC on December 21, 2015, did not identify any IROFS components or administrative controls for PSSC-29. The laboratory explosion event has been assessed to be limited to a hydrogen event (EXP14a) and an event produced by an unintended chemical reaction (EXP14b). Laboratory material controls are considered to be defense-in-depth that minimize the quantity of hazardous material available for explosion/dispersion in an explosion. The IROFS for Event EXP14a is an administrative control of gas feed sequence that requires operators to feed gases to the LAC furnace in the appropriate sequence to ensure the furnace is purged with argon between feeding air and hydrogen/argon. The IROFS for Event EXP14b is an administrative control of chemical safety that ensures the chemical makeup of the reagents and segregation/separation of vessels/components containing incompatible chemicals. These IROFS administrative controls are addressed in PSSC-19 “Facility Worker Action” and PSSC-07 “Chemical Safety Controls,” respectively (Ref. 10.4). These administrative controls will be verified by the staff as part of the verification of PSSC-19 and PSSC-07.

4. IROFS Evaluated from IVP

The PSSC 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-29. The Administrative control of Gas feed Sequence IROFS have been mapped to PSSC-7 and PSSC-19. The verification of the completion of those IROFS will be evaluated by the staff as part of the review of the completion of those PSSCs.

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 needed to verify this PSSC.

7.2. Resident Inspector Activities

No Resident Inspection activities were needed to verify this PSSC.

7.3. Headquarters Verification Activities

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

8. Other Supporting activities

No other supporting activities were needed 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-29.

The laboratory explosion event has been assessed to be limited to a hydrogen event (EXP14a) and an event produced by an unintended chemical reaction (EXP14b). Laboratory material controls are considered as defense-in-depth that minimize the quantity of hazardous material available for explosion/dispersion in an explosion. The IROFS for Event EXP14a is an administrative control of gas feed sequence that requires operators to feed gases to the LAC furnace in the appropriate sequence to ensure the furnace is purged with argon between feeding air and hydrogen/argon. The IROFS for Event EXP14b is an administrative control of chemical safety that ensures the chemical makeup of the reagents and segregation/separation of vessels/components containing incompatible chemicals. These IROFS administrative controls are addressed in PSSC-19 “Facility Worker Action” and PSSC- 07 “Chemical Safety Controls,” respectively (Ref. 10.4). These administrative controls will be verified by the staff as part of the verification of PSSC-19 and PSSC-07. The Administrative control of Gas feed Sequence IROFS have been mapped to PSSC-10 and PSSC-07. The verification of the completion of those IROFS will be evaluated by the staff as part of the review of the completion of those PSSCs.

Therefore the staff has completed its verification of PSSC-29 and has concluded that, 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 20. “Laboratory Material Controls (Revision 0),” September 24, 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-29 Completion Letter,” dated May 26, 2016.

10.6 Construction Authorization Request, February 2005.