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DCS-NRC-000461

10 August 2017

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Subject: Docket Number 070-03098
CB&I AREVA MOX Services
Mixed Oxide Fuel Fabrication Facility
10CFR70.23(a)(8) Completion Process License Application Update

- Reference (1) DCS-NRC-000405, letter from CB&I AREVA MOX Services to NRC, dated 21 December 2015, 10CFR70.23(a)(8)
- (2) NRC-DCS-000747, letter from NRC to CB&I AREVA MOX Services, dated January 29, 2016, U.S. Nuclear Regulatory Commission Response to Mixed Oxide Services Request to the Development of Title 10 of the Code of Federal Regulations Paragraph 70.23(a)(8) Completion Process

Enclosed is an advance copy of License Application changes describing MOX Services 10CFR70.23(a)(8) completion process in support of NRC Principal Structures, Systems, and Components (PSSCs) verification. The process was previously summarized in Reference (1) and acknowledged by the NRC (Reference 2) that the MOX Services actions will support NRC staff's ability to make the necessary findings related to PSSC verification as required by 10CFR70.23(a)(8). While these changes will be included in the January 2018 annual update of the License Application, MOX Services is providing an advance copy to facilitate ongoing NRC PSSC verification activities.

Enclosure 1 includes the text added to the License Application. Enclosure 2 includes the associated tables. The tables in Enclosure 2 are withheld from public disclosure for security related information consistent with similarly withheld information in the Integrated Safety Analysis Summary.

If you have any questions, please feel free to contact me at (803) 442-6485 or Dealis Gwyn, Licensing and Nuclear Safety Manager, at (803) 819-2780.

Sincerely,


David Del Vecchio
President and Project Manager

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Enclosures:

- (1) License Application Chapter 17 Text
- (2) License Application Chapter 17 Tables (Security Related Information)

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Enclosure 1

License Application Chapter 17 Text

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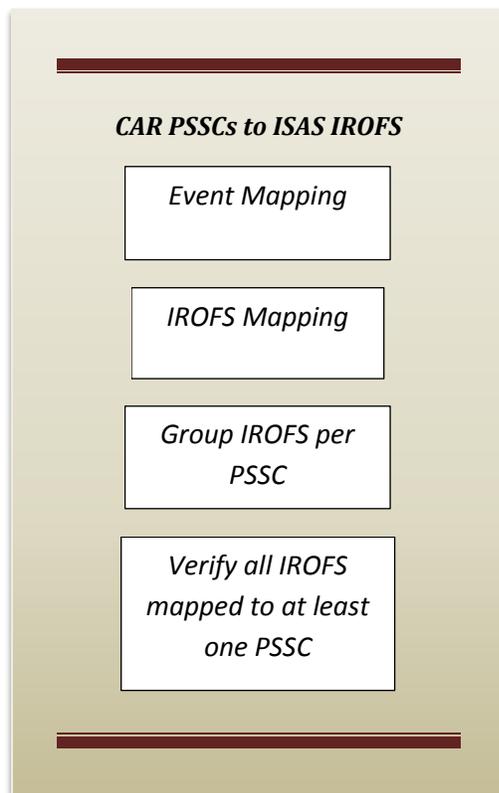
17.0 PSSC Completion

17.1. Purpose

The purpose of Chapter 17 is to describe the process that will provide the basis to notify NRC that MOX Services has completed construction of a Principal Structure, System or Component (PSSC) in accordance with the application as per 10 CFR 70.23(a)(8). The following sections describe the relationship between the PSSCs identified in the Construction Authorization Request (CAR) and the IROFS that are identified in the ISAS. Completing construction of a PSSC is a step in the process as MOX Services prepares to possess and use special nuclear material for operations. For simplicity, MOX Services will only refer to this phase as “operations”. In order to operate, MOX Services must also complete any remaining construction punchlist items, demonstrate that IROFS will perform their credited safety function (also referred to as preoperational testing), and develop the required procedures and programs as well as a trained and qualified staff (also referred to as operational readiness).

17.2. CAR PSSCs and ISAS IROFS Relationship

10CFR70.23(a)(8) requires the NRC to verify construction of PSSCs prior to issuance of a



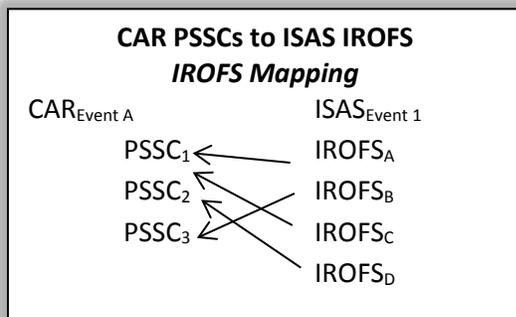
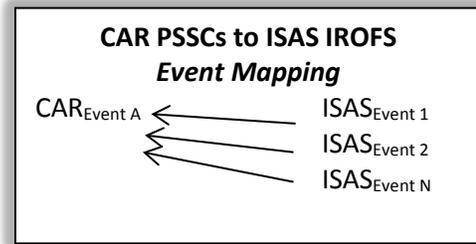
license. PSSCs are effectively preliminary Items Relied on for Safety (IROFS) that were identified in the CAR as part of the safety assessment of the design basis. PSSCs are items identified in the CAR that are required to provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents. These PSSCs were identified at a level sufficient to support the NRC review for compliance with 10CFR70.22 and subsequent issuance of a Construction Authorization (CA). CAR Table 5.6-1, MFFF Principal SSCs summarizes the PSSCs that supported the NRC issuance of CAMOX-001 in March 2005.

In order to receive a license to possess and use Special Nuclear Material (SNM), an Integrated Safety Analysis (ISA) is required by 10CFR70.62. MOX Services provided a summary of this ISA to the NRC in 2006 in its Integrated Safety Analysis Summary (ISAS), which was submitted along with the License

Application (LA). The NRC completed its review of the LA, ISAS, and other licensing submittals in 2010 – as documented with the issuance of the Final Safety Evaluation Report (FSER) in December 2010. As noted in the FSER, the NRC staff will not issue a license to

possess and use SNM before a determination that construction of the PSSCs is in accordance with the application. 10 CFR 70.23(a)(8) refers to “approved pursuant to paragraph (b)” and paragraph (b) cites the “design bases of principal structures, systems and components ... provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents” as one of the requirements that must be met prior to the NRC issuing a construction authorization. MOX Services has paraphrased 10 CFR 70.23(a)(8) PSSC verification to “verification that construction of PSSCs is in accordance with the design bases in the Construction Authorization Request as refined in the License Application IROFS design basis sections” – which is consistent with the Construction Authorization (CAMOX-001) issued by the NRC.

Since the ISA is a more detailed evaluation, events were evaluated and the associated IROFS were identified with more specificity than in the CAR phase. With the more detailed evaluation, some events evolved into multiple events, some were determined to be not credible, while others were combined to facilitate evaluation. This usually resulted in a more detailed identification of the IROFS for the events – which significantly increased the number of IROFS described in the ISAS from the 53 PSSCs identified in the CAR. Since the 10CFR70.23(a)(8) specifically requires NRC verification of construction of PSSCs (and not IROFS), a PSSC to ISAS IROFS correlation was



developed as a tool to facilitate the NRC finding that must be made regarding PSSC construction prior to issuance of a license. The results of the correlation (or mapping) are provided in Tables 17-1, 17-2, and 17.3. The LA tables were developed by initially mapping ISAS events to the events in the CAR that resulted in the PSSCs identified in CAR Table 5.6-1. Subsequently, for each event, ISAS IROFS (also referred to as control groups) were

mapped to the PSSCs associated with the corresponding CAR event.

As discussed in FSER Section 1.2.1.3.1, the NRC will complete verification of construction of the 53 PSSCs using a sample-based inspection program of the IROFS that relate to a PSSC. In order to assure that each ISAS IROFS can be considered for the sample-based PSSC inspection program, all the ISAS IROFS must be mapped to at least one PSSC. As such, an additional verification of PSSC to IROFS mapping was performed to validate that the IROFS identified in the ISAS were mapped to at least one PSSC. This validation, which is documented in project document *CAR PSSCs to ISAS IROFS Summary Compliance Crosswalk*, ensures that, upon

verification of the construction of the 53 PSSCs, all the IROFS identified in the ISAS were included in the inspection pool for at least one PSSC.

The terms “ISAS IROFS”, “IROFS Control Group”, and “PSSC Control Group” are used throughout LA Chapter 17 to support PSSC verification and are defined below:

- ISAS IROFS – IROFS credited in the ISAS to meet 10CFR70.61 performance objectives. These IROFS are summarized in tables at the end of each event section (e.g., loss of confinement, explosion) in the ISAS.
- IROFS Control Group – IROFS systems, structures, and components required to perform the credited ISAS IROFS safety function. The use of ISAS IROFS and IROFS Control Group for PSSC completion and verification are interchangeable.
- PSSC Control Group – the grouping of IROFS components to support PSSC completion and verification. For non-criticality PSSCs, “PSSC Control Group” and “IROFS Control Group” are synonymous. For PSSC-009, criticality IROFS are grouped by unit/system for both engineered IROFS and administrative IROFS into PSSC Control Groups. PSSC Control Group is only used to support PSSC completion and verification.

Changes to the ISA (e.g., revisions to events, added or deleted IROFS control groups) are reflected in updates to Tables 17-1 through 17-3, as appropriate.

In summary,

- a) 10 CFR 70.23(a)(8) requires the NRC to verify construction of principal structures, systems, and components prior to issuance of a license
- b) A PSSC to ISAS IROFS correlation has been developed as a tool to facilitate PSSC verification
 - 1) Configuration management of PSSC to ISAS IROFS correlation is maintained
 - 2) All ISAS IROFS are mapped to at least one PSSC
- c) As discussed in FSER Section 1.2.1.3.1, the NRC must complete verification of construction of 53 PSSCs.

17.3. PSSC Completion

One of the goals of MOX Services approach to PSSC completion is to provide NRC the earliest reasonable notification that a PSSC has been constructed in accordance with the application. The early notification allows NRC reviews and inspections to be performed in closer time proximity to the actual MOX Services completion. This approach can balance resources associated with PSSC verification as well as supporting near “real time” NRC PSSC verification. As discussed in Section 17.1, PSSC completion is one step in preparing for operations. In support of early NRC notification and recognizing additional future activities (e.g., preoperational testing, operational readiness reviews), MOX Services has developed PSSC

completion options that recognizes processes embedded in the construction process (system turnover process with punchlist items), planned delayed final completion (e.g., Temporary Construction Openings, jumpers to facilitate testing), and recognition that some items are not required for initial operations (e.g., cask loading equipment).

PSSCs can involve multiple components and safety functions. To facilitate early completion notifications, PSSCs have been subdivided into PSSC control groups (see Tables 17-1 through 17-3). A PSSC control group may be associated with ISAS IROFS (e.g., VHD system, PSSC-006-015) or a process unit (e.g., KPA Criticality IROFS, PSSC-009-032). For PSSC completion, the PSSC control groups are only used to facilitate PSSC verification.

For engineered IROFS Systems, Structures, and Components (SSCs), MOX Services will provide NRC notification of completion of a PSSC or PSSC control group. If there are items associated with the PSSC control group that have not been completed, these items will be identified consistent with the factors discussed below.

- Any remaining items (e.g., punchlist items) shall be tracked to completion by a formal project process (e.g., PP11-42, *Construction Project Turnover*, PP16-4 *Temporary Modification Request*)
- While many of these punchlist items are expected to be minor and would not affect startup testing, a subset of the punchlist items include planned delayed completion items. Examples of these planned items include:
 - Temporary Construction Openings (TCOs). TCOs exist to facilitate introduction of components into the facility/room to facilitate construction.
 - Jumpers. Jumpers are temporary configurations (e.g., temporary pipe to reroute testing fluids) that are necessary to support preoperational testing and are requested and controlled under the Temporary Modification Request process. The temporary modification process tracks the use of these temporary configurations until the final permanent configuration is completed (i.e., after the completion of the associated preoperational test(s)).
 - Filters. In order to not diminish filtration capability during construction, the filters that will be used for operations may not be installed until close to the operating phase (e.g., operational readiness).
 - Glovebox panels. In order to minimize the potential for damage during nearby construction activities, the final glovebox panels installation may be delayed until their installation is required to support preoperational testing.

Project processes will ensure any remaining items are completed prior to operations.

- SSCs that are not required for initial operation. As operations is a phased process, not all SSCs may be necessary to support the initial operations (e.g., only 1 of the two pellet

presses). Similarly, some SSCs may not be required until later in operations (e.g., assembly loading into a cask for transport). PSSC control groups where this condition may exist at the time of the associated PSSC completion letter are identified in Tables 17-1 and 17-2. When proceeding to operations without the “not required IROFS” being installed, the planned operations must be bounded by the existing licensing basis or the licensing basis will be updated consistent with the processes discussed in LA Chapter 16. Provisions must also exist to ensure installation of the remaining items is completed and any necessary preoperational testing is performed prior to placing these items in service.

Tables 17-1 through 17-3 include the proposed PSSC completion basis and the identified PSSC control groups that contain IROFS that are not required for initial operations. As PSSC control groups are completed, the PSSC completion column will be updated to 1) reference the applicable PSSC completion letter, 2) summarize any items remaining that affect PSSC completion and 3) identify IROFS that are not installed and are not required for initial operation. If there are IROFS that are not installed, the ISA will be updated, as necessary, consistent with initial operations configuration. Any impacts on the licensing basis will be evaluated consistent with processes described in LA Chapter 16.

Administrative IROFS are considered PSSC complete when they are implemented in the first level approved document (e.g., Operating Limits Manual). First level document refers to an approved document that supports operations which establishes requirements that may also be flowed down into lower level documents. For example, an administrative IROFS that requires power to be removed prior to maintenance can be PSSC complete with a specification in the OLM that establishes the operating requirement even though subsequent maintenance procedures may duplicate that requirement.

The PSSC Completion Letter provided to the NRC will identify any remaining items along with the process that will assure completion. In all cases, operations will be consistent with the licensing design basis as well as the Integrated Safety Analysis.

17.4. PSSC Completion Packages

The completion of construction of a PSSC or PSSC control group is documented in a PSSC Completion Package. PSSC completion packages are not intended to include all the information that supports the conclusion the PSSC has been constructed in accordance with the application. PSSC completion packages are predominantly expected to be crosswalks that provide references to the supporting completion documentation. PSSC completion packages are prepared using controlled project processes and are maintained, as necessary, until the NRC verifies completion of the PSSCs and issues a license to MOX Services.

17.5. PSSC Completion Letters

When a PSSC or PSSC control group has been completed in accordance with the application and the associated PSSC Completion Package has been developed, MOX Services will notify the NRC by a PSSC completion letter. At a minimum, the PSSC completion letter will provide the following information:

- ISAS IROFS associated with PSSC or PSSC control group
- Summary description of key components
- Completion basis with references
- Discussion of any NRC inspection open items
- Summary of any remaining items to complete and identification of the process(es) that will ensure completion
- Summary of any IROFS that are not required for initial operation and supporting licensing basis.

17.6. PSSC All Complete Letter

MOX Services will provide NRC a “PSSC all complete” letter which will include the MOX basis that PSSCs have been constructed in accordance with the application. While the letter is predominantly a summary listing of the submitted completion letters, it may include additional references to demonstrate IROFS commodities that may not be directly associated with a PSSC control group have also been constructed.

17.7. PSSC Configuration Management

Included in MOX Services processes for PSSC completion is PSSC Configuration Management (CM). PSSC CM is necessary to ensure that the NRC is notified of any material changes to the PSSC after the PSSC has been declared complete. A graded approach is utilized for PSSC CM as 1) some changes may not require changes to the PSSC Completion Package or NRC notification, 2) some changes may require changes to the PSSC Completion Package but do not require NRC notification, and 3) some changes may require changes to the PSSC Completion Package and NRC notification. Changes that impact a completed PSSC that would require updates to the PSSC Completion Package and NRC notification are:

- Result of a license amendment, or
- Change in the associated licensing design basis, or
- Add IROFS
- Software changes/updates - reserved

Impacts of changes/updates to software on PSSC configuration management is under development and will be added to Chapter 17 at later date, but no later than the submittal of a completion package that include IROFS software.

Changes associated with a completed PSSC that are the result of a design change associated with an IROFS or software changes/updates (reserved), but do not meet the above criteria, require an update of the PSSC Completion Package but do not require formal NRC notification. These changes are not considered material to the PSSC completion notification. For example, a design change that deletes an IROFS in a previously completed PSSC does not significantly impact the completion determination unless it meets one of the other criteria (e.g., requires a license amendment) since the other IROFS within the PSSC remain “completed” and remain consistent with the licensing design basis. The PSSC Completion Package and any revisions are available for NRC inspection.

Changes that do not meet the above criteria are considered not material to the PSSC completion determination or the PSSC Completion Package. Records are available to support NRC verification that MOX Services has not performed activities that materially impact the PSSC Completion except as described above.

17.8. PSSC Completion Process

The primary goal of the PSSC Completion Process is to provide timely NRC notification of PSSC construction completion. Timely notification refers to notification as close to the actual PSSC construction completion as reasonably achievable recognizing a PSSC may contain many IROFS components that are installed over a period of time. The MOX Services PSSC Completion Process, which is documented and controlled in project processes, is a step in receiving authorization to operate the MOX facility although other key steps (preoperational testing, Operational Readiness Review) remain to be completed prior to being able to receive and possess special nuclear material.

CAR Table 5.6-1 summarizes the 53 PSSCs that were identified in the Construction Authorization Request and provides the starting point for correlating the IROFS identified in the Integrated Safety Analysis Summary with the CAR PSSCs. The correlation is developed to support the NRC in making their PSSC verification in accordance with 10CFR70.23(a)(8) prior to issuing a license. In addition, MOX Services has divided the PSSCs into PSSC Control Groups to allow timely notification of PSSC completion. The PSSC Control Groups are provided in Tables 17-1 (non-criticality IROFS), 17-2 (criticality engineered IROFS) and 17-3 (criticality administrative IROFS).

The tables also identify duplicate PSSC Control Groups. Duplicate PSSC Control Groups include PSSC Control Groups whose IROFS components are a subset of another Control Group. In order to eliminate redundant tracking and closure, these duplicate Control Groups are closed

to the appropriate PSSC Control Group that will provide the PSSC Closure Package/NRC notification. In this context, the subject PSSC control group that is “closed” is considered PSSC complete and the scope for PSSC completion is included in another PSSC control group. The closure of these duplicate PSSC control groups is documented in the Chapter 17 tables and additional NRC notification is not planned. If all PSSC control groups of a given PSSC are duplicates and are closed to other PSSC control groups, a PSSC completion letter will be provided to the NRC providing the basis for the closure (i.e., the associated IROFS are included in other PSSC control groups). Therefore, a minimum of one PSSC completion letter will be provided for each PSSC.

PSSC Completion basis will be based on one of the following methods

- Approved procedure(s) – approved procedure(s) that demonstrates implementation of administrative IROFS
- Verification of criticality dimensions – completed forms that verifies construction meets required criticality dimensions
- Construction turnover process – process used to verify and document system has been constructed in accordance with design and system is ready for pre-operational testing. A defined set of action items may exist as a result of the construction turnover process. These action items are tracked to completion under a controlled MOX Services process.
- Field walkdown – documented field walkdown to verify completed construction. When this option is utilized, it must include appropriate documentation to support the SSC(s) has been constructed in accordance with the application.
- Operating Limits Manual – approved OLM is used to demonstrate implementation of an IROFS (e.g., administrative IROFS).
- Programs – approved program document (e.g., Criticality Safety Program) that implements IROFS
- Work Package Verification – closed construction work package is used to demonstrate completed construction of an SSC.
- Procurement specification – approved procurement specification that establishes requirements consistent with the licensing design basis for IROFS SSCs that are not permanently installed in the facility (e.g., conveyance cart). This method is complemented by approved project process that allows the use of IROFS in this category consistent with the approved specification.
- Other – method is described and justification provided that the chosen method demonstrates completed construction in accordance with application.

Tables 17-1, 17-2, and 17-3 provide the methodology expected to be used for each PSSC Completion Control Group; however, the completion methodology that is used as the basis for PSSC completion will be provided in each PSSC Completion Letter.

17.9. Design Basis

PSSC and IROFS Relationship

- All ISAS IROFS are mapped to at least one CAR PSSC
- Changes to ISA are incorporated into Tables 17-1 through 17-3, as appropriate

PSSC Completion

- MOX Services will provide notification of completion of a PSSC or PSSC control group. Any remaining items to complete will be identified consistent with the following factors, as appropriate
 - Punchlist items are tracked to completion by a formal project process
 - Provisions exist for planned delayed completion items to ensure remaining items are completed prior to operations
 - For SSCs not required for initial operation
 - Plant configuration and operations are bounded by the licensing basis
 - Provisions exist that ensure installation of the remaining items and any required preoperational testing is performed prior to placing these SSCs in service
- Administrative IROFS are considered PSSC complete when are implemented in the first level approved document (e.g., Operating Limits Manual)
- Tables 17-1 through 17-3 will be updated as PSSCs or PSSC control groups are completed with the following information
 - Applicable PSSC completion letter reference
 - Summary of any remaining items to complete
 - Identification of any IROFS that are not required for initial operation

PSSC Completion Packages

- Completion of PSSC/PSSC control group is documented in a PSSC completion package
- PSSC completion packages are prepared and maintained, as necessary, until the NRC verifies completion of PSSCs and issues an operating license to MOX Services

PSSC Completion Letters

- MOX Services will notify the NRC when a PSSC or PSSC control group has been completed
- PSSC completion letter will provide the following information
 - ISAS IROFS associated with the Completion Letter
 - Summary description of key components
 - Completion basis with references
 - NRC Open items
 - Summary of any remaining PSSC completion items to complete and identification of the process(es) that will ensure completion

- Summary of any IROFS that are not required for initial operation and supporting licensing basis

PSSC All Complete Letter

- MOX Services will notify the NRC when all PSSCs are complete.
- PSSC all complete letter will include basis that all PSSCs have been constructed in accordance with the application

PSSC Configuration Management

- Impacted PSSC Completion Package(s) will be updated and revised PSSC Completion Letter(s) will be provided to the NRC as a result of
 - License amendment
 - Change in the associated licensing design basis
 - Added IROFS
 - Software changes/updates - reserved
- Impacted PSSC Completion Package(s) will be updated as a result of
 - Design change
 - IROFS deletion
 - Software changes/updates – reserved
- Records are available to support NRC verification that MOX Services has not performed activities that materially impact PSSC completion except as described above.

PSSC Completion Process

- Closure of duplicate/subset PSSC control groups is documented in Tables 17-1 through 17-3 and additional NRC notification is not required
- At least one PSSC completion letter will be provided for each PSSC
- PSSC completion basis is based on one of the following methods
 - Construction turnover process
 - Action items are tracked to completion under controlled process
 - Approved procedure(s)
 - Verification of criticality dimensions
 - Field walkdown
 - Must include/reference appropriate documentation to support the SSC(s) have been constructed in accordance with the application
 - Operating Limits Manual
 - Approved program(s)
 - Work Package Verification
 - Procurement specification
 - Used for SSCs not permanently installed in the facility

- Must be complemented by approved process required use consistent with the specification
- Other
 - Method is described and justified that it demonstrates completion in accordance with the application
- PSSC completion basis will be provided in PSSC Completion Letter