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

October 29, 2015

Mr. David Del Vecchio
President and Chief Operating Officer
Chicago Bridge and Iron AREVA MOX Services
Savannah River Site
P.O. Box 7097
Aiken, SC 29804-7097

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NUMBER 70-3098/2015-003

Dear Mr. Del Vecchio:

During the period from July 1 through September 30, 2015, the U. S. Nuclear Regulatory Commission (NRC) completed inspections pertaining to the construction of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF). 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 activities, and interviewed personnel.

Based on the results of this inspection, the enclosed report documents one finding which was determined to involve a violation of NRC requirements. However, because this finding was a Severity Level (SL) IV violation and was entered into your corrective action program, the NRC is treating it as a non-cited violation (NCV) consistent with Section 2.3.2 of the NRC Enforcement Policy. This NCV is described in the subject inspection report. If you contest the NCV or the significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTENTION: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the MFFF.

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

Deborah A. Seymour, Chief
Construction Projects Branch 1
Division of Construction Projects

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

Enclosure:
NRC Inspection Report No. 70-3098/2015-003
w/attachment: Supplemental Information

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Should you have any questions concerning this letter, please contact us.

Sincerely,

Deborah A. Seymour, Chief
Construction Projects Branch 1
Division of Construction Projects

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DATE	10/29/2015	10/28/15	10/19/15	10/21/15	10/19/15	10/21/15	10/21/15
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Letter to from Deborah Seymour dated October 29, 2015.

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2015-003

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2015-003
Applicant:	Chicago Bridge and Iron (CB&I) AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	July 1 – September 30, 2015
Inspectors:	C. Huffman, Senior Resident Inspector, Construction Projects Branch (CPB) 1, Division of Construction Projects (DCP), Region II (RII) W. Gloersen, Senior Construction Project Inspector, CPB1, DCP, RII B. Adkins, Senior Fuel Facility Inspector, Safety Branch (SB), Division of Fuel Facility Inspection (DFFI), RII T. Sippel, Fuel Facility Inspector, SB, DFFI, RII
Accompanying Personnel:	W. Jones, Director, DCP, RII D. Tiktinsky, Senior Project Manager, Fuel Manufacturing Branch (FMB), Division of Fuel Cycle Safety and Environmental Review (FCSE), Office of Nuclear Materials Safety and Safeguards (NMSS) K. Morrissey, Programmatic Oversight and Regional Support Branch (PORSB), FCSE, NMSS C. Tripp, Senior Criticality Safety Analyst, PORSB, FCSE, NMSS A. Chowdhury, Staff Engineer Southwest Research Institute
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.) 70-3098/2015-003

The scope of the inspections encompassed a review of various MFFF activities related to Quality Level (QL)-1 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 standards. This inspection included, as applicable, the following inspection attributes: corrective action program, installation, test control, design control, software quality assurance, and quality assurance program.

The principle systems, structures and components (PSSCs) discussed in this inspection report included: PSSC-009, Criticality Controls; PSSC-021, Fire Barriers; PSSC-023, Fluid Transport Systems; PSSC-024, Gloveboxes; and PSSC-036, MFFF Building Structure.

Routine Resident Inspections

The inspectors reviewed the applicant's construction project status meeting notes, reviewed the status of work packages maintained at various work sites, conducted daily tours of work and material storage areas, and observed installation of mechanical equipment. The inspectors verified that the licensee is identifying conditions adverse to quality and capturing them in their corrective action program. Except as noted below, construction activities were performed in a safe and quality-related manner. No findings of significance were identified (Section 2).

PSSC Inspections

PSSC-009, Criticality Controls

Quality Assurance Program

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was quality assurance. The item relied on for safety (IROFS) associated components were the room C-210 Drip Tray; KDB (dissolution) slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in Aqueous Polishing Building (BAP) room C-210; and the KDB electrolyzer KDB*EZR1000. IFI 70-3098/2015-003-001, Review Criticality and Single-Parameter Spacing Analysis of Pipe Arrays in the Active Gallery, was opened to further evaluate the adequacy of the MOX Services criticality analysis for the Active Gallery. No findings of significance were identified (Section 3.a. (1)).

Design Control

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in BAP room C-210; and KDB*EZR1000. No findings of significance were identified (Section 3.a. (2)).

Test Control

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was test control. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified (Section 3.a. (3)).

Corrective Action Program

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was corrective action program. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified (Section 3.a. (4)).

Software Quality Assurance Program (QAP)

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was software QAP. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified (Section 3.a. (5)).

PSSC-023, Fluid Transport System

Test Control

The inspectors observed testing activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was test control. The IROFS component was Oxalic Mother Liquors Recovery (KCD), Offgas Treatment Unit (KWG), Process Steam System (SPS) and Purification Cycle (KPA) piping. Specifically, the inspectors observed liquid penetrant testing or reviewed radiographs of process piping installation. The inspectors also reviewed documentation associated with the testing. No findings of significance were identified (Section 3.b. (1)).

Installation

The inspectors observed construction activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation. The associated IROFS component was piping and associated supports in the BAP. Specifically, the inspectors observed installed piping and reviewed documentation associated with its installation in the BAP Active Gallery (Room C234) and Oxalic Mother Liquor Recovery (Room C134). No findings of significance were identified (Section 3.b. (2)).

PSSC-021, Fire Barriers

Installation and Procedure Controls

The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedure controls and installation. The associated IROFS components were fire dampers located in the MOX Process Building (BMP). No findings of significance were identified (Section 3.c).

PSSC-036, MFFF Building Structure

Installation and Procedure Controls

The inspectors reviewed construction activities related to PSSC-036, MFFF Building Structure (including vent stack), as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS component was the MFFF BMP temporary construction opening closures in Rooms B139 and B141, redesign work in B-183, and structural steel/embeds in Room B239/240. The detailed inspection activities identified Non-cited Violation (NCV) 70-3098/2015-03-02, Failure to Maintain Design Control for Structural Steel Welding. This NCV is associated with the inadequate design control activities of ECR-021131 which resulted in the welding of safety-related structural steel to embed plates in Rooms B239/240 that were not installed in accordance with the American Welding Society (AWS) D1.1 minimum fillet weld size requirements (Section 3.d).

PSSC-024, Gloveboxes

Installation, Special Processes, and Procedure Controls

The inspectors observed construction activities related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedure controls, special processes (welding), and installation. The inspectors observed ongoing installation and procedure control activities associated with the following glovebox systems:

- Jar Storage and Handling Unit (NTM)
- Grinding (PRE)
- Rod Cladding Units (GME)
- Oxalic Precipitation and Oxidation Unit (KCA)
- $Pu0_2$ Decanning Unit (KDA)
- Dissolution Unit (KDB)
- Dechlorination and Dissolution Unit (KDD)

The inspectors observed construction activities and reviewed records related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedure controls, special processes and installation. The inspectors

observed installation, alignment of the glovebox units, welding and procedure control activities associated with the gloveboxes. No findings of significance were identified (Section 3.e).

Programmatic Inspections

10 CFR 70.72 Facility Change and Change Control Process

The facility change process, as outlined in Chapter 16 of the license application, was performed by the applicant in accordance with project procedures. Training provided to MOX Services' staff involved with the facility change process was acceptable. The inspectors had reasonable assurance that the evaluations properly screened facility changes to assure that the change process program documented and maintained the safety basis of the facility and to ensure that the applicant's commitments related to the regulatory requirements of 10 CFR Part 70 were met. No findings of significance were identified (Section 4.a).

REPORT DETAILS

1. Summary of Facility Status

During the inspection period, the applicant (Chicago Bridge and Iron (CB&I) AREVA MOX Services (MOX Services)) continued construction activities of principle systems, structures and components (PSSCs). Construction activities continued related to closure of temporary construction openings (TCOs) related to walls in the MFFF Process 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 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 (Inspection Procedure (IP) 88130, Construction: Resident Inspection Program for On-Site Construction Activities at the Mixed Oxide Fuel Fabrication Facility; and IP 88110, Quality Assurance: Problem Identification, Resolution, and Corrective Action)

a. Scope and Observations

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

The inspectors routinely reviewed the status of work packages (WPs) maintained at various work sites. The inspectors monitored the status of WP completion to verify construction personnel obtained proper authorizations to start work, monitor progress and to ensure WPs were kept up-to-date as tasks were completed.

The inspectors conducted daily tours of material storage and work areas to verify that materials and equipment were properly stored in accordance with Quality Assurance (QA) requirements.

The inspectors routinely reviewed various corrective action documents. The review included non-conformance reports (NCRs) and condition reports (CRs). The inspectors also reviewed the closure of selected NCRs and CRs.

The inspectors routinely performed tours of the MOX Fuel Fabrication Facility (MFFF) work areas to verify that MOX Services' staging of piping, installation of ductwork, and installation of glove-boxes, installation of fire dampers met regulatory commitments and procedural requirements.

The inspectors conducted tours of material storage areas to determine if MOX Services was properly storing equipment and materials in accordance with MOX Project Quality Assurance Plan (MPQAP) storage requirements. Specifically, the inspectors assessed

MOX Services compliance with Project Procedure (PP) 10-38, Storage and Control of Material.

The inspectors verified that installations of supports and glove boxes were in accordance with applicable field drawings and met the general construction notes. The inspectors observed installation of piping supports and ventilation supports.

The inspectors performed reviews of WPs and routine walk downs of the areas to verify adequate cleanliness. The inspectors performed routine walk downs of installed piping and tanks to ensure cleanliness control barriers were properly maintained.

b. Conclusions

The inspectors reviewed the applicant's construction project status meeting notes, reviewed the status of work packages maintained at various work sites, conducted daily tours of work and material storage areas, and observed installation of mechanical equipment. The inspectors verified that the licensee is identifying conditions adverse to quality and capturing them in their corrective action program. Except as noted below, construction activities were performed in a safe and quality-related manner. No findings of significance were identified.

3. PSSC Related Inspections

a. PSSC-009, Criticality Controls

(1) Attribute: Quality Assurance; IP 88106, Quality Assurance: Program Development and Implementation (Pre-Licensing and Construction)

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF Construction Authorization Request (CAR). The inspection attribute observed was quality assurance. The Item Relied on for Safety (IROFS) associated components were the room C-210 Drip Tray; dissolution (KDB) slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000.

The inspectors reviewed the MOX Services Nuclear Criticality Safety (NCS) organization structure to determine if the organization met commitments contained in Sections 6.1 of the License Application (LA) and 6.1.1 of the CAR. Through interviews and records reviews, the inspectors verified that the NCS manager and engineering staff met the minimum education and training requirements of American Nuclear Society (ANS) 8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors; and ANS 8.19, Administrative Practices for Nuclear Criticality Safety. The inspectors reviewed audits, management assessments, and QA surveillances to determine if MOX Services was performing periodic audits of the NCS program as required by ANS 8.19. The inspectors confirmed that training and qualification records were maintained as QA records.

The inspectors reviewed three Nuclear Criticality Safety Evaluations (NCSEs) associated with the KDB Unit to determine if the NCSEs were developed and approved in accordance with the requirements of ANS 8.19. The inspectors reviewed the associated KDB criticality calculations that support the NCSEs to determine if the calculations took process variability and uncertainty into account, including modeling the most reactive combination of geometric and material tolerances. The inspectors verified that the calculations modeled both normal and credible abnormal conditions consistent with the requirements of ANS 8.1. The inspectors verified that the NCSEs were independently reviewed by a Senior NCS Engineer as required by Section 6.4.1 of the LA. As an independent check to MOX Services' analysis, the inspectors developed a SCALE computer model of the tanks and neutron absorber panels in Cell C-210 of the BAP to confirm that effective neutron multiplication factor (k_{eff}) met the upper safety limit identified in the LA for both normal and abnormal conditions. The inspectors performed various sensitivity analyses to confirm that specific design changes associated with cadmium thickness tolerances and spacing between the cadmium sheets and tank walls were consistent with conclusions reached by MOX Services.

The inspectors reviewed the NCSE and calculation for the KDB electrolyzer and compared them to equipment drawings to determine whether the analysis conservatively modeled the as-built conditions. The inspectors determined that the electrolyzer was modeled conservatively and in accordance with license commitments and that equipment dimensions, spacing, and cadmium absorber thicknesses were appropriately flowed down into subcritical limits on facility drawings. The inspectors noted that several dimensions were modeled at their nominal values, so that there was no allowance for manufacturing or installation tolerances. The inspectors also noted that the electrolyzer calculation document referenced an out-of-date version of the equipment drawing. The inspectors noted some minor deviations between the subcritical dimension limits as indicated on the drawings and the required subcritical values specified in the calculation; however, because the analysis adequately bounded the as-built dimensions, the inspectors had no safety concern.

Specifically, the inspectors reviewed one case concerning whether the analysis adequately bounded the as-built dimension. That case concerned the minimum required spacing between the electrolyzer enclosure and the concrete wall. The inspectors subsequently determined that full-density water was modeled between the enclosure and the wall, reducing the sensitivity of the model to this distance; rather than affect the gap between the enclosure and the reflector, the reduced thickness merely replaced concrete with additional water. The inspectors determined that MOX Services had also noticed the discrepancy and had reevaluated the system and shown it to be adequately subcritical. The electrolyzer is one of the most geometrically complex components in the BAP. No additional discrepancies were noted.

The inspectors reviewed the KDB Hazard and Operability (HAZOP) Study to confirm that criticality-related action items were properly closed including a documented technical justification. The inspectors interviewed NCS staff to determine the method for modeling the piping contained in the Active Gallery (Room C-234). The inspectors noted that solution-bearing piping was being installed in the Active Gallery, but it was not covered by a specific analysis. Generic limits exist for piping diameters, but these may not be sufficient if a large number of safe-diameter pipes are run close to each other or to other solution-bearing equipment. MOX Services staff stated that it did not make use of "field-

run" piping, but rather specified the locations for pipes in its computer-aided design (SmartPlant®) system. The inspectors reviewed several analysis that MOX Services stated contained criteria for piping and small equipment spacing, but it was not apparent how these analyses established criteria for spacing of large piping arrays. MOX Services stated that it had done a preliminary and informal calculation of the Active Gallery, but that additional work was needed. Inspectors observed a draft report, DCS01-KKJ-DS-NTE-H-35092, Spacing Analysis for Single-Parameter Controlled Components, which is intended to consolidate spacing requirements for piping and components in the Active Gallery. MOX Services is currently evaluating how to verify required dimensions given the large number of limits to be included in this document. The inspectors determined that further review by the NRC staff will be necessary to evaluate the acceptability of the criticality and single parameter-spacing analysis for large piping arrays in the Active Gallery. Inspector Follow-up Item (IFI) 70-3098/2015-003-001, Review Criticality and Single-Parameter Spacing Analysis of Pipe Arrays in the Active Gallery, was opened to further evaluate the adequacy of the MOX Services criticality analysis for the Active Gallery.

The inspectors reviewed the System Design Description (SDD), Safety Requirements Documents for Process Unit Controllers (SRD), and other design input documents and verified that IROFS were properly classified as Quality Level (QL) 1 and that criticality safety requirements managed by the safety programmable logic controller (SPLC) were properly flowed down into detailed design documents such as drawings, specifications, and work packages.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was quality assurance. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. IFI 70-3098/2015-003-001, Review Criticality and Single-Parameter Spacing Analysis of Pipe Arrays in the Active Gallery, was opened to further evaluate the adequacy of the MOX Services criticality analysis for the Active Gallery. No findings of significance were identified.

(2) Attribute: Quality Assurance; IP 88107, Quality Assurance: Design and Document Control (Pre-Licensing and Construction)

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK 5000, TK6000, TK3000, and TK1500 in in BAP room C-210; and the KDB electrolyzer KDB*EZR1000.

The inspectors reviewed the applicant's change control program procedure PP9-3, Design Control, to determine if design changes were controlled in accordance with MPQAP requirements. The inspectors reviewed various Engineering Change Requests (ECRs) to verify that design changes were subject to design control measures

commensurate with those applied to the original design. The inspectors verified that engineering changes impacting criticality safety were properly reviewed and approved by the NCS group.

The inspectors reviewed the Basis of Design for Nuclear Criticality Safety to determine if MOX Services flowed down NCS license commitments from Section 6 of the LA into the detailed MFFF design. The inspectors reviewed various NCS calculations to verify that the calculations were (1) identified by subject (including the components and IROFS to which the calculations apply), originator, reviewer, and date such that the calculations were traceable, (2) assumptions and design inputs were consistent with MOX Services' detailed design, (3) conservative assumptions were used to establish credible abnormal conditions including sensitivity studies to determine optimally moderated conditions and impacts of reduced equipment distances, and (4) calculated values for k_{eff} met upper safety limit values specified in the license application. The inspectors reviewed the Cell C-210 structural qualification calculation to verify that the slab tanks and neutron shield panels were seismically qualified as stated in the integrated safety analysis (ISA). The inspectors reviewed the corrosion study for the KDB electrolyzer and verified that the corrosion allowance specified in the design was conservative with respect to the expected corrosion rate of titanium throughout the life of the facility. The inspectors determined that the titanium corrosion rate was based on conservative process assumptions and experimental data. In addition, sensitivity analysis showed that the effect of reduced titanium thickness on the model k_{eff} was almost negligible.

The inspectors reviewed the implementation of the licensee's Quality Assurance Program through a review of design documentation for the C-210 Drip Trays. The inspectors reviewed and compared the applicable HAZOPs, NCSE, NCS calculations, and systems drawings. The inspectors reviewed the NCS calculations and drawings, to verify a sample of dimensions that the licensee was using in their criticality safety calculations for the drip tray. The inspectors also confirmed that the IROFS established in the HAZOP and NCSE, such as the sump level alarm, were shown in drawings. The inspectors were unable to verify the as-built design because the drip trays had not yet been installed for C-210.

The inspectors reviewed the specification for the Nuclear Incident Monitors (NIM) to determine if the NIM system met the requirements of ANS 8.3, Criticality Accident Alarm System, and 10 CFR 70.24. The inspectors verified that LA and ANS requirements were properly flowed down into specifications, drawings, coverage analysis, and the system design description. The inspectors reviewed the coverage analysis and observed that the licensee was establishing coverage for areas that would contain more than the 450 grams of fissile material listed in 10 CFR 70.24(a).

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified.

(3) Attribute: Quality Assurance; IP 88109, Quality Assurance: Inspection, Test Control, and Control of Measuring and Test Equipment (Pre-Licensing and Construction)

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was corrective action program. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000.

The inspectors selected a number of NCS-related CRs and interviewed the responsible engineers to verify that the licensee adequately implemented their corrective action program procedure. The inspectors verified that the licensee was entering the conditions at the proper threshold/category, corrective actions were adequate to correct the identified condition, and corrective actions were prioritized and completed on a schedule commensurate with their significance. The inspectors reviewed several NCRs documenting out-of-tolerance criticality dimensions for the KDB slab tanks. The inspectors verified that the non-conforming conditions were properly communicated from through the supply chain from the sub-vendor to the vendor to MOX Services. The inspectors reviewed the revised criticality analyses to verify that MOX Services had an adequate technical basis for a “use as is” disposition of the NCRs.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was corrective action program. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified.

(4) Attribute: Quality Assurance; IP 88110, Quality Assurance: Problem Identification, Resolution and Corrective Action (PIRCA)(Pre-Licensing and Construction)

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was corrective action program. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000.

The inspectors selected a number of NCS-related CRs and interviewed the responsible engineers to verify that the licensee adequately implemented their corrective action program procedure. The inspectors verified that the licensee was entering the conditions at the proper threshold/category, corrective actions were adequate to correct the identified condition, and corrective actions were prioritized and completed on a schedule commensurate with their significance. The inspectors reviewed several NCRs documenting out-of-tolerance criticality dimensions for the KDB slab tanks. The

inspectors verified that the non-conforming conditions were properly communicated from through the supply chain from the sub-vendor to the vendor to MOX Services. The inspectors reviewed the revised criticality analyses to verify that MOX Services had an adequate technical basis for a “use as is” disposition of the NCRs.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was corrective action program. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified.

(5) Attribute: Quality Assurance; IP 88112 (DRAFT), Software Quality Assurance

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was software quality assurance plan (QAP). The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000.

The inspectors verified that the computer software used to perform criticality calculations (SCALE-4.4a) was qualified and used in accordance with Section 3.2.3.E of the MPQAP. The inspectors confirmed that MOX Services performs the necessary QA checks to verify that the software produced correct solutions for the encoded mathematical model for each parameter employed and produces a valid solution to the physical problem associated with the particular application (e.g. correctly calculates k_{eff} for the system being modeled). The inspectors confirmed that any changes to the computer software or hardware were followed by reverification that the mathematical operations performed by the code were performed as intended. The inspectors performed a spot check of computers used by the NCS staff to ensure that the correct version of the code was used as documented in the validation report and LA. The inspector determined that no changes had been made to the validation reports since they were reviewed by licensing to support issuance of the construction authorization.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was software QAP. The IROFS associated components were the room C-210 Drip Tray; KDB slab tanks KDB*TK5000, TK6000, TK1500, and TK3000 in BAP room C-210; and the KDB electrolyzer KDB*EZR1000. No findings of significance were identified.

b. PSSC-023, Fluid Transport Systems

(1) Attribute: Test Control; IP 88134, Construction: Piping Relied on for Safety

(a) Scope and Observations

The inspection attribute observed was test control. The IROFS component was Oxalic Mother Liquors Recovery (KCD) piping in the BAP. Specifically, the inspectors performed visual, observed visual and/or liquid penetrant testing of process piping installation for weld numbers:

- KPA-DP4030-01-FW023-C0R0
- KCD-0114414A-12
- KCD-0114414B-12
- KCD-0114414C-12
- KCD-0114414D-12
- KCD-0114414E-12
- KWG-DS-PLI-T-5134412B-01 (PT Report Number MOX-2098)
- KPA-DS-PLI-T-5337500-02 (PT Report Number MOX-2138)
- KPA-DS-PLI-T-0060300-02 (PT Report Number MOX-2137)
- KPA-DS-PLI-T-0060300-01 (PT Report Number MOX-2136)

The inspectors interviewed staff performing the liquid penetrant testing and reviewed procedure M-NDE-004, Liquid Penetrant Testing, Revision 9, to determine whether the testing was performed in accordance with the procedure.

The inspectors also reviewed subcontractor (System One) radiography reports CRT-MOX-1465C1 (Weld SPS-6631800-09-FW007 C1R0) and CRT-MOX-1705C1 (Weld KPA-5337500-04-FW001 C1R0). The inspectors reviewed radiography records and images with System One personnel to determine whether inspections were performed in accordance with the System One radiography procedure M-NDE-009, Revision 4.

The inspectors verified that personnel performing the testing were qualified. The inspectors verified that thermometers were calibrated and that adequate light was used to perform the liquid penetrant testing.

(b) Conclusion

The inspectors observed testing activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation test control. The IROFS component was Oxalic Mother Liquors Recovery (KCD), Offgas Treatment Unit (KWG), Process Steam System (SPS) and Purification Cycle (KPA) piping. Specifically, the inspectors observed liquid penetrant testing or reviewed radiographs of process piping installation. The inspectors also reviewed documentation associated with the testing. No findings of significance were identified.

(2) Attribute: Installation; IP 88134 Construction: Piping Relied on for Safety; and IP 55050, Nuclear Welding General Inspection Procedure

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation. The associated IROFS component was active gallery pipe support frames. Specifically, the inspectors observed installed pipe support frames and reviewed documentation associated with its installation and inspection.

The inspectors reviewed the weld quality of completed welds on pipe support frames in the active gallery and secure warehouse to determine whether they met the requirements of American Welding Society (AWS) D1.6, Structural Welding Code – Stainless Steel; and PP 11-51, AWS D1.1 and D1.6 General Welding Procedure. The inspectors performed independent visual inspections on piping welds and bends in the BAP active gallery.

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation. The associated IROFS component was piping and associated supports in the BAP. Specifically, the inspectors observed installed piping and reviewed documentation associated with its installation in the BAP Active Gallery (Room C234) and Oxalic Mother Liquor Recovery (Room C134). No findings of significance were identified.

c. PSSC-021, Fire Barriers

(1) Attribute: Procedures; IP 88136, Construction: Mechanical Components

(a) Scope and Observations

The inspectors observed the ongoing activities related to installation of fire dampers in the BMP. The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS components were fire dampers located in the BMP.

Specifically, the inspectors observed the fire dampers HDE*DMPF0171B-04 and HSA*DMPF240B. The inspectors verified that the installed fire dampers met the requirements of DCS01-BMF-DS-PLF-A-04509, Revision (Rev.) 3, MOX Fuel Fabrication Facility Construction of Typical Fire Damper Penetration Details. Specifically, the inspectors verified that Structo-Crete™ material was installed in accordance with annular space requirements and that the fit-up of damper flanges to walls was sufficient to allow for the future installation of flange sealer material.

(b) Conclusion

The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS components were fire dampers located in the BMP. No findings of significance were identified.

d. PSSC-036, MFFF Building Structure (Including Vent Stack)

(1) Attribute: Design Control; IP 88132, Construction: Structural Concrete Activities; and IP 88133, Structural Steel and Support Activities

(a) Scope and Observations

The inspectors observed the closure of TCOs in Rooms B139 and B141. The inspectors observed rebar and formwork installation. The inspectors also observed the concrete after formwork removal to determine whether the concrete placements resulted in walls free of major concrete defects such as delamination, honeycombing or voiding. The inspectors reviewed construction specification DCS01-BKA-DS-SPE-B-09330-8, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3 and 4, to determine whether concrete work was performed in accordance with the appropriate procedures.

The inspectors observed concrete removal in Room B-183 (Fuel Assembly Storage) that was necessary for modifications associated with accommodating various fuel designs, to determine whether damage was done to remaining structures during the partial demolition of walls. The inspectors reviewed ECR-025816, Room B-183 TAS Fuel Assembly Storage Concrete Modification Details, to determine whether design changes were adequate and in accordance with site specifications and the American Concrete Institute (ACI)-349 code.

MPQAP Section 3, Design Control, states, in part, that measures are established in MOX Services QA procedures to assure that applicable requirements are correctly translated by MOX Services into design documents.

The MFFF structural carbon steel welding is to be constructed in accordance with the requirements of AWS D1.1, Structural Welding Code. Table 5.8 of AWS D1.1 specifies the minimum fillet weld size required based on the thickness of the base metal. Base metals with thicknesses greater than ¾ inch (") are required to have a minimum fillet weld size of 5/16". ECRs are design change documents that are subject to the same code requirements and rigor as the original design.

Contrary to the above, on or before August 19, 2015, measures to assure that applicable requirements are correctly translated by MOX Services into design documents were inadequate. Specifically, ECR-021131, PSJ Weld Plate Locations, Revision 0, was created with the allowance for welds of ¼" on base metals exceeding ¾" in thickness. Specifically, DCS01-PSJ-MG-PLE-M-01104 Sheet 1, DCS01-PSJ-MG-PLE-M-01108 Sheet 1 and DCS01-PSJ-MG-PLE-M-01109 Sheet 1, were three drawings where ECR-021131 was referenced or incorporated and provided for weld sizes less than the AWS D1.1 minimum.

The inadequate design control activities associated with ECR-021131 resulted in the welding of safety-related structural steel to embed plates in Rooms B239/240 that were not installed in accordance with the AWS D1.1 minimum fillet weld size requirements. Specifically, structural steel supports for the Ground and Sorted Pellet Storage Unit Glovebox (PSJ) and associated shield panels were installed with a weld size of ¼".

This finding was determined to be a Severity Level (SL) IV violation using Section 6.5 of the Enforcement Policy. Because this was a SL IV violation and the example supporting the violation was entered into the applicant's corrective action program (CR-15-316), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy and is identified as NCV 70-3098/2015-03-02, Failure to Maintain Design Control for Structural Steel Welding.

The inspectors determined that this finding was more than minor because it represented an inadequate implementation of design control activities whereby applicable code requirements were not met. Specifically, the engineering change process used by the applicant was not in accordance with MPQAP program requirements as the changes implemented failed to meet the code technical requirements. Failure to design the welded connections in accordance with AWS code requirements will result in the need to perform a code deviation or rework of the welds.

(b) Conclusions

The inspectors reviewed construction activities related to PSSC-036, MFFF Building Structure (including vent stack), as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedures and installation. The associated IROFS component was the MFFF BMP TCO closures in Rooms B139 and B141, redesign work in B-183, and structural steel/embeds in Room B239/240. The detailed inspection activities identified NCV 70-3098/2015-03-02, Failure to Maintain Design Control for Structural Steel Welding. This NCV is associated with the inadequate design control activities of ECR-021131 which resulted in the welding of safety-related structural steel to embed plates in Rooms B239/240 that were not installed in accordance with the AWS D1.1 minimum fillet weld size requirements.

e. PSSC-024, Gloveboxes

(1) Attribute: Installation; IP 88130 and IP 55050

(a) Scope and Observations

The inspectors observed construction activities related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedure controls, special processes (welding), and installation. The inspectors observed ongoing installation and procedure control activities associated with the following glovebox systems:

- Jar Storage and Handling Unit (NTM)
- Grinding (PRE - GB1000 and PRE GB4000)
- Rod Cladding Units (GME – GB6300 and GB3300A)
- Oxalic Precipitation and Oxidation Unit (KCA – GB8000)

- PuO_2 Decanning Unit (KDA – GB1000)
- Dissolution Unit (KDB – GB1000)
- Dechlorination and Dissolution Unit (KDD – GB1000 and GB2000)

The inspectors focused on the vendor weld quality of the gloveboxes. Welds were inspected to determine whether gloveboxes were structurally sound and free from defects that would allow leakage. The inspectors also observed the installation of metallic bellows that allow a semi-rigid connection between adjacent glovebox systems. Specifically, the inspectors observed bellows installation on the KDD/KDB gloveboxes and NTM gloveboxes. Observations included alignment of the glovebox shells, component installation, internal cleanliness, distortion control, and welding of the glovebox units. No findings of significance were identified.

The inspectors observed continuing work associated with distortion control activities, grinding, and permanent construction aid installations that were necessary to achieve proper clearance for rotating fire doors on NTM link glove boxes.

The inspectors observed storage condition of the gloveboxes to determine whether adequate moisture, temperature, and cleanliness controls were implemented.

The inspectors reviewed vendor generated liquid penetrant testing on welds associated with the KDA Gloveboxes contained in Receipt Inspection Report QC-RIR-13-47515.

(b) Conclusions

The inspectors observed construction activities and reviewed records related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were procedure controls, special processes and installation. The inspectors observed installation, alignment of the glovebox units, welding and procedure control activities associated with the gloveboxes. No findings of significance were identified.

4. Programmatic Inspections

a. 10 CFR 70.72 Facility Change and Change Control Process (IP 88106, Quality Assurance: Program Development and Implementation; and IP 88107, Quality Assurance: Design and Documentation Control)

(1) Scope and Observations

The inspectors evaluated the implementation of MOX Services change processes for the LA and the Integrated Safety Analyses Summary (ISAS) as defined in Chapter 16 of the LA. The summary of changes was provided in a letter to NRC dated January 29, 2015, and consisted of facility changes made since the last LA and ISAS update submitted to the NRC on January 27, 2014.

The inspectors reviewed the current facility change and change control program. Key elements of the inspection included the determination of the adequacy of the current program to meet licensing commitments, the regulatory requirements associated with each change, and the performance of the evaluations required by the process on a case

by case basis. Inspection focus was also on the effectiveness of MOX Services' change process program to document and maintain the safety basis of the facility due to changes and for determining the need for prior approval based on execution of the program and the requirements for requiring amendments for certain changes.

In addition, the inspectors verified that the applicant implemented PP 8-6, Licensing Basis Configuration Management, Rev. 13, dated September 9, 2014, by selecting targeted samples from the summary of changes made to the LA and ISAS during 2014. The inspectors reviewed the effectiveness of MOX Services' change and change control process to maintain the safety basis of the facility and to determine whether the applicant's PP 8-6 screening process appropriately determined the need for submitting a license amendment request. The applicant's screening process was documented on PP 8-6 Form 1, Applicability Determination Form (ADF), to determine whether licensing documents were affected and needed evaluation; and Form 2, Licensing Evaluation Form, to determine whether prior regulatory approval of the change was required. The inspectors reviewed PP 8-6 and determined that the procedure was adequate. The ADF was treated as a permanent QA record in accordance with the records retention requirements specified in PP 3-4, Records Management.

The inspectors selected targeted ADF samples from the summary list of facility changes which did not require pre-approval in accordance with 10 CFR 70.72 (d)(2) and Chapter 16 of the LA. The targeted ADF samples were selected based on a variety of engineering disciplines, including ventilation, piping, chemical safety, criticality safety, fire safety, structure, electrical power, and digital instrumentation and controls. The summary included changes to process safety information, the ISA, and management measures. In addition, the summary included changes that potentially impacted the LA as discussed in LA Chapter 16.2.3. The list of ADFs reviewed is provided in the attachment to this inspection report. The inspectors also interviewed engineering and licensing staff responsible for completing and reviewing the ADFs to get an overview of the MOX Services' change process and any updates or improvements of the process since the last inspection.

The inspectors reviewed PP 8-6 and changes made since the last inspection of the program was performed and determined that the procedure was adequate for evaluating the range of changes that require evaluation. MOX Services' staff also provided information about the types of documents that were included in the change process and would require the PP8-6 evaluation. These included major areas such as engineering and design control and well as areas that dealt with specific technical disciplines such as chemical safety or criticality and the safety evaluations performed for these technical areas.

A review of the list of documents that would require implementation of the PP8-6 process was made and the list was determined to be acceptable and adequate for evaluating changes that could be safety related or require updating of key licensing documents. The documents affected in a number of evaluations would generally provide for multiple evaluations of the same changes. Review of the process and associated documents needing change evaluations provided adequate assurance that the process was complete and that changes that could affect safety or require amendments would be expected to be subject to the change process.

The inspectors verified that MOX Services had a process that was appropriately implemented for determining when deviations in the design of the facility needed to be evaluated against commitments to codes and standards specified in licensing documents. The inspectors conducted interviews with design control staff to obtain information on the deviation control process and to get an update on the changes to the program since the inspectors last looked at the program. The inspectors verified that the deviation control process specifically defined when changes to the design needed evaluation in the change control process. The deviation control process has specific definitions that define when changes to the design need to be evaluated in the change control process. Deviations of commitments to codes and standards are also processed and evaluations for compliance with 10 CFR 70.61 are made. The inspection staff had previously reviewed the process and definitions for determining deviations that require when change process evaluations are needed and found that the process is acceptable for screening changes and evaluating the safety impact through compliance with 10 CFR 70.61. A log of the changes to determine whether PP 8-6 processing was needed was maintained and was part of the change process. The inspectors determined that the current process remains acceptable.

The inspectors also verified that training was provided to MOX Services' staff involved with the facility change process. The inspectors' selected 13 individuals who had signed the Level 1 QR Reviewer block on selected PP 8-6 Evaluation Forms. In these cases, the individuals had attended the LICS 4000, Application of PP 8-6, Licensing Basis Configuration Management course, or had been exempted by the Licensing Manager based on documentation of experience and if classroom training was unavailable based on the remoteness of the work location. The inspectors determined that currently employed Level 1 QR Reviewers had performed the required reading for PP 8-6, Licensing Basis Configuration Management, Rev. 13, Internal Change Notice (ICN) 03.

(2) Conclusions

The change process, as outlined in Chapter 16 of the LA, was performed by the applicant in accordance with project procedures. Training provided to MOX Services' staff involved with the facility change process was acceptable. The inspectors had reasonable assurance that the evaluations properly screened changes to assure that the applicant's commitments related to the regulatory requirements of 10 CFR Part 70 were met. For the changes reported, a license amendment was not needed. No findings of significance were identified.

5. Follow-up of Previously Identified Items

a. (Closed) Unresolved Item (URI) 70-3098/2014-02-01, Review of Equivalency Evaluations for Changes to NFPA 70 - 1999 Commitments

(1) Scope and Observations

National Fire Protection Administration (NFPA)-70, Annex H, Administration and Enforcement, Section 80.13 (15) and (16) states that (1) the authority having jurisdiction (AHJ) is permitted to waive specific requirements or permit alternative methods where it can be assured that equivalent objectives can be achieved by establishing and maintaining effective safety and (2) technical documentation shall be available to

demonstrate equivalency or an application for a waiver shall be prepared and filed with the AHJ.

LA Chapters 7 (Fire Protection) and 16 (Authorizations and Exemptions) were revised to clarify how equivalencies and exemptions to NFPA codes are addressed within the LA. The revised text indicated that if an NFPA code or standard cannot be met and an alternate method that provides an equivalent level of safety cannot be identified (i.e., performance-based design and/or documented analysis), then a formal request to approve that exemption (deviation) from the NFPA code or standard shall be submitted to the NRC for review and approval.

The NRC staff reviewed the clarifications made to the LA and determined that the changes met the staff position outlined in Section 7.4.3.2.2 of NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, Rev. 2.

(2) Conclusions

URI 70-3098/2014-02-01, Review of Equivalency Evaluations for Changes to NFPA 70 - 1999 Commitments, was closed based on the clarifications made to Chapters 7 and 16 of the License Application.

6. 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 October 15, 2015. 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

D. Del Vecchio, President and Chief Operating Officer
G. Rousseau, Executive Vice President, Deputy Project Manager
A. Bryson, Nuclear Criticality Safety Engineer
B. Eble, Nuclear Criticality Safety Lead
B. Foster, Senior Nuclear Criticality Safety Engineer
P. Henry, System Engineer
K. Trosen, Welding Engineer
E. Radford, Regulatory Compliance
M. Gober, Vice President, Engineering
D. Gwyn, Licensing/Nuclear Safety Manager
D. Ivey, Quality Assurance Manager
S. King, Vice President, Project Assurance (Acting)
C. Murray, Engineer, Welded Equipment & Piping Group
A. Olorunniwo, Civil/Structural Manager

2. INSPECTION PROCEDURES (IPs) USED

IP 88106	Program Development and Implementation
IP 88107	Design and Document Control
IP 88109	Quality Assurance: Inspection, Test Control, and Control of Measuring and Test Equipment
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action)
IP 88130	Resident Inspection Program For On-Site Construction Activities at the Mixed-Oxide Fuel Fabrication Facility
IP 88132	Structural Concrete Activities
IP 55050	Nuclear Welding General Inspection Procedure

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
70-3098/2014-02-01	Closed	URI, Review of Equivalency Evaluations for Changes to NFPA 70 - 1999 Commitments (Section 5.a).
70-3098/2015-03-01	Open	IFI, Review Criticality and Single-Parameter Spacing Analysis of Pipe Arrays in the Active Gallery (Section 3.a)
70-3098/2015-03-02	Open/Closed	NCV, Failure to Maintain Design Control for Structural Steel Welding (Section 3.c)

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ADF	Applicability Determination Form
AHJ	Authority Having Jurisdiction
ANS	American Nuclear Society
AWS	American Welding Society
BAP	Aqueous Polishing Building
BMF	Fuel Manufacturing Building
BMP	MOX Process Building
CAR	Construction Authorization Request
CB&I	Chicago Bridge and Iron
CPB1, 2	Construction Projects Branch 1, 2
CR	Condition Report
DCP	Division of Construction Projects
DFFI	Division of Fuel Facility Inspection
ECR	Engineering Change Request
EZR	Electrolyzer
FCR	Field Change Request
FTS	Fluid Transport System
HAZOP	Hazard and Operability Study
ICN	Internal Change Notice
IFI	Inspection Follow-Up Item
RCAIP	Inspection Procedure
IR	Inspection Report
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
ISAS	Integrated Safety Analysis Summary
KCD	Oxalic Mother Liquors Recovery
KDB	Dissolution Unit
k_{eff}	Effective Neutron Multiplication Factor
LA	License Application
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MOX Services	CB&I AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Evaluation
NCR	Non-conformance Report
NCV	Non-cited Violation
NFPA	National Fire Protection Administration
NIM	Nuclear Incident Monitor
No.	Number
NRC	Nuclear Regulatory Commission
NTM	Jar Storage and Handling Unit
PAF	Process Assembly Facility
PIRCA	Problem Identification, Resolution, and Corrective Action
PP	Project Procedure
PRE	Grinding
PSJ	Ground and Sorted Pellet Storage

PSSC(s)	Principle System(s), Structure(s), and Component(s)
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
QL-1 (LR)	Quality Level 1 (low risk)
RCA	Root Cause Analysis
RII	Region II
Rev.	Revision
SB	Safety Branch
SCALE	Comprehensive Nuclear Safety Analysis Computer Code System for Reactivity Determination
SDD	System Description Document
SDR	Supplier Deficiency Report
SL	Severity Level
SPLC	Safety Programmable Logic Controller
SSC	System, Structure, or Component
SQAP	Software QA Program
SRD	Safety Requirements Document
TK	Tank
TCO	Temporary Construction Opening
™	Trademark
TTML	Tensile Testing Metallurgical Lab
URI	Unresolved Item
WP	Work Package

5. LIST OF PSSCs REVIEWED

PSSC-009	Criticality Controls
PSSC-021	Fire Barriers
PSSC-023	Fluid Transport Systems
PSSC-024	Gloveboxes
PSSC-036	MFFF Building Structure

6. RECORDS AND DOCUMENTS REVIEWED

Applicability Determination Forms (ADFs)

ADF 005687, Revision to DCS01 AAS DS ANS H 38390, Revision to Nuclear Safety Evaluation for Explosion Events, December 13, 2013
ADF 005701, Update of Fire Protection Basis of Design for Fire Barriers
ADF 005702, Update of Pellet Storage Units NCSE to Current Design
ADF 005703, Update Of Pellet Repackaging Unit NCSE to Reflect New Safety Strategy
ADF 005711, Update the Specification for Pressure Relief Valves and Pressure Control Valves (PCVS) To Broaden the Seismic Qualification Acceptance Criteria for Stainless Steel PCVS with a C2 Seismic Performance Requirement
ADF 005717, 005838, Update Fluid Transport Basis of Design, January 21, 2014
ADF 005724, Update the Functional Classification List (FCL) to Clarify the Requirements of the MOX Design Earthquake (DE)
ADF 005734, Revise Final Dosing Unit NCSE to Reflect Current Safety Strategy

ADF 005739, Update Assembly Rod Loading and Assembly Fabrication Unit NCSEs to Reflect Current Safety Strategy
ADF 005740, Revision of Rod Inspection Unit NCSE to Reflect Current Safety Strategy
ADF 005743, Limited (Single) Exception Deviation to ASME B31.3.
ADF 005748, Removal of Unnecessary Adsorber RDO-ADS1025, March 4, 2014
ADF 005749, Update the Loss of Confinement Nuclear Safety Evaluation (NSE) and HAZOP of the Dissolution and Dissolution/Dechlorination Units (KDB/KDD) to Reflect that Scenarios Involving Leaks from the Air Diaphragms For Certain Process Pumps that Result in Consequences in Excess of 10CFR70.61 Limits are not Credible
ADF 005752, Update the Process Equipment Welding Requirements to Allow the Use of Level I Personnel to Perform NDE Examination under the Direct Supervision of a Level II in Accordance with the AWS Code
ADF 005757, Revision of Homogenization, Filling, and Sampling Unit NCSEs to Reflect Current Safety Strategy
ADF 005761, Update the Dissolution Units (KDB/KDD) and Purification Cycle Unit (KPA) Safety Requirements Documents (SRDs) to Reflect Inhibit Key Automation for IEEE 603-1998 Compliance
ADF 005765, Update of Design Basis for Supply Air HVAC System P&ID and Fire Hazard Analysis (FHA)
ADF 005769, Update the IROFS Samples Nuclear Safety Evaluation (NSE) to Provide a General Update and Address Changes Associated with Revised Input Documents
ADF 005782, Update to PUO2 Decanning, Milling, and Decanning NCSEs to Reflect Current Safety Strategy
ADF 005790, Update to PUO2 Canning NCSEs to Incorporate Current ECRs and to Reflect Current Safety Strategy
ADF 005791, Update to Waste Storage Unit NCSE to Reflect Current Safety Strategy
ADF 005796, Update of Design Basis for HVAC System
ADF 005798 (based on ECR-023780), Clarifying the Application of Code Stamping for Vessels That Fall under the Scope of ASME Section VIII, Division 1 (ASME Code) Requirements, June 19, 2014
ADF 005803, Update the Basis of Design for Electrical Systems and the Basis of Design for Instruments and Controls to Indicate that IEEE 384 Separation Requirements will not be Maintained Inside Gloveboxes
ADF 005818, Update to Fuel Assembly Control Area NCSE to Reflect Current Safety Strategy
ADF 005819, Update the Basis of Design (BOD) for Aqueous Polishing Process Criteria to Incorporate Outstanding ECRs and DCRs, Incorporate NNSA Comments on the Previous Revision, Reflect Cancellation of the PDCF Project
ADF 005820 (based on ECR-024016), Utilize AISC Steel Design Code Guidance for Structural Steel, June 6, 2014
ADF 005827, Update to Scrap Box Loading Unit NCSE to Reflect Current Safety Strategy
ADF 005834, Update of Fire Area Suppression Drawings to Reflect Removal of Sprinklers for Elevator Hoistways
ADF 005838, Update to Assembly Packing Unit NCSE to Reflect Current Safety Strategy
ADF 005839, Update the Instruments and Controls Basis of Design (BOD) To Incorporate Design Requirements for Bypasses to Reflect the Requirements of IEEE 603 per Resolution to a Project Condition Report
ADF 005855, Update Various NCSEs to Document Spacing Requirements for Favorable Geometry Components

ADF 005867, Update Various HVAC Systems to Reflect Multiple Fire Damper Configurations
ADF 005880, Update Fire Area/Barrier/Suppression Drawing
ADF 005882 (based on ECR-024209), Update KWG P&ID by Downgrading the Status of KWG*PSV5170 A/B and KWG*FLT5150 A/B to non-IROFS, August 21, 2014
ADF 005885, Update to Primary Dosing Unit NCSE to Incorporate Current ECRs and to Reflect Current Safety Strategy
ADF 005886, Update to Rod Cladding and Tray Loading Unit NCSEs to Incorporate Current ECRs and to Reflect Current Safety Strategy
ADF 005898 (based on ECR 008813), Modifies BOD For Reconciled Years of the ASME B31.3 Code and ASME Section VIII, September 16, 2014
ADF 005914, Update to Sintering Furnace Unit NCSE to Clarify Geometry Requirements
ADF 005919, Update Pellet Quality Control and Manual Sorting Unit NCSE to Incorporate Current ECRs and to Reflect Current Safety Strategy
ADF 005895, Update Supply Air HVAC to Reflect Removal of Several Fire Dampers
ADF 005908, Update of Fire Protection Basis Based on Project Condition Report
ADF 005943, Update Jar Storage Unit NCSE to Incorporate Current ECRs and to Reflect Current Safety Strategy
ADF 005965 Update Dissolution Unit NCSE to Reflect Current Safety Strategy
ADF 005981 Update Drip Tray Unit NCSE to Reflect Current Safety Strategy
ADF 005945, Revise LA Chapter 7, Fire Protection, for clarifications
ADF 005958, Revise LA Chapter 7, Fire Protection, for design basis requirement revisions
ADF 005971, Revise Fire NSE to Incorporate Current E CRs and to Reflect Current Safety Strategy
ADF 005981, Revise Fire NSE to Incorporate Current ECRs and to Reflect Current Safety Strategy

Audits & Surveillances

Audit Report SA-11-A07, Engineering Program and Activities
Audit Report SA-10-A06, MOX Engineering
Surveillance Report QA-14-0036, QA Review of Random In-Process Civil, Mechanical, Electrical and Process Unit Work Packages
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