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

October 30, 2017

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

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NUMBER 70-3098/2017-003

Dear Mr. Del Vecchio:

During the period from July 1, 2017, through September 30, 2017, the U. S. Nuclear Regulatory Commission (NRC) completed inspections pertaining to the construction of the Mixed Oxide Fuel Fabrication Facility. The purpose of the inspections was to determine whether activities authorized by the construction authorization and license application were conducted safely and in accordance with NRC requirements. The enclosed inspection report documents the inspection results. At the conclusion of the inspections, the findings were discussed with those members of your staff identified in the enclosed report.

The inspections examined activities conducted under your construction authorization and license application as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your authorization. The inspectors reviewed selected procedures and records, observed construction activities, and interviewed personnel.

Based on the results of this inspection, no violations or deviations were identified. In accordance with 10 CFR 2.390 of NRC's "Rules of Practice and Procedure," a copy of this letter and its enclosure may be accessed through the NRC's public electronic reading room, Agency-Wide Document Access and Management System (ADAMS) on the internet at http://www.nrc.gov/reading-rm/adams.html.

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

Sincerely,

**/RA/**

Michael Ernstes, Chief
Construction Inspection Branch 3
Division of Construction Oversight

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

Enclosure: NRC Inspection Report No. 70-3098/2017-003
w/attachment: Supplemental Information

cc w/encl: (See next page)

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SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2017-003

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| DATE | 10/20/17 | 10/18/17 | 10/20/17 | 10/16/17 | 10/16/17 | 10/16/17 | 10/17/17 | 10/25/17 |
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| DATE | 10/24/2017 | 10/23/2017 | 10/30/2017 | | | | | |

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

| | |
|---|---|
| Docket No.: | 70-3098 |
| Construction Authorization No.: | CAMOX-001 |
| Report No.: | 70-3098/2017-003 |
| Applicant: | CB&I AREVA MOX Services |
| Location: | Savannah River Site<br>Aiken, South Carolina |
| Inspection Dates: | July 1 – September 30, 2017 |
| Inspectors: | B. Adkins, Senior Fuel Facility Project Inspector, Safety Branch (SB), Division of Fuel Facility Inspection (DFFI)<br>A. Artayet, Senior Construction Inspector, Construction Inspection Branch 2 (CIB2), DCO<br>J. Eargle, Senior Project Inspector, Construction Inspection Branch 3 (CIB3), Division of Construction Oversight (DCO)<br>W. Gloersen, Senior Project Inspector, CIB3, DCO<br>N. Karlovich, Construction Resident Inspector, CIB3, DCO<br>J. Kent, Construction Inspector, Construction Inspection Branch 4 (CIB4), DCO<br>D. Piccirillo, Senior Construction Inspector, CIB2, DCO<br>T. Steadham, Senior Construction Inspector, CIB2, DCO<br>J. Vasquez, Construction Inspector, CIB4, DCO |
| Accompanying Personnel: | M. Diaz, Project Manager, Fuel Manufacturing Branch (FMB), Division of Fuel Cycle Safety and Environmental Review (FCSE), Office of Nuclear Materials Safety and Safeguards (NMSS)<br>M. Ernstes, Branch Chief, CIB3, DCO<br>D. Tiktinsky, Senior Project Manager, FMB, FCSE, NMSS |
| Approved by: | Michael Ernstes, Chief<br>Construction Inspection Branch 3<br>Division of Construction Oversight |

Enclosure

# EXECUTIVE SUMMARY

CB&I AREVA MOX Services (MOX Services)
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report (IR) Number (No.) 70-3098/2017-003

The scope of the inspections encompassed a review of various MFFF activities related to Quality Level (QL)-1 (safety-related) construction for conformance to U.S. Nuclear Regulatory Commission (NRC) regulations, the Construction Authorization Request (CAR), the MOX Project Quality Assurance Plan (MPQAP), applicable sections of the license application (LA) and applicable industry codes and standards. This inspection included, as applicable, the following inspection attributes: As-built/functional arrangements of structures, systems, and components; procedures; and installation.

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

- PSSC-003, Backflow Prevention Features
- PSSC-004, C2 Confinement System Passive Barrier
- PSSC-005, C3 Confinement System
- PSSC-006, C4 Confinement System
- PSSC-009, Criticality Control
- PSSC-012, Emergency AC Power System
- PSSC-021, Fire Barriers
- PSSC-028, Instrument Air System (Scavenging Air)
- PSSC-041, Process Cells

## Routine Resident Inspections

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

## PSSC Inspections

PSSC-004, C2 Confinement System Passive Barrier

In-process welding of a QL-1 support to the medium depressurization exhaust (MDE) pipe spool was observed. Drawings and field change requests were reviewed to verify whether the latest issue of drawings were being used and field changes to supports were approved by appropriate personnel. Weld data sheets were reviewed to verify that the weld and in-process attributes such as shielding gas type, gas flow, travel speed, filler material, and amperage were in accordance with the welding procedure. No findings of significance were identified. (Section 3.a)

PSSC-005, C3 Confinement System

In-process gas tungsten arc welding (GTAW) welding was observed on the ground of pipe spool weld 16-C304-HDE-8388-FW002-C0R0. Drawings were reviewed to verify whether the latest

issue of drawings were being used and field changes to supports were approved by appropriate personnel. Weld data sheets and material issue reports were reviewed to verify the weld and observed in-process attributes such as shielding gas type, gas flow, travel speed, filler material, and amperage were in accordance with the welding procedure. No findings of significance were identified. (Section 3.b)

PSSC-006, C4 Confinement System

For the samples reviewed, MOX Services performed receipt activities related to QL-1 ventilation components in accordance with their specifications, procedures and the MPQAP. The applicant maintained the physical condition of the QL-1 ventilation components sampled through the use of proper handling, storage and control techniques of ventilation components. In addition, the applicant maintained the associated records and documentation for these QL-1 ventilation components. No findings of significance were identified. (Section 3.c)

PSSC-041, Process Vessels and Pipes

In-process welding and visual inspections of a ½" nominal pipe size (NPS) Schedule 40S austenitic stainless pipe full penetration butt joint met the code requirements of the 1996 Edition including 1998 Addenda of ASME B31.3, Process Piping. Testing of the automatic welding equipment on a sample ½" NPS schedule 40 stainless pipe was in accordance with procedures. Storage and distribution of weld rods and electrodes for two rod rooms were in accordance with ASME B31.3. Various designated field material storage areas throughout the job site were in accordance with the MPQAP, including QL-1 designated locked storage areas. No findings of significance were identified. (Section 3.d)

**Programmatic Inspections**

10 CFR 70.72 Facility Change and Change Control Process (IP 88117, Facility Changes (License Application) and Change Process (10 CFR 70.72) (Pre-Licensing and Construction)

Based on the review of the selected Applicability Determination Forms, the inspectors had reasonable assurance that the change process, as defined in Chapter 16 of the license application (LA), was adequately screening changes to the LA and Integrated Safety Analysis Summary (ISAS); and for the changes reported, a license amendment was not needed. No findings of significance were identified. (Section 4.a)

Quality Assurance: Design and Documentation Control

The design control program was adequately defined and included effective procedures that identified design input controls, processes, analyses, verifications, change controls, interface controls; translates quality standards into design documents; and control deviations from standards. Applicable design bases and other requirements necessary to assure adequate quality were included or referenced in the applicant's procurement documents for procurement of QL-1 material, equipment and services. No findings of significance were identified. (Section 4.b)

Quality Assurance: Control of Materials, Equipment, and Services

The procurement of QL-1 material, equipment and services were controlled to assure conformance with specified technical and QA requirements. The necessary controls have been established for QL-1 items, to ensure that only correct and accepted material, parts, and components are used or installed. No findings of significance were identified. (Section 4.b)

Quality Assurance:  Inspection, Test Control, and Control of Measuring and Test Equipment

Inspections and tests verifying conformance of an item or activity to specified requirements were planned and executed in accordance with approved QA program requirements.  No findings of significance were identified.  (Section 4.b)

## REPORT DETAILS

### 1. Summary of Facility Status

During the inspection period, the applicant (CB&I AREVA MOX Services (MOX Services)) continued construction activities of principle systems, structures and components (PSSCs). Other construction activities included staging of process piping and installation of supports in the Aqueous Polishing Building (BAP); installation of process piping in the BAP; installation of ventilation system ductwork and supports in the BAP and MOX Processing Building (BMP); installation of drip trays in the BAP; installation of fire dampers in the BAP and BMP; and installation of various gloveboxes in the BAP and BMP. The applicant continued to receive, store, assemble, and test glove boxes and process equipment at the Process Assembly Facility (PAF).

### 2. Routine Resident Inspection Activities

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

(1) Scope and Observations

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

The inspectors reviewed the status of work packages (WPs) maintained at various work sites. The inspectors reviewed various corrective action documents. The review included non-conformance reports (NCRs) and condition reports (CRs). The inspectors routinely performed tours of the MOX Fuel Fabrication Facility (MFFF) work areas to observe ongoing work activities and communications.

(2) Conclusions

No findings of significance were identified.

### 3. PSSC Inspections

a. PSSC-004, C2 Confinement System Passive Barrier

(1) Scope and Observations

The inspectors observed construction activities related to PSSC-004, C2 Confinement System Passive Barrier, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes (welding).

The inspectors observed the in-process welding of a QL-1 support to the MDE pipe spool that occurred on the ground. The weld observed was C520-HV-11015-FW006-C0R0. The inspectors reviewed drawings and field change requests to verify whether the latest issue of drawings were being used and field changes to supports were

approved by appropriate personnel. The inspectors reviewed weld data sheets to verify that the weld and observed in-process attributes such as shielding gas type, gas flow, travel speed, filler material, and amperage were in accordance with the welding procedure. The inspector reviewed the records for welder S151 to verify the welder was qualified for the welding that occurred.

(2) Conclusions

No findings of significance were identified.

b. PSSC-005, C3 Confinement System

(1) Scope and Observations

The inspectors observed construction activities related to PSSC-005, C3 Confinement System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes (welding).

The inspectors observed the in-process gas tungsten arc welding (GTAW) welding on the ground of pipe spool weld 16-C304-HDE-8388-FW002-C0R0. The inspectors reviewed drawings to verify whether the latest issue of drawings were being used and field changes to supports were approved by appropriate personnel. The inspectors reviewed weld data sheets and material issue reports to verify that the weld and observed in-process attributes such as shielding gas type, gas flow, travel speed, filler material, and amperage were in accordance with the welding procedure. The inspector reviewed the records for the welder to verify welder S112 was qualified for the welding that occurred.

(2) Conclusions

No findings of significance were identified.

c. PSSC-006, C4 Confinement System (IP 88139, Ventilation and Confinement Systems)

(1) Scope and Observations

The inspectors observed construction activities related to PSSC-006, C4 Confinement System, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were special processes (welding) and control of equipment, materials, and services.

The inspectors observed the in-process GTAW welding of the root pass of safety related ventilation weld VHD-8227003-02-FW-016-C0R0. This weld was between pipe spools VHD-82273003-01-Q1-01 and VHD-82273003-02-Q1-01 in room B115. The inspectors reviewed drawings to verify whether the latest issue of drawings were being used and field changes to supports were approved by appropriate personnel. The inspectors reviewed weld data sheets and material issue reports to verify that adequately identified the weld and observed in-process attributes such as shielding gas type, gas flow, travel speed and direction, filler material, and amperage were in accordance with the welding procedure. The inspector observed the in-process QC verification of fit-up for the weld.

The inspectors reviewed the records for the QC and welder to verify they were qualified for the inspection and welding that occurred.

The inspectors reviewed receipt inspection reports (RIR) associated with QL-1 ventilation piping for the MFFF to verify that the documents were in accordance with regulatory and QA programmatic requirements and industry standards.

The inspectors reviewed 15 RIR packages associated with 25 ventilation piping components. For these QL-1 ventilation components, the inspectors evaluated the adequacy of the documentation packages with respect to procurement specifications and other engineering-related documents. The inspection of these documentation packages focused on ensuring that they specified the shape, size, dimension, and material type and grade, and the Certificate of Conformance certifies the components met construction, material, test, and qualification requirements associated with these QL-1 ventilation components.

(2) Conclusions

For the samples reviewed, MOX Services performed receipt activities related to QL-1 ventilation components in accordance with their specifications, procedures and the MPQAP. The applicant maintained the physical condition of the QL-1 ventilation components sampled through the use of proper handling, storage and control techniques of ventilation components. In addition, the applicant maintained the associated records and documentation for these QL-1 ventilation components. No findings of significance were identified.

d. PSSC-041, Process Vessels and Pipes (IP 55050, Nuclear Welding; and IP 88136, Construction: Mechanical Components)

(1) Scope and Observations

The inspectors observed in-process welding and reviewed associated documentation related to the assembly of PSSC-041, Process Vessels and Pipes, for the fluid transport system (FTS) of the aqueous polishing building (BAP). The inspection attribute reviewed was for the control of special processes specific to welding. The inspectors reviewed a selection of CB&I AREVA MOX Services field construction records for the FTS noted above and located in the active gallery. The inspectors reviewed the following completed quality records:

- engineering drawing;
- pipe and weld filler material records;
- welding procedure specifications (WPSs) with supporting procedure qualification records (PQRs); and
- welder and welding operator qualification records (WPQs).

The inspectors verified that in-process welding and visual inspections of a ½" nominal pipe size (NPS) Schedule 40S austenitic stainless pipe full penetration butt joint met the Code requirements of the 1996 Edition including 1998 Addenda of ASME B31.3, Process Piping. Specifically, the inspectors verified the following:

- traceable pipe and weld filler material met applicable chemical analysis, mechanical properties, and intergranular corrosion testing;
- qualifications of two WPSs with supporting PQRs for manual and automatic GTAW met Code requirements for the applicable essential and nonessential variables delineated in ASME Section IX, Standard for Welding and Brazing Qualifications;
- qualifications for a welder/welding operator using a unique identifying number P235 with two separate WPQs met essential variables of ASME Section IX; and
- visual QC inspections for cleanliness and fit-up and tack with manual GTAW were signed-off as acceptable prior to initiating automatic autogenous GTAW using a catalyst to achieve complete penetration for a square-groove weld.

Specifically, the inspectors observed automatic autogenous (without use of filler metal) welding for the above QL-1(LR) field weld-no. LGF-5481601-02-FW001-C0R0 to verify proper use of gas shielding and backing gas flow rates, and QC sign-offs for cleanliness and fit-up and tack on the weld data sheet document-no. 1500164 for work order 15-C234-P-M-2004-15N-2661 were in accordance with the requirements of the CBI AREVA MOX welding program. Prior to starting the above actual production weld, the inspectors also observed successful testing of the automatic welding equipment on a sample ½" NPS schedule 40 stainless pipe.

The inspectors observed the storage and distribution of weld rods and electrodes for two rod rooms to determine whether storage and control of weld filler materials by the rod room attendant were in accordance with ASME B31.3.

The inspectors observed the testing of a welder to determine whether the control of welder qualification testing by the test supervisor was in accordance with ASME Section IX.

The inspectors observed various designated field material storage areas throughout the job site to determine whether storage conditions were in accordance with the MPQAP, including QL-1 designated locked storage areas. In addition, the inspectors observed proper use of FME covers for the heating, ventilation, and air conditioning (HVAC) and piping systems in various accessible rooms and storage areas.

(2) Conclusions

No findings of significance were identified.

## 4. Programmatic Inspections

a. 10 CFR 70.72 Facility Change and Change Control Process (IP 88117, Facility Changes (License Application) and Change Process (10 CFR 70.72) (Pre-Licensing and Construction)

(1) Scope and Observations

The inspectors evaluated the implementation of MOX Services change processes for the License Application (LA) and the Integrated Safety Analyses Summary (ISAS) as defined in Chapter 16 of the LA. The summary of facility changes was provided in a

letter to NRC dated January 19, 2017, and consisted of facility changes made since the last LA and ISAS update submitted to the NRC in January 2016.

The inspectors reviewed the current facility change and change control program. MOX Services defined its licensing basis configuration management program in Project Procedure (PP) 8-6, Licensing Basis Configuration Management. The documentation of the evaluation in the change process was performed using an Applicability Determination Form (ADF) specified in PP 8-6. The inspectors reviewed changes made to PP 8-6 since the last inspection of the program and determined that the procedure was adequate for evaluating the range of changes that require evaluation. In addition, the inspectors verified that 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 a sampling of the changes submitted by MOX Services as part of the January 2017 update to the LA and ISAS. The samples were selected in a variety of disciplines and related to the changes with a higher degree of safety significance. The technical disciplines included fluid mechanics, HVAC, process piping, chemical safety, criticality safety, fire safety, emergency power, load handling, electrical power, and software. The inspectors verified that the selected samples did not result in a change to the LA or ISAS. The inspectors also evaluated selected ADFs to determine whether the change process outlined Chapter 16 of the LA functioned as required and whether the evaluations were properly screening changes in order to assure that the applicants commitments related to the regulatory requirements of Part 70 have been met. The ADFs that were evaluated by the inspectors are listed in the records section of this inspection report.

(2) Conclusions

Based on the review of the selected ADFs, the inspectors had reasonable assurance that the change process, as defined in Chapter 16 of the LA, was adequately screening changes to the LA/ISAS; and for the changes reported, a license amendment was not needed. No findings of significance were identified.

b. Quality Assurance Program

(1) Quality Assurance: Design and Documentation Control (IP 88107)

(a) Scope and Observations

The inspectors evaluated the applicant's implementation of MOX Services' design and documentation control program to verify compliance with the MOX Project Quality Assurance Plan (MPQAP) and implementing procedures. The following items relied on for safety (IROFS) components and the associated principle systems, structures, and components (PSSCs) were selected as inspection samples:

| | |
|---|---|
| Fire Damper: | HSA*DMPF0341B (PSSC-021) |
| Balancing Damper: | HDE*DMP0241B (PSSC-005) |
| Tanks: | KDB*TK4160 (PSSCs 009 and 041) |
| | KPA*TK1300 (PSSCs 003, 009, and 041) |
| Drip Tray: | LGF*DRIP6900 (PSSC-041) |

Cabinet: PSJ*CAB0004A (PSSC-012)
Panel: NCR*SPNL0007A (PSSC-012)
Logic Cabinet: KKJ*SPLC0001B-02 (PSSCs 009 and 028)

Design Control

For the IROFSs listed above, the inspectors determined if the design control program was adequately defined and included effective procedures that identified design input controls, processes, analyses, verifications, change controls, interface controls; translates quality standards into design documents; and control deviations from standards. To accomplish this, the inspectors:

- Reviewed the applicant's system for control of design inputs (design bases, conceptual design reports, performance requirements, regulatory requirements, codes and standards) to determine if documentation, review and approval commitments were being met.

- Reviewed the applicant's design process for translating design inputs into plant design, fabrication, construction, testing, inspection, and examination requirements. Verified that this design process was in accordance with MPQAP commitments and requirements. Determined if the design process was controlled to ensure correct design; proper classification of items relied on for safety (IROFS); suitable application of materials, parts, equipment, and processes; and accurate translation of requirements into specifications, drawings, procedures, and instructions.

- Reviewed the applicant's process for design analysis to verify that design analyses are documented in accordance with MPQAP commitments and requirements.

- Reviewed the applicant's program for verifying the adequacy of the design of QL-1 controls. Determined if design verifications, reviews and qualification tests (or independent verification) were performed in accordance with MPQAP commitments and requirements.

- Reviewed the applicant's design interface control program to determine if design internal and external interfaces were identified, procedurally controlled, and documented in accordance with MPQAP commitments and requirements.

Document Control

For the IROFSs listed above, the inspectors determined that applicable design bases and other requirements necessary to assure adequate quality were included or referenced in the applicant's procurement documents for procurement of QL-1 material, equipment and services. To accomplish this, the inspectors:

- Reviewed a variety of the applicant's documents that specify quality requirements or prescribe activities affecting quality associated with QL-1 controls to determine if these documents were prepared, reviewed, approved, and distributed to and used at the location where the prescribed activity was

performed in accordance with MPQAP commitments and requirements for document control.

- Reviewed the applicant's QA program implementing documents (QA procedures, drawings, and specifications), to determine if the document contents were in accordance with MPQAP commitments and requirements for instructions, procedures and drawings.

- Verified that the requirements of 10 CFR 21, Reporting of Defects and Noncompliance, are delineated, as applicable, on IROFS procurement documents.

(b) Conclusions

No findings of significance were identified.

(2) Quality Assurance: Control of Materials, Equipment, and Services (IP 88108)

(a) Scope and Observations

The inspectors evaluated the applicant's implementation of control of materials, equipment, and services program to verify compliance with the MPQAP and implementing procedures. The following IROFS components and the associated PSSCs were selected as inspection samples:

| | |
|---|---|
| Fire Damper: | HSA*DMPF0341B (PSSC-021) |
| Balancing Damper: | HDE*DMP0241B (PSSC-005) |
| Tanks: | KDB*TK4160 (PSSCs 009 and 041) |
| | KPA*TK1300 (PSSCs 003, 009, and 041) |
| Drip Tray: | LGF*DRIP6900 (PSSC-041) |
| Cabinet: | PSJ*CAB0004A (PSSC-012) |
| Panel: | NCR*SPNL0007A (PSSC-012) |
| Logic Cabinet: | KKJ*SPLC0001B-02 (PSSCs 009 and 028) |

Procurement Control System

For the IROFSs listed above, the inspectors determined whether the procurement of QL-1 material, equipment and services are controlled to assure conformance with specified technical and QA requirements. To accomplish this, the inspectors:

- Reviewed the applicant's system for evaluating and selecting suppliers/subcontractors and their proposals/offers. Verified that evaluations were performed before subcontracts and/or purchase orders are awarded. Verified that the measures used for evaluating and selecting procurement sources are as specified in QA procedures and meet the requirements of the approved MPQAP. Verified that suppliers/subcontractors for QL-1 items had been placed on the approved supplier list and are periodically evaluated in accordance with the approved MPQAP.

- Reviewed the applicant's measures for evaluating supplier/subcontractor performance after contracts were awarded. Verified that such measures have been established and were in accordance with the approved MPQAP. Reviewed a variety of procurement contractors (at least one each for materials, equipment, and services) associated with an IROFS and verified that established evaluation measures were being followed.

- Reviewed the applicant's methods for accepting supplier-subcontractor-furnished material, equipment, or services. Verified that the supplier/subcontractor with an approved QA program had been placed on the applicant's Approved Suppliers List before the award of the subcontract. Verified that any certificate of conformance, source verifications, receipt inspections, or post-installation testing (or other approved methods) used to accept QL-1, affecting materials, equipment, or services, had been performed per the approved MPQAP and associated implementing procedures.

- Verified that the procurement process has been performed per the approved MPQAP and associated implementing procedures.

- Reviewed any reports of nonconformance from suppliers/subcontractors, and verified that the applicant had properly evaluated their effect on QL-1 safety controls.

- Reviewed the applicant's system for specifying, accepting, and receiving commercial grade items. Verified that this system meets the requirements in the approved MPQAP and implementing procedures.

Identification and Control of Material, Parts, and Components

For the IROFSs listed above, the inspectors determined whether the necessary controls have been established for QL-1, to ensure that only correct and accepted material, parts, and components are used or installed. In order to accomplish this, the inspectors:

- Verified that the applicant had established and maintained an identification system on QL-1 items.

- Verified that item identification methods made use of physical markings and ensured that traceability is established and maintained in a manner that allowed an item to be traced to applicable design or other specifying documents. Verified that item traceability documentation ensured that the item could be traced from its source through installation or end use.

(b) Conclusions

No findings of significance were identified.

(3) Quality Assurance: Inspection, Test Control, And Control of Measuring and Test Equipment (IP 88109)

(a) Scope and Observations

The inspectors evaluated the applicant's implementation of the inspection, test control, and control of measuring and test equipment program to verify compliance with the MPQAP and implementing procedures. The following IROFS components and the associated PSSCs were selected as inspection samples:

| | |
|---|---|
| Fire Damper: | HSA*DMPF0341B (PSSC-021) |
| Balancing Damper: | HDE*DMP0241B (PSSC-005) |
| Tanks: | KDB*TK4160 (PSSCs 009 and 041) |
| | KPA*TK1300 (PSSCs 003, 009, and 041) |
| Drip Tray: | LGF*DRIP6900 (PSSC-041) |
| Cabinet: | PSJ*CAB0004A (PSSC-012) |
| Panel: | NCR*SPNL0007A (PSSC-012) |
| Logic Cabinet: | KKJ*SPLC0001B-02 (PSSCs 009 and 028) |

For the IROFS listed above, the inspectors determined whether inspections and tests verifying conformance of an item or activity to specified requirements were planned and executed in accordance with approved QA program requirements. In order to accomplish this, the inspectors:

- Verified that inspection requirements and acceptance criteria were contained in the applicable design documents approved by the responsible design organization. Verified that inspection activities were documented and controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means.

- Verified that tests required to verify conformance of an item to specified requirements, and to demonstrate satisfactory performance for service, were planned and executed. Verified that the characteristics to be tested and test methods to be employed were specified. Verified that test results were documented and their conformance with acceptance criteria were evaluated.

- Verified that the applicant had established controls for tools, instruments, gauges, and other measuring and test equipment (M&TE) used for quality-affecting activities. Verified that M&TE was controlled, calibrated (at specified periods), and adjusted to maintain accuracy within necessary limits.

- Verified that the applicant had established the requirements to identify the status of inspection and test activities. Verified that the status was indicated either on the items or in documents traceable to the items, where it was necessary to assure that required inspections and tests were performed, and to assure that items that have not passed the required inspections and tests were not inadvertently installed, used, or operated. Verified that the status was maintained through indicators (i.e., physical location and tags, markings, shop travelers, stamps, inspection records, computerized logs, or other suitable means).

(b) Conclusions

No findings of significance were identified.

## 5. Follow-up of Previously Identified Items

a. (Closed) Unresolved Item (URI) 70-3098/2012-003-006: Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings

During a quality assurance (QA) inspection in 2012, the inspectors identified a potential issue regarding intergranular corrosion testing of stainless steel piping, tubing and fittings used in FTS applications. Specifically, the inspectors identified that MOX Services may not have specified the correct test method for intergranular corrosion testing for 316L stainless steel tubing and fittings as documented in procurement specification DCS01-CCJ-DS-SPE-C-28110-0, as referenced in Purchase Order 10888-P-5748. Specifically, the inspectors noted that MOX Services had specified Practice A instead of Practice C as specified in ASTM A262 for 316L material in the procurement specification. The applicant entered this condition into their corrective action system as CR 12-442 to document the potential non-compliance. The inspectors reviewed the following documents to determine if MOX Services adequately addressed the issue:

- CR 12-275, Austenitic Stainless Pipe Delivered in Sensitized Condition;
- CR-12-442, Material Acceptance is not in Accordance with Procurement Specification;
- ECR-019201, Update of Material Standards for Instrument Valves and Fittings;
- CR-12-446, End Use Applications Testing Requirements;
- DCS01-CCJ-DS-SPE-C-28040-1, Instrument Specification Instrument Tubing;
- DCS01-KKJ-DS-NTE-F-13347, List of Corrosion and Non-corrosive Conditions for MFFF Piping Systems;
- DCS01-KKJ-DS-NTE-F-13348, MOX Position Regarding Corrosion Testing

Based on interviews with MOX Services engineering and a review of the documentation listed above, the inspectors concluded that MOX Services performed adequate actions to address the potential noncompliance. Specifically, the applicant consulted with corrosion experts from the reference plant in France and DOE facilities in the United States to determine if Practice C as specified in ASTM A262, Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels, was the correct corrosion test for 316L material used in FTS applications. Based on their investigation, the applicant concluded that Practice C was inappropriate for testing of 316L material due to the aggressiveness of the test (boiling nitric acid at a concentration of 65%). Specifically, Practice C results in both intergranular corrosion and general corrosion and is, therefore, not capable of discriminating between the two corrosion mechanisms. This often results in a false negative test result and is not representative of the ability of the 316L material to withstand the potential for intergranular corrosion. The applicant concluded that Practice A was the correct screening test for all stainless steel material used in MOX applications. Based on the information reviewed, the inspectors did not identify any violations of more than a minor significance. This issue is considered closed.

b. (Closed) Inspector Follow-up Item (IFI) 70-3098/2013-02-01: Perform Additional Review of Closed Tank Work Packages

The inspectors reviewed CR-13-210, Inadequate Work Package Closure Reviews, to review the actions taken by MOX Services to correct recurring work package related

issues. Based on their review of this CR, the inspectors concluded that MOX Services has taken adequate corrective actions to ensure the adequacy and completeness of MOX work packages. Specifically, MOX Services took the following corrective actions to address the issue: (1) performed an apparent cause analysis, (2) added a new management position titled "Director of Work Control," (3) implemented a work control database that interfaces directly with Documentum, (4) revised Project Procedure (PP) 11-44 and 2-1 to incorporate all roles and responsibilities associated with work packages, (5) completed reviews of all completed work packages and corrected identified deficiencies, (6) developed three new work control procedures that address work package planning, control and use of work packages, and work package closure (7) implemented a new work package packet format to reduce errors and improve efficiency, (8) established a "war room" to expedite review and closure of completed work packages, (9) increased the size of the work package group to correct deficiencies and implement new requirements, (10) revised work package forms to improve efficiency, (11) conducted three quality assurance surveillances to assess adequacy of corrective actions, and (12) closed all open CRs related to work package deficiencies. No findings of significance were identified. This item is considered closed.

c. (Closed) Inspector Follow-up Item (IFI) 70-3098/2010-004-009: Review of Commercial Grade Dedication Plan for Nelson Studs

On October 29, 2010, URI 70-3098/2010-003-002 was initiated to evaluate if the requirements of construction specification DCS01-BAA-DS-SPE-B-09352, Metal Fabrications for Quality Level 1, 2, 3 and 4, Quality Level 1a Items Relied on for Safety (IROFS), Revision (Rev.) 0., for the fabrication of D2L and H4L studs were being properly implemented by vendor Special Maintenance and Construction Incorporated (SMCI). After further inspections, it was determined that MOX services failed to ensure that applicable AWS code requirements were correctly implemented into design documents. This finding was documented as VIO 70-3098/2010-004-003.

As documented in inspection report (IR) 70-3098/2011-004, the previously mentioned violation was closed after inspectors determined that MOX services, through its corrective action program, modified its design specifications in accordance with AWS D1.6-1999 and properly dispositioned nonconforming materials previously procured from SMCI.

After further evaluation, it was determined that additional reviews were needed in order to verify that critical characteristics of D2L and H4L studs were implemented in accordance with ASTM A496. For this reason, IFI 70-3098/2010-004-009 was opened to document the need for additional inspector reviews of commercial grade dedication (CGD) plans used by SMCI, a nuclear quality assurance (NQA)-1 vendor to MOX services, for the dedication of NELSON studs used to manufacture NQA-1 concrete embed plates.

The inspectors evaluated SMCI's commercial grade dedication plan to verify that critical characteristics identified were adequate to ensure that D2L and H4L studs would perform their intended safety function. In addition, the inspectors evaluated the adequacy of MOX Fuel Fabrication Facility (MFFF) independent oversight of CGD activities, including QA audits of activities at the MFFF, audits of appendix B suppliers who performed CGD, and commercial grade surveys of non-appendix B suppliers. The inspectors also interviewed responsible personnel and reviewed commercial grade

surveys of suppliers who performed verifications of critical characteristics. The results of this inspection were documented in IR 70-3098/2012-001. This item was closed based on the review of previous inspection reports, associated documentation, and implemented corrective actions. No findings of significance were identified. This item is considered closed.

## 6. Exit Meeting

The inspection scope and results were summarized throughout this reporting period and by the Senior Project Inspector at an exit meeting with applicant management on October 19, 2017. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes was not included in this report.

## SUPPLEMENTAL INFORMATION

### 1. PARTIAL LIST OF PERSONS CONTACTED

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

### 2. INSPECTION PROCEDURES (IPs) USED

| | |
|---|---|
| IP 88117 | Facility Changes (License Application) and Change Process (10 CFR 70.72) (Pre-Licensing and Construction) |
| IP 88130 | Resident Inspection Program For On-Site Construction Activities at the Mixed-Oxide Fuel Fabrication Facility |
| IP 88134 | Piping Systems Relied on for Safety |
| IP 88139 | Ventilation and Confinement Systems |
| IP 55050 | Nuclear Welding General Inspection Procedure |

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

| Item Number | Status | Description |
|---|---|---|
| 70-3098/2010-004-009 | Closed | IFI: Review of Commercial Grade Dedication Plan for Nelson Studs (Section 5.c) |
| 70-3098/2012-003-006 | Closed | URI: Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings (Section 5.a) |
| 70-3098/2013-002-001 | Closed | IFI: Perform Additional Review of Closed Tank Work Packages (Section 5.b) |

### 4. LIST OF ACRONYMS USED

| | |
|---|---|
| ADAMS | Agency-Wide Document Access and Management System |
| ADF | Applicability Determination Form |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |

| | |
|---|---|
| BAP | Aqueous Polishing Building |
| BMP | MOX Processing Building |
| CB&I | Chicago Bridge and Iron |
| CAR | Construction Authorization Request |
| CFR | Code of Federal Regulations |
| CGD | Commercial Grade Dedication |
| CIB 2, 3, 4 | Construction Inspection Branch 2, 3, 4 |
| CMTR | Certified Material Test Report |
| CR | Condition Report |
| DCO | Division of Construction Oversight |
| DFFI | Division of Fuel Facility Inspection |
| ECR | Engineering Change Request |
| FCSE | Division of Fuel Cycle Safety and Environmental Review |
| FMB | Fuel Manufacturing Branch |
| FME | Foreign Material Exclusion |
| FTS | Fluid Transfer System |
| GTAW | Gas Tungsten Arc Welding |
| HDE | High Depressurization Exhaust |
| HVAC | Heating Ventilation and Air Conditioning |
| IFI | Inspector Follow-up Item |
| IR | Inspection Report |
| IROFS | Items Relied on for Safety |
| ISAS | Integrated Safety Analysis and Summary |
| LA | License Application |
| MDE | Medium Depressurization Exhaust |
| MOX | Mixed Oxide |
| MOX Services | CB&I AREVA MOX Services |
| MFFF | MOX Fuel Fabrication Facility |
| MPQAP | MOX Project Quality Assurance Plan |
| M&TE | Measuring and Test Equipment |
| NCR | Non-conformance Report |
| NMSS | Office of Nuclear Materials Safety and Safeguards |
| No. | Number |
| NPS | Nominal Pipe Size |
| NQA-1 | Nuclear Quality Assurance (1) |
| NRC | U.S. Nuclear Regulatory Commission |
| PAF | Process Assembly Facility |
| PP | Project Procedure |
| PQR | Procedure Qualification Record |
| PSSC | Principle System, Structure and Component |
| QC | Quality Control |
| QL | Quality Level |
| QL-1 (LR) | QL-1 (Low Risk) |
| RII | Region II |
| RIR | Receipt Inspection Report |
| SB | Safety Branch |
| SMCI | Special Maintenance and Construction Incorporated |
| URI | Unresolved Item |
| WP | Work Package |
| WPQ | Welder Performance Qualification |

WPS Welding Procedure Specification

## 5. LIST OF PSSCs REVIEWED

- PSSC-003, Backflow Prevention Features
- PSSC-004, C2 Confinement System Passive Barrier
- PSSC-005, C3 Confinement System
- PSSC-006, C4 Confinement System
- PSSC-009, Criticality Control
- PSSC-012, Emergency AC Power System
- PSSC-021, Fire Barriers
- PSSC-028, Instrument Air System (Scavenging Air)
- PSSC-041, Process Cells

## 6. RECORDS AND DOCUMENTS REVIEWED

### Applicability Determination Forms (ADFs)

ADF 006255, Revise LA Chapter 15 (Radiation Safety) to clarify what is descriptive text and identify existing design basis requirements (commitments) in a discrete section

ADF 006285, Rev. 1 of ECR-026101 updates the halogenated fire suppression demands calculation to reflect changes in rooms B-150, B-150a, and B-150b

ADF 006289, Update the fluid list to reflect the latest fluid service categories provided in the application of ASME B31.3 Fluid Service Categories to Piping

ADF 006292, Update the MFFF Deviations Log to incorporate outstanding ECRs and to clarify the definition of ASME B31.3 "Owner" and "Owner's Inspector"

ADF 006297, Revision to ECR-25620, Rev. 1, updates the KBD/KDD design package to be consistent with the actual design and the interface with the KDA/KDM systems

ADF 006301, Update various Nuclear Criticality Safety Evaluations (NCSEs) to reflect a change in the maximum mass of pellets in each Mo-boat

ADF 006307, Rev. 0, updates the VHD system P&IDs to reflect the basis for the functional and seismic classification of instrumentation loops that are connected to IROFS confinement loops that are connected to IROFS confinement boundaries

ADF 006313, Rev. 3, Updates the Loss of Confinement NSE to document the basis for the functional and seismic qualifications of instrumentation loops and their commodity elements that are connected to IROFS confinement boundaries

ADF 006319, Update the Loss of Confinement (LOC) Nuclear Safety Evaluation (NSE) and several high depressurization exhaust (HDE) system P&IDs to document the removal of HDE final filter air-operated damper (AOD) hand switches in the Emergency Control Rooms

ADF 006321, Update the software QA plan to reflect improvements on observations from an activity assessment

ADF 006322, Update PuO2 Decanning, Milling, and Recanning Nuclear Criticality Safety Evaluation to reflect removal of reliance on the integrity of cans as IROFS for mass control

ADF 006328, Update the MFFF Deviations Log to reflect a deviation to ASME B31.3

ADF 006329, Update the Functional Classification List to document the basis for the functional and seismic classification of instrumentation loops and their commodity elements that are connected to IROFS confinement boundaries

ADF 006330, Update the Safety Requirements Document for laboratory units controllers to incorporate outstanding ECRs

ADF 006333, Update the MFFF 480VAC emergency bus A and B switchgear one line diagrams to incorporate general revisions

ADF 006343, Update the Basis of Design for Fluid Transport Systems – Equipment and Piping to provide clarification of fluid transport system categories and close confirmation required items

ADF 006346, Revisions to NSCE's of KCA, KPA, KCD, KDB and KDD to identify those thermowell pots that are evaluated for geometry control as part of the overall criticality safety strategy since TW pots may contain fissile material

ADF 006347, Update the aqueous waste reception P&ID to reflect downgrading the floor drain in Room C-410 from QL1 to QL4

ADF#: 006348, Update the $PuO_2$ Decanning Unit (KDA) NCSE to specify the seismic classification/performance requirements and emergency power requirements for the supply air HVAC system (HSA) room heater system and the related glovebox instrument air system (IAS)

ADF 006349, Update the AP auxiliary unit, NCSE to reflect completion of a criticality calculation that demonstrates that the active gallery is substantially subcritical (20% below subcritical limit)

ADF 006350, Rev. 0 of ECR-026517 updated various project Safety Requirements Documents for MP units (DCE, NBX, NDP, NCR, NDS, NXR, and NPG) to reflect removal of the override key (out-of-order key) in accordance with DCR 12-0514

ADF 006353, Update the Laboratories (LLJ) NCSE to reflect changes to the alarm acknowledgement pushbuttons, lamp test pushbuttons, and tunnel locking cylinders in the laboratory mass controlled areas

ADF 006355, Update the aqueous waste reception (KWD) P&ID to reflect downgrading the KWD air lift KWD-AL3032 from QL-1 to QL-2

ADF 006358, Update the powder process hazards analyses and load handling NSE to clarify the need for an administrative IROFS to prevent operating equipment in the powder process units without first verifying the hoist is in the safe parked position

ADF 006365, Update the Primary Dosing Unit (NDP) NCSE to reflect an increase in the measurement uncertainty for load cells used for measuring the amount of powder in a hopper

ADF 006374, Update the liquid decontamination (DCS) P&ID to reflect the addition of tag numbers to the DCS flex hoses

ADF 006379, Update various fire protection clean agent P&IDs to reflect implementation of DCR 16-580 and associated documents which provided a basis for the elimination of extended discharge systems for specific rooms in the MFFF

ADF 006383, Update the Loss of Confinement NSE to provide clarification for two LOC-12 events pertaining to the Sintering Furnace Safety Controllers

ADF 006398, Update the Seismic Systems and Components Basis of Design (BOD) to address the qualification of wireway

ADF 006403, Update the supply air HVAC (HSA) system P&IDs to reflect a change in quality level for HSA ductwork that transits through C3b rooms from QL-4 to QL-1LR

ADF 006404, Update the MFFF drip tray NSCE and criticality safety calculation to reflect a slight increase in slope of drip tray KPA*DRIP 7900 (from 1.0% to 1.18%)

ADF 006407, Update the MFFF Deviations Log to add a clarification that indicates that ASME B31.3 can be used for emergency diesel generator fuel supply piping

ADF 006413, Update the MFFF Deviation Log to address the qualification of welds on the cross bracing of High Depressurization Exhaust (HDE) System filter housings

ADF 006419, Changes to ISAs text related to clarifying seismic performance requirements for the HDE variable frequency drives and fans

ADF 006437, Rev. 0 of ECR-028711 updated the MFFF Deviation Log to address the qualification of welds on the cross bracing of High Depressurization Exhaust (HDE) System filter housings

ADF 006443, Update the Loss of Confinement NSE to add failure of a drive shaft as a cause for a small breach of the glovebox boundary (LOC-2a)

ADF (sequence number not applicable), MPQAP Rev. 16, Revise MPQAP to address corporate changes and current organizational structure and incorporate Amendment MPQAP-2015-0001

**Certified Material Test Reports**

Consolidated Power Supply (CPS), CMTR for Line Item 2 chemical analysis, Lab Number 14-0928, CPS Lot L14528, Heat # 042692, Mfgr. Lot # 200780, ½" NPS, S/40s SMLS pipe, ASME SA312-TP403L

CPS, CMTR for Line Item 2 ASTM A262 Practice A, Lab Number 14-0928, CPS Lot L14528, Heat # 042692, Mfg. Lot # 200780, ½" NPS, S/40s SMLS pipe, SA312-TP304L

Arcos, CMTR Arcos S.O. 133050, Arcos 308/308L, Lot No. AT9850 – Heat No. 744825, chemical analysis, mechanical properties, and delta ferrite number, 7/15/13

**Condition Reports**

10888-MOX-CR-16-363, Rear End Brackets Installed with Unknown Material Composition
10888-MOX-CR-17-084, Storage Inspection Records
10888-MOX-CR-17-202, Improperly Labeled Storage Areas in MFFF
10888-MOX-CR-17-204, Rod Room Storage
10888-MOX-CR-17-208, Purge Gas Flow Rate
10888-MOX-CR-17-209, Monthly Controlled Storage Area Inspections
10888-MOX-CR-17-210, Dissimilar Metals in Contact
10888-MOX-CR-17-188, Incorrect Quality Level Material
10888-MOX-CR-17-272

**Drawings**

50-001326-44D, Balancing Damper with Outboard Bearings, Shaft Seals, Hand Quadrant, Rev. J
B241-HV-00001, HVAC Support Detail, Rev. 0
BMP-L2-A3-30-HDE-9D, MOX Fuel Fabrication Facility BMP Level 2 – Area 3 HDE System HVAC Spool Fabrication Drawing, Rev. 0
BMP-L2-A3-30-HDE-9D, MOX Fuel Fabrication Facility BMP Level 2 – Area 3 HDE System HVAC Spool Fabrication Drawing Equipment Flange Detail, Rev. 0
DCS01-ZMS-DS-PLD-M-11225-SH16, General Notes for HVAC Supports: Clearance/Gaps, Rev. 2
DCS01-ZMS-DS-PLD-M-11225-SH16, General Notes for HVAC Supports: Clearance/Gaps, Rev. 5
DCS01-ZMS-DS-PLD-M-11196, Standard HVAC Support Detail Typical Three-Way Carbon Steel Support for A Maximum of 10" Diameter Duct, Rev. 1
DCS01-HDE-DS-SCH-V-12510-SH15, Piping & Instrument Diagram High Depressurization Exhaust System MOX Level 2, Rev. 9
DCS01-LGF-DS-PLI-T-5481601-02, weld map drawing, Sheet 2, Rev. 2

**Engineering and Field Change Requests (ECRs and FCRs)**

ECR 018930, Misc. Drip Tray Detail and Section Revisions, 6/29/16
ECR 018986, Remove Pipe Support Penetration Holds from Dray Tray Design Drawings, 2/1/13
ECR 019126, Drip Tray Weld Details, 11/6/12
ECR 025243, Delete Drip Tray Colemanite Requirement, 3/2/15

ECR-017913, Clarify Material for Washers in Demisters, Leak Detection Pots, and Separator Pots, Rev. 2
ECR-018989, Modification of Fastener Material for FreNuc Fabricated Pots and Demisters, Rev. 1
ECR-020152, Revise fire damper Installation, Operation, and Maintenance Manual to Reflect Retaining Angle Size, Rev. 0
ECR-021640, Clarify Material for Washers in Demisters, Leak Detection Pots, and Separator Pots, Rev. 0
ECR-027944, Computerized Radiography, Rev. 0
ECR-028114, PT Requirements in DCS01-KKJ-DS-SPE-L-12045, Rev. 0
ECR-029417, Revise Damper Procurement Specification DCS-QGA-DS-SPE-V-15910 Rev. 0, Rev. 1
FCR-004005, Volume Damper Installation Tolerances for Orientation, Location, and Handle Modification, Rev. 2
FCR-04010, Modification of Volume Damper Handles, Rev. 1

**Nonconformance Reports (NCRs)**

10888-MOX-NCR-14-5920
10888-MOX-NCR-14-5922
10888-MOX-NCR-15-6095
10888-MOX-NCR-15-6431
10888-MOX-NCR-17-7547
10888-MOX-NCR-17-7563
10888-MOX-NCR-16-7267
10888-MOX-NCR-17-7608
10888-MOX-NCR-17-7650
10888-MOX-NCR-17-289
10888-MOX-NCR-17-7741

**Miscellaneous**

Mixed Oxide Fuel Fabrication Facility License Application, 1/17
Mixed Oxide Fuel Fabrication Facility Integrated Safety Analyses Summary, 1/17
MPQAP-2016-0001, “MOX Project Quality Assurance Plan,” Rev. 16
Weldstar, Certification of Compliance, Customer P.O. 1088-P-00012710, Item #4, 1/16” X 36”, 10 lbs. containers, Arcos ER308/308L, Heat # 744825, Lot # AT9850, Control # AT9850, 3/25/14
CPS CGD No. CGD-1-062, Type 1 Dedication Plan, Pipe, ½” NPS, Sch. 40S, SMLS, ASME Section II, SA312 304L, Rev. 4 [linked with MOX Services Document No. 08716-00011258_00000-0022, Submittal Review Form (Traveler), Rev. E]Schoeller-BleckMann, Inspection Certificate 16902, Rev. 01, for SA312-304L, Heat-No. 042692 and Lot-No. 200780, ASTM A262 Practice E, chemical analysis, and mechanical properties with tensile and yield strength with percent elongation in 2”, Hydrostatic test of 2500 psi, 2/4/14
DCS01-ZMS-DS-CAL-M-11493-0, Qualification of Support HVAX 3-Way Q-shape Typical QL-1, Rev. 0
DCS01-QGA-DS-SPE-V-15910-7, Procurement Specification Dampers QL-1, Rev. 7
DCS01-QGA-DS-NDS-M-65765-7, Statement of Work Fire Dampers, 1/26/17

Audit Report FNUC-12-VE286, Shaw AREVA MOX Services Triennial Audit of FreNuc, SA, 1/14/13
EGS-TR-327701-372, Performance Test Curves for 8 inch Round Balancing Damper, 5/2/12
DCS01-ZMJ-DS-SPE-M-21402-2, Equipment Seismic Qualification Specification, Rev. 2
DCS01-QGA-DS-SPE-V-15890-9, Construction Specification Section 15890 Ductwork Fabrication and Installation QL-1, Rev. 9
DCS01-HDE-DS-NOM-V-12280-2, HVAC HDE Damper List, Rev. 2
DCS01-ZMS-DS-SPE-M-12173-5, Construction Specification Field Fabrication and Installation of HVAC Supports QL-1, Rev. 5
DCS01-KKJ-DS-SPE-L-12045-3, Specification for Demisters, Leakage Detection Pots, and Separator Pots, Rev. 3
DCS01-KKJ-DS-CAL-M-10254-1, Drip Tray/Concrete Containment Sizing Calculations for C116, C118, C119, C126, C147, C234, C242, C435, C439, C526, and C527, Rev. 1
DCS01-BAP-DS-SPE-B-09360-1, Construction Specification - Installation of the BAP Process Cell Drip Trays, Rev. 1
DCS01-BAP-DS-SPE-B-09356-1, Fabrication Specification - Specification for Fabrication of the BAP Process Cell Drip Trays, Rev. 1
DCS01-BAP-DS-NTE-B-09103-2, BAP Stainless Steel Drip Tray Interface Information," Rev. 2
DCS01-BAP-DS-NTE-B-09104-3, Design of Drip Trays, Rev. 3
DCS01-BAP-DS-NTE-B-09102-1, BAP Stainless Steel Drip Trays Technical Description and Design Requirements, Rev. 1
08716-00008791_00000-1082, NCR-975, Rev. D
08716-00008791_00000-0622, Installation, Operation, and Maintenance Manual, Rev. D
08716-00008967-00000-0338, Drip Tray Plate Layout, Rev. 0
QA Audit Report INT-16-VE46 of Intermech, Inc., 4/27/16
FFI-12-VE117R1, 11/12
MOX QC Qualification Certificate for P. Gallagher, 1/25/12
MOX QC Qualification Certificate for C. Knight, 10/22/14
MOX QC Qualification Certificate for K. Sackman, 8/4/15
Qualified Suppliers List, 6/17
Approved Suppliers List, 10/12
08716-00006475-00000-0130, Separator Pot with Overflow, KDB-TK4160 Fabrication Drawings, Rev. B
08716-00006475-00000-0042, Design and Earthquake Calculation for Separator Pots with Overflow, Rev. C
08716-000005147-0251, Condition Report for Damper Structural Calculation, Rev. C
08716-000005147-0114, Final Dedication/Seismic Report for Ruskin Model R82AMS Round Balancing Dampers with Integral Air Sensor Probes, Rev. 0
08716-00005147-0104, Ruskin Installation, Operation, and Maintenance Manual, Rev. A
08716-00003307_00003-0278, Report 2011-030 UL 555 Testing, Rev. E
PO 10888-B-00008967 to Intermech, Inc. for Process Cell Drip Trays, Rev. 2
Weld material requisitions for UTC Nos. 203061, 213906, 232109 for FW135/136/137/138/139-C0, Rev. 0

**Other IROFS Specific Documents**

DCS01-ZMY-DS-NTE-M-65788-0, Application of the Determination of Minimal Physical Properties through Chemical Analysis for Austenitic Stainless Steels, QL 1 (IROFS)

DCS01-ZMS-DS-PLD-M-C520-HV-11015, HVAC Support Detail, Rev. 0
DCS01-ZMS-DS-PLD-M-11225-SH14, General Notes for HVAC Supports: Shims, Rev. 8
DCS01-ZMS-DS-PLD-M-11225-SH13, General Notes for HVAC Supports: Shims, Rev. 6
DCS01-XGA-DS-PLI-V-22610, MOX FFF HVAC-BAP HDE/HSA Systems Level 3 Area 9 Col. A-E; 3.9-6 Part Plan EL 15'6" to 37'0", Rev. 2
DCS01-QGA-DS-SPE-V-15890-9, Construction Specification section 15890 Ductwork fabrication and installation, Rev. 9

**Project Procedures (PPs)**

PP 3-4, Records Management Procedure, Rev. 8
PP 3-5, Control of Nonconforming Items, Rev 12
PP 3-6, Corrective Action Process, Rev. 17
PP 3-12, Supplier Evaluation, Rev. 15
PP 3-13, Supplier Surveillance, Rev. 8
PP 3-15, Control of Measuring and Test Equipment, Rev. 7
PP 3-28, Quality Control Receiving Inspection, Rev. 6
PP 3-29, Inspection at Supplier Facilities, Rev. 3
PP 3-30, Quality Control Inspection Plans and Reports, Rev. 5
PP 8-3, Evaluation and Reporting of Defects and Noncompliance, Rev. 7
PP 8-6, "Licensing Basis Configuration Management", Rev. 13
PP 10-37, Control of Issued Material", Rev. 3
PP 10-38, Storage and Control of Material, Rev. 2
PP 11-51, AWS D1.1 and D1.6 General Welding Procedure, Rev. 2
PP 11-52, AWS D9.1 General Welding Procedure, Rev. 0
PP 11-58, Weld Filler Material Control, Rev. 4
PP 11-60, Welder/Welding Operator Qualification, Rev. 1
PP 12-40, Preventive Maintenance of In-storage or Installed Equipment during the Construction Phase, Rev. 0
PP 10-38 and Layup and Storage Maintenance Requirements, 7/27/17

**Purchase Orders**

Shaw AREVA MOX Services, purchase order 10888-O-00011258, Rev. 2, Release 13, Line Item 2, Catalog ID 99496, for ½" NPS, Sched. 40S, seamless SA312-TP304L, 6/20/14

Shaw AREVA MOX Services, purchase order 10888-P-00012710, Rev. 2, Line Item 4, Catalog ID 1310, for 1/16" dia. X 36" long bare welding rod, SFA-5.9, ER308/308L (dual certified), Heat # 744825, Lot # AT9850, 6/9/14

**Receipt Inspection Reports (RIRs)**

Material Receipt Report 50206, for PO 12710, Line Item 4 with UTC Material Trace number 0000203062, 4/3/14

QC-RIR-14-51210
QC-RIR-14-52333

QC-RIR-16-60331
QC-RIR-12-31832
QC-RIR-12-1089
QC-RIR-12-40170
QC-RIR-13-47833
QC-RIR-13-1251
QC-RIR-15-1423
QC-RIR-12-1191
QC-RIR-13-1234
QC-RIR-13-1263
QC-RIR-14-52183
QC-RIR-14-51835
QC-RIR-14-52076
QC-RIR-15-1410
QC-RIR-15-1438
QC-RIR-15-53087
QC-RIR-15-56017
QC-RIR-15-49979
QC-RIR-15-54948
QC-RIR-16-60483A
QC-RIR-16-57445

**Welding Documents**

Welding Technique Sheet # B31.3-GT-8-8-01 for manual GTAW, Rev. 5, 4/6/17

Performance Qualification Test Checklist for PQT 3403 Std. Test No. AGAC01, and WPQ Welding Operator P235 for automatic autogenous GTAW 2" NPS using Liburdi LDW-16 catalyst in 5G position and NDE-RT, 11 Dec 15 (with Computed Radiography Report CRT-MOX-WQ-2430 12/7/15)

PQR-No. B31.3-GT-8-8-3/8-3G, for manual GTAW, 24 Oct 16 (with SRNL, Material Test Report No. 201512003 for mechanical testing, 1/12/, 2016)

WPQ for Welder Symbol P235 for Std. test no. AG04 manual GTAW ¼" NPS Sched. 40 using ER316/316L in 6G position with 4 coupons and NDE-RT, 12/4/15

Welding Technique Sheet # B31.3-GTAC-8-8-01 for automatic autogenous GTAW with Liburdi Dimetrics Automatic Parameter Sheet for ½" Sched. 40 nominal wall, Page 8 of 22, Rev. 6, 2/29/16

PQR-No. B31.3-GTAC-8-8-1/2-40, for automatic autogenous GTAW, 3/21/11
WO 16-C520-MDE-0004-V-9269-06
Weld doc 1606795
FCR-006208, HVAC support clashes in C520 between gridlines A and C.1, Rev. 3
WTS D9.1-GT-SS-01, Rev.0
WO 16-C304-HDE-0002-V-8388
Weld doc 1605522
MIR 1605522-002
WTS B31.3-GT-8-8-01, GTAW welding, Rev. 5
Weld Doc 1700355

MIR 1700355-007
Weld Document No. 1500164, 1/13/15

**Work Packages**

13-CP23-B241-HDE-L-M-001, Installation of HVAC Commodities In B-241, 12/15/2016
14-C234-KDB-TK4160-M-21C-2807, Install Mechanical Equipment Supports, Separator Pot with Overflow, and Nozzle to Pipe Connections in Room C234, 5/20/15
16-B341-HAS-0001-V-4767, In-Wall Fire Damper Installation for B34, 11/26/17
16-CP20-C242-DRIP-TRAY-C-8222-02, Install Drip Tray LGF-DRIP6900 in Room C-242, 3/22/17
16-CP20-C242-DRIP-TRAY-C-8222-05, Place Grout Beneath Drip Tray Liner in Room C-242, 5/31/17
16-B303-MDE-0017-V-5356, Installation of HVAC Commodities in B-303 (QL-1LR)