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

July 20, 2012

Mr. Kelly D. Trice
President and Chief Operating Officer
Shaw AREVA MOX Services
Savannah River Site
P.O. Box 7097
Aiken, SC 29804-7097

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2012-002

Dear Mr. Trice:

During the period from April 1 through June 30, 2012, the U. S. Nuclear Regulatory Commission (NRC) completed inspections pertaining to the construction of the Mixed Oxide (MOX) Fuel Fabrication Facility. The purpose of the inspections was to determine whether activities authorized by the construction authorization 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 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, no violations or deviations were identified.

In accordance with 10 Code of Federal Regulations 2.390 of NRC's "Rules of Practice," a copy of this letter and its enclosures 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/

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 70-3098/2012-002 w/attachment

cc w/encls: (See next page)

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SIGNATURE	Via email	Via email	Via email			
NAME	W. Gloersen	M. Shannon	B. Adkins			
DATE	7/18/2012	7/18/2012	7/19/2012			
E-MAIL COPY?	YES	YES	YES			

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Letter to Kelly Trice from Deborah Seymour dated July 20, 2012.

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2012-002 AND NOTICE OF VIOLATION

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2012-002
Applicant:	Shaw AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	April 1 – June 30, 2012
Inspectors:	M. Shannon, Senior Resident Inspector, Construction Projects Branch 1 (CPB1), Division of Construction Projects (DCP), Region II (RII) B. Adkins, Resident Inspector, CPB1, DCP, RII
Accompanying Personnel:	None
Approved by:	D. Seymour, Branch Chief, CPB1, DCP, RII

EXECUTIVE SUMMARY

Shaw AREVA MOX Services (MOX Services)
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report No. 70-3098/2012-002

The scope of the inspections encompassed a review of various MFFF activities related to Quality Level (QL)-1 construction for conformance to NRC regulations, the Construction Authorization Request (CAR), the MOX Project Quality Assurance Plan (MPQAP), and applicable industry standards. This included, as applicable, the following inspection attributes: mechanical components; pipe supports and restraints; inspection of safety function interfaces; structural concrete; control; control of materials, equipment, and services; design and document control; and problem identification, resolution, and corrective action.

The principle systems, structures and components (PSSCs) discussed in this inspection report include: PSSC-21, Fire Barriers; PSSC-023, Fluid Transport System (FTS); PSSC-09, Criticality Control; and PSSC-36, MOX Fuel Fabrication Building Structure. Non-PSSCs discussed in this inspection report included an evaluation of the adequacy of the applicant's independent oversight of commercial grade dedication (CGD) activities, including quality assurance audits of activities at the MFFF, audits of Appendix B suppliers who perform CGD, and commercial grade surveys of non-Appendix B suppliers who control and verify critical characteristics of basic components.

Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130), and Problem identification, Resolution, and Corrective Actions (IP 88110)

Construction activities, as noted in Section 2, were performed in a safe and quality related manner. The inspectors concluded that MOX Services had conducted proper oversight of onsite contractors. No findings of significance were identified.

PSSC Related Inspections

PSSC-021, Fire Barriers – Fire Doors

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the MFFF Construction Authorization Request (CAR). The inspection attribute observed was installation and the associated system, structure, and component (SSC) was fire door PML*FD0081 in Room B-140b of the MOX Manufacturing Process Building (BMP). No findings of significance were identified (Section 3.a.(1)).

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control and the associated SSC was fire door PML*FD0081 in Room B-140b of the BMP. No findings of significance were identified (Section 3.a.(2)).

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSC was fire door PML*FD0081 in Room B-140b of the BMP. No findings of significance were identified (Section 3.a.(3)).

PSSC-009, Criticality Control

The inspectors observed construction activities related to PSSC-09, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was control of materials, equipment, and services and the associated SSC was Colemanite concrete installed in Room C-234 (Active Gallery) of the Aqueous Polishing Building (BAP). No findings of significance were identified (Section 3.b.(1)).

The inspectors observed construction activities related to PSSC-09, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was test control and the associated SSC was colemanite concrete installed in Room C-234 (Active Gallery) of the BAP. No findings of significance were identified (Section 3.b.(2))

PSSC-023, Fluid Transport System

The inspectors observed construction activities related to PSSC-23, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation and the associated SSC was Active Gallery Modules 3N and 3S in Room C-234 of the BAP. No findings of significance were identified (Section 3.c.(1)).

The inspectors observed construction activities related to PSSC-10, Process Vessels and Pipes, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes and the associated SSCs were BAP pipe supports and High Depressurization Exhaust (HDE) ductwork. No findings of significance were identified (Section 3.c.(2)).

PSSC-036, MOX Fuel Fabrication Building Structure

Construction activities related to PSSC-036 as described in Table 5.6-1 of the MFFF CAR were adequately performed and included installations of embedded plates and ground cables, heavy lifts of equipment and supplies, verification of equipment placements by surveys, reinforcing bar (rebar) installation, placement of concrete, welding, non-destructive testing, installation of tanks, and receipt of materials. These construction activities were performed in a safe and quality related manner and in accordance with procedures and work packages. No findings of significance were identified (Section 3.d).

Follow-up of Previously Identified Items

VIO 70-3098/2010-002-001, Failure to Identify Rebar Installations that did not Meet Clear Cover Requirements, was closed based on the documentation reviewed in the applicant's revised Quality Control Inspection Plan, C112, and direct observations of rework and re-inspection of associated BMP walls (Section 4.a).

VIO 70-3098/2010-002-004, Inadequate Commercial Grade Dedication of QL-1 Materials, was closed based on the documentation reviewed in the applicant's corrective action program (Section 4.b).

VIO 70-3098/2010-003-007, Failure to Implement Stop Work/Time Out During Adverse Weather Conditions, was closed based on the documentation reviewed in the applicant's corrective action program and direct observation of replacement of the affected concrete (Section 4.c).
VIO 70-3098/2010-004-001, Failure to Ensure that Design Changes Were Governed by Control Measures Commensurate with Those Applied to the Original Design, was closed based on the

documentation reviewed in the applicant's corrective action program and verification that the applicable design documents had been properly revised (Section 4.d).

VIO 70-3098/2010-004-002, Failure to Segregate Non Conforming Material, was closed based on the proper disposition of the non-conforming embed plate, completion of briefings with craft and supervision regarding hold tags and control of non-conforming items, and walk downs of the lay down yards to confirm that non-conforming items were properly segregated and tagged (Section 4.e).

VIO 70-3098/2011-001-002, Failure to Meet the Requirements of American Society of Mechanical Engineers NQA-1, Quality Assurance Requirements for Nuclear Facilities Applications, Subpart 2.15, Quality Assurance Requirements for Hoisting, Rigging, and Transporting of Items for Nuclear Power Plants, was closed based on appropriate revision to the equipment lifting procedure PP11-36 and observations that evaluations were performed as required for lifts of nuclear equipment (Section 4.g).

REPORT DETAILS

1. Summary of Facility Status

During the period, the applicant continued construction activities of principle structures systems, and components (PSSCs). Construction activities continued related to Release 2, 3A and 3B activities which included multiple inside and outside walls, elevated floors, and roof of the Mixed Oxide (MOX) Process Building (BMP), Aqueous Polishing Building (BAP), and the Shipping Receiving Building (BSR). Shaw AREVA MOX Services (MOX Services) continued installation of Quality Level (QL)-1 tanks during this inspection period. The applicant continued with the application of coatings on the walls and ceilings of the BMP and BAP upper level rooms and hallways. Other construction activities included installation of process piping and supports in the BAP, installation of ventilation system ductwork and supports in the BAP and BMP, installation of cable trays and cable tray supports in the BAP and BMP, installation of conduit in the BAP and BMP, and installation of fire doors and dampers in the 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 per Inspection Procedure (IP) 88130, Resident Inspection Program for On-Site Construction Activities; and IP 88110, Problem Identification, Resolution, and Corrective Action

a. Scope and Observations

The inspectors routinely attended the applicant's construction plan-of-the-day meetings and civil engineering meetings. The inspectors routinely held discussions with MOX Services design engineers, field engineers, quality control/assurance personnel, batch plant personnel, steel workers, and subcontractor (Alberici, Superior, Electric Boat, Egizzi, Soils and Materials Engineering, Inc.) 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 routinely verified that changing weather conditions were taken into account for planned construction activities and construction activities were conducted in a safe manner. The inspectors also observed proper communication in the work areas, observed that the work force was attentive, workers adhered to procedures, observed proper communication between supervisors and workers, noted adequate cleanliness of the construction areas, and noted that hazardous materials were properly stored and/or properly controlled when in the field.

The inspectors routinely reviewed various corrective action documents. The review included non-conformance reports (NCRs), condition reports (CRs), root cause reports, and supplier deficiency reports; and reviewed the closure of selected NCRs and CRs. The inspectors noted that the applicant entered issues identified during self assessments into the corrective action system.

The inspectors noted that MOX Services continued to maintain cleanliness of the BMP and BAP including the posting of areas to prevent tobacco use, eating, and drinking in areas where safety-related equipment was stored or installed.

b. Conclusions

Construction activities, as noted in Section 2, were performed in a safe and quality related manner. The inspectors concluded that MOX Services had conducted proper oversight of onsite contractors. No findings of significance were identified.

3. PSSC Related Inspections

a. PSSC-21 (Fire Barriers) – Fire Doors

(1) Installation Attribute (IP 88136, Mechanical Components; and IP 88141, Fire Prevention and Protection)

(a) Scope and Observations

The inspectors observed the installation of PML*FD0081 in Room B-140b of the BMP. The inspectors reviewed work package 12-CP20-BMP-TCOs – FD72, FD81, and FD91, Installation and Forms, Rebar, Structural Embedded Items and Concrete, to determine if MOX Services provided adequate work instructions including the appropriate sign-offs by quality control and survey. The inspectors observed activities such as rigging and handling, placement of the fire door in the temporary wall opening, installation of reinforcing bar (rebar) and forms, final survey, and placement of concrete. The inspectors verified that the rebar and forms were installed in accordance with Engineering Change Request (ECR)-016135, Revision (Rev.) 2, which provided design and installation of reinforcing necessary for the closure of Temporary Construction Openings (TCOs) B-140B-WO3-GBF and B-140B-W04-GBF.

The inspectors visually inspected the fire door sliding panel for the presence of intumescent material credited as a QL-1a fire barrier. The intumescent material seal swells when heated to provide a seal between the sliding door and casing during a fire. The inspectors performed measurements of the gap between the door and the casing to determine if the gap sizing and associated tolerances were consistent with design requirements.

(b) Conclusion

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the Mixed Oxide Fuel Fabrication Facility (MFFF) Construction Authorization Request (CAR). The inspection attribute observed was installation and the associated system, structure, and component (SSC) was fire door PML*FD0081 in Room B-140b of the BMP. No findings of significance were identified.

(2) Design Control Attribute (IP 88107 Design and Document Control)

(a) Scope and Observations

The inspectors selected fire door PML*FD0081 as an inspection sample to assess implementation of design control quality assurance requirements. The inspectors

reviewed the applicable portions of the MFFF License Application (LA) to determine the commitments made by MOX Services with regards to the design and qualification of process fire doors. With regards to qualification, the LA states that fire doors are Factory Mutual (FM) or Underwriters Laboratory (UL) listed, or are qualified through additional testing or analysis to U.S. Standards or an equivalent method. The LA specifically states that the Pellet Handling Unit (PML) fire doors are not UL listed or FM approved.

The inspectors reviewed DCS01-AAJ-DS-DOB-M-40108-3, Basis of Design for Fire Protection and Detection Systems. Specifically, the inspectors reviewed Section 2.3.2.4, which states, in part, that fire doors and fire windows used in fire barriers shall be installed and maintained in accordance with The National Fire Protection Association (NFPA) 80…Fire doors shall have a fire resistance rating consistent with the designated fire resistance rating of the fire barrier… The use of fire doors that are not UL listed or FM approved deviates from the guidance of Section 1-6.1 of NFPA 80, which requires fires doors be labeled…The use of these fire doors has been qualified through equivalency analysis.

The inspectors reviewed the equivalency analysis, DCS01-ASI-DS-NTE-R-10413-0, Pellet Handling Fire Door and Jar Storage Fire Lock Engineering Evaluation. Based on their review, the inspectors determined that MOX Services intends to credit previous fire testing performed for the reference plant (MELOX) using standards from the Official Journal of the Republic of France. MOX Services has concluded that the French fire testing methods were essentially equivalent to the U.S. fire test methods prescribed in NFPA 252, Standard Methods of Fire Tests of Door Assemblies, with the exception of performance of the hose-stream test. In addition, as stated in the engineering evaluation, MOX Services has implemented several design changes from the reference plant design that could impact the French fire test results. MOX Services concluded that the design changes did not adversely impact the French fire test results and that additional fire testing was not required. The inspectors determined that further review by the NRC staff will be necessary to determine the acceptability of crediting previous French fire door testing in lieu of performing additional testing prescribed by NFPA 252. Inspector Follow-up Item (IFI) 70-3098/2012-002-001, Review Pellet Handling Fire Door and Jar Storage Fire Lock Engineering Evaluation, was opened to further evaluate this condition.

The inspectors reviewed building concrete drawings contained in DCS01-ASI-DS-PLG-R-10010-C, MOX Processing Area Fire Area/Barrier Layout Level 3, to determine if the fire rating of PML*FD0081 was consistent with the fire rating of the room and walls where the fire door is installed.

The inspectors reviewed the design of the PML fire door as described in DCS01-PML-CG-SDD-M-05578-1, Pellet Process Area Pellet Handling Unit (PML) System Description Document. The inspectors reviewed DCS01-PML-DS-NTE-M-22487-B, Pellet Handling Unit (PML) Component Classification Summary (CCS), to identify the items relied on for safety (IROFS) related to fire protection, specifically fire barriers. According to the CCS, the sliding door panel is categorized as a QL-1a IROFS fire barrier for secondary confinement. The panel must be operable after a seismic event or an impact event. A fire-resistant compound with excellent insulation properties is installed inside the door between the steel outer panels. Note 3.15 of the CCS states that the fire door is equipped with an intumescent material that expands during a fire to seal the space between a door panel and fire door frame. It is QL-1 because it is part of the fire barrier. The inspectors reviewed various design output documents including

DCS01-PML-MG-NOM-M-7002-1, BMP-Level-01 Level-02 Pellet Handling Bill of Materials Vertical Fire Door, Door Panel Assembly, Right Hand, and design drawing DCS01-PML-MG-PLE-M-70101, Pellet Handling Unit – PML Vertical Fire Door Right Hand Door General Assembly, to determine if MOX Services adequately flowed down quality requirements into detailed design documents.

During their review, the inspectors noted a discrepancy between the CCS and Bill of Materials in that the intumescent material was specified as QL-1 in the CCS, but was listed as QL-4 in the Bill of Materials. This discrepancy was brought to the attention of MOX Services and was entered into the MOX Services corrective action program as CR-12-359. Based on their review, the inspectors concluded that this was an isolated design documentation error and did not represent a programmatic issue.

As a corrective action, MOX Services will conduct independent material testing on the specific material lot to confirm that the material ordered was the material received. This testing will be performed under an approved commercial grade dedication program in accordance with applicable quality assurance requirements. The inspectors determined that further review of commercial grade dedication documentation including material test reports was needed to further evaluate the significance of this issue. The inspectors opened unresolved item (URI) 70-3098/2012-002-002, Review of Pellet Handling Fire Door Commercial Grade Dedication Documentation and Material Test Reports, to further evaluate this issue.

(b) Conclusion

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control and the associated SSC was fire door PML*FD0081 in Room B-140b of the BMP. The inspectors opened URI 70-3098/2012-002-002, Review of Pellet Handling Fire Door Commercial Grade Dedication Documentation and Material Test Reports, to further evaluate this issue. No findings of significance were identified.

(3) Procurement Attribute (IP 88108 Control of Materials, Equipment, and Services)

(a) Scope and Observations

The inspectors selected the Mecatiss MP2 fire-resistant fibrous material as an inspection sample to determine if MOX Services adequately procured the material as a QL-1. The inspectors reviewed Receipt Inspection Report QC-RIR-12-32566 and noted that the MP2 material was procured as a commercial grade item (CGI). The inspectors reviewed the Diversified Metal Products, Inc., Mecatiss commercial grade dedication (CGD) Plan to determine if vendor identified the necessary critical characteristics to ensure the material would be capable of performing its intended safety function. The CGD Plan identified the following critical characteristics, part number, manufacturer name, material, and density. The inspectors reviewed completed CGI dedication documentation to verify that the acceptance criteria were met and the MP2 material was properly dedicated.

(b) Conclusion

The inspectors observed construction activities related to PSSC-21, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was

procurement and the associated SSC was fire door PML*FD0081 in Room B-140b of the BMP. No findings of significance were identified.

b. PSSC-09 (Criticality Control)

(1) Control of Materials, Equipment, and Services Attribute (IP 88108, Control of Materials, Equipment, and Services)

(a) Scope and Observations

The inspectors reviewed various design and construction documents related to the installation of colemanite concrete in Room C-234 of the BAP. Colemanite concrete is used as a neutron absorbing material beneath the drip tray in Room C-234 to prevent nuclear criticality in the event of leakage from BAP processing cell equipment. Specifically, the inspectors reviewed DCS01-BKA-DS-SPE-DS-SPE-B-09334-1, Construction Specification Section 03550 Colemanite Concrete, to determine if MOX Services adequately specified the appropriate technical requirements for the colemanite concrete aggregates including boron content, bonded water content, and gradation. The inspectors verified that the requirements in the specification were consistent with nuclear criticality safety requirements contained in DCS01-KKJ-DS-ANS-H-35014, Aqueous Polishing – Nuclear Criticality Safety Evaluation (NCSE-D) of MFFF Drip Trays, and DCS01-KKJ-CG-CAL-H-08253-B, Criticality Safety of the Drip-tray Cell of C-234 (Active Gallery).

In the area of nonconforming materials, the inspectors reviewed NCR CE-12-3746 which addressed nonconforming bonded water test results from the Savannah River National Laboratory (SRNL). The inspectors noted that the bonded water content for one sample (16.5%) did not meet the value listed in the construction specification (18%). The inspectors reviewed the “use as is” disposition and associated technical justification. The technical justification included reference to ECR 14103 Rev. 2 which changed the required minimum bonded water content for Room C-234 from 18% to 12%. The inspectors reviewed the ECR which included an updated criticality calculation to justify the change to the lower bonded water value.

(b) Conclusions

The inspectors observed construction activities related to PSSC-09, Criticality Control, as described in Table 5.6-1 of the Mixed Oxide Fuel Fabrication Facility (MFFF) Construction Authorization Request (CAR). The inspection attribute observed was control of materials, equipment, and services and the associated system, structure, and component (SSC) was colemanite concrete installed in Room C-234 (Active Gallery) of the BAP. No findings of significance were identified.

(2) Test Control Attribute (IP 88109 Inspection, Test Control, and Control of Measuring Equipment)

(a) Scope and Observations

In the area of test control, the inspectors reviewed Attachment A, Requirements for Neutronic Inspection, contained in DCS01-BKA-DS-SPE-B09334-1, Construction Specification No. 03550: Colemanite Concrete to determine if MOX Services specified adequate test controls for the required neutronic testing. Neutronic testing is required to

ensure that the hydrogen (water)/boron couple is uniformly distributed in the colemanite concrete. The inspectors reviewed the calibration procedure and calibration report used to confirm that the neutronic measuring device could meet the required sensitivity and statistical requirements to confirm uniformity of the colemanite aggregate in the colemanite concrete mix.

The inspectors verified that MOX Services performed neutronic testing of the colemanite mock-up panel in accordance with an approved test procedure. The test procedure included steps for (1) proper set up of the neutronic measurement gauge (Troxler and SRNL gauge), (2) performing background measurements in air, (3) laying out the measurement grid, and (4) performing individual measurements at the grid locations. The inspectors reviewed the neutronic mock-up test results contained in DCS01-KKJ-DS-NTE-H-35086-0, Neutronic Inspection of the Active Gallery Mock-up Panel. The inspectors noted that some of the test data did not meet the statistical acceptance criteria, which required that no single measurement shall vary from the mean measurement by more than three standard deviations with an uncertainty equal to or less than 1%. The data showed that larger uncertainty of 1.84% was needed to meet the three standard deviation requirement. The inspectors reviewed NCR CE-12-3764, which provided an adequate technical justification for a “use-as-is” disposition.

The inspectors reviewed DCS01-KKJ-DS-NTE-H-35087-0, Inspection Requirements for the Borated Concrete Associated with the Drip Trays. This procedure provided instructions for the drip tray field inspection of borated concrete using a Troxler Model 3430 neutron backscatter gauge. The inspectors reviewed Work Package 12-CP27-3B-DRIP TRAY-0001-C to determine if MOX Services provided adequate work instructions including a step to reference the use of DCS01-KKJ-DS-NTE-H-35087-0. The inspectors reviewed completed field test reports that provided baseline readings prior to the pour and completed readings following completion of the colemanite concrete pour. The inspectors noted that in all cases the data met the required acceptance criteria with significant margin indicating that the colemanite aggregate was adequately distributed throughout the colemanite concrete.

(b) Conclusion

The inspectors observed construction activities related to PSSC-09, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was test control, and the associated SSC was colemanite concrete installed in Room C-234 (Active Gallery) of the BAP. No findings of significance were identified.

c. PSSC-23, Fluid Transport Systems

(1) Installation Attribute (IP 88134, Piping Systems Relied on for Safety)

(a) Scope and Observations

The inspectors observed installation of BAP active gallery module 3-South (3S) into Room C-234 of the BAP. The inspectors reviewed work package 11-CP27-C234-FRAME-M-0001 and Rigging Plan 00080A, Critical Lift Record Card for 3N & 3S, to determine if MOX Services specified adequate work instructions for (1) proper lifting and rigging of the module to preclude damage and (2) placement of the module in Room C-234. The inspectors verified that the capacity of the spreader beam and rigging gear was sufficient for lifting the weight of the module, piping, and rigging equipment.

The inspectors conducted a walk down of active gallery module 3-North (3N) to verify functional arrangement including installation of piping and pipe supports as shown on the General Dynamics Electric Boat M03N-001 Module Assembly Guide, and applicable MOX Services piping isometric diagrams. The inspectors noted that MOX Services had not completed installation of all piping and pipe supports prior to placement of module 3N in the BAP active gallery. The inspectors will complete their functional arrangement inspections at a later date once an entire module is complete and signed-off by Quality Control (QC) personnel.

(b) Conclusion

The inspectors observed construction activities related to PSSC-23, Fluid Transport Systems, as described in Table 5.6-1 of the MFFFCAR. The inspection attribute observed was installation and the associated SSC was Active Gallery Modules 3N and 3S in Room C-234 of the BAP. No findings of significance were identified.

(2) Special Processes Attribute (IP 88134, Piping Systems Relied on for Safety; IP 88143, Pipe Supports and Restraints; and IP 55050, Nuclear Welding General Inspection Procedure)

(a) Scope and Observations

In the area of welding, the inspectors performed spot checks of welder qualifications for the following field welds:

- C151-PS-00167-FW001-COR0
- C135-PS-12155-SH693-FW003-COR0
- C135-PS-12390-SH751-FW002-COR0
- C109-HV-11001-FW009-COR0
- C109-HV-11002-FW004-COR0
- C109-HV-11040-FW003-COR0
- 11CP23-C131-HDE-E-M-0001
- C109-HV-11009-FW001-COR0
- C109-HV-11009-FW003-COR0
- C109-HV-11009-FW004-COR0

The inspectors reviewed welder qualification records to determine if the welders were qualified per the applicable American Welding Society (AWS) and American Society of Mechanical Engineers (ASME) code requirements to perform the specified weld listed on the associated weld technique sheet (WTS).

(b) Conclusion

The inspectors observed construction activities related to PSSC-10, Process Vessels and Pipes, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes (welder qualification) and the associated SSCs were BAP pipe supports and HDE ductwork. No findings of significance were identified.

d. PSSC-036, MOX Fuel Fabrication Building Structure (Including Vent Stack)

(1) Installation and Test Control Attributes (IP 88132, Structural Concrete, and IP 88134, Piping Relied on For Safety)

(a) Scope and Observations

During the inspection period, the inspectors observed the following activities associated with PSSC-036, MFFF building structure (including vent stack):

- Installation of structural reinforcing steel in the BMP, BAP, and BSR;
- Installation of embedded piping, embedded support plates, and plant grounding system in the BMP. BAP, and BSR;
- Concrete placements in walls and floors of the BSR, BAP, and BMP and placement of the roof section of the BMP;
- Operation of the concrete batch plant;
- Receipt of cement, fly ash, sand and gravel;
- Concrete testing in the field (slump, air entrainment, and temperature);
- Installation of building grounding cables in various floors and walls;
- Surveys (proper positioning/location) of embedded piping and embedded plates;
- Cleanliness of areas prior to concrete placement, and maintenance of cleanliness during the concrete placements;
- Installation of coatings in the BAP and BMP.

The inspectors observed routine lifts conducted to position reinforcing steel and embedded plates; installation and removal of concrete retaining walls; and movement of equipment such as generators, pumps, temporary lighting, and toolboxes. The lifts were conducted in accordance with the applicant's procedures. The inspectors reviewed the applicable sections of the MPQAP and verified that installations of the structural reinforcing steel, embedded plates, embedded piping, and electrical grounding of the MFFF structures were in accordance with QA programmatic requirements. Specifically, the inspectors verified that installations were in accordance with applicable field drawings and met the general construction notes detailed on the following drawings: 1) MFFF Concrete and Reinforcing General Notes, DCS01-01352, Revision 9 (Sheet 1 of 2); and 2) MFFF Concrete and Reinforcing General Notes and Tolerance Details, DCS-01352, Revision 6 (Sheet 2 of 3), and Revision 0 (Sheet 3 of 3).

The inspectors evaluated the adequacy of ongoing concrete placement activities conducted by Alberici, Soil and Materials Engineers, Inc. (S&ME), and MOX Services. The inspection of these activities focused on reinforcing steel bar installation, formwork preparation, pre-placement testing, and placement procedures associated with QL-1 concrete construction of the MFFF building structure.

The inspectors observed various activities prior to and during each major concrete placement. Prior to selected placements, the inspectors selectively checked for proper placement of reinforcing steel, including proper lap splices, supports, and bar spacing, alignment, and proper clear cover. The inspectors selectively checked for proper embed plate placement by observing ongoing surveys, and verified embed plate support structures were properly restrained, observed placement of embedded piping, installation of piping supports, mounting of piping to supports, installation of galvanic sleeves between piping and supports, and verified cleanliness of the placement area.

The inspectors observed the installation of the grounding system for the reinforcing steel, including embedded grounding posts for future equipment installation. During the placements, the inspectors observed proper lift heights and observed MOX Services' field engineers and quality control (QC) personnel performing inspections of the

reinforcing steel, embed plates, embed piping, cleanliness prior to placements, and detailed observations of the placements.

The inspectors observed that concrete samples were collected at the prescribed frequency and noted that the slump and air content met the acceptance criteria or were appropriately dispositioned with NCRs, and that the concrete test cylinders were collected and temporarily stored per procedure prior to transport to S&ME for curing and later testing. Batch plant operators correctly implemented procedural requirements and were in constant communication with the concrete placement crews. The inspectors reviewed concrete cylinder break test records performed and documented by S&ME. The inspectors noted that the cylinder breaks met the acceptance criteria specified in American Concrete Institute (ACI)-349.

The following list is a summary of the reviewed concrete placement activities:

- April 3, 2012, BAP-W302.A, BAP Interior Wall, 291 cubic yards
- April 8, 2012, BAP-F302/306.2, BAP Elevated Floor, 330 cubic yards
- April 10, 2012, BMP-R1B.2/4B.2/5B.1/8B.1, BMP Roof, 1160 cubic yards
- April 11, 2012, BSR- GW1C.1/2C.2, BSR Gabion Wall, 121 cubic yards
- April 11, 2012, BSR-W301.1/304.1, BSR Interior Wall, 115 cubic yards
- April 13, 2012, BAP-W311.1/309.3, BAP Interior Wall, 166 cubic yards
- April 19, 2012, BMP-W328.4/326.2/324.6, BMP Interior Wall, 278 cubic yards
- April 20, 2012, BAP-W305.2/306, BAP Interior Wall, 240 cubic yards
- April 21, 2012, BAP-W207B.2, BAP Interior Wall, 98 cubic yards
- April 24, 2012, BSR-F301.2/302.4, BSR Elevated Floor, 336 cubic yards
- April 25, 2012, BAP-GW12A.2/11A.2, BAP Gabion Wall, 57 cubic yards
- April 26, 2012, BMP-GW4B.1/5B, BMP Gabion Wall, 149 cubic yards
- April 27, 2012, BSR-W301.4, BSR Interior Wall, 475 cubic yards
- April 28, 2012, BAP-W311.2/309.5, BAP Interior Wall, 153 cubic yards
- May 1, 2012, BAP-W312.1/310.5, BAP Interior Wall, 175 cubic yards
- May 5, 2012, BAP-W309.1/307.3, BAP Interior Wall, 158 cubic yards
- May 9, 2012, BSR-W205.5, BSR Interior Wall, 24 cubic yards
- May 10, 2012, BAP W312.2/310.3, BAP Interior Wall, 114 cubic yards
- May 16, 2012, BAP-W307.2/309.2, BAP Interior Wall, 126 cubic yards
- May 16, 2012, BAP-W309.4/309.2, BAP Interior Wall, 14 cubic yards
- May 18, 2012, BMP-W327.2/327.4/321, BMP Interior Wall, 169 cubic yards
- May 23, 2012, BMP-GW11A.2, BMP gabion Wall, 39 cubic yards
- May 24, 2012, BAP-W310.1, BAP Interior Wall, 123 cubic yards
- May 24, 2012, BAP-F307.1, BAP Elevated Floor, 75 cubic yards
- May 24, 2012, BMP-W327.5/328.3, BMP Interior Wall, 142 cubic yards
- Mary 30, 2012, BMP-R11A/12A, BMP Roof, 1046 cubic yards
- June 1, 2012, BSR-F302.5/302.6, BSR Elevated Floor, 256 cubic yards
- June 5, 2012, BSR-W304.2/307.1, BSR Interior Wall, 301 cubic yards
- June 6, 2012, BMP-W328.6, BMP Interior Wall, 13 cubic yards
- June 7, 2012, BAP-TCO 150, BAP Temporary Construction Opening, 10 cubic yards
- June 8, 2012, BMP-GW12A.2, BMP gabion Wall, 57 cubic yards
- June 8, 2012, BAP-W308.2/310.2, BAP Interior Wall, 169 cubic yards
- June 14, 2012, BAP-W302B, 119 cubic yards
- June 16, 2012, BSR-W304.3/305./W307.5, 347 cubic yards
- June 19, 2012, BMP-GW2C.1/3C/4C.1, 198 cubic yards

- June 22, 2012, BMP-W327.3/W32.1/W323.6, 175 cubic yards
- June 22, 2012, BAP-W310.6, 17 cubic yards
- June 28, 2012, BMP-R15A/R16A, 788 cubic yards
- June 29, 2012, BAP-F405/406, 255 cubic yards

The inspectors performed various reviews for the above placements, which included walk downs with the field engineers; walk downs with QC personnel, verification of rebar by use of field drawings, WP reviews and routinely performed walk downs of the area to verify adequate cleanliness prior to concrete placement.

(b) Conclusions

Construction activities related to PSSC-036 as described in Table 5.6-1 of the MFFF CAR were adequately performed and included installations of reinforcing steel, embedded plates and ground cables; concrete placements; operation of the batch plant; heavy lifts of equipment and supplies; verification of equipment placements by surveys; rebar installation; placement of concrete; welding; non-destructive testing; installation of tanks; and receipt of materials. These construction activities were performed in a safe and quality related manner and in accordance with procedures and WPs. No findings of significance were identified.

4. Follow-up of Previously Identified Items

a. (Closed) VIO 70-3098/2010-002-001, Failure to Identify Rebar Installations that did not Meet Clear Cover Requirements.

(1) Scope and Observations

Violation 70-3098/2010-002-001 documented the failure to adequately monitor ongoing construction activities that could not be verified during subsequent inspections. The applicant's Quality Control Inspection Plan, C-112, was revised to require in-process inspections for those areas that would be inaccessible during subsequent final inspections. C-112 was also revised to require verification of inaccessible areas at the time of form placement. Corrective actions also included briefing of QC inspectors and field engineers on the changes to C-112. The inspector verified that walls BMP-217 and BMP 219/223 were re-inspected and repaired prior to concrete placement.

(2) Conclusions

VIO 70-3098/2010-002-001, Failure to Identify Rebar Installations that did not Meet Clear Cover Requirements, was closed based on the documentation reviewed in the applicants revised Quality Control Inspection Plan, C112, and direct observations of rework and re-inspection of associated BMP walls.

b. (Closed) VIO 70-3098/2010-002-004, Inadequate Commercial Grade Dedication of QL-1 Materials.

(1) Scope and Observations

The inspectors identified that the applicant had incorrectly specified the use of Positive Material Identification (PMI) equipment tor verification of 304L stainless steel material for the commercial grade dedication of QL-1 materials. The PMI equipment was not

capable of distinguishing 304L stainless steel from 304 stainless steel; therefore, its use in this specific dedication application was improper. The inspectors verified that the applicant modified the verification process, revised the design specification to clarify that the CGIE use of the PMI can only be performed for "dry" applications, revised the Integrated Safety Analysis Summary to clarify the use of 304 and 304L stainless steel in fabrication of specified glove boxes, and developed a corrective action plan to disposition any non conforming items due to the prior use of the PMI equipment.

(2) Conclusions

VIO 70-3098/2010-002-004, Inadequate Commercial Grade Dedication of QL-1 Materials, was closed based on the documentation reviewed in the applicant's corrective action program.

c. (Closed) VIO 70-3098/2010-003-007, Failure to Implement Stop Work/Time Out During Adverse Weather Conditions.

(1) Scope and Observations

The inspectors identified that MOX Services personnel and sub-contract personnel were not aware of the "Stop Work" and "Time Out" responsibilities contained in Project Procedure PP 3-10. Because of the lack of awareness, a concrete placement was allowed to continue with weather conditions that could potentially impact the quality of the concrete. The inspectors reviewed documentation showing that the associated personnel were re-trained. The inspectors also observed the removal of the suspect concrete in BMP wall 217. The inspectors also monitored replacement of the above noted removed concrete.

(2) Conclusions

Violation 70-3098/2010-003-007, Failure to Implement Stop Work/Time Out During Adverse Weather Conditions, was closed based on the documentation reviewed in the applicant's corrective action program and direct observation of replacement of the affected concrete.

d. (Closed) VIO 70-3098/2010-004-001, Failure to Ensure that Design Changes Were Governed by Control Measures Commensurate With Those Applied to the Original Design.

(1) Scope and Observations

The inspectors identified that the applicant had approved a "use as is" disposition to increase the allowable fissile thickness for KCD Tank 1000 from 63.5 millimeters to 75.9 millimeters without changing the design input documents to reflect the accepted nonconformance. The inspectors verified that the applicable design documents were properly revised and an engineering change was issued to document the acceptance of the new criticality dimension. The inspectors noted that the applicant performed an extent of condition and did not identify any additional non-conformances.

(2) Conclusions

Violation 70-3098/2010-004-001, Failure to Ensure that Design Changes Were Governed by Control Measures Commensurate with Those Applied to the Original Design, was closed based on the documentation reviewed in the applicant's corrective action program and verification that the applicable design documents had been properly revised.

e. (Closed) VIO 70-3098/2010-004-002, Failure to Segregate Non-Conforming Material.

(1) Scope and Observations

The inspectors had identified that a non-conforming embed plate had been installed on a concrete form and had not been segregated in a non-conforming area as required. The inspectors verified that the non-conforming plate was subsequently dispositioned in accordance with the applicant's project procedure PP3-5, Control of Non-Conforming Items. A review of other corrective action documents indicated that briefings were held with craft and supervisory personnel regarding hold tags and control of non conforming items. Independently the applicant and the inspectors walked down the lay down yards to confirm that non-conforming items were properly segregated and tagged.

(2) Conclusions

Violation 70-3098/2010-004-002, Failure to Segregate Non Conforming Material, was closed based on the proper disposition of the non-conforming embed plate, completion of briefings with craft and supervision regarding hold tags and control of non-conforming items, and walk downs of the lay down yards to confirm that non-conforming items were properly segregated and tagged.

f. (Closed) VIO 70-3098/2011-001-002, Failure to Meet the Requirements of ASME NQA-1, Quality Assurance Requirements for Nuclear Facilities Applications, Subpart 2.15, Quality Assurance Requirements for Hoisting, Rigging, and Transporting of Items for Nuclear Power Plants.

(1) Scope and Observations

The inspectors had identified that the applicant's program for lifting of nuclear components was inconsistent with the requirements of NQA-1 subpart 2.15 and that due to this, the procedure used to lift the colemanite shield panels for KCK Tank 1500 and KCB Tank 3000 was inadequate. The inspectors verified that the applicant's equipment lifting procedure was revised to require evaluations for critical lifts of nuclear equipment. In addition, on a routine basis, the inspectors verified that evaluations were completed for ongoing lifts of nuclear equipment.

(2) Conclusions

Violation 70-3098/2011-001-002, Failure to Meet the Requirements of ASME NQA-1, Subpart 2.15, Quality Assurance Requirements for Hoisting, Rigging, and Transporting of Items for Nuclear Power Plants, was closed based on appropriate revision to the equipment lifting procedure PP11-36 and observations that evaluations were being performed as required for lifts of nuclear equipment.

g. (Open) IFI 70-3098/2012-002-003, Evaluation of Epoxy Installed Rebar.

(1) Scope and Observations

Inspection report IR 70-3098/2010-004 discussed licensee identified Non-Cited Violation (NCV) 70-3098/2010-004-006. The applicant completed the evaluation and identified those areas where rebar was improperly installed with epoxy. The applicant was not able to evaluate successfully the as left installation as acceptable and must consider the rebar not installed for the final ANSYS analysis. An Inspector Follow-up Item (IFI) 70-3098/2012-002-003 is identified to perform a detailed review of the applicant's resolution of the epoxied rebar issue.

(2) Conclusion

IFI 70-2098/2012-002-003 was identified for review of the applicant's resolution of the improperly epoxied rebar installations.

5. Exit Interviews

The NRC resident inspectors communicated the inspection scope and results to the applicant throughout the reporting period, and summarized and presented the inspection results for this reporting period to the applicant on July 16, 2012. No dissenting comments were received from 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 the report.

SUPPLEMENTAL INFORMATION

1. PARTIAL LIST OF PERSONS CONTACTED

MOX Services

R. Alley, Engineering Assurance Manager
H. Baldner, Regulatory Compliance
J. Burnette, Chemical and Mechanical Engineering Manager
E. Chassard, Executive Vice President and Deputy Project Manager
R. Foster, Nuclear Safety
B. Gillham, Compliance Manager
M. Gober, Vice President Engineering
D. Gwyn, Licensing Manager
D. Ivey, Quality Assurance Manager
D. Kehoe, Quality Assurance
L. Lamb, Vice President Facility Design and Construction
E. Najmola, Vice President of Construction
A. Olorunniwo, Civil/Structural Manager
J. Peregoy, Quality Control Manager
M. Peters, Batch Plant Manager
K. Trice, MOX President
R. Whitley, Vice President Project Assurance

2. INSPECTION PROCEDURES (IPs) USED

IP 55050	Nuclear Welding General Inspection Procedure
IP 88108	Control of Materials, Equipment, and Services
IP 88109	Inspection, Test Control, & Control of Measuring 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 88134	Piping Systems Relied on for Safety
IP 88136	Mechanical Components
IP 88141	Fire Prevention and Protection
IP 88143	Pipe Supports and Restraints

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
IFI 70-3098/2012-002-001	Open	Review Pellet Handling Fire Door and Jar Storage Fire Lock Engineering Evaluation (Section 3.a.(2)
URI 70-3098/2012-002-002	Open	Review Pellet Handling Fire Door Commercial Grade Dedication Documentation and Material Test Reports (Sections 3.a.(2))
VIO 70-3098/2010-002-001	Closed	Failure to Identify Rebar Installations that did not meet Clear Cover Requirements (Section 4.a)
VIO 70-3098/2010-002-004	Closed	Inadequate Commercial Grade Dedication of QL-1 Materials (Section 4.b)
VIO 70-3098/2010-003-007	Closed	Failure to Implement Stop Work/Time Out During Adverse Weather Conditions (Section 4.c)
VIO 70-3098/2010-004-001	Closed	Failure to Ensure that Design Changes Were Governed by Control Measures Commensurate With Those Applied to the Original Design (Section 4.d)
VIO 70-3098/2010-004-002	Closed	Failure to Segregate Non-Conforming Material (Section 4.e)
VIO 70-3098/2011-001-002	Closed	Failure to Meet the Requirements of ASME NQA-1, Subpart 2.15, Quality Assurance Requirements for Hoisting, Rigging, and Transporting of Items for Nuclear Power Plants (Section 4.f)
IFI 70-3098/2012-002-003	Open	Review of the Applicant's Resolution of the Improperly Epoxied Rebar Installations (Section 4.g)

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System

ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BAP	Aqueous Polishing Building
BMP	MOX Manufacturing Building
BSR	Shipping and Receiving Building
CAR	Construction Authorization Request
CCS	Component Classification Summary
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CGI	Commercial Grade Item
CGIE	Commercial Grade Item Evaluation
CPB1	Construction Projects Branch 1
CR	Condition Report
DCP	Division of Construction Projects
ECR	Engineering Change Request
FM	Factory Mutual
FTS	Fluid Transport System
HDE	High Depressurization Exhaust
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
IROFS	Items Relied on for Safety
LA	License Application
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MOX Services	Shaw AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
NCR	Non-conformance Report
NFPA	National Fire Protection Association
NQA-1	Quality Assurance Requirements for Nuclear Facilities Applications
NRC	Nuclear Regulatory Commission
PAF	Process Assembly Facility
PML	Pellet Handling Unit
PP	Project Procedure
PSSC	Principle System, Structure, and Component
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
Rebar	Reinforcing bar
RII	Region II
S&ME	Soils and Materials Engineering, Inc.
SCAQ	Significant Condition Adverse to Quality
SRNL	Savannah River National Laboratory
SSCs	Systems, Structures, and Components
TCO	Temporary Construction Opening
UL	Underwriters Laboratory
URI	Unresolved Item
VIO	Violation
WP	Work Package

5. LIST OF PSSCs REVIEWED

PSSC-021 Fire Barriers
PSSC-009 Criticality Controls
PSSC-023 Fluid Transport Systems
PSSC-036 MOX Fuel Fabrication Building Structure (including vent stack)

6. RECORDS AND DOCUMENTS REVIEWED

As documented in the enclosures.