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

November 14, 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. 70-3098/2012-003 AND NOTICE OF VIOLATION

Dear Mr. Trice:

During the period from July 1 through September 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, one violation of NRC requirements was identified for failure to meet MOX Project Quality Assurance Plan (MPQAP) storage requirements for safety-related piping.

The violation was evaluated in accordance with the NRC Enforcement Policy available on the NRC's Web site at www.nrc.gov. The violation is cited in the enclosed Notice of Violation (Notice) and is cited in the Notice because they were identified by the NRC. The circumstances surrounding the violations are described in detail in the subject inspection report.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. For your consideration, NRC Information Notice 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLMEMENTATION OF CORRECTIVE ACTION," is available on the NRC's web site.

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. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

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

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 70-3098/2012-003
   w/attachment: Supplemental Information

cc w/encls: (See next page)

cc w/encls:
Mr. Kevin Hall, Acting Federal Project Director
NA-262.1
P.O. Box A
Aiken, SC 29802

Mr. Sam Glenn, Deputy
Federal Project Director
NA-262.1
P.O. Box A
Aiken, SC 29802

Dr. Peter Winokur, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Ave., NW, Suite 700
Washington, DC 20004

Mr. Joseph Olencz, NNSA/HQ
1000 Independence Ave., SW
Washington, DC 20585

Susan Jenkins
Division of Radioactive Waste Management
Bureau of Health and Environmental Control
2600 Bull St.
Columbia, SC 29201

D. Silverman
Morgan, Lewis, and Bockius
1111 Penn. Ave., NW
Washington, DC 20004

G. Carroll
Nuclear Watch South
P.O. Box 8574
Atlanta, GA 30306

Diane Curran
Harmon, Curran, Spielburg and Eisenberg, LLP
1726 M St., NW, Suite 600
Washington, DC 20036

L. Zeller
Blue Ridge Environmental Defense League
P.O. Box 88
Glendale Springs, NC 28629

Mr. Dealis Gwyn, Licensing Manager
Shaw AREVA MOX Services
Savannah River Site
P.O. Box 7097
Aiken, SC 29804-7097

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. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

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

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 70-3098/2012-003
   w/attachment: Supplemental Information

cc w/encls: (See next page)

■ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ■ NON-SENSITIVE

ADAMS: ■ Yes ACCESSION NUMBER: ML12319A431 ■ SUNSI REVIEW COMPLETE ■ FORM 665 ATTACHED

OFFICE	RII: DCP	RII: DCP	RII: DCP				
SIGNATURE	WBG via email	MXS1 via email	BJA1 via email				
NAME	W. Gloersen	M. Shannon	B. Adkins				
DATE	11/14/2012	11/14/2012	11/14/2012				
E-MAIL COPY?	YES	YES	YES				

OFFICIAL RECORD COPY DOCUMENT NAME: G:\CCI\DCP\CPB1\MOX FFF\Inspection\Inspection Reports\2012\2012-003\IR 2012-003.docx

Letter to Kelly Trice from Deborah Seymour dated November 14, 2012.

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2012-003 AND NOTICE OF VIOLATION

Distribution w/encls:
P. Silva, NMSS
D. Tiktinsky, NMSS
J. Munday, RII
R. Haag, RII
C. Ogle, RII
J. Yerokun, RII
D. Seymour, RII
K. O'Donohue, RII
C. Evans, RII
S. Freeman, RII
W. Gloersen, RII
M. Shannon, RII
B. Adkins, RII
PUBLIC

NOTICE OF VIOLATION

Shaw AREVA MOX Services (MOX Services) Docket Number (No.) 70-3098
Aiken, South Carolina Construction Authorization No. CAMOX-001

During Nuclear Regulatory Commission (NRC) inspection activities conducted July 1 through September 30, 2012, one violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Condition 3.A of the NRC Construction Authorization No. CAMOX-001, Revision (Rev.) 3, dated August 8, 2011, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MOX Project Quality Assurance Plan (MPQAP) dated March 26, 2002, and supplements thereto (MPQAP, Rev. 10, Change 1, dated July 22, 2011).

MPQAP Section 13, Handling, Storage, and Shipping, states, in part, that handling, storage, cleaning, packaging, shipping, and preservation of items are controlled in accordance with requirements of this section to prevent damage or loss and to minimize deterioration.

Section 13.2.1, states, in part, that handling, storage, cleaning, packaging, shipping and preservation of items shall be conducted in accordance with established work and inspection procedures, shipping instructions or other specified documents.

DCS01-KKJ-DS-SPE-M-15115-4, Division No. 15 – Field Fabrication and Installation of Piping, Valves, and Specialty Items, Section 3.2 Installation, specifies requirements for the storage and handling of quality level 1 and 2 piping. Section A.10, states, in part, that protective devices and coatings applied for shipment and storage by the pipe fabricator and the manufacturers of components and equipment shall not be removed until each piping section, or item is ready for installation, except as temporary removal may be required for inspection.

MOX Services Project Procedure (PP) PP10-38, Storage and Control of Material, Rev. 0, specifies requirements for the storage and handling of QL-1 items. Section 3.2.4, Storage Areas, Paragraph 3.2.4.1, states, in part, that items stored in a warehouse will be placed on pallets, racks, bins, dunnage, cribbage, or shelves to permit air circulation. In addition, Section 3.2.4, Storage Areas, Paragraph 3.2.4.3, states, in part, that long-term outside storage areas will be well-drained, preferably gravel covered or paved, and reasonably removed from construction areas and traffic to prevent the possibility of damage. Items stored in these locations will be placed on dunnage, cribbing, or equivalents to provide adequate drainage and air circulation. Lastly, Section 3.4, Special Storage Considerations, Paragraph 3.4(f), states, in part, that items in storage shall have all covers, caps, plugs, or other closures intact.

MOX Services PP11-33, Housekeeping and Work Area Cleanliness, Rev. 0, specifies requirements with regards to permanent plant materials and equipment storage. Specifically, Section 3.3, General, Section 3.3.4, states, in part, materials delivered to the work area shall be stored so that they are accessible, but will not interfere with, or be

damaged by, construction activity. Equipment shall be placed in its permanent location as soon as practical and protected as required from construction activity.

MOX Services PP 11-71, Piping Installation Procedure, Rev. 2, specifies requirements with regards to material handling and storage. Section 4.2, General Requirements and Precautions, Paragraph 4.2.31, temporary supports must be of the same material as the piping or otherwise insulated with a non-metallic, halide-free material from the piping to protect against corrosion.

Contrary to the above, on or before August 21, 2012, MOX Services failed to ensure that the storage and handling of Quality Level 1 (QL-1) piping was conducted in accordance with established work and inspection procedures or other specified documents as observed in (1) the Secure Warehouse, (2) the lay-down yard behind the Secure Warehouse, (3) the Celebration lay-down yard , and (4) the lower level process rooms of the aqueous polishing building (BAP) including C-110, C-121, C-133, C-135, C-140, and C-151, and as evidenced by the following examples:

1. Inspectors observed selected QL-1 piping in storage areas that did not have covers, end caps, plugs, or other protective devices intact.

2. Inspectors observed QL-1 piping in both outside and inside storage areas that were not placed on pallets, bins, dunnage, cribbage, or shelves to provide adequate air circulation and drainage.

3. Piping delivered to the work areas was not stored to prevent damage from adjacent construction activities, and thus was not protected as required from construction activity, in that bent piping was observed as a result of adjacent construction activities and improper construction sequencing and installed piping was not protected from adjacent construction activities, specifically from a Colemanite™ concrete pour in Room C-234.

4. Temporary supports were not of the same material as the piping or otherwise insulated with a non-metallic, halide-free material from the piping to protect against corrosion, in that the use of carbon tie wire as support material for stainless steel piping was observed.

This is a Severity Level IV violation (VIO) (Supplement II) (VIO 70-3098/2012-003-001).

Pursuant to the provisions of 10 Code of Federal Regulations (CFR) 2.201, Shaw AREVA MOX Services is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Mixed Oxide Fuel Fabrication Facility construction project, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a “Reply to a Notice of Violation” and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the authorization should not be modified, suspended,

or revoked, or why such other actions as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room (PDR), or from the NRC's document system (ADAMS), which is accessible from the NRC web site at http://www.nrc.fob/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld, and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.
In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Atlanta, Georgia this 14th day of November 2012.

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2012-003
Applicant:	Shaw AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	July 1 – September 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 G. Crespo, Sr. Construction Inspector, Construction Inspection Branch 1 (CIB1), Division of Construction Inspection (DCI), RII J. Brady, Sr. Construction Inspector, Construction Projects Branch 3 (CPB3), DCP, RII D. Edwards, Construction Project Inspector, CPB1, DCP, RII D. Failla, Construction Inspector, Construction Inspection Branch 3 (CIB3), DCP, RII C. Jones, Sr. Construction Inspector, CIB1, DCI, RII R. Mathis, III, Construction Inspector, CIB1, DCI, RII D. Terry-Ward, Construction Inspector, CIB1, DCI, RII L. Castelli, Sr. Construction Inspector, CIB1, DCI, RII N. Karlovich, Construction Inspector, CIB1, DCI, RII S. Walker, Sr. Reactor Inspector, CIB1, DCI, RII
Accompanying Personnel:	M. Magyar, Construction Project Inspector (Trainee), Construction Projects Branch 2 (CPB2), DCP, RII D. Marcano, Quality Assurance Engineer, NRC Headquarters (HQ) K. Mott, Electronics Engineer, NRC HQ
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 Number (No.) 70-3098/2012-003

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), applicable sections of the license application (LA) and applicable industry standards. This inspection included, as applicable, the following inspection attributes: control of materials, equipment, and services; design and document control; inspection; special processes; vendor oversight/inspection; fabrication; installation; 10 CFR Part 21; software quality assurance plan (SQAP); procurement; and corrective action program (CAP).

The principle systems, structures and components (PSSCs) discussed in this inspection report include: PSSC-005, Confinement System; PSSC-009, Criticality Controls; PSSC-012, Emergency Alternating Current (AC) Power Systems; PSSC-021, Fire Barriers; PSSC-023, Fluid Transport System; PSSC-024, Gloveboxes; PSSC-031, Material Handling Controls; PSSC-036, MFFF Building Structure (including vent stack); PSSC-041, Process Cells; PSSC-045, Process Safety Control Subsystem; and PSSC-050, Supply Air System. Non-PSSCs discussed in this inspection report include an evaluation of the adequacy of MOX Services' CAP and an inspection of procurement activities associated instrument stands used in QL-1 instrument and control (I&C) systems.

Routine Resident Inspections

Construction activities, as identified in Section 2.a, were performed in a safe and quality-related manner. No findings of significance were identified.

The inspectors conducted daily tours to verify proper housekeeping/cleanliness of work areas and storage of QL-1 materials and equipment. Violation (VIO) 70-3098/2012-003-001, Failure to Meet MPQAP Storage Requirements for QL-1 Piping, was identified (Section 2.b).

The inspectors reviewed various changes to the use of codes and standards and conducted interviews with MOX Services' staff to determine if MOX Services was reporting deviations to codes and standards as required by the Section 16 of the LA. Unresolved Item (URI) 70-3098/2012-003-002, Potential Failure to Maintain Records of Changes to LA Commitments was identified (Section 2.c).

PSSC Related Inspections

PSSC-005, Confinement System

The inspectors observed construction activities related to PSSC-005, Confinement System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement. The associated system, structure, and component (SSC) was High Depressurization Exhaust (HDE) system air-operated dampers. The inspectors concluded that the requirements of the basis of design were adequately translated into engineering specifications and procurement controls for the QL-1 air operated dampers. Quality assurance

audits for engineering, procurement, and construction activities addressed applicable requirements. No findings of significance were identified (Section 3.a).

PSSC-009, Criticality Controls

The inspectors observed construction activities related to PSSC-009, 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). The inspectors concluded that the colemanite aggregate was properly procured and tested in accordance with engineering specifications. No findings of significance were identified (Section 3.b(1)).

The inspectors observed construction activities related to PSSC-009, 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 process drip trays installed in Room C-234 (Active Gallery) of the BAP. The inspectors concluded that the drip tray channel and sump met the required nuclear criticality safety sub-critical dimensions. No findings of significance were identified (Section 3.b(2)).

The inspectors observed construction activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation 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(3)).

The inspectors observed construction activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were dew point transmitters and process nuclear measurement panels. No findings of significance were identified (Section 3.b(4)).

The inspectors observed construction activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was fabrication and the associated SSCs were drip trays; heating, ventilation, and air conditioning (HVAC) ductwork; and HVAC supports. These activities were adequately performed and met the license requirements. No findings of significance were identified (Section 3.b(5)).

The inspectors observed factory acceptance testing activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were Software Quality Assurance Program (SQAP) and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. NNJ*SPLC0001 is the safety programmable logic controller that provides safety functions for 10 process units. The configuration management process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(a)).

The inspectors observed software verification and validation (V&V) activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The configuration management process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(b)).

The inspectors reviewed requirements traceability activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were

SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The requirements traceability process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(c)).

The inspectors observed testing activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The inspectors concluded for the samples selected and testing observed that the factory acceptance test (FAT) was properly controlled and implemented, and that anomalies identified were controlled. No findings of significance were identified (Section 3.b(6)(d)).

The inspectors reviewed V&V and training activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. Based on the samples selected, the inspectors determined that the software (SW) tools used for V&V activities satisfied the technical and quality assurance requirements. The inspectors determined that the SW tool V&V plan was adequate, the SW tools were indentified within the SW development process, SW tools were placed under control of configuration management, V&V activities were implemented for SW produced using the tool, the emulator test driver (ETD) Independent V&V (IV&V) staff met the user-training requirements and the requisite designer and IV&V independence as required by Institute of Electrical and Electronics Engineers (IEEE) 1012-1998, IEEE Standard for Software Verification and Validation. No findings of significance were identified (Section 3.b(6)(e)).

The inspectors reviewed failure modes and effects analysis (FMEA) activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. The inspectors concluded that the vendor's FMEA defined the system to be analyzed, defined the applicable interfaces to the system to be analyzed, provided a description of the environmental conditions considered, provided a description of the operation of the system components to be analyzed, identified the failure categories, and classified failures. No findings of significance were identified (Section 3.b(6)(f)).

PSSC-031, Material Handling Controls

The inspectors observed factory acceptance testing activities related to PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. The configuration management process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(a)).

The inspectors reviewed software V&V activities related to PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The configuration management process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(b)).

The inspectors reviewed requirements traceability activities related to PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was

NNJ*SPLC0001. The requirements traceability process was adequately documented, controlled and implemented. No findings of significance were identified (Section 3.b(6)(c)).

The inspectors observed testing activities related to PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The inspectors concluded for the samples selected and testing observed that the FAT was properly controlled and implemented, and that anomalies identified were controlled. No findings of significance were identified (Section 3.b(6)(d)).

The inspectors reviewed V&V and training activities related to PSSC-31, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. Based on the samples selected, the inspectors determined that the SW tools used for V&V activities satisfied the technical and quality assurance requirements. The inspectors determined that the SW tool V&V plan was adequate, the SW tools were indentified within the SW development process, SW tools were placed under control of configuration management, V&V activities were implemented for SW produced using the tool, the ETD IV&V staff met the user-training requirements and the requisite designer and IV&V independence as required by IEEE-1012-1998. No findings of significance were identified (Section 3.b(6)(e)).

The inspectors reviewed FMEA activities related to PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. The inspectors concluded that the vendor's FMEA defined the system to be analyzed, defined the applicable interfaces to the system to be analyzed, provided a description of the environmental conditions considered, provided a description of the operation of the system components to be analyzed, identified the failure categories, and classified failures. No findings of significance were identified (Section 3.b(6)(f)).

PSSC-041, Process Cells

The inspectors observed construction activities related to PSSC-041, Process Cells, 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 BAP. The inspectors concluded that the colemanite aggregate was properly procured and tested in accordance with engineering specifications. No findings of significance were identified (Section 3.b(1)).

The inspectors observed construction activities related to PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was inspection and the associated SSC was process drip trays installed in Room C-234 (Active Gallery) of the BAP. The inspectors concluded that the drip tray channel and sump met the required nuclear criticality safety sub-critical dimensions. No findings of significance were identified (Section 3.b(2)).

The inspectors observed construction activities related to PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation 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(3)).

The inspectors observed construction activities related to PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was fabrication and the associated SSCs were drip trays, HVAC ductwork, and HVAC supports. These activities were adequately performed and met the license requirements. No findings of significance were identified (Section 3.b(5)).

PSSC-012, Emergency AC Power Systems

The inspectors observed construction activities related to PSSC-012, Emergency AC Power Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was vendor oversight/inspection. The associated SSC was the emergency diesel generator. The applicant adequately inspected and reported activities conducted by Fairbanks Morse Engine and provided adequate records of shop inspections and monitoring the progress at the suppliers shop. No findings of significance were identified (Section 3.c).

PSSC-021, Fire Barriers – Fire Dampers

The inspectors observed construction activities related to PSSC-012, Emergency AC Power System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was vendor oversight/inspection and the associated SSC was the emergency diesel generator. The applicant adequately inspected and reported activities conducted by Fairbanks Morse Engine, and provided adequate records of shop inspections and monitoring of the progress at the supplier's shop. No findings of significance were identified (Section 3.d(1))..

The inspectors observed construction activities related to PSSC-021, 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 dampers installed in various rooms of the BAP and MOX Process Building (BMP). The first example of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was identified (Section 3.d(2)).

The inspectors observed construction activities related to PSSC-021, 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 dampers installed in various rooms of the BAP and BMP. Inspector Follow-up Item (IFI) 70-3098/2012-003-004, Review Fire Damper Seismic Qualification Report, was identified (Section 3.d(3)).

PSSC-023, Fluid Transport System

The inspectors observed construction activities related to PSSC-023, Fluid Transport Systems (FTS), as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control and the associated SSC was FTS piping in the BAP. The second example of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was identified (Section 3.e(1)).

The inspectors observed construction activities related to PSSC-023, FTS, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes and the associated SSC was FTS pipe supports. These activities were adequately performed and met the license requirements. No findings of significance were identified (Section 3.e(2)).

The inspectors observed construction activities related to PSSC-023, FTS, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were control of materials,

equipment, and services; and 10 CFR Part 21. The associated SSC was QL-1 FTS piping in the BAP. IFI 70-3098/2012-003-005, Review Final 10 CFR Part 21 Report Regarding Thermal Sensitization of Piping, was identified. No findings of significance were identified (Sections 3.e(3)).

The inspectors observed construction activities related to PSSC-023, FTS, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSC was FTS instrument tubing, valves and fittings. Two examples of URI 70-3098/2012-003-006, Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings, were identified (Sections 3.e(4)).

The inspectors observed construction activities related to PSSC-023, FTS, 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 FTS pipe supports. These activities were adequately performed and met the license requirements. No findings of significance were identified (Sections 3.e(5)).

PSSC-024, Gloveboxes

The inspectors observed construction activities related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation and the associated SSC was the KCC*GB1000 feeding head body. No findings of significance were identified (Section 3.f(1)).

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

Construction activities related to PSSC-036 as described in Table 5.6-1 of the MFFF CAR were adequately performed. The inspection attributes observed were installation and test control. The inspection activities included observations of 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 work packages. No findings of significance were identified (Section 3.g(1)).

The inspectors observed construction activities related to PSSC-036, MFFF Building Structure (Including Vent Stack), as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was problem identification, resolution, and corrective action. The associated SSC were the Hilti anchor bolts. No violations of significance were identified (Section 3.g(2)).

PSSC-045, Process Safety Control Subsystem

The inspectors observed construction activities related to PSSC-045, Process Safety Control Subsystem, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were single point annunciator panels, hand valves with position switches, and air operated stop valves. These activities were adequately performed and met the license requirements. No findings of significance were identified (Section 3.h(1)).

PSSC-050, Supply Air System

The inspectors observed construction activities related to PSSC-050, Supply Air System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were temperature transmitters and target flow meters. These activities were adequately performed and met the license requirements. No findings of significance were identified (Section 3.i(1)).

Non-PSSC Inspections

Corrective Action Program Inspection

The requirements for problem identification and resolution specified in the MPQAP and 10 CFR 50, Appendix B were implemented adequately. Measures were established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, non-conformances, and significant conditions adverse to quality, were promptly identified and corrected at the MFFF. The documentation and reporting of conditions adverse to quality were adequately performed in accordance with procedures and specifications. Quality Assurance (QA) records associated with these activities were properly maintained in accordance with project procedures. MOX Services was adequately implementing the MPQAP requirements related to corrective action follow up, closure, trend analysis, and root cause analysis. The lessons learned program was also adequately implemented. No findings of significance were identified (Section 4.a).

The inspectors determined that the MFFF staff were generally aware of the importance of having a strong Safety Conscious Work Environment (SCWE) and expressed a willingness to raise safety issues. No one interviewed by the inspectors had experienced retaliation for safety issues raised, or knew of anyone who had failed to raise issues. No findings of significance were identified (Section 4.a).

Instruments and Control Systems (QL-1 Instrument Support Stands Procurement and Design Control Inspection)

The requirements of the basis of design were correctly translated into engineering specifications and procurement controls for QL-1 instrument support stands. No findings of significance were identified (Section 4.b).

Follow-up of Previously Identified Items

VIO 70-3098/2009-002-002 was closed. The drawing and specification for the Vital Power Inverter system provided a design configuration for the maintenance bypass function that was consistent with the requirement from the electrical basis of design to provide an uninterruptible source of power to critical loads. As previously identified in Inspection Report 70-3098/2010-002, the applicant had implemented a procedure revision for a final technical review process that was designed to prevent recurrence (Section 5.a).

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 3A and 3B activities which included multiple inside and outside walls, elevated floors, and roof of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) Manufacturing Building (BMP), Aqueous Polishing Building (BAP), and the Shipping Receiving Building (BSR). 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 and BMP, 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 Activities (Inspection Procedure (IP) 88130, Resident Inspection Program for On-Site Construction Activities at the Mixed Oxide Fuel Fabrication Facility)

a. Routine Inspection Activities

(1) 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 AREVA Services (MOX Services) design engineers, field engineers, quality control/assurance personnel, batch plant personnel, steel workers, and subcontractors (Alberici, Superior, Electric Boat, and Soils and Materials Engineering, Inc. (S&ME)) 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, 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 causes, and supplier deficiency reports (SDRs); 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.

(2) Conclusions

Construction activities, as identified in Section 2.a(1), were performed in a safe and quality-related manner. No findings of significance were identified.

b. Routine Inspection of Quality Level (QL)-1 Equipment Storage

(1) Scope and Observations

The inspectors toured various MFFF construction areas to determine if MOX Services was (1) maintaining cleanliness of work areas including the prevention of foreign material into process equipment and piping; (2) preventing damage to safety-related equipment as a result of adjacent construction activities; and (3) ensuring proper storage of safety-related materials and equipment. During their tour, the inspectors noted several instances of damaged piping in various laydown yards and BAP process rooms.

The MOX Project Quality Assurance Plan (MPQAP), Revision (Rev.) 10, Change 1, Section 13, Handling, Storage, and Shipping, states, in part, that handling, storage, cleaning, packaging, shipping, and preservation of items are controlled in accordance with requirements of this section to prevent damage or loss and to minimize deterioration.

Section 13.2.1, states, in part, that handling, storage, cleaning, packaging, shipping and preservation of items shall be conducted in accordance with established work and inspection procedures, shipping instructions or other specified documents.

DCS01-KKJ-DS-SPE-M-15115-4, Division No. 15 – Field Fabrication and Installation of Piping, Valves, and Specialty Items, Section 3.2 Installation, specifies requirements for the storage and handling of quality level 1 and 2 piping. Section A.10, states, in part, that protective devices and coatings applied for shipment and storage by the pipe fabricator and the manufacturers of components and equipment shall not be removed until each piping section, or item is ready for installation, except as temporary removal may be required for inspection.

MOX Services Project Procedure (PP) PP10-38, Storage and Control of Material, Rev. 0, specifies requirements for the storage and handling of QL-1 items. Section 3.2.4, Storage Areas, Paragraph 3.2.4.1, states, in part, that items stored in a warehouse will be placed on pallets, racks, bins, dunnage, cribbage, or shelves to permit air circulation. In addition, Section 3.2.4, Storage Areas, Paragraph 3.2.4.3, states, in part, that long-term outside storage areas will be well-drained, preferably gravel covered or paved, and reasonably removed from construction areas and traffic to prevent the possibility of damage. Items stored in these locations will be placed on dunnage, cribbing, or equivalents to provide adequate drainage and air circulation. Lastly, Section 3.4, Special Storage Considerations, Paragraph 3.4(f), states, in part, that items in storage shall have all covers, caps, plugs, or other closures intact.

MOX Services PP11-33, Housekeeping and Work Area Cleanliness, Rev. 0, specifies requirements with regards to permanent plant materials and equipment storage. Specifically, Section 3.3, General, Section 3.3.4, states, in part, materials delivered to the work area shall be stored so that they are accessible, but will not interfere with, or be

damaged by, construction activity. Equipment shall be placed in its permanent location as soon as practical and protected as required from construction activity.

MOX Services PP 11-71, Piping Installation Procedure, Rev. 2, specifies requirements with regards to material handling and storage. Section 4.2, General Requirements and Precautions, Paragraph 4.2.31, temporary supports must be of the same material as the piping or otherwise insulated with a non-metallic, halide-free material from the piping to protect against corrosion.

Contrary to the above, on or before August 21, 2012, MOX Services failed to ensure that the storage and handling of Quality Level 1 (QL-1) piping was conducted in accordance with established work and inspection procedures or other specified documents as observed in (1) the Secure Warehouse, (2) the lay-down yard behind the Secure Warehouse, (3) the Celebration lay-down yard , and (4) the lower level process rooms of the aqueous polishing building (BAP) including C-110, C-121, C-133, C-135, C-140, and C-151, and as evidenced by the following examples:

(a) QL-1 piping was improperly stored in the following MFFF locations: (1) the Secure Warehouse, (2) the laydown yard behind the Secure Warehouse, and (3) the Celebration laydown yard. Specifically, the inspectors noted the following deficiencies: (1) piping was stored in a manner that resulted in distortion and physical damage (bent piping); (2) piping was not stored on dunnage (e.g., wooden blocks or plywood) to prevent direct contact with the standing water on the ground; (3) piping was missing end caps to prevent entry of foreign material; and (4) piping with dirt and debris on the surface of the pipe due to improper storage and weed growth in the laydown yard. The following pipe spools were damaged as a result of improper storage: KPA-0610615E-0.250-QL1, KPA-0600114C-02-QL1, KCD-5154913B-03-QL1-W05NA, and KWS-5412315C-02-QL1-W025A. These deficiencies were documented in CR-12-371 and CR-12-401.

(b) Piping was improperly stored in the Secured Warehouse and lower level process rooms of the BAP including C-110, C-121, C-133, C-135, C-140, and C-151. Specifically, the inspectors noted the following deficiencies: (1) missing or inadequate temporary supports, (2) missing end caps, (3) improper storage on floor/platforms, (4) use of piping as a support for other installed piping, and (5) bent piping as a result of improper construction sequencing. The following pipe spools were damaged as a result of improper storage: KCD-0259414B-0.250-QL1-02, DCS01-KPA-DS-PLI-T-0241000 SH 1 Rev. 4, KPA-DS-PLI-T-6330300 SH03, DCS01-KPC-DS-PLI-T-0104513B SH02 Rev. 2, DCS01-KPC-DS-PLI-T-5165321B SH02 Rev. 2, KWD-5317512A-0.250-QL1-01, and KPC-0105301-0.250-QL1-02. MOX Services issued CR-12-436 and CR-12-511 to address these deficiencies.

Failure to meet MPQAP storage requirements for QL-1 Piping was considered to be a violation (VIO) of NRC requirements and is identified as VIO 70-3098/2012-003-001, Failure to Meet MPQAP Section 13 Requirements for Storage of QL-1 Piping.

The issue meets the agency guidance for a more than minor violation because it is related to the failure to establish, implement, or maintain an adequate process, program, procedure, or quality oversight function that could render the quality of the construction activity unacceptable or indeterminate.

(2) Conclusions

The inspectors conducted daily tours to verify proper housekeeping/cleanliness of work areas and storage of QL-1 materials and equipment. VIO 70-3098/2012-003-001, Failure to Meet MPQAP Storage Requirements for QL-1 Piping was identified.

c. Annual Reporting Requirements for License Application Changes

(1) Scope and Observations

The inspectors reviewed the reporting requirements contained in Chapter 16, Authorizations and Exemptions, of the MFFF License Application (LA) dated March 2010. The reporting requirements of Chapter 16 of the LA became regulatory requirements with the approval of Rev. 3 of the Construction Authorization, dated August 8, 2011. Chapter 16 of the LA states that if a change to the LA is made, the affected onsite documentation will be updated promptly per written procedures. In addition, MOX Services was required to maintain records of changes to its facility. For changes that do not require NRC pre-approval of the LA, MOX Services was required to submit to the NRC annually, within 30 days after the end of the calendar year during which the changes occurred, a brief summary of the changes.

The inspectors concluded that MOX Services was not maintaining appropriate records of changes to the use of codes and standards that were committed to in the LA. In addition, these changes were not reported to the NRC. MOX Services placed this issue in the corrective action program as CR-12-338 to determine if the changes to various code requirements should be considered changes to the LA and therefore reported. Pending resolution of this issue, the potential failure to maintain appropriate records and to report changes annually is identified as Unresolved Item (URI) 70-3098/2012-003-002, Potential Failure to Maintain Records of Changes to LA Commitments.

(2) Conclusions

The inspectors reviewed various changes and conducted interviews with MOX Services' staff to determine if MOX Services was reporting deviations to codes and standards as required by the Section 16 of the LA. The inspectors identified URI 70-3098/2012-003-002, Potential Failure to Maintain Records of Changes to LA Commitments to further review this issue.

3. PSSC Related Inspections

a. PSSC-005, Confinement System

(1) Attribute: Procurement (IP 88140, Instrument and Control Systems)

(a) Scope and Observations

The inspectors reviewed QL-1 procurement specification DCS01-CCJ-DS-SPE-C-28223-2, Air Operated Dampers (AODs), to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design inputs and quality program documents such as Quality Assurance (QA) and Quality Control (QC) procedures, specifications, supplier evaluation summary reports, supplier

surveillance reports, QA audit reports, MOX Services' submittal reviews, commercial grade dedication (CGD) plans and associated engineering change requests (ECRs), were reviewed. Personnel responsible for engineering, QA, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of AODs for use in confinement systems such as the high depressurization exhaust (HDE) system. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the Integrated Safety Analysis (ISA) to assure reasonable assurance that procured items would perform their intended safety function when installed.

The inspectors reviewed subcontract documents for the AODs, to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for AODs were adequately communicated to the supplier. Supplier QA Audit Reports were reviewed to ensure proper supplier oversight during the implementation of the procurement process and that the designated supplier was evaluated to provide QL-1 AODs. The inspectors also reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the capability of the supplier to implement the technical and quality requirements of specification DCS01-CCJ-DS-SPE-C-28223-2.

The inspectors also reviewed specification, DCS01-CCJ-DS-SPE-C-28223-2, Air Operated Dampers, to determine whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112-4. Specification DCS01-CCJ-DS-SPE-C-28223-2, Sections 1.8 and 2.4 addressed the requirements to formally qualify the AODs as seismic category I (SC-1), defined as designed to withstand the effects of the Design Basis Earthquake in order to prevent or mitigate adverse consequences of the earthquake, which is consistent with the design basis documents.

(b) Conclusion

The inspectors observed construction activities related to PSSC-005, Confinement System, as described in Table 5.6-1 of the MFFF Construction Authorization Request (CAR). The inspection attribute observed was procurement. The associated SSC was HDE system AODs. The inspectors concluded that the requirements of the basis of design were adequately translated into engineering specifications and procurement controls for the QL-1 AODs. QA audits for engineering, procurement, and construction activities addressed applicable requirements. No findings of significance were identified.

b. PSSC-009, Criticality Control; PSSC-041, Process Cells; and PSSC-031, Material Handling Controls

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

(a) Scope and Observations

The inspectors reviewed DCS01-ZMJ-DS-CGD-M-65988-0, Commercial Grade Item Evaluation for Thornton Laboratory Services Method 2 for Colemanite Concrete Aggregate Testing, to determine if MOX Services identified the necessary critical

characteristics and acceptance methods to provide reasonable assurance that the item will be capable of performing its intended criticality safety function.

The inspectors reviewed completed CGD documentation including test results for boron and bonded water content and required Certificates of Conformance (C of C). The inspectors reviewed TLTI-11-VS210, Shaw Areva MOX Services Quality Assurance Commercial Grade Item Survey, to determine if MOX Services adequately assessed the ability of the testing lab to control the identified critical characteristics including material control, control of measuring and test equipment (M&TE), test control, inspection, document control, and non-conformance reporting. The inspectors verified that the test method used to measure the boron content of the colemanite was approved by the appropriate groups including Engineering and Nuclear Safety. The inspectors reviewed the boron and bonded water content test results to determine if the colemanite aggregate met the requirements of the engineering specification.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Control, and PSSC-041, Process Cells, 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 BAP. The inspectors concluded that the colemanite aggregate was properly procured and tested in accordance with engineering specifications. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors reviewed work package WP 12-CP23-C234-DRIP-TRAY-M-0008/0009 to determine if MOX Services performed the required subcritical dimensional inspections as required by the Subcritical Dimension Evaluation Form PP9-39A. The inspectors reviewed DCS01-KKJ-CG-CAL-H-08253-B, Criticality Safety of the Drip-tray Cell C-234 (Active Gallery), and DCS01-KKJ-DS-ANS-H-35014-4, Aqueous Polishing – Nuclear Criticality Safety Evaluation (NCSE-D) of MFFF Drip Trays, to determine if the subcritical dimensions listed on the PP9-39A form were consistent with the subcritical dimensions specified in the nuclear criticality safety evaluation – design (NCSE-D). The inspectors reviewed completed sub-critical dimensional inspection reports for the C-234 drip tray channel and sump to determine if the measurements met sub-critical dimensional requirements. The inspectors noted that PP9-39A requires re-verification of previous critical dimensions to check for thermal expansion/contraction due to welding. The inspectors performed independent measurements of the drip tray channel width and sump diameter.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Control, and PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was inspection and the associated SSC was process drip trays installed in Room C-234 (Active Gallery) of the BAP. The inspectors concluded

that the drip tray channel and sump met the required nuclear criticality safety sub-critical dimensions. No findings of significance were identified.

(3) Attribute: Installation (IP 88132, Structural Concrete Activities)

(a) Scope and Observations

The inspectors observed the placement of colemanite concrete in Room C-234 of the BAP. The purpose of the colemanite is to provide a neutron absorbing material underneath the active gallery drip tray for the prevention of criticality. The inspectors reviewed WP12-CP27-3B-DRIP TRAY-0001-C, Installation of Forms, Placement of Concrete and Grout – Room C-234, to determine if the work package contained the necessary work steps and inspections to properly place, consolidate, and cure the colemanite concrete. The inspectors verified that QC personnel performed the required pre-pour inspections listed on the pour card. The inspectors observed concrete placement activities including proper consolidation of the colemanite beneath the drip tray channel and sump. The inspectors observed concrete field tests to verify requirements for slump, air content, and temperature. The inspectors verified that maximum temperature requirements for placement of the concrete were not violated. The inspectors reviewed the batch tickets to ensure that the quantities listed for cement, colemanite aggregate, water, and admixtures were consistent with the colemanite specification and approved mix design. The inspectors performed post-pour walkdowns to ensure that the concrete was properly cured.

The inspectors reviewed (1) concrete cylinder break test reports to ensure that the concrete strength met the required specification; (2) neutronic test reports to verify the neutron absorption capability of colemanite aggregate; and (3) slope and flatness measurements to prevent liquid retention in the active gallery drip tray.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Control, and PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation and the associated SSC was colemanite concrete installed in Room C-234 (Active Gallery) of the BAP. No findings of significance were identified.

(4) Attribute: Procurement (IP 88140, Instrument and Control Systems)

(a) Scope and Observations

1) Dew Point Transmitters

The inspectors reviewed the procurement specification for QL-1 dew point transmitters, to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design input documents and associated ECRs were also reviewed and personnel responsible for engineering, QA, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of dew point transmitters for use in criticality control. The procurement specification was also evaluated to determine whether the specification adequately

addressed the events included in the ISA to assure that procured items would perform their intended safety function when installed.

The procurement records for a July 2011 purchase of dew point transmitters were examined to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for dew point transmitters were adequately communicated to the supplier. A 2010 audit of the supplier was reviewed to determine whether the technical and quality capabilities of the supplier had been evaluated for providing QL-1 dew point transmitters.

2) Process Nuclear Measurement Panels

The inspectors reviewed QL-1 procurement specification DCS01-CCJ-DS-SPE-C-28067-1, Process Nuclear Measurement Panels, to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design inputs and quality program documents such as QA/QC procedures, specifications, supplier evaluation summary reports, supplier surveillance reports, QA audit reports, MOX Services' submittal reviews, CGD plans and associated ECRs, were also reviewed. Personnel responsible for engineering, QA, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of process nuclear measurement panels for use in criticality safety controls and radiation detection. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA to assure reasonable assurance that procured items would perform their intended safety function when installed.

The inspectors reviewed subcontract documents for the process nuclear measurement panels, to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for process nuclear measurement panels were adequately communicated to the supplier. Supplier QA Audit Reports were reviewed to ensure proper supplier oversight during the implementation of the procurement process and that the designated supplier was evaluated to provide QL-1 process nuclear measurement panels. The inspectors also reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the capability of the supplier to implement the technical and quality requirements of specification DCS01-CCJ-DS-SPE-C-28067-1.

The inspectors also reviewed specification, DCS01-CCJ-DS-SPE-C-28067-1, Process Nuclear Measurement Panels, to determine whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112-4. Specification DCS01-CCJ-DS-SPE-C-28067-1, Section 2.9, addressed the requirements to formally qualify the process nuclear measurement panels as seismic category II, which was defined as "seismically qualified to remain in place, but need not remain operational during or after the design earthquake (DE),"and "No part of the equipment shall become detached during or after the earthquake." The definitions were consistent with the design basis documents.

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Control, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were dew point transmitters and process nuclear measurement panels. No findings of significance were identified.

(5) Attribute: Fabrication (IP 55050, Nuclear Welding General; and IP 55100, Structural Welding General)

(a) Scope and Observations

The inspectors reviewed documents related to welding of drip trays in room C-234 to determine whether the drip tray was procured, fabricated, and installed in accordance with design specifications, procedures, and American Welding Society (AWS) D1.6, Structural Welding Code - Stainless Steel, 1999 edition. Specifically, the inspectors reviewed the following:

- Work Package 12-CP23-C234-DripTray-M-0009
- Weld travelers for welds BMF-DS-PLS-B-02701-01-FW011-C0R1 and BMF-DS-PLS-B-02701-01-FW018-C0R0
- Certified Material Test Reports (CMTR) for drip tray material and weld filler material
- Receipt Inspection Report (RIR) QC-RIR-12-36720
- Welding procedure specifications and supporting procedure qualification records
- Nondestructive examination reports

The inspectors observed welding of QL-1 ductwork to determine whether the ductwork was welded in accordance with design specifications, procedures, and AWS D9.1, Sheet Metal Welding Code, 2006 edition. The inspectors observed the fit-up and tack, and the welding of weld BMP0106-HDE47-D-M-0001-FW045. The inspectors reviewed welder qualification records to determine whether the welders were qualified in accordance with AWS D1.6, 1999 edition and D9.1, 2006 edition.

The inspectors reviewed three work packages related to heating, ventilation, and air conditioning (HVAC) structural steel supports to determine whether applicable documents were included, weld travelers were followed, hold points were observed, and welding was documented. The inspectors reviewed work packages for the following HVAC supports:

- C109-HV-11061
- B229-HV-06029
- B108-HV-05026

(b) Conclusion

The inspectors observed construction activities related to PSSC-009, Criticality Control, and PSSC-041, Process Cells, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was fabrication and the associated SSCs were drip trays, HVAC ductwork, and HVAC supports. These activities were adequately performed and met the license requirements. No findings of significance were identified.

(6) Attributes: Software Quality Assurance Program (SQAP), and Vendor Oversight/Inspection (Draft IP 88112, Digital Instrumentation and Control (DI&C) System/Software Design; IP 88140, Instrumentation and Controls; and IP 88115, Supplier/Vendor Inspection); SSC: NNJ*SPLC0001 (the Safety Programmable Logic Controller that Provides Safety Functions for 10 Process Units).

(a) Software Configuration Management

1) Scope and Observations

The inspectors assessed the vendor's Software Configuration Management Plan and vendor's project procedures to verify that the process was defined and appropriately implemented by the vendor and MOX Services. The inspectors evaluated several System Integration Deficiency Reports (SIDRs) associated with configuration management to ensure the issues were identified and properly addressed. The inspectors reviewed the Verification and Validation (V&V) Summary Reports for the design and implementation phases to determine if configuration issues identified during the life cycle phases were properly translated into the appropriate design and testing documents. Document Review Releases (DRR) were reviewed to ensure that changes made to the software design documents went through the proper V&V process and that technical changes were dispostioned correctly.

The inspectors reviewed purchase orders outlining contract and design changes, and engineering change requests demonstrating agreed deviations and resolutions to ensure the requested software changes or deviations were appropriately tracked, evaluated, and resolved. The inspectors conducted interviews with appropriate staff to gain an understanding of the configuration management program and the interface between MOX Services and the vendor. The inspectors observed portions of the factory acceptance testing (FAT), reviewed interim change notices (ICNs) and associated SIDRs to verify in-process configuration management was adequate and that software program control was maintained.

The inspectors evaluated several completed SIDRs associated with the implementation phase to verify compliance with the configuration management plan and to verify that they had the correct signoffs and reviews and were of adequate independence in accordance with the vendor's nonconformance procedure, Project Procedure Manual (PPM) 10.0. The inspectors reviewed four of the anomalies identified in two closed SIDRs (SIDR 737 and 738). The inspectors reviewed the associated sections of the Software Design Description (SDD) and SW documentation to verify that the changes identified in the SIDR had been completed.

The inspector reviewed software development checklists (SDC) to verify they were completed in accordance with the software configuration management plan and to verify that the vendor's application program development procedure, PPM 7.0, was followed. SDCs are used in configuration management of the application program upon initiation of the V&V process.

2) Conclusions

The inspectors observed factory acceptance testing activities related to PSSC-009, Criticality Control, and PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. NNJ*SPLC0001 is the safety programmable logic controller that provides safety functions for 10 process units. The configuration management process was adequately documented, controlled and implemented. No findings of significance were identified.

(b) Software Verification and Validation Phase Documentation

1) Scope and Observations

The inspectors reviewed V&V design phase and implementation phase summary reports to verify activities were properly documented and issues that developed were appropriately captured and addressed. The inspectors discussed lessons learned from each phase with the appropriate staff to ensure corrective actions were properly integrated into the process. The inspectors assessed the criticality, hazard and risk analyses for both the design and implementation phases to verify that no undesired software integrity consequences, hazards, or software anomalies were introduced without proper review and correction.

2) Conclusions

The inspectors observed software V&V activities related to PSSC-009, Criticality Control, and PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The design and implementation phase was adequately documented, controlled and implemented. No findings of significance were identified.

(c) Requirements Traceability

1) Scope and Observations

The inspectors conducted an inspection of software traceability to verify compliance with the requirements of MFFF technical specifications and Institute of Electrical and Electronics Engineers (IEEE) 1074-1997, IEEE Standard for Developing Software Life Cycle Processes. During the October 2011 requirements phase inspection (the inspection report is available electronically in the NRC's document system (ADAMS), which is accessible from the NRC web site at http://www.nrc.fob/reading-rm/adams.html, at accession number ML12041A331), the inspectors traced a process hazards event in the process hazards analysis to the nuclear safety evaluation to the NCSE-D and then to the software requirement specification (SRS). The SRS referenced the safety function to logic diagram (LD) 200. LD200 displays the logic for maximum number of cans entering the glove box. Using the Plant Traceability Matrix (PTM), the inspectors continued the forward trace of the requirement for counting the number of cans entering the Plutonium Oxide (PuO_2) Can Receiving and Emptying Unit (NDD) glovebox and for ensuring that the maximum number of cans is not exceeded in the glovebox. This requirement is identified as NDD01-01 in the SRS.

The inspectors traced the requirement forward to the design phase to verify the required inputs (memory can counts) and outputs (signal to delete authorization) were indentified in the Software Design Description (SDD). From the SDD the inspectors traced the requirement forward to the implementation phase verification test specification to verify the maximum number of cans identified in the SRS was tested. The inspectors reviewed the actual verification test results with the vendor staff to verify that the delete authorization output signal was generated when the maximum number of cans was exceeded. The inspectors observed the verification test input values, injected values, actual values as well as the execution order to test the parameter input. The inspectors then traced the requirement forward to the FAT document.

The inspectors traced custom function block Determine_Index to verify it was developed and reviewed in accordance with the project software life cycles. The inspectors traced the function block to the SRS and to the verification test procedure and the test cases for MOX NNJ*SPLC0001.

The inspectors reviewed the design phase Criticality, Hazard and Risk Analysis to determine if any new requirements were identified. The inspectors observed that SR-234, SR-235 and SR-236 were identified as new requirements. SR-234 was identified to address the power up/power loss cycles. The inspectors reviewed the SRS to verify it was revised to include SR-234. The inspectors reviewed the tracing documentation for SR-234 from the requirements phase to the design phase and to the testing phase. The inspectors reviewed the FAT results associated with SR-234 to verify that the results were in accordance with the acceptance criteria. In addition, the inspectors traced software interface requirements (SR-235, SR-236) from the PTM to determine if the software vendor accurately translated the software requirements to the SRS and the SDD. The inspectors also verified that the software requirements had been properly translated into validation test documents for the FAT.

The inspectors also traced SRS requirements NDP11-01, NDP11-01.1, and NDP11-01.2 from the SRS to the SDD, to the verification test, and to the FAT using the PTM. The inspectors verified that the requirements were traceable and that each requirement and its acceptance criteria were included in the FAT. The inspectors also reviewed the verification test associated with these requirements. These requirements issued delete authorizations with the purpose of controlling the amount of PuO_2 in the process.

2) Conclusions

The inspectors reviewed requirements traceability activities related to PSSC-009, Criticality Control, and PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The requirements traceability process was adequately documented, controlled and implemented. No findings of significance were identified.

(d) Factory Acceptance Testing

1) Scope and Observations

The inspectors reviewed the results of testing to verify that results and actions taken in connection with any deficiencies were recorded. The inspectors observed that the testing included item descriptions, test data, and test logs. The inspectors observed that anomalies were captured in SIDRs in accordance with the vendor's test control procedure. The inspectors reviewed SIDR 814 to verify that the software regression testing was performed as required by the SIDR. The inspectors observed that the software version and changes were identified in the software development checklists. The inspectors reviewed SIDR 817 and ICN 456 Rev. 1 to verify the in-process changes were properly identified in the FAT. The inspectors reviewed SIDR 817 and 806 to verify they were prepared and processed in accordance with the nonconformance and corrective action procedure, PPM 10.0.

The inspectors observed in process testing associated with primary dosing unit (NDP) to verify that the results of the test were properly recorded and that testers were following the procedures with the most up to date documentation. The inspectors observed that tests were controlled in accordance with vendor procedures for identifying deficiencies and changes to the test procedure were controlled.

The inspectors observed MOX Services' personnel witnessing the tests, and interviewed a MOX Services' witness. The inspectors were informed during the interview that as part of the witnessing, MOX Services also reviewed the completed appendices of the test for adequacy of test acceptance criteria, and traced a sample of tests back to the requirement in the SRS.

The inspectors reviewed Project Review Committee meeting notes for entering the test phase to verify that they had met requirements in accordance with test control procedure, PPM 6.0.

2) Conclusions

The inspectors observed testing activities related to PSSC-009, Criticality Control, and PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. The inspectors concluded for the samples selected and testing observed that the FAT was properly controlled and implemented, and that anomalies identified were controlled. No findings of significance were identified.

(e) Software (SW) Tools

1) Scope and Observations

The inspectors interviewed V&V personnel and reviewed documentation related to the SW tools used for verification testing. The inspection was conducted to verify if the SW verification tools satisfied the MFFF technical requirements and to assess acceptability of the tools for safety related quality assurance tasks.

a) Identification and Configuration Management of SW Tools

The inspectors reviewed the MFFF Technical Specification for Safety Programmable Logic Controller (SPLC) to assess compliance with IEEE Standard 7-4.3.2-1993, IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations, Clause 5.3.3, Software Tools. The inspectors reviewed the vendor's SRS to verify that the SW tool requirements were addressed and in compliance with the MFFF Technical Specifications.

The inspectors noted that the user interface with the application program is through the vendor's SW installed on a PC. The SW is (1) used to compile the application program SW code (2) perform verification testing of the SPLC application program SW and, (3) download the SW code into the main processors. Verification testing is conducted on a workstation running the vendor's emulator and the emulator test driver (ETD).

The inspectors reviewed the vendor's SQAP to verify that the SW tools were identified. The inspectors noted that the SQAP identifies the emulator, ETD and simulation SW as tools for use in testing the application program SW code. The inspectors noted that the SQAP required the tools to be placed under configuration management in accordance with PPM 7.04, Software Tool Development, and as required by IEEE Std. 7-4.3.2-1993. The inspectors reviewed the Software Configuration Management Plan (SCMP) to verify the SW, ETD and simulation SW were identified in the plan.

b) SW Tool Output V&V Activities

The inspectors reviewed documents and interviewed personnel to determine if the SW produced using the tool is subject to V&V activities as required by IEEE Std. 7-4.3.2-1993, Section 5.3.3. The inspectors reviewed the Software V&V Test Plan and the Software Verification Test Specification to assess the verification process. The inspectors noted that verification testing assessed whether SPLC project safety modules or project functions and function blocks interconnected as expected and provided the expected results for a representative range of inputs.

The inspectors reviewed the FAT and Validation Test Plan to assess the validation process. The inspectors reviewed the Software V&V Plan (SVVP) and noted that V&V reporting shall occur throughout the entire life cycle and include task reports, V&V phase summary reports, verification test reports and validation test reports. The inspectors reviewed both the V&V Design Activity Summary Report and the V&V Implementation Activity Summary Report for compliance with the applicable standards for documentation and reporting, for the applicable phase of IEEE 1012-1998, IEEE Standard for Software Verification and Validation.

In addition, the inspectors requested the vendor to explain, describe and present several verification test report findings, initial set-up, recording of comparison and test result displays, and test case tracing to their safety requirement origin. The inspectors observed several validation system-level tests at the vendor's test facility, asked questions of personal to request test case set-up, physical system layout configuration, current programming, test case procedure followed, and system level test result recordings.

c) ETD V&V activities

The inspectors evaluated the Emulator Test Driver (ETD) Verification and Validation Plan and the following documents for compliance with IEEE Std. 7-4.3.2-1993, Section 5.3.3 and for compliance to IEEE1012-1998 subsection 7.4.6:

- ETD Software Verification & Validation Plan (SVVP); Document No. 910002-1-802
- ETD Software Requirements Specification (SRS); Document No. 910002-1-809
- ETD Software Design Description (SDD), Document No. 910002-1-810
- ETD Test Plan / Specification (Document No. 910002-1-812)
- ETD Test Procedure and test cases (Document No. 910002-1-870)
- ETD Task Reports (Document No. 910002-1-037)
- ETD Verification and Validation Test report (Document No. 910002-1-854)
- ETD Final Verification and Validation Report (Document No 910002-1-814)
- Nuclear Integration Emulator Test Driver Traceability Matrix (Document No. 910002-1-804)
- Products Procedures Manual, Section PPM 7.04, Software Tool Development
- SW Developer's Workbench, Document No. 9700100-003, August 2006

The inspectors reviewed the ETD-SVVP to assess compliance with IEEE-1012-1998. The inspectors noted that a SW development process that consisted of a requirements phase, implementation phase and test phase structure, was identified.

The inspectors selected a sample of ETD test cases to verify that the SW and logic applications were tested at the component level as required by the ETD-SRS. In addition, the inspectors reviewed the ETD Final Verification and Validation Report to verify that the version change from V9 to V10 was evaluated against the ETD test cases.

d) SW Tool Training

The inspectors reviewed the vendor's SVVP for compliance with IEEE-1012-1998, Clause 7.4.6, which states that the SVVP shall include training for each tool. The inspectors noted that the SVVP plan stated that independent verification and validation (IV&V) engineers assigned to work on the emulator tool shall be trained to use this tool. The inspectors reviewed several ETD V&V users' personal training folders for addressing proper training for SW development who were assigned to use the ETD application. The inspectors assessed the records to verify that ETD users had received the most current ETD and SW simulation training. In addition, several other IV&V engineers' personnel folders were reviewed by the inspectors to verify completion of an advanced programming course, and comprehensive training.

e) SW Tool V&V Independence

The inspectors reviewed several of the vendor's organizational charts that were presented to verify the requisite IV&V independence existed within the SW-developed activities. The inspectors noted that the ETD-SVVP stated that the IV&V staff is independent of the SW design staff and functionally reports to the Projects Quality Assurance Manager (PQAM) and the SW development staff report to the project manager. In addition, it also stated that the PQAM is the authority for both approving V&V task products and for resolving issues raised by V&V. The inspectors reviewed both the MOX Services' Project Staffing organizational chart, as well as the vendor V&V

organizational chart as a demonstration of the listed SW developers and IV&V independence to confirm that the SVVP-ETD independence was implemented. The inspectors also reviewed several ETD development document authors against the authors of the IV&V Test Case and Test Reporting documentation to verify that the staff from the SW development branch was not the same as the staff from the IV&V branch.

2) Conclusions

The inspectors reviewed V&V and training activities related to PSSC-009, Criticality Control, and PSSC-31, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/construction and the associated SSC was NNJ*SPLC0001. Based on the samples selected, the inspectors determined that the SW tools used for V&V activities satisfied the technical and quality assurance requirements. The inspectors determined that the SW tool V&V plan was adequate, the SW tools were indentified within the SW development process, SW tools were placed under control of configuration management, V&V activities were implemented for SW produced using the tool, the ETD IV&V staff met the user-training requirements and the requisite designer and IV&V independence as required by IEEE-1012-1998. No findings of significance were identified.

(f) Failure Modes and Effects Analysis

1) Scope and Observations

The scope of this inspection was to assess the vendor's Failure Mode and Effects Analysis (FMEA) for compliance with NRC regulations and MFFF requirements. The inspectors reviewed the Technical Specification for Safety Programmable Logic Controllers, (DCS01-CCJ-EW-SPE-C-36007-4), Section 2.2.1.4.3, which states the failure analysis requirements for the SPLCs. The requirements state that FMEA shall be performed in accordance with IEEE 352-1987, Guide for General Principles of Reliability Analysis of Nuclear Power Generating Station Safety Systems, Sections 4.1, 4.4 and 4.5; to identify the effects of faults on the state of the outputs and the ability of the SPLC to operate given the fault, identify fault categories, and estimate the fraction of total failures in each category.

The inspectors performed a backwards traceability analysis of the vendor's FMEA document to the source NRC regulations per the guidance of IEEE-1074-1997, Clause 4.4. The input document for the vendor FMEA was listed as the MFFF technical specification document. The input document to the technical specification is listed as the Basis of Design for Instruments and Controls (BOD), DCS01-AAJ-DS-DOB-C-40112. The BOD, Section 2.3.8, Protective, Safety, and Emergency System Design Requirements, required that, the design of items relied on for safety (IROFS) shall satisfy the single failure criteria identified in Section 2.3.1.1 of the Design Requirements Document. The Design Requirements Document, DCS01-AAJ-DS-DOB-D-40101, Section 2.3.1.1, General Safety Basis Guidance, stated that design features credited in the ISA to prevent and/or mitigate design basis events to meet 10 CFR 70.61 performance requirements are designed to meet the single failure criterion in accordance with IEEE 379-1994, IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems requirements. IEEE 379-

1994, Clause 6, Design Analysis for Single Failure, states that other procedures for the performance of the single-failure analysis are described in IEEE Std 352-1987.

The inspectors determined through backwards traceability that using IEEE 352-1987 as guidance to perform a FMEA is acceptable for meeting and addressing the applicable NRC requirements as committed to by MOX Services. In addition, the inspectors determined that requirements for the FMEA were consistent with Section 11.5 of the LA, which states in part, that the safety control subsystems are designed using the methods and practices identified in IEEE 379-1994.

The inspectors evaluated the vendor's FMEA document, for conformance to the applicable sections of IEEE 352-1987 and the above listed MFFF requirements. The inspectors noted that the FMEA boundary is the applicable components and failures external to the main components are not considered. These external interfaces include, but are not limited to, the SPLC power feeds, input sensors, environmental conditions, and other system interfaces. The inspectors discussed this with the applicant, and the applicant stated they performed a Hazard and Operability Analysis for the integrated FMEA. In addition, the inspectors noted the FMEA grouped component faults into categories, classified failures into those that will be detected by SPLC diagnostics and those that will not be detected by SPLC diagnostics.

2) Conclusions

The inspectors reviewed FMEA activities related to PSSC-009, Criticality Control, and PSSC-031, Material Handling Controls, as described in Table 5.6-1 of the MFFF CAR. The inspection attributes observed were SQAP and vendor oversight/inspection and the associated SSC was NNJ*SPLC0001. The inspectors concluded that the vendor's FMEA defined the system to be analyzed, defined the applicable interfaces to the system to be analyzed, provided a description of the environmental conditions considered, provided a description of the operation of the system components to be analyzed, identified the failure categories, and classified failures. No findings of significance were identified.

c. PSSC-012, Emergency Alternating Current (AC) Power System

(1) Attribute: Vendor Oversight/Inspection (IP 88115, Supplier/Vendor Inspection (Construction Phase))

(a) Scope and Observations

The inspectors reviewed Purchase Order 10888-P-4217, between MOX Services and Fairbanks Morse Engine, including Specification for Emergency Diesel Generators Quality Level 1, DCS01-EEJ-DS-SPE-E-25236-2, dated October 3, 2011; to determine if the inspections required by MOX Services complied with Project Procedure (PP) 3-29, Rev. 9, Inspection at Supplier Facilities, and to verify that applicable regulatory requirements, including American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1, 10 CFR Part 21, and controls for documenting and reporting deficiencies and maintaining adequate quality, were observed.

The inspectors reviewed Shop Inspection Report FME-12-SIR213, dated July 10, 2012, to verify adequacy of fabrication activities which covered shop work housekeeping and

safety, segregation of nonconforming materials, document controls, and records control. The inspectors reviewed Shop Surveillance Reports FMC-11-VS168 to verify that inspection activities and results were appropriately documented and controlled, personnel were properly qualified and certified, M&TE was properly documented and calibrated, hold and witness points were observed, and nonconforming items were adequately identified and segregated, and notifications to affected organization were issued.

(b) Conclusion

The inspectors observed construction activities related to PSSC-012, Emergency AC Power System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was vendor oversight/inspection and the associated SSC was the emergency diesel generator. The applicant adequately inspected and reported activities conducted by Fairbanks Morse Engine, and provided adequate records of shop inspections and monitoring of the progress at the supplier's shop. No findings of significance were identified.

d. PSSC-021, Fire Barriers – Fire Dampers

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

(a) Scope and Observations

The inspectors visually inspected an installed fusible link for fire damper *DMPF0172B-07 to ensure it (1) contained the correct temperature rating as required by the Greenheck design drawing 52410 (386 ˚Fahrenheit (˚F)) and (2) was properly marked in accordance with the requirements of Underwriters Laboratories (UL) 33, Underwriters Laboratories Inc. Standard for Safety Heat Responsive Links for Fire-Protection Service. The inspectors also reviewed completed inspection documentation to determine if Flanders performed the necessary inspections to verify proper installation of the fusible link, including proper orientation and required markings per the UL 33 Standard. Section 17.1 of UL 33 requires that fusible links be marked with the temperature rating, a distinctive type or model designation, the manufacturer's or private labeler's name or identifying symbol, and the year of manufacture.

The inspectors reviewed vendor design drawings, component datasheets, and completed commercial grade dedication documentation to determine if the fusible link met the requirements for Response Time Index (RTI). Section 2.2.1.1 of the Statement of Work requires that fusible links have a minimum activation temperature of 375 ˚F and a minimum RTI of 150 $meters^{0.5}second^{0.5}$.

The inspectors reviewed the Flanders' report for their MOX Fire Dampers Inspection for damper serial number 52410. The inspectors reviewed the report to determine if the fire damper vendor performed the required inspections specified in Section 2.14, Inspections, of the Scope of Work (SOW). The required inspections included verification of material type, gauge thickness, inside diameter, overall length, flange configuration, flange squareness, surface finish, and clearances between the damper and sleeve. The inspectors also reviewed UL Standard 555, Fire Dampers, to determine if inspections specified in the SOW were consistent with the requirements of the UL standard.

(b) Conclusion

The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was inspection and the associated SSC was fire dampers installed in various rooms of the MFFF. No findings of significance were identified.

(2) Attribute: Design Control (IP 88107, Design and Document Control; and IP 88141, Fire Prevention and Protection)

(a) Scope and Observations

The inspectors reviewed DCS01-QGA-DS-NDS-M-65765-1, SOW Fire Dampers, to determine if the design requirements imposed by MOX Services on the fire damper vendor were consistent with licensing basis commitments in the LA. The inspectors noted that Section 7.6.1 of the LA references UL 555, Fire Dampers, as the applicable design code for the MFFF fire dampers. UL 555 references UL 33 as the applicable standard for heat responsive devices (fusible links).

The inspectors selected fire damper number *DMPF0172B-07 from the High Pressure Supply Air (HSA) system as an inspection sample. Section 2.1.14 of the SOW requires that fire dampers be designed to UL 555 for the designed static pressure of the system in which the fire damper is to be installed. Section 2.1.24 of the SOW lists the design pressure of the HSA system as +10 inches water gauge (W.G.). The inspectors reviewed various vendor design documents including Greenheck design drawing No. 52410, SSDFD-210 8x8 w/Fusible Link Position Indicator, and the Greenheck Model SSDFD-210 product datasheet, to determine if the fire damper met HSA system requirements for dynamic closure pressure and dynamic closure flow. The inspectors reviewed MOX Services' Document No. 08716-00003307_00003-0278, Report 2011-030 UL 555 Testing, to determine if the (1) SSDFD-210 fire damper was tested at the correct pressure and flow rate as required by UL 555 and the SOW, and (2) representative samples for the operational testing were selected in accordance with the requirements of UL 555, Section 9.2.

The inspectors verified that the fire resistance rating of the fire damper was 1.5 hours as specified in DCS01-QGA-DS-SPE-V-15911-3, Fire Dampers. The inspectors reviewed the MOX Services' building construction drawings to determine if the fire damper rating was consistent with the fire rating of the wall in which the damper will be installed.

The inspectors reviewed various vendor design documents to determine if the fire damper sleeve met the design requirements specified in the SOW. Specifically, the inspectors reviewed Superior Design Drawing 52410 to determine if the fire damper sleeve was (1) designed in accordance with Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) duct construction standards and AWS D9.1 requirements, (2) constructed of the correct material (stainless steel) at the specified gage thickness, (3) designed to not extend more than allowed by UL 555 beyond both surfaces of the wall which the sleeve passes, and (4) designed with perimeter angles to secure the fire damper-sleeve assembly into the opening through which the assembly is installed.

Based on the requirements in the SOW, the inspectors noted that fire dampers will not carry a UL label since the actuation temperature and manual operation are outside the UL 555 code requirements. MOX Services informed the inspectors that the use of non UL-listed fire dampers was acceptable since the fire dampers underwent sufficient testing and analysis in accordance with the requirements of UL 555, to demonstrate that in the event of a fire, the dampers will be capable of performing their intended safety function of closure during a fire.

The inspectors questioned MOX Services as to whether this code deviation was captured in the MOX Services Deviation Log and whether this change was screened for potential impact to the LA as required by PP8-6, Licensing Basis Configuration Management. PP8-6 establishes the process to identify potential impacts to the licensing basis, and provides assurance that the facility licensing basis is not altered when making changes to the MFFF design or associated programs.

MOX Services informed the inspectors that a PP8-6 Applicability Determination was not performed on the SOW since this type of documents was not one of the documents listed in PP8-6, Attachment A, Documents/Document Types Requiring Evaluation for Licensing Basis Impact. MOX Services informed the inspectors that this type of change is typically captured in a change to a BOD document. The inspectors questioned MOX Services as to whether the BOD document covering fire dampers was revised to reflect the deviation from UL 555 requirements. MOX Services informed the inspectors that the BOD document was not revised to reflect the deviation; therefore, a PP8-6 screening and evaluation was not performed.

The inspectors noted that Section 16.2.3, Changes to the License Application, states, in part, MOX Services maintains the LA so that it is accurate and up-to-date by means of the MFFF configuration management processes, which include written procedures. MOX Services evaluates changes to the facility and its processes for impact on the LA, and updates the LA, as needed, in order to ensure its continued accuracy… A change to the facility or its processes is evaluated, as described above, before the change is implemented. The evaluation of the change determines, before the change is implemented, whether an application for an amendment to the LA is required to be submitted in accordance with 10 CFR 70.34. The inspectors noted that the implementing procedure for the Chapter 16.2.3 requirements, PP8-6, requires MOX Services to screen and evaluate the impact of changes on the MFFF licensing basis to determine if NRC notification and approval is required.

Based on this review, the inspectors determined that a licensing evaluation should have been performed prior to the change being implemented. The inspectors determined that further review by the NRC staff will be necessary to (1) determine the technical significance of the issue including the technical adequacy of the UL 555 qualification/test program and (2) to determine if the change was reportable to the NRC in the form of a license amendment request. Example 1 of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was opened to further assess the significance of this issue.

(b) Conclusion

The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was

design control and the associated SSC was fire dampers installed in various rooms of the BAP and BMP. The first example of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was identified.

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

(a) Scope and Observations

The inspectors reviewed various NCRs to determine if MOX Services met MPQAP and procedure requirements for the issuance and resolution of non-conforming items. Specifically, the inspectors reviewed NCR No. EN-12-3791, which documented several items that were missing from the vendor Record Document Package. These missing items will be submitted to MOX Services after shipment at a later date. In accordance with the MOX Services NCR procedure, MOX Services placed NCR hold tags on the fire dampers as required by the MOX Services PP3-05, Control of Nonconforming Items. The fire damper was conditionally released for installation into the MFFF; however, the hold tags will remain until the documents are submitted to MOX Services for review and approval by QC receipt inspection personnel. The missing documentation listed in the NCR includes: (1) C of C; (2) seismic C of C; (3) approved seismic qualification report; (4) retest seismic anomaly related to electro thermal link (ETL); (5) approved UL test report; (6) UL certification of ETL; (7) CGD package; and (7) material test reports.

The inspectors determined that further review by the NRC staff will be necessary to evaluate the acceptability of the Seismic Qualification Report. The UL Qualification Reports will be reviewed as part of URI 70-3098/2012-003-003. Inspector Follow-up Item (IFI) 70-3098/2012-003-004, Review Fire Damper Seismic Qualification Report, was opened to further evaluate the seismic adequacy of the fire dampers.

(b) Conclusion

The inspectors observed construction activities related to PSSC-021, Fire Barriers, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSC was fire dampers installed in various rooms of the BAP and BMP. IFI 70-3098/2012-003-004, Review Fire Damper Seismic Qualification Report, was identified.

e. PSSC-023, Fluid Transport Systems

(1) Attribute: Design Control (IP 88108, Control of Materials, Equipment and Services; IP 88134, Piping Systems Relied on for Safety)

(a) Scope and Observations

The inspectors reviewed ECR-017988, Allow Corrosion Testing Methods in the Reference Facility for 316L Materials. This ECR was generated against DCS01-KKJ-DS-NTE-L-17021-0 to allow the use of International Standards Organization (ISO) corrosion testing methods performed for the reference facility in France, in lieu of American Society of Testing and Materials (ASTM) A262 Practice C, Nitric Acid Test for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels, for 316L material used in nitric acid service. Specifically, the ECR allows the use of ISO 3651-2, Determination of Resistance to Intergranular Corrosion of Stainless Steels – Part 2:

Ferritic, Austenitic and Ferritic (duplex) Stainless Steels – Corrosion Test in Media Containing Sulfuric Acid. The inspectors reviewed the ECR for technical adequacy and to determine if MOX Services properly screened the change to determine if the change impacted design basis codes and standards committed to in the LA.

Based on a review of the LA, the inspectors concluded that MOX Services is committed to the requirements of ASTM A262, Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels. According to ASME SA-312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes, ASTM A262 intergranular corrosion testing is required if specified in the purchase order. The inspectors noted that intergranular corrosion testing was specified in the MOX Services' purchase orders for 316L piping material.

The inspectors questioned MOX Services as to whether this change was captured in the MOX Services' Deviation Log and whether this change was screened for potential impact to the LA as required by PP8-6, Licensing Basis Configuration Management. PP8-6 establishes the process to identify potential impacts to the licensing basis, and provides assurance that the facility licensing basis is not altered when making changes to the MFFF design or associated programs.

MOX Services informed the inspectors that a PP8-6 review was not performed and the change was not listed in the MOX Services' Deviation Log. The inspectors questioned MOX Services as to why a PP8-6 review was not performed since general specifications are listed in Attachment A, of PP8-6, as documents requiring a review. MOX Services informed the inspectors that the specification was improperly categorized as a technical document (NTE) instead of a specification (SPE). According to Attachment A, Documents/Document Types Requiring Evaluation for Licensing Basis Impact, of PP8-6, only specifications with a designation of SPE require a licensing basis impact review. This deficiency was entered into MOX Services' corrective action program as CR-12-437, Technical Specification Not Reviewed per PP8-6.

The inspectors determined that further review by the NRC staff will be necessary to (1) determine the technical significance of the issue including the use of ISO standards in lieu of the ASTM standards with regards to intergranular corrosion testing of 316L material, and (2) to determine if the change was reportable to the NRC in the form of a license amendment request. Example 2 of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was identified to further assess the significance of this issue.

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport Systems, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was design control and the associated SSC was FTS piping in the BAP. The second example of URI 70-3098/2012-003-003, Assess Significance of Improperly Performed Licensing Evaluations, was identified.

(2) Attribute: Special Processes (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

The inspectors reviewed three work packages related to piping structural steel supports to determine whether applicable documents were included, weld travelers were followed, hold points were observed, and welding was documented. The inspectors reviewed work packages for the following pipe supports:

- B268-PS-00012
- B101-PS-06007
- C150-PS-00078

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was special processes and the associated SSC was pipe supports. These activities were adequately performed and met the license requirements. No findings of significance were identified.

(3) Attribute: 10 CFR 21 (IP 88111, 10 CFR 21 Inspection – Facility Construction; IP 88134, Piping Systems Relied on for Safety)

(a) Scope and Observations

The inspectors reviewed DCS-NRC-000319, Docket Number 07-3098, Shaw AREVA MOX Services Mixed Oxide Fuel Fabrication Facility Part 21 60-day Interim Report Notification: Thermal Sensitization of Pipe, to determine if MOX Services adequately implemented the requirements of 10 CFR Part 21 with regards to reporting and content.

The Part 21 Interim Report addressed a potential deviation associated with the thermal sensitization of austenitic stainless steel (SS) piping. The stainless steel piping is slated for use in various portions of the aqueous polishing process. Through independent testing, MOX Services has identified that one heat of ½ inch 304L SS pipe supplied by the vendor failed the ASTM A262 Practice A and Practice C tests as required by MOX Services' project specifications. Failure of the testing indicates that the material may be susceptible to intergranular corrosion during service conditions. MOX Services has entered this condition into their corrective action program as CR 12-275. The inspectors noted that this is only an interim report and that MOX Services has not determined that a defect actually exists. MOX Services has committed to completing a final report by May 2, 2013.

The inspectors reviewed the date of discovery as specified in the interim report to determine if MOX Services met the 60-day interim report requirement of 10 CFR Part 21. The inspectors reviewed the interim report to determine if the report contained the required information specified in 10 CFR 21.21(d)(4).

The inspectors determined that further review by the NRC staff will be necessary to determine the acceptability of the final 10 CFR Part 21 report including compliance with reporting requirements, report content, and technical adequacy of the evaluation. Inspector Follow-up Item (IFI) 70-3098/2012-003-005, Review Final 10 CFR Part 21 Report Regarding Thermal Sensitization of Piping.

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was 10 CFR Part 21 and the associated SSC was FTS system piping in the BAP. IFI 70-3098/2012-003-005, Review Final 10 CFR Part 21 Report Regarding Thermal Sensitization of Piping, was identified. No violations of significance were identified.

(4) Attribute: Procurement (IP 88140, Instrument and Control Systems)

(a) Scope and Observations

1) Instrument Tubing

The inspectors interviewed personnel responsible for engineering, quality assurance, and procurement support; reviewed equipment specifications and receipt records; and conducted direct observations of items in storage. The inspection was conducted to verify that the design, procurement, and receipt of QL-1 instrument tubing intended for use inside process cells and in the FTS satisfied the requirements of the MPQAP and NRC regulations, and was accomplished in a manner that would assure that installed items will perform their intended safety function.

The inspection scope included a review of procurement controls established under Rev. 2 to Subcontract 10888-S-00005925, dated July 2012. Line items on the purchase order included 316L stainless tubing manufactured to ASME SA-213, Seamless Ferritic Stainless Steel and Austenitic Stainless Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes; and ASTM A-269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service. The inspectors observed that the purchase order identified instrument tubing specification DCS01-CCJ-DS-SPE-C-28040 and Technical Document Change Notices (TDCNs) S5925-001-01SEP11 and S5925-TDC01-31MAY12 to communicate the technical and quality requirements for the purchased items. A review of the MOX Services approved supplier list (ASL), dated July 17, 2012, confirmed that the designated supplier was authorized to supply QL-1 instrument tubing. The authorization was based upon supplier audit report PHC-10-VE229 which documented that the applicant's auditors had verified the supplier was capable of implementing the technical and quality requirements outlined in instrument tubing specification DCS01-CCJ-DS-SPE-C-28040. The audit report also documented that the supplier had approved the Appendix B quality assurance program of their sub-supplier who was designated to manufacture their tubing.

The inspectors reviewed receipt inspection records and conducted direct observations of a shipment of QL-1 stainless steel tubing received under Subcontract 10888-S-00005925. Documentation in the receipt package indicated the tubing was designated for use inside process cells, and in the FTS. The tubing was capped, wrapped, and

configured to protect against damage and contamination from foreign material. The storage environment was controlled for temperature and humidity and was secured to prevent unauthorized access. Stored items were clearly labeled and tagged to show acceptance status. The inspectors observed the labels were sufficient to uniquely identify the items including item description, manufacturer, manufacturing heat, associated procurement documents, and storage location. Nonconforming tubing was segregated and marked with red QC Hold Tags to prevent inadvertent use. Tubing that had been received but not inspected was tagged with Materials Department Hold Tags to show that the items were not available for issue. Receipt inspection records showed that QC inspectors had issued NCR QC-12-4333 for four failures to meet documentation and marking requirements of specification DCS01-CCJ-DS-SPE-C-28040.

The inspectors compared the receipt inspection record package with the LA, the basis of design, the specification for procurement of instrument tubing (DCS01-CCJ-DS-SPE-C-28040), and the specification for testing 316L stainless steel products (DCS01-KKJ-DS-NTE-L-16279-6). The inspectors determined that the receipt inspection had not identified or documented the following inconsistency with specified requirements.

The CMTRs for the shipment of 316L stainless steel tubing documented that the manufacturer had implemented an incorrect test for resistance to intergranular stress corrosion. The CMTRs stated that corrosion resistance testing had been conducted according to ASTM A262 Practice E, Strauss Test, instead of the correct methodology, Practice C. The inspectors determined that the use of Practice C was required by engineering specification DCS01-KKJ-DS-NTE-L-16279, which was applicable to QL-1 stainless steel materials used inside process cells and in the Fluid Transport System (FTS). The specification specifically identified that Practice E was not applicable to the MFFF. The inspectors noted that previous instances have occurred where resistance to intergranular stress corrosion was not adequately tested. The problem had been documented in a 2011 condition report, 10888-MOX-CR-11-521. The corrective actions included issuance of Engineering Change Request (ECR) 013589 to ensure future procurements of 316L material correctly addressed testing requirements for nitric acid applications. In January 2012, the ECR was incorporated into specification DCS01-KKJ-DS-NTE-L-16279 under Rev. 6.

The inspectors determined that testing to verify resistance to corrosion was consistent with Section 11.7 of the LA, which states that the basic materials of construction for the FTS must be compatible with the process fluids, which includes consideration of corrosion where applicable. The final technical review documentation for procurement specification DCS01-CCJ-DS-SPE-C-28040 specifically identified the applicability of the LA to the purchased tubing. The final technical review documented that the purchased instrument tubing was designated for use in process cells and the FTS, was QL-1, and had a safety function to maintain confinement. The procurement specification identified engineering specification DCS01-KKJ-DS-NTE-L-16279 as an applicable reference source, but did not flow down the associated requirements for testing corrosion resistance of the 316L stainless steel. Neither the procurement specification nor its final technical review identified any applicability of the purchased items to any other safety-related system.

PP3-28, Quality Control Receiving Inspection, Section 3.5.1 stated that the planning process for receiving inspection should include review of applicable project

specifications. Section 3.6.1.1 stated that QC receiving inspection personnel shall only accept items, material, and equipment which conform to specified requirements.

Requirements applicable to acceptance of purchased items were defined in MPQAP, Section 7.2.6.4.D, which required receipt inspections to be planned and executed in accordance with the requirements of Section 10, Inspection. Section 10.2.6.A of the MPQAP stated that items shall be inspected for completeness, markings, calibration, adjustments, protection from damage, or other characteristics as required, in order to verify the quality and conformance of the item to specified requirements. MOX Services issued Condition Report 10888-MOX-CR-12-442 to address this adverse condition.

Interviews with responsible engineering personnel indicated the procurement specification for tubing was not intended to signify that the portions of tubing to be used in the FTS and inside process cells were classified as QL-1. Reportedly, the QL-1 classification was only applicable to tubing intended for use in the supply air system. Although the specification and procurement records did not address this distinction, the applicant stated that additional documentation was available to demonstrate that none of the stainless steel tubing to be used inside process cells or the FTS will be required to perform a confinement safety function. The applicant asserted that the documentation would demonstrate that tubing used in those applications was more properly classified as Quality Level 4 (QL-4).

The verification of applicable requirements for demonstrating resistance of instrument tubing material to intergranular stress corrosion cracking will require further review, and is identified as Example 1 for URI 70-3098/2012-003-006, Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings.

2) Instrument Valves and Fittings

The inspectors interviewed personnel responsible for engineering, quality assurance, and procurement support; reviewed equipment specifications and receipt records; and conducted direct observations of items in storage. The inspection was conducted to verify design, procurement, and receipt of QL-1 instrument valves and fittings intended for use inside process cells, and in the FTS, would satisfy the requirements of the MPQAP and NRC regulations, and was accomplished in a manner that would assure that installed items will perform their intended safety function.
The inspection scope included a review of procurement controls established under Purchase Order 10888-P-5748, IC008-1, Instrument Valves, Fittings, and Manifold Valve Assemblies. The inspectors observed that the purchase order identified instrument valves and fittings specification DCS01-CCJ-DS-SPE-C-28110-0, Instrument Specification – Instrument Valves and Fittings, to communicate the technical and quality requirements for the purchased items. The purchase order was also reviewed to determine whether restrictions defined in the ASL had been sufficiently documented and communicated to the supplier.

The inspectors reviewed receipt inspection records and conducted direct observations of a shipment of stainless steel fittings received in April 2012 under Purchase Order 10888-P-5748. The purchased items were observed to be clearly labeled for identification of the items and to show acceptance status. Stored items were protected against damage or contamination, and were protected against unauthorized access.

The inspectors compared the receipt inspection record packages with the procurement specification (DCS01-CCJ-DS-SPE-C-28110-0), and an associated specification for testing 316L stainless steel products (DCS01-KKJ-DS-NTE-L-16279-6). The inspectors noted the following discrepancy between the receipt inspection packages and the referenced specifications:

Procurement specification DCS01-CCJ-DS-SPE-C-28110-0, as referenced in Purchase Order 10888-P-5748, stated that fittings shall be ASME SA-276, Standard Specification for Stainless Steel Bars and Shapes, Grade 316 seamless stainless steel, and that the materials shall also meet the requirements of and be in accordance with MOX Services' specification DCS01-KKJ-DS-NTE-L-16279-6, Welded Equipment and General Specification for 316 and 316L Stainless Steel Materials. Specification DCS01-KKJ-DS-NTE-L-16279-6 required testing of 316 and 316L stainless steel materials using ASTM A262 Practice C to verify resistance to intergranular attack from immersion in nitric acid process fluids. In contrast to the specification, the inspectors noted that the CMTRs for the instrument fittings stated that corrosion resistance testing had implemented ASTM A262 Practice E. As identified in DCS01-KKJ-DS-NTE-L-16279-6, ASTM A262 Practice A or E would not be an acceptable corrosion test for 316 and 316L stainless steel used in nitric acid applications such as the FTS.

The applicable requirement in Project Procedure PP3-28, Quality Control Receiving Inspection, Section 3.5.1 stated that the planning process for receiving inspection should include review of applicable project specifications. Section 3.6.1.1 stated that QC receiving inspection personnel shall only accept items, material, and equipment which conform to specified requirements.

Section 10.2.6.A of the MPQAP stated that items shall be inspected for completeness, markings, calibration, adjustments, protection from damage, or other characteristics as required, in order to verify the quality and conformance of the item to specified requirements. MOX Services issued Condition Reports 10888-MOX-CR-12-442 and 12-446 to address this adverse condition.

In contrast to the provisions of the procurement specification, interviews with MOX Services' personnel indicated that the purchased instrument valves and fittings were not intended for use as QL-1 items, and thus would not require corrosion resistance testing as indicated by the specifications. The inspectors were informed that the instrument valves and fittings would be utilized as QL-4 items for systems containing nitric acid process fluids such as in the FTS. The applicant personnel stated that additional documentation was available to demonstrate that none of the stainless steel fittings used inside process cells or the FTS will be required to perform a confinement function and that fittings used in those applications were properly classified as QL-4.

The inspectors determined that further review was required to verify the applicable requirements for demonstrating resistance of instrument fittings to intergranular stress corrosion cracking. This issue is identified as the second example for URI 70-3098/2012-003-006, Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings.

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSC was FTS instrument tubing, valves and fittings. Two examples of URI 70-3098/2012-003-006, Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings, were identified.

(5) Attribute: Control of Materials, Equipment, and Services (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 areas of handling, shipping, and storage, the inspectors observed the loading and transport of BAP pipe spools from the G laydown yard to the Celebration laydown yard to determine if MOX Services implemented the necessary controls to prevent corrosion concerns associated with the cross-contamination of carbon steel and stainless steel. The inspectors noted the following observations: (1) the majority (95%) of the pipe spools were wrapped in plastic; (2) the truck bed had a wood surface; (3) pipe spools were transported inside wood crates. Based on these work practices, the inspectors found no evidence for the potential for cross-contamination between carbon steel and stainless steel during transport of piping between laydown yards and the MFFF.

(b) Conclusion

The inspectors observed construction activities related to PSSC-023, Fluid Transport System, as described in Table 5.6-1 of the MFFF CAR. These activities were adequately performed and met the license requirements. The inspection attribute observed was control of materials, equipment, and services and the associated SSC was FTS pipe supports. No findings of significance were identified.

f. PSSC-024, Gloveboxes

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

(a) Scope and Observations

The inspectors observed assembly of the KCC*GB1000 feeding head body, at the PAF. The inspectors reviewed work package DCS01-KCC-AG-WPK-M-50089, KCC*1000/2000, to determine if the work package contained the necessary steps for proper assembly of the feeding head body. The inspectors verified that the torque wrenches used for assembly of QL-1 fasteners were properly marked, calibrated, and within proper range. The inspectors reviewed material test reports and commercial grade dedication worksheets in Receipt Inspection Report No. 38972 to determine if the feeding head body material met 304L material specification requirements for chemical and physical properties.

The inspectors reviewed ECRs-000889, 007481, and 011189 to determine the adequacy of the technical justifications associated with KCC*GB1000 design changes. The

inspectors reviewed inspector qualification records to determine if the QC inspector was certified to inspect mechanical equipment.

(b) Conclusion

The inspectors observed construction activities related to PSSC-024, Gloveboxes, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was installation and the associated SSC was the KCC*GB1000 feeding head body. No findings of significance were identified.

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

(1) Attributes: Installation and Test Control (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):

1) Installation of structural reinforcing steel in the BMP, the BAP, and BSR;
2) Installation of embedded piping, embedded support plates, and plant grounding system in all three buildings;
3) Concrete placements in walls and floors of the BSR, BAP, and BMP and placement of the roof section of the BMP;
4) Operation of the concrete batch plant;
5) Receipt of cement, fly ash, sand and gravel;
6) Concrete testing in the field (slump, air entrainment, and temperature);
7) Installation of building grounding cables in various floors and walls;
8) Surveys (proper positioning/location) of embedded piping and embedded plates;
9) Cleanliness of areas prior to concrete placement, and maintenance of cleanliness during the concrete placements;
10) 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, Rev. 9 (Sheet 1 of 2); and 2) MFFF Concrete and Reinforcing General Notes and Tolerance Details, DCS-01352, Rev. 6 (Sheet 2 of 3), and Rev. 0 (Sheet 3 of 3).

The inspectors evaluated the adequacy of ongoing concrete placement activities conducted by Alberici, 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 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, Code Requirements for Nuclear Safety Related Concrete Structures.

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

July 5, 2012, BMP-W327.6/325.3, BMP Interior Wall, 239 cubic yards
July 12, 2012, BMP-GW11A.3/10A.1, BMP Gabion Wall, 30 cubic yards
July 14, 2012, BSR-W307.3/308.2, BSR Interior Wall, 233 cubic yards
July 17, 2012, BMP-R11B/12B/7b.2/8B.2, BMP Roof, 1156 cubic yards
July 18, 2012, BMP W325.2, BMP Interior Wall, 152 cubic yards
July 19, 2012, BAP-W307.1/309.6, BAP Interior Wall, 174 cubic yards
July 20, 2012, BAP-W403.1/404.1, BAP Interior Wall, 210 cubic yards
July 20, 2012, BAP-GW13B.1/12B.1, BAP Gabion Wall, 175 cubic yards
July 27, 2012, BAP-W308.1/310.4, BAP Interior Wall, 220 cubic yards
July 31, 2012, BAP-W411.1, BAP Interior Wall, 104 cubic yards
August 1, 2012, BSR-W307.2, BSR Interior Wall, 190 cubic yards
August 10, 2012, BAP-W405.1/404.3, BAP Interior Wall, 196 cubic yards
August 15, 2012, BMP-R9A/10A, BMP Roof, 1184 cubic yards
August 17, 2012, BSR-W307.4, BSR Interior Wall, 180 cubic yards
August 18, 2012, BAP-W411.2, BAP Interior Wall, 140 cubic yards
August 18, 2012, BAP-W412.1, BAP Interior Wall, 112 cubic yards
August 24, 2012, BAP-TCO 135, BAP Temporary Construction Opening, 13 cubic yards
August 27, 2012, BSR-W307.6/307.7/308.6, BSR Interior Wall, 100 cubic yards
August 29, 2012, BMP-FD51/71, BMP Fire Damper, 8 cubic yards

August 31, 2012, BMP-R9B/10B/5B.2, BMP Roof, 968 cubic yards
September 6, 2012, BAP-F403/404, BAP Elevated Floor, 448 cubic yards
September 7, 2012, BMP-R13A/14A, BMP Roof, 1073 cubic yards
September 11, 2012, BAP-W412.2, BAP Interior Wall, 73 cubic yards
September 13, 2012, BSR-W308.1, BSR Interior Wall, 160 cubic yards
September 19, 2012, BMP-R13B/14B/9B.1, BMP Roof, 790 cubic yards
September 20, 2012, BSR-W306.1, BSR Interior Wall, 208 cubic yards
September 24, 2012, BAP-W406.1/405.2, BAP Interior Wall, 130 cubic yards
September 26, 2012, BSR-R17A.1/21A.1, BSR Roof, 343 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 reinforcing bar (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.

(2) Attribute: Problem Identification, Resolution, and Corrective Action (IP 88110, Problem Identification, Resolution, and Corrective Action)

(a) Scope and Observations

The inspectors reviewed CR-12-193, Hilti Bolts, to determine if MOX Services adequately implemented corrective actions related to the failure of Hilti concrete anchors in Rooms B-184 and C-119 of the MFFF. The inspectors reviewed the adequacy of the interim corrective actions, which included (1) removal of torque wrenches from the field, (2) check of the calibration of the torque wrenches, (3) placing a hold on the Hilti anchors in the warehouse, and (4) notifying construction engineering and QC of the condition. The inspectors reviewed the “before” and “as found” calibration records. The inspectors reviewed the forensic analysis report of the material failure performed by the MOX Materials and Welding Engineering Group. The inspectors noted that MOX Services concluded that the failure of the Hilti anchors was a result of over-torque by the operator and not a material defect. The inspectors reviewed the final corrective actions which included training the installers on the proper use of calibrated torque wrenches. The inspectors reviewed completed training records to verify that the training was completed.

The inspectors reviewed the corrective actions associated with CR-12-194, Hilti Anchor Traceability. The inspectors noted that this condition report was written as result of the follow-up to CR-12-193. Specifically, this CR addressed a potential material traceability issue with the Hilti anchors. During the applicant’s investigation of CR-12-193, MOX Services attempted to determine the potential extent of condition including whether the failures were from a single lot of material. As a result, MOX Services determined that

only the unit type code (UTC) and not the lot number were recorded into the Passport tracking system. MOX Services noted that the UTC tracking number covered multiple lots of Hilti anchors and that the Hilti documentation (e.g., C of C, packing slip, etc.) did not list the lot number or associated quantities. MOX Services noted that the lot number was only recorded on the outside of the cartons/boxes from the manufacturer. MOX Services concluded that the UTC number provided traceability to the receipt inspection documentation packages; however, it did not narrow the population by lot, resulting in potentially a large population of Hilti anchors impacted in the event of a material failure in a specific lot. MOX Services implemented a corrective action to separate the UTC numbers by lot number when recording the information in the Passport system.

(b) Conclusions

The inspectors observed construction activities related to PSSC-036, MFFF Building Structure (Including Vent Stack), as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was problem identification, resolution, and corrective action and the associated SSC was the Hilti anchor bolts. No violations of significance were identified.

h. PSSC-045, Process Safety Control Subsystem

(1) Attribute: Procurement (IP 88140, Instrumentation and Control System)

(a) Scope and Observations

1) Single Point Annunciator Panels

The inspectors reviewed QL-1 procurement specification DCS01-CCJ-DS-SPE-C-28416-0, Single Point Annunciator Panels, to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design inputs and quality program documents such as QA/QC procedures, specifications, supplier evaluation summary reports, supplier surveillance reports, quality assurance audit reports, MOX Services' submittal reviews, commercial grade dedication plans, and associated ECRs were reviewed. Personnel responsible for engineering, quality assurance, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of Single Point Annunciator Panels for use in the Process Safety Control Subsystem. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA and if the specification provided reasonable assurance the procured items would perform their intended safety function when installed.

The inspectors reviewed subcontract documents for the Single Point Annunciator Panels to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for Single Point Annunciator Panels were adequately communicated to the supplier. Supplier QA Audit Reports were reviewed to ensure proper supplier oversight during the implementation of the procurement process and that the designated supplier was evaluated to provide QL-1 Single Point Annunciator Panels. The inspectors also reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the

capability of the supplier to implement the technical and quality requirements of specification DCS01-CCJ-DS-SPE-C-28416-0.

The inspectors also reviewed specification, DCS01-CCJ-DS-SPE-C-28416-0, Single Point Annunciator Panels to determine whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112-4. The review identified that sections 1.8 and 2.3 of the specification addressed requirements to formally qualify the Single Point Annunciator Panels as SC-1 in accordance with the design basis document.

2) Hand Valves with Position Switches

The inspectors reviewed procurement specification DCS01-CCJ-DS-SPE-C-28254-2, Hand Valves with Position Switches, to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Although the quality level classification for the hand valves is QL-1, the quality level classification for the valve position switches is QL-4. Design inputs and quality program documents such as QA/QC procedures, specifications, supplier evaluation summary reports, supplier surveillance reports, quality assurance audit reports, MOX Services' submittal reviews, commercial grade dedication plans and associated ECRs, were also reviewed and personnel responsible for engineering, quality assurance, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of hand valves with position switches for use in Process Safety Control Subsystem. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA and would provide reasonable assurance that procured items would perform their intended safety function when installed.

The inspectors reviewed subcontract documents for the hand valves with position switches, to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for hand valves with position switches were adequately communicated to the supplier. Supplier QA audit reports were reviewed to ensure proper supplier oversight during the implementation of the procurement process and that the designated supplier was evaluated to provide QL-1 hand valves with position switches. The inspectors also reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the capability of the supplier to implement the technical and quality requirements of specification DCS01-CCJ-DS-SPE-C-28254-2.
The inspectors reviewed specification, DCS01-CCJ-DS-SPE-C-28254-2, Hand Valves with Position Switches, to evaluate and determine whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112-4. The review determined that Sections 1.8 and 2.3 of the specification addressed the requirements to formally qualify the hand valves as SC-1 and position switches as SC-II, consistent with the design basis document.

3) Air Operated Stop Valves

The inspectors reviewed QL-1 procurement specification DCS01-CCJ-DS-SPE-C-28195-1, Air Operated Stop Valves, to verify that technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design inputs and

quality program documents such as QA/QC procedures, specifications, supplier evaluation summary reports, supplier surveillance reports, quality assurance audit reports, MOX Services' submittal reviews, commercial grade dedication plans, and associated ECRs were reviewed. Personnel responsible for engineering, quality assurance, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of air operated stop valves for use in Process Safety Control Subsystem. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA so that procured items would perform their intended safety function when installed.

The inspectors reviewed subcontract documents for the air operated stop valves, to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for air operated stop valves were adequately communicated to the supplier. Supplier QA audit reports were reviewed to ensure proper supplier oversight during the implementation of the procurement process and that the designated supplier was evaluated to provide QL-1 air operated stop valves. The inspectors also reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the capability of the supplier to implement the technical and quality requirements of specification DCS01-CCJ-DS-SPE-C-28195-1.

The inspectors reviewed specification, DCS01-CCJ-DS-SPE-C-28195-1, Air Operated Stop Valves, to evaluate and determine whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112-4. The review noted that Sections 1.8 and 2.3 of the specification addressed the requirements to formally qualify the air operated stop valves as SC-1, consistent with the design basis.

(b) Conclusion

The inspectors observed construction activities related to PSSC-045, Process Safety Control Subsystem, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were single point annunciator panels, hand valves with position switches, and air operated stop valves. These activities were adequately performed and met the license requirements. No findings of significance were identified.

i. PSSC-050, Supply Air System

(1) Attribute: Procurement (IP 88140, Instrumentation and Control System)

(a) Scope and Observations

1) Temperature Transmitters

The inspectors reviewed the procurement specification for QL-1 temperature transmitters to verify that the technical and quality requirements satisfied the requirements of the MPQAP and NRC regulations. Design input documents and associated ECRs were reviewed, and personnel responsible for engineering, quality assurance, and procurement support were interviewed to verify technical and quality

requirements were appropriately defined in the procurement of temperature transmitters. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA and if the specification provided assurance that procured items would perform their intended safety function when installed.

Procurement records for a 2011 purchase of temperature transmitters were examined to evaluate the adequacy of the translation of engineering requirements into procurement controls and to determine whether technical and quality requirements for temperature transmitters were adequately communicated to the supplier. A 2011 supplier audit report was reviewed to evaluate the verification of the supplier's technical and quality program capability to provide QL-1 temperature transmitters.

2) Target Flow Meters

The inspectors reviewed the procurement specification for target flow instruments to verify that technical and quality requirements addressed the requirements of the MPQAP and NRC regulations. Design input documents, associated ECRs were reviewed, and personnel responsible for engineering, quality assurance, and procurement support were interviewed to ensure technical and quality requirements were appropriately defined in the procurement of target flow meters transmitters for use in the supply air system. The procurement specification was also evaluated to determine whether the specification adequately addressed the events included in the ISA to assure that procured items would perform their intended safety function when installed.

Procurement records for a 2009 purchase of Nuclear Logistics target flow switches were examined to evaluate the adequacy of the translation of engineering requirements into procurement documents and to determine whether technical and quality requirements for the components were adequately communicated to the supplier. A 2011 supplier audit report was reviewed to evaluate the adequacy of supplier oversight during the implementation of the procurement process. The inspectors determined whether the designated supplier was evaluated to provide QL-1 target flow meters.

(b) Conclusion

The inspectors observed construction activities related to PSSC-050, Supply Air System, as described in Table 5.6-1 of the MFFF CAR. The inspection attribute observed was procurement and the associated SSCs were temperature transmitters and target flow meters. These activities were adequately performed and met the license requirements. No findings of significance were identified.

4. Non-PSSC Inspections

a. Quality Assurance: Problem Identification, Resolution and Corrective Actions (PIRCA) (Construction, Pre-Operation and Operation) (IP 88110)

(1) Scope and Observations

The scope of the inspection covered a review of various documents and activities related to QL-1 and QL-2 construction for conformance to NRC regulations, the MPQAP, and applicable industry standards. The purpose of the inspection was to evaluate

programmatic implementation of the applicant's problem identification, resolution and corrective action requirements.

The inspectors reviewed applicable portions of MOX Services' CAP to assess its adequacy and whether it has been effectively implemented. The inspectors reviewed procedures associated with problem identification and corrective actions. The inspectors reviewed several CRs and NCRs generated by the applicant to verify that there was proper documentation, prioritization, and resolution of problems identified. The inspectors reviewed the classification of the condition, timeliness and adequacy of corrective actions to verify compliance with the applicant's approved procedures. The inspectors reviewed procedures associated with lessons learned, trend analysis, and root cause analysis. The inspectors reviewed the documentation and records associated with lessons learned, trend analysis, and root cause analysis.

The inspection focused on several aspects of the applicant's programs as outlined below:

(a) Procedures

The inspectors reviewed the MOX Services' CAP implementing procedures to determine if they were appropriately approved and implemented. Specifically, the inspectors reviewed PP3-5, Control of Nonconforming Items; and PP3-6, Corrective Action Process, to evaluate if the changes made to the procedures were consistent with requirements and commitments for identifying, reporting, and documenting conditions adverse to quality.

(b) Identification and Classification of Conditions Adverse to Quality (CAQ)

The inspectors reviewed a sample of CRs to verify that the CRs: (1) had been assigned a significance level consistent with the criteria in PP3-6; (2) had unique identifiers for tracking; and (3) adequately described the problem for which the CR had been initiated. As part of MOX Services' CAP review, the inspectors attended a management review committee (MRC) meeting in order to evaluate the applicant's process for review of recently initiated CRs, threshold for assigning significance levels to initiated CRs, the evaluation process and remedial corrective actions, and corrective action plan used to preclude recurrence, as applicable. The inspectors observed the members of the MRC discuss the issues and reach conclusions through management consensus. The inspectors reviewed a sample of NCRs and verified that the NCRs had unique identifiers, provided an adequate description of the nonconforming condition, and were issued for material non-conformances that were within the scope of the NCR-related deficiencies identified in PP3-5. The inspectors reviewed a sample of NCRs and verified that nonconforming conditions were appropriately linked to an associated CR. The inspectors reviewed ECP files and Action Tracking Items to determine if adverse conditions identified during investigations conducted in these non-CAP programs were entered into the CAP as required.

(c) Documentation and Reporting of Conditions Adverse to Quality

The inspectors reviewed a sample of CRs from different areas to verify that the applicant had an adequate process and the necessary instructions for documenting and reporting of the conditions. The inspectors verified that the CRs were reviewed to determine if the

extent of condition was documented, the remedial action(s) completed in a timely manner and the results documented within the CR.

The inspectors also reviewed the audit process including the audit procedure and audit reports and verified that the results were distributed to the appropriate organizations and management and that corrective action were initiated as necessary. The audit process was also discussed with MOX Services' staff to determine their working knowledge of the procedure and associated reports.

Inspectors reviewed six 10 CFR Part 21 Evaluation forms and associated CRs and NCRs from the past year. The forms were evaluated to verify that potential significant conditions adverse to quality were adequately evaluated and the process was properly implemented. Several of the associated CRs and NCRs as well as the evaluation process and roles and responsibilities were discussed with engineering and licensing personnel. Additional CRs regarding the premature closure of NCRs and CRs as well as construction training deficiencies were also reviewed.

(d) Condition Report Follow-up, Closure, and Trending

The inspectors reviewed the root cause evaluation for work package deficiencies contained in RCA-11-001 for 10888-MOX-CR-11-665 to determine if the appropriate causes were determined and if corrective actions were adequate. The inspectors observed that MOX-CR-11-665 was initiated because of work package problems. The MRC categorized this CR issue as level B and exercised an optional provision to require performance of a root cause evaluation. The inspectors found that the root cause was thorough and fully addressed the causes of the problem. The inspectors concluded that the corrective actions, if properly implemented should correct the problem. The corrective actions were not complete at the time of the inspection. The inspectors toured, with MOX personnel, the work control centers and worker location changes for field engineers and QC inspectors that were made to address the weaknesses identified in the root cause. These changes appeared to be having a positive impact on the work package problems, based on interviews with workers during the tour.

The inspectors observed that a predecessor CR, MOX-CR-11-341, had been initiated due to a trend of work package problems associated with missed steps, signatures, and hold points. It had also been categorized as a level B CR, but the normal apparent cause investigation was selected to investigate this problem vice the optional root cause evaluation. This CR was closed one month before MOX-CR-11-665 was initiated. Since the CRs were very similar, and both addressed extensive work package problems, the inspectors considered that the MRC had not recognized the full extent of the work package issues at the time of the initiation and processing of 341. Even though 341 was a trend CR which identified that multiple problems had occurred, MRC did not consider that a root cause evaluation, which is intended to prevent repetition or recurrence, was the appropriate tool. The inspectors considered this a missed opportunity for the MRC. The applicant initiated action tracking item MOX-AT-12-1533 to address this issue.

(e) Employee Concerns Program (ECP)

The inspectors evaluated the applicant's Safety Conscience Work Environment (SCWE) through a review of the applicant's ECP procedure and interviews. The inspectors interviewed the ECP manager and the Quality Assurance Corrective Actions manager to

determine the extent of connection with the Corrective Action Program. The ECP manager has monthly meetings with the project management to inform of any trends and issues related to ECP.

The inspectors reviewed several of the concerns and its investigations. The inspectors determined that the investigations where thorough and adequate. The ECP process allows for the individuals to present concerns and know its resolution.

The inspectors determined from MFFF management that every person coming onto the site was required to have training on the licensee's CAP, and the licensee's ECP process as part of the General Employee Training (GET). The ECP is also included in the Consolidated Annual Training (CAT) program required at the MFFF.

(2) Conclusions

No findings of significance were identified. The requirements for problem identification and resolution specified in the MPQAP and 10 CFR 50, Appendix B, which were reviewed, were implemented adequately. Measures were established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, non-conformances, and significant conditions adverse to quality, were promptly identified and corrected at the MFFF. The documentation and reporting of conditions adverse to quality were adequately performed in accordance with procedures and specifications. QA records associated with these activities were properly maintained in accordance with project procedures. The MFFF was adequately implementing the MPQAP requirements related to corrective action follow up, closure, trend analysis, and root cause analysis. The lessons learned program was also adequately implemented.

The inspectors determined that the MFFF staff were generally aware of the importance of having a strong SCWE and expressed a willingness to raise safety issues. No one interviewed had experienced retaliation for safety issues raised, or knew of anyone who had failed to raise issues.

b. Instrument and Control Systems (IP 88140) - Instrument Support Stands

(1) Scope and Observations

The inspectors interviewed personnel responsible for engineering, quality assurance, and procurement support; and reviewed engineering specifications for QL-1 instrument support stands. The inspection was conducted to verify design and procurement of the items satisfied the requirements of the MPQAP and NRC regulations and was accomplished in a manner that would assure that installed items will perform their intended safety function.

The review of the procurement specification for instrument support stands evaluated whether the specification correctly addressed the basis of design for instrument systems as outlined in DCS01-AAJ-DS-DOB-C-40112. The specified materials of construction (i.e. stainless steel) were consistent with the analyzed plant environment. Specifications addressed the requirement to formally qualify the stands for continued functionality when subjected to seismic events. Dimensional specifications (e.g. height of instrument support stands) addressed requirements to consider human interface aspects of design.

A review of records for procurement of design and fabrication services was performed to determine whether technical and quality requirements for instrument support stands were adequately communicated to the manufacturer and whether the capabilities of the manufacturer had been sufficiently evaluated. The inspectors reviewed records of communications between the supplier and applicant to verify interfaces were formally documented and that information was reviewed by designated applicant personnel. Examples inspected included a seismic test plan, a commercial grade dedication plan, and a report of qualifications for the supplier personnel responsible for seismic design.

The inspectors reviewed the report of the initial supplier acceptance audit and records of subsequent supplier evaluations to determine whether the applicant adequately evaluated the capability of the supplier to implement the technical and quality requirements of the procurement specification. The applicant's evaluations had determined the supplier had not adequately demonstrated a capability to conduct some required functions, and consequently had defined ASL restrictions and conditions of procurement in the procurement specification to provide assurance that the required capabilities would be demonstrated prior to delivery of purchased items.

Documents reviewed in this inspection are listed in the attachment.

(2) Conclusions

The requirements of the basis of design were correctly translated into engineering specifications and procurement controls for QL-1 instrument support stands. No findings of significance were identified.

5. Follow-up of Previously Identified Items

a. (Closed) VIO 70-3098/2009-02-02, Failure to Correctly Translate Electrical Design Requirements into Design Documents (Four Examples) (PSSC-012)

(1) Scope and Observations

VIO 70-3098/2009-002-002 was identified in July 2009 with four examples of failure to correctly translate design basis requirements into engineering drawings and specifications. A follow-up inspection on March 29, 2010 (the inspection report is available electronically in the NRC's document system (ADAMS), which is accessible from the NRC web site at http://www.nrc.fob/reading-rm/adams.html, at accession number ML102180205), verified that corrective actions had been effectively implemented for examples 1, 2, and 4; however, violation example 3, which cited errors in an engineering drawing and specification for Vital Power Inverters, had not been corrected. The inspectors found that the revised single line schematic drawing and the procurement specification for the Vital Power Inverters still did not specify a maintenance bypass switch configuration which would assure power would not be interrupted when the switch was actuated. On May 8, 2010, the applicant issued a revised response to the NOV (ADAMS Accession ML101390299) clarifying that the specification for the Vital Power Inverter system had not yet undergone a final technical review and that the development of the specification was considered to be still in process.

The inspectors interviewed responsible engineers, reviewed the procurement specification and the single line schematic drawings issued for the Vital Power Inverter system, and evaluated corrective actions taken under condition report 10888-MOX-CR-10-177.

The inspectors determined that the final technical review for specification DCS01-EEJ-DS-SPE-E-25232, Three Phase Static Uninterruptible Power Supplies (UPS), had been completed in February 2010. The specification defined functional requirements for the static transfer switch, including requirements for transfer within ¼ cycle, provisions for synchronizing controls, and requirements for output stability. In addition, the specification provided functional requirements for the manual bypass switch, including a requirement for the switch to provide transfer of load with no interruption using make-before-break contacts, and to lock out normal supply and normal output. Requirements for output signal quality were consistent with American National Standards Institute (ANSI)/IEEE Std. 944-1986, IEEE Recommended Practice for the Application and Testing of Uninterruptible Power Supplies for Power Generating Stations, and included requirements for voltage regulation to be within ± 1% and frequency within ± 0.5% (0.3 Hz).

The review of drawing DCS01-EEC-DS-SCE-E-26062, Sheet 1, 208/120 VAC Vital Power EEC*PNL1000 and 2000 One-Line Diagram, determined that the drawing depicted a normally open maintenance disconnect switch which functioned to disconnect the inverter system from the 480 volt bypass power source and to directly supply the 208/120 volts AC Power Vital panel via a step down transformer. Note 3 on the drawing specifically required the maintenance bypass design to provide uninterrupted service to critical loads.

To address the extent of condition, condition report 10888-MOX-CR-10-177 provided a list of specifications still requiring final technical review to meet the NRC commitment. The applicant stated that the final technical reviews for the specifications were to be completed prior to award of purchase contracts.

Documents reviewed in this inspection are listed in the Attachment.

(2) Conclusions

The drawing and specification for the Vital Power Inverter system provided a design configuration for the maintenance bypass function that was consistent with the requirement from the electrical basis of design to provide an uninterruptible source of power to critical loads. As previously identified in inspection report 70-3098/2010-002, the applicant had implemented a procedure revision for a final technical review process that was designed to prevent recurrence. The violation is closed in this report. No findings of significance were identified.

6. Exit Interviews

The inspection scope and results were summarized throughout this reporting period and by senior resident inspector on July 26, August, 22, August 29, and October 3, 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
K. Armstrong, Shaw AREVA MOX Services Software Quality Assurance
J. Burnette, Chemical and Mechanical Engineering Manager
C. Calandra, Project Manager, Process Unit Design and Commissioning
F. Cater, Equipment Qualification Manager
C. Deters, Procurement Subcontracts Administrator
K. Dewitt, Shaw AREVA MOX Services, Safety Programmable Logic Controllers Lead
M. Gober, Vice President Engineering
D. Gwyn, Licensing Manager
D. Ivey, Quality Assurance (QA) Manager
R. Justice, QA Corrective Action Manager
S. Murphy, Construction Manager
E. Najmola, Vice President of Construction
J. Peregoy, Quality Control Manager
M. Peters, Batch Plant Manager
D. Pike, Construction Services, Supervisor
K. Trice, Shaw AREVA MOX Services President
R. Whitley, Vice President Project Assurance
L. Wood, Regulatory Compliance Manager

2. INSPECTION PROCEDURES (IPs) USED

IP 55050	Nuclear Welding General Inspection Procedure
IP 55100	Structural Welding General Inspection Procedure
IP 88107	Quality Assurance: Design and Document Control
IP 88108	Quality Assurance: Control of Materials, Equipment, and Services
IP 88109	Inspection, Test Control, and Control of Measuring Equipment
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action
IP 88111	10 CFR 21 Inspection – Facility Construction
IP 88112	Inspection of Digital Instrumentation and Control (DI&C) System/Software Design for Fuel Fabrication Facilities (DRAFT)
IP 88115	Supplier/Vendor Inspection (Construction Phase)
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 88140	Instrumentation and Controls
IP 88141	Fire Prevention and Protection
IP 88143	Pipe Supports and Restraints

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
VIO 70-3098/2012-003-001	Open	Failure to Meet MPQAP Storage Requirements for QL-1 Piping (Section 2.b)
URI 70-3098/2012-003-002	Open	Potential Failure to Maintain Records of Changes to LA Commitments (Section 2.c)
URI 70-3098/2012-003-003	Open	Assess Significance of Improperly Performed Licensing Evaluations (Section 3.d(2) and 3.e(1))
IFI 70-3098/2012-003-004	Open	Review Fire Damper Seismic Report (Section 3.d(3))
IFI 70-3098/2012-003-005	Open	Review Final 10 CFR Part 21 Report Regarding Thermal Sensitization of Piping (Section 3.e(3))
URI 70-3098/2012-003-006	Open	Review of Requirements for Testing Material Properties of Instrument Tubing and Fittings (2 examples) (Section 3.e(4))
VIO 70-3098/2009-002-002	Closed	Failure to Correctly Translate Electrical Design Requirements into Design Documents (four examples) (Section 5.a)

4. LIST OF ACRONYMS USED

AC	Alternating Current
ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System
ANSI	American National Standards Institute
AOD	Air Operated Damper
ASL	Approved Supplier List
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
BAP	Aqueous Polishing Building
BMP	MOX Process Building
BOD	Bases of Design
BSR	Shipping and Receiving Building
CAP	Corrective Action Program
CAR	Construction Authorization Request
CAQ	Condition Adverse to Quality
CAT	Consolidated Annual Training
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CGIE	Commercial Grade Item Evaluation

CIB1, 2, 3	Construction Inspection Branch 1, 2, or 3
CMTR	Certified Material Test Report
C of C	Certificate of Conformance
CPB1, 2, 3	Construction Projects Branch 1, 2, or 3
CR	Condition Report
DCI	Division of Construction Inspection
DCP	Division of Construction Projects
DE	Design Earthquake
DI&C	Digital Instrumentation and Control
DRR	Document review/release
ECP	Employee Concerns Program
ECR	Engineering Change Request
ETD	Emulator Test Driver
ETL	Electro Thermal Link
˚F	Degrees Fahrenheit
FAT	Factory Acceptance Test
FLO	Flowserve
FMEA	Failure Modes and Effects Analysis
FTS	Fluid Transport System
GET	General Employee Training
HDE	High Depressurization Exhaust
HSA	High Pressure Supply Air
HVAC	Heating Ventilation and Air Conditioning
I&C	Instrumentation and controls
ICN	Interim Change Notice
IEEE	Institute of Electrical and Electronics Engineers
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
ISAS	Integrated Safety Analysis Summary
ISO	International Standards Organization
IV&V	Independent Verification and Validation
LA	License Application
LD	Logic Diagram
M&TE	Measuring and Test Equipment
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MOX Services	Shaw AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
MRC	Management Review Committee
NCR	Non-conformance Report
NCSE-D	Nuclear Criticality Safety Evaluation – Design
NDD	PuO_2 Can Receiving and Emptying Unit
NDP	Primary Dosing Unit
No.	Number
NPG	Homogenizing and Pelletizing Unit
NOV	Notice of Violation
NQA-1	Quality Assurance Requirements for Nuclear Facilities Applications
NRC	Nuclear Regulatory Commission

NTE	Technical Document
PAF	Process Assembly Facility
PIRCA	Problem Identification, Resolution and Corrective Actions
PP	Project Procedure
PPM	Project Procedure Manual
PQAM	Projects Quality Assurance Manager
PSSC	Principle System, Structure, and Component
PTM	Project Traceability Matrix
PuO_2	Plutonium Oxide
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
QL-2	Quality Level 2
QL-4	Quality Level 4
RCA	Root Cause Analysis
Rebar	Reinforcing Bar
Rev.	Revision
RIR	Receipt Inspection Report
RII	Region II
RTI	Response Time Index
S&ME	Soils and Materials Engineering, Inc.
SC-1	Seismic Category 1
SCMP	Software Configuration Management Plan
SCWE	Safety Conscience Work Environment
SDC	Software Development Checklist
SDD	Software Design Description
SDR	Supplier Deficiency Report
SIDR	System Integration Deficiency Reports
SMACNA	Sheet Metal and Air Conditioning Contractors National
SOW	Statement of Work
SPLC	Safety Programmable Logic Controller
SQA	Software Quality Assurance
SQAP	Software Quality Assurance Program
SPE	Specification
SRS	Software Requirements Specification
SSC	Systems, Structures, and Components
SW	Software
SVVP	Software Verification and Validation Plan
TDCN	Technical Document Change Notice
UL	Underwriters Laboratories
UPS	Uninterruptable Power Supply
URI	Unresolved Item
UTC	Unit Type Code
V	Volt(s)
V&V	Verification and Validation
VIO	Violation
WG	Water Gauge
WP	Work Package

5. LIST OF PSSCs REVIEWED

PSSC-005 Confinement System
PSSC-009 Criticality Controls
PSSC-012 Emergency AC Power System
PSSC-021 Fire Barriers
PSSC-023 Fluid Transport Systems
PSSC-024 Gloveboxes
PSSC-031 Material Handling Controls
PSSC-036 MOX Fuel Fabrication Building Structure (including vent stack)
PSSC-041 Process Cells
PSSC-045 Process Safety Control Subsystem
PSSC-050 Supply Air System

6. RECORDS AND DOCUMENTS REVIEWED

Procedures

EG 75, Rev. 0, Design Freeze
PP1-11, Rev. 0, Action Tracking Process
PP3-2, Rev. 3, Trend Analysis
PP3-5, Rev. 8, Control of Nonconforming Items
PP3-6, Rev. 15, Corrective Action Process
PP3-7, Rev. 7, Audits
PP3-13, Rev. 7, Supplier Verification
PP3-28, Rev. 3, Quality Control Receiving Inspections
PP3-29, Rev. 1, Inspection at Supplier Facilities
PP8-3, Rev. 6, Evaluation of Defects and Noncompliance (10 CFR Part 21)
PP8-6, Rev. 10, Licensing Basis Configuration Management
PP9-1, Rev. 13, SSC Quality Levels and Marking Design Documents
PP9-8, Rev.11, Technical Documents
PP9-9, Rev. 12, Engineering Specifications
PP9-18, Commercial Grade Item Evaluation
PP9-32, Rev. 1, Equipment Qualification
PP10-14, Rev. 7, Supplier/Subcontractor Technical Document Submittal Management
PP11-74, Piping Support Installation
PP11-37, Rev. 0, HVAC Ductwork Field Fabrication and Installation for Nuclear Clean Air Systems
PP11-38, Rev. 0, HVAC Duct and Equipment Supports Field Fabrication, Modification, and Installation
PP11-50, Rev. 0, General Welding Program Instructions
PP11-74, Rev. 0, Piping Support Installation
Welding Technique Sheets: D1.6-GT-A-B-01 Rev. 3; D9.1-GM-SS-01 Rev. 1
Procedure Qualification Records: D9.1-GM-3-SG-4G-16, D9.1-GM-3-SG-4G-10
Bahnson, Inc., W/IP NDT 600 Liquid Penetrant Testing, Rev. 0
Bahnson, Inc., W/IP NDT 100 Visual Testing, Rev. 8
Intermech Welding Procedures IM-96, Rev. 1; BSC-77, Rev. 0
Intermech Procedure Qualification Records: IM-96.1, Rev. 0; IM-96.2, Rev. 0;

Procurement Documents

RIR Inspection Summary, QC-RIR-12-1038, HVAC Duct, PO No. 10888-B-00004024, Rev. 027
RIR Inspection Summary, QC-RIR-12-36720, Drip Tray, PO No. 10888-P-00006778, Rev. 015
Purchase Order 10888-P-3962 (Nuclear Logistics Inc.), Target Flow Switches, February 24, 2009
Purchase Order 10888-P-5748, IC008-1 Instrument Valves, Fittings, and Manifold Valve Assemblies, January 4, 2011
Subcontract 10888-S-00005925, Rev. 2, Tubing, dated July18, 2012
Subcontract 10888-S-00006981, IC023-2, Instrument Stands, dated September 29, 2011
Subcontract 10888-S-7937 (NLI), IC007-1, Temperature Transmitters, QL-1, August 8, 2011
Subcontract 10888-S-8432, IC009-1, Dew Point Transmitters, QL-1, July 6, 2011
Request for Change Proposal RFCP 6981-000-003, Rev. 0, dated August16, 2012
Receiving Inspection Report QC-RIR-12-36433, Purchase Order 10888-B-5925, Rev. 2, dated July 20, 2012
Receiving Inspection Report Inspection Summary, QC-RIR-12-32237, Instrument Fittings, Purchase Order 10888-B-5748
Receiving Inspection Report Inspection Summary, QC-RIR-12-32239, Instrument
Fittings, Purchase Order 10888-B-5748
Receiving Inspection Report Inspection Summary, QC-RIR-12-33006, Instrument
Fittings, Purchase Order 10888-B-5748
Receiving Inspection Report Inspection Summary, QC-RIR-12-33518, Instrument Fittings, Purchase Order 10888-B-5748
Supplier Submittal Review 08716-00006981-00000-0015, Rev. A, Commercial Grade Dedication Plan, dated July17, 2012
Supplier Submittal Review 08716-00006981-00000-013, Rev. B, Seismic Test Plan (STP), dated June 4, 2012
Technical Document Change Notice S5925-001-01SEP11, dated September 29, 2011
Technical Document Change Notice S5925-TDC01-31 MAY12, dated August 22, 2012
Technical Document Change Notice 10888-P-3962-TDC-22 February12, 2012
Supplier Submittal Review 08716-00005944_00000-0138, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD068, Rev. 05),
Supplier Submittal Review 08716-00005944_00000-0139, Rev. C, Commercial Grade Dedication Evaluation Plan (CGD070, Rev. 04),
Supplier Submittal Review 08716-00005944_00000-0140, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD071, Rev. 03),
Supplier Submittal Review 08716-00005944_00000-0141, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD072, Rev. 03),
Supplier Submittal Review 08716-00005944_00000-0142, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD073, Rev. 02),
Supplier Submittal Review 08716-00005944_00000-0143, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD074, Rev. 03),
Supplier Submittal Review 08716-00005944_00000-0144, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD075, Rev. 04),
Supplier Submittal Review 08716-00005944_00000-0145, Rev. B, Commercial Grade Dedication Evaluation Plan (CGD076, Rev. 03),
Supplier Submittal Review 08716-00005944_00000-0146, Commercial Grade Dedication Evaluation Plan (CGD077, Rev. 03),
P5944-SR-00015 Supplier/Sub Contractor Request, NQA-1 Addenda for DCS01-UFJ-DS-CCT-M-65766-3
Service Submittal Review 08716-00006374_-0030, Rev. RA

Proposal NTS-ES-06112010-05, National Technical Services, dated; June 11, 2010
Solicitation and Award Document 10888-R-30248, Canberra Industries, Inc. Rev. 20
Solicitation and Award Document 10888-B-6374, QualTech NP, March 14, 2011
Purchase Order 10888-B-2922, Stainless Steel Ball Valves, Modification 7
Proposal 10000398, Canberra Industries, Inc., dated; February 10, 2011
Best Value (BV) Technical Evaluation Worksheet 10000398, Canberra Industries, Inc., dated November 3, 2011

Specifications

DCS01-BAP-DS-NTE-B-09102-1, BAP Stainless Steel Drip Trays Technical Description and Design Requirements, Rev. 1
DCS01-BAP-DS-SPE-B-09356-0, Specification for Fabrication of the BAP Process Cell Drip Trays, Rev. 0
DCS01-KKJ-DS-NTE-L-16272-6, Welded Equipment and Piping General Specification for 304L Stainless Steel Materials, Rev. 6
DCS01-ZMJ-DS-NTE-N-61504-0, MFFF Supplier Direction for Commercial Grade Dedication Activities, 04/26/12
DCS01-EEJ-DS-SPE-E-25236-2, Emergency Diesel Generators Quality Level 1, October 3, 2011
DCS01-CCJ-DS-SPE-C-28040, Rev. 1, Instrument Tubing, dated April 27, 2010;
- ECR 007372, Rev. 0, Preparation for Shipment;
- ECR 008840 Rev. 2, Update to Specification; and
- ECR 012576, Rev. 1, Stainless Steel Handling, Electrical and I&C, dated May 2, 2012

DCS01-CCJ-DS-SPE-C-28067, Rev. 1, Process Nuclear Measurement Panels
- ECR-008935, Rev. 1, Preparation and Storage per NQA-1;
- ECR-012567, Rev. 1, Stainless Steel Handling – Electrical and I&C
- ECR-011168, Rev. 0, LGF Neutron Detector under LGF*TK4000/5000,

DCS01-CCJ-DS-SPE-C-28106, Instrument Specification-Temperature Transmitters, Rev. 1, dated September 14, 2010
- ECR 012576, Rev. 1, Stainless Steel Handling, Electrical and I&C, dated May 2, 2012;
- ECR 008935, Rev. 1, Preparation and Storage Changes per NQA-1;
- ECR-008984, Rev. 0, Additional Temperature Transmitters details for DCS01-CCJ-DS-SPE-C-28106-1;
- ECR-010830, Rev. 0, Add Missing Standard to QL-1 Instrument Procurement Specs per 10888-CR-10-697

DCS01-CCJ-DS-SPE-C-28110, Rev. 0, Instrument Specification – Instrument Valves and Fittings, dated August 24, 2011
- ECR 008187, Rev. 0, Shipping Requirement Changes to IC008-1;
- ECR 008935, Rev. 1, Preparation and Storage Changes per NQA-1;
- ECR 011977, Rev. 1, Shrouded Probe Application and Documentation Corrections;
- ECR 012576, Rev. 1, Stainless Steel Handling, Electrical and I&C, dated May 2, 2012

DCS01-CCJ-DS-SPE-C-28146, Rev. 0, Instrument Support Stands
- ECR 007991, Rev. 0, BOD Reference Corrections;
- ECR 008935, Rev. 1, Preparation and Storage Changes per NQA-1;
- ECR 010218, Rev. 0, Reference and Editorial Changes;
- ECR 010828, Rev. 0, Clarification of Reference;
- ECR 011295, Rev. 0, Missing IEEE 1074 Standard;
- ECR 012576, Rev. 1, Stainless Steel Handling;
- ECR 013815, Rev. 0, Change Default Primary Thermocouple Element Type
- ECR 014933, Rev. 0, BOD General References

DCS01-CCJ-DS-SPE-C-28195, Rev. 1, Air operated Stop Valves
ECR-012567, Rev. 1, Stainless Steel Handling; and
ECR-015626, Rev. 0, Change Request, QL-1, Air Operated (AO) Stop Valve
DCS01-CCJ-DS-SPE-C-28223, Rev. 2, Air Operated Dampers
DCS01-CCJ-DS-SPE-C-28254, Rev. 2, Hand Valves with Position Switches
DCS01-CCJ-DS-SPE-C-28258, Rev. 0, Procurement Specification – Dew Point Transmitters
ECR-013940, Rev. 0, DCS01-CCJ-DS-SPE-C-28258-0 Dew Point Transmitter SPR Discrepancy
ECR 012576, Rev. 1, Stainless Steel Handling, Electrical and I&C;
ECR 008935, Rev. 1, Preparation and Storage Changes per NQA-1;
ECR 011084, Rev. 0, Incorrect Vendor Product Code;
DCS01-CCJ-DS-SPE-C-28386, Rev. 2 Procurement Specification – Target Flow Meters
ECR 012576, Rev. 1, Stainless Steel Handling, Electrical and I&C
DCS01-CCJ-DS-SPE-C-28416, Rev. 0, Single Point Annunciator Panels
ECR-008935, Rev. 1, Preparation and Storage Changes per NQA-1;
ECR-010830, Rev. 0, Add missing Standard to QL-1 Instrument Specs; and
ECR-012567, Rev. 1, Stainless Steel Handling – Electrical and I&C
DCS01-EEA-DS-SCE-E-26058, Sh. 1, Essential Power EEA-PNL 1000 One-Line Diagram, Rev. 6
DCS01-EEC-DS-SCE-E-26062, Sh. 1, 208/120 VAC Vital Power EEC*PNL1000 and 2000 One-Line Diagram, dated July 13, 2011;
ECR-014540, Rev. 0, Add Salient Features to VHD and EEC Panels to Allow Procurement.
DCS01-EEJ-DS-SPE-E-25232, Three Phase Static Uninterruptible Power Supplies (UPS), Rev. 2, dated May 4, 2011
DCS01-KKJ-DS-NTE-L-16279, Rev. 6, General Specification for 316L Stainless Steel Material; Quality Level 1 (IROFS);
ECR 013589, Rev. 2, Add Clarification for Intergranular Testing of 316L used in Nitric Acid, dated April 3, 2012.
DCS01-UFJ-DS-TRD-H-12042, Rev. 3, Consumables that come into Contact with Stainless Steels and Corrosion Resistant Alloys, dated November 10, 2011
Technical Specification for Safety Programmable Logic Controllers DCS01-CCJ-EW-SPE-C-37007, Rev. 4

Work Packages

WP 12-CP23-C234-DripTray-M-0009
WP 11-CP23-BMP0106-HDE47-D-M-0001
WP 12-CP27-B101-ZMS-S-M-0003
WP 12-CP27-B268-ZMS-S-M-0001
WP 10-CP27-C150-ZMS-S-M-0002
WP 12-CP23-C109-HAS-S-M-0006
WP 12-CP-23-B229-HDE-S-M-0004
WP 11-CP23-B108-HAS-S-M-0002

Condition Reports

10888-MOX-CR-12-373, (NRC Identified) Drip Tray shop weld records incorrect
10888-MOX-CR-10-677, Trend Report SQAP-027 Identified incomplete CR EOCs and CAPs
10888-MOX-CR-11-331, Part 21 Notification (ATS- heat material did not meet the % elongation requirement per ASTM B348-09 Grade 2)

10888-MOX-CR-11-341, SQAP Unfavorable Trend Violation of Work Packages
10888-MOX-CR-11-420, Assessment Report did not Evaluate Identified Adverse Conditions
10888-MOX-CR-11-467, Improper Completion of Extent of Condition for CR-11-078
10888-MOX-CR-11-488, Major Tool Part 21 Notification (welds – no record of visual or liquid penetrant test)
10888-MOX-CR-11-489, Failure to Initiate Corrective Action Document (refer to 11-488)
10888-MOX-CR-11-554, Chemical Storage Activity Assessment Findings
10888-MOX-CR-11-556, Traceability of Ductwork
10888-MOX-CR-11-643, Lack of Penetration in ASTM A554 Tube Seal Seam Weld
10888-MOX-CR-11-659, CR on FreNuc Separator Pots
10888-MOX-CR-11-665, Work Package Deficiencies, and RCA-11-001
10888-MOX-CR-12-002, 10 CFR 21 Investigation into Tube steel Supplied by Shaw SSS (linear indication identified)
10888-MOX-CR-12-008, NQA-1 Vendor Commercial Grade Dedication Issues
10888-MOX-CR-12-011, Piping Support Installation Checklist
10888-MOX-CR-12-012, Commercial Grade Dedication of Flexible cable inside of Glove Boxes
10888-MOX-CR-12-020, Closure of NCR Prior to Completion of Corrective Action
10888-MOX-CR-12-025, Hazardous Chemical Confinement Zones Electrical Installations
10888-MOX-CR-12-028, CR Pre-maturely Closed
10888-MOX-CR-12-050, Inadequate Safety Classification and Critical Characteristics in CGIE Evaluation
10888-MOX-CR-12-051, Inadequate Critical Characteristics in Commercial Grade Item Evaluation
10888-MOX-CR-12-05OX-CR-12-249, Commercial Grade Dedication on Anvil Pipe Support Hardware
10888-MOX-CR-12-085, Construction Personnel Required Reading Not Current
10888-MOX-CR-12-091, Part 21 Evaluation Resulting from Record Package Omission of GB 2000 Mounting Ring Dimension
10888-MOX-CR-12-092, Bending Stresses for the Nozzle to Shell Interface on Conventional Tanks
10888-MOX-CR-12-102, Vendor Submittals, Action per AT-11-291, Annual Review of Vendor Submittals [Open].
10888-MOX-CR-12-114, Inadequacies in Work Package Reviews by Construction Technical Reviewers
10888-MOX-CR-12-120, B171E Conduit Supports
10888-MOX-CR-12-160, Failure to Inspect HVAC Materials in timely manner.
10888-MOX-CR-12-161, Bypass of Hold-points
Surveillances: Hold Points in Work Packages 12-0461, 12-0429, 12-0430, 12-0402, 12-0401, 12-0374, 12-0338, 12-0360, 12-0361, 12-0308, 12-0325, 12-0324
10888-MOX-CR-12-162, Construction Training Deficiencies
10888-MOX-CR-12-175, Vendor Records Do Not Comply with PP3-4, Record Management
10888-MOX-CR-12-195, Inspection Reports by Construction
10888-MOX-CR-12-196, Work Package Closure Issues
10888-MOX-CR-12-220, PP3-5 Violations
10888-MOX-CR-12-225, NCR closure without proper justification
ECR-012236, Clear Cover Qualification of BSR and BMP Walls on Line 12 and G for Pours W103, W101, W113
10888-MOX-CR-12-237, Construction Training Program Improvement -Several CRs 12-162, 12-085, etc. roll-up into this CR.
10888-MOX-CR-12-517, Inadequate CR Investigations

Surveillance Report, SR-QA-11-0382, CR Investigation: Compliance with Procedure PP3-6, Corrective Action Process
10888-MOX-CR-10-089, NOV Documentation, dated March 4, 2010
10888-MOX-CR-10-177, Incomplete Response to NRC, dated April 1, 2010
10888-MOX-CR-11-521, Misapplication of ASTM A262, dated September 12, 2011
10888-MOX-CR-12-428 (NRC Identified), Incomplete Commercial Grade Dedication Plan for Instrument Support Stands was approved, dated August 21, 2012
10888-MOX-CR-12-442 (NRC Identified), Material acceptance is not in accordance with procurement specification, dated August 28, 2012
10888-MOX-CR-12-446 (NRC Identified), stainless steel instrument tubing was not tested to ASTM practice 262C, dated August 29, 2012

Nonconformance Reports

QC-12-4290, Drip tray trough failed liquid penetrant testing
CE-12-4291, No slope on portion of drip tray
AC-12-3932, PP3-5 Control of Measuring and Test Equipment
QC- 11-3268, PP3-28, Section 3.1.2.5
QC-11-3438, NPG GB4000 Shell Weldment
QC-11-3439, NPG GB4000 Shell Weldment
QC-11-3440, NPG GB4000 Shell Weldment
QC-11-3630, ABW Technologies - Lack of Penetration in ASTM A554 Tube Seal Seam Weld.
QC-11-3642, ABW Technologies - Lack of Penetration in ASTM A554 Tube Seal Seam Weld.
QC-12-3857, PP11-64, Attachment D Base Metal Evaluation (Thickness Criteria)
QC-09-1237, Damaged Rebar, DCS01-BKA-DS-SPE-B-09330-4 Section
QC-12-3997, PP11-64, Paragraph 3.2.6
AC-11-3069, DCS01-BMF-DS-PLF-B-01352-03
AT-12-3957, Fire Doors
AT-12-3970, Major Tool - Part 21Evaluation Resulting from Record Package Omission of GB 2000 Mounting Ring Dimension
CE-12-4000, Identification marking on duct flange BMP-L1-A03-21-HAS-13D PC-6/ 6”x6” Galv. Steel Equip. Flange is partially unreadable.
CE-12-4018, 4/0 Ground Cable
NCR QC-12-4333, Failures to meet documentation and marking requirements of specification SPE-C-28040
NCR QC-12-4444, Columbia Fluid Systems has supplied C of Cs for ASME SA-479 and SA-182 and not SA-276

Vendor Non-Conformance Reports:

Vendor	**NCR No.**	**MOX Services Doc. No.**	**Associated Part 21 Evaluation Form**
Shaw SSS	NCR 11-0124	08716-00002738_-4048 Rev. D	2012-02
ABW	NCR 11-269	08716-00006617_0000-61 Rev. B	2011-03
Major Tool	NCR 36173	-	2012-03
Major Tool	NCR 34434	08716-00002768_0001-0158 Rev. A	2011-02

20090163, Incorrect configurations shown in drawing, specification, and calculation for vital power inverter system, dated April 29, 2009

Part 21 Evaluation Forms

Log Number	Associated CR	Subject	Discovery Date
2012-02	12-092 (addressed in CR 11-659)	Vendor Joseph Oat did not include as part of the tank qualification the bending stresses for the nozzle to the shell interface.	February 15, 2012
2011-03	11-643 (addressed in NCRs(QC-11-3630 and QC-11-3642))	ABW Technologies - Lack of Penetration in ASTM A554 Tube Seal Seam Weld	November 11, 2011
2012-03	12-091 (addressed in NCR AT-12-3970)	Major Tool - Part 21Evaluation Resulting from Record Package Omission of GB 2000 Mounting Ring Dimension	February 17, 2012
2011-02	11-488 (addressed in NCRs (QC-11-3438, QC-11-3439, QC-11-3440) and CR 11-489	Major Tool Part 21 Notification (welds- visual or liquid penetrant test - no record of)	July 22, 2011
2012-01	12-002 (addressed by vendor NCR11-0124)	10 CFR 21 Investigation into Tube steel Supplied by Shaw SSS (linear indication identified)	December 14, 2011
2011-01	11-331 (refer to EN 46939: Part 21 Noncompliance to percent elongation requirements per ASTM Code)	Part 21 Notification (ATS- heat material did not meet the % elongation requirement per ASTM B348-09 Grade 2)	April 13, 2011

Audit Plans and Reports:

SA-11-A03, Quality Assurance Programs
SA-11-A04, Construction Programs and Activities
SA-11-A05, Development of Software Programmable Logic Controller
SA-11-A06, Corrective Action Process, September 26, 2011 – November 5, 2011
Review all correspondence (Notification Memo, Transmittal/Closure Memo, Audit Plan)
BNL-11-VE102 (Supplier Audit Report), BNL Industries, Inc.
BNL-11-VE102 (Supplier Evaluation Summary Report), Rev. 0, BNL Industries Inc.
BNL-11-VE102-01(Supplier Deficiency Report)
BNL-11-VE187 (Supplier Evaluation Summary Report), Rev. 2, BNL Industries Inc.
BNL-11-VE195 (Supplier Evaluation Summary Report), Rev. 0, BNL Industries Inc.
BNL-11-VS200 (Supplier Surveillance Report), BNL Industries, Inc. (BNL)
BNL-12-VS203 (Supplier Surveillance Checklist and Report), Rev. 2, BNL Industries
FLO-10-VE182 (Supplier Audit Report), Flowserve Corporation
FLO-11-VS204 (Supplier Surveillance Report), Flowserve Corporation

FLO-12-VE73 (Supplier Evaluation Summary Report), Rev. 3, Flowserve Corporation
FLO-12-VS153 (Supplier Surveillance Checklist and Report), Rev. 0, Flowserve Corp.
KIN-10-VE187 (Supplier Audit Report), dated 9/8/2010
KIN-11-VE78 (Supplier Evaluation Summary Report), Rev. H
KIN-11-VE187 (Supplier Evaluation Summary Report), Rev. I .
KIN-11-VE237 (Supplier Evaluation Summary Report), Rev. H,
KIN-11-VE269 (Supplier Evaluation Summary Report)
KIN-11-VE275 (Supplier Evaluation Summary Report)
KIN-12-VE255 (Request for Supplier Evaluation)
ISU-11-VE182 (Supplier Audit Report), dated May 13, 2011
ISU-11-VE215 (Supplier Evaluation Summary Report), dated June 7, 2011
NLI-11-VE28 (Supplier Evaluation Summary Report), dated March 17, 2011
NLI-11-VE28 (Supplier Evaluation Summary Report), Rev. 11
NLI-11-VE28 (Audit Plan)
NLI-11-VS141 (Supplier Surveillance Report)
NLI-12-VE241 (Supplier Evaluation Summary Report), Rev. 11
PHC-10-VE229 (Supplier Audit Report), dated October 21, 2010
PHC-11-VE90 (Supplier Evaluation Summary Report), Rev. 19
PHC-12-VS160 (Supplier Surveillance Report and Checklist)
Service Submittal Review Form 08716-00002922-0104, Rev. B
Service Submittal Review Form 08716-00002922-0122, Rev. A

Trend Reports:

Shaw AREVA MOX Services, LLC Quality Assurance Program Trend Report SQAP-030, Reporting Period 030
Shaw AREVA MOX Services, LLC Quality Assurance Program Trend Report SQAP – 031 (July 1, 2011 – September 30, 2011)
Shaw AREVA MOX Services, LLC Quality Assurance Program Trend Report SQAP – 032 (October 1, 2011 –December 31, 2011)

Management Assessment:

2011 QA Management Assessment Report CY12-M-QA-004

Miscellaneous Documents

BMF-DS-PLS-B-02701-01-BME-001, Base Metal/Surface Evaluation Sheet
Liquid Penetrant Reports: PT-MOX-0450; PT-MOX-0453 R1
10-CP27-C141-ZMS-S-M-0002, Install Pipe Supports in BAP Room C141
10-CP27-C150-ZMS-S-M-0003, Install Pipe Supports in BAP Room C150
Purchase Order 10888-P-4217
Shaw AREVA MOX Services Training Matrix Required Reading, MOX Construction, July 11, 2012
DCS01-KKJ-DS-NTE-L-13226-0 (QL-1): Response to AT-12-486 (CR-11-659), July 2, 2011
FMC-11-SIR176, Shop Inspection Report
FMC-11-SIR221, Shop Inspection Report
FMC-11-SIR 265, Shop Inspection Report
FMC-11-SIR296, Shop Inspection Report
FME-12-SIR213, Shop Inspection Report
FMC-11-VS168, Supplier Surveillance Report

Final Technical Review for SPE-E-25134-2 and SPE-E-25232-2, dated February 22, 2012
Final Technical Review for SPE-C-28040, Instrument Tubing, dated September 21, 2010
Final Technical Review for SPE-C-28146, Instrument Support Stands, dated June 20, 2011
Nonconformance Report (NCR) QC-12-4333, Nonconforming Instrument Tubing, dated July 21, 2012
DCS01-AAJ-DS-DOB-C-40112, Rev. 4, Basis of Design for Instruments and Controls, dated March 25, 2010
ECR-015734, Modify Pressure of manual valves with position switches to match pressure in mechanical valve spec., Rev. 0.
ISAS Evaluation PP8-6D, Rev. 0, dated October 31, 2006
ADF 1009, Technical Specification for Safety Programmable Logic Controllers, October 9, 2006

Software Plans and Documents for the MOX Project

Software Requirements Specification NNJ1, 775460-1B-809, MOX Document No., 08716-00001964_00000-0765 Rev. C
Software Design Description NNJ*SPLC0001, 775460-1-810, MOX Document No. 08716-00001964_00000-0784 Rev. B
Software Quality Assurance Plan, MOX Document No. 08716-00001964_00000-0762 Rev. B
Software Configuration Management Plan, MOX Document No. 08716-00001964_00000-0764 Rev. B
Software Verification and Validation Test Plan, MOX Document No., 08716-00001964_00000-0775 Rev. A
Software Verification Test Specification, IOM doc No., 775460-1-812, Rev. 2
Factory Acceptance Test (FAT) MOX Document No., 08716-00001964_00000-1060 Rev. B
Validation Test Plan, MOX Document No., 08716-00001964_00000-0835 Rev. A
Software Verification and Validation Plan (SVVP), MOX Document No., 08716-00001964_00000-0763 Rev. C
Verification and Validation (V&V) Design Activity Summary Report NNJ*SPLC0001, 775460-1-861, MOX Document No., 08716-00001964_00000-0792 Rev. B
Verification and Validation Implementation Activity Summary Report NNJ*SPLC0001, 775460-1-862, MOX Document No. 08716-00001964_00000-0792 Rev. A
NNJ1 Internally Imposed Requirements Project Traceability Matrix, 775460-1-804 Rev. 4
Verification Test Procedure for Test Cases for MOX NNJ1SPLC0001 NDP_Process _Unit Program for Train B, 775460-1B-870, Rev. 1
Verification Test Procedure for Test Cases for MOX NNJ1SPLC0001 NDP_Process _Unit Program for Train A, 775460-1A-870, Rev. 11
Criticality, Hazard and Software Risk Analysis NNJ*SPLC0001 – Implementation Phase, 775460-1-855, Rev. 6
Criticality, Hazard and Software Risk Analysis NNJ*SPLC0001– Design Phase, 775460-1-855, Rev. 4
Primary Dosing and PuO2 Can Receiving and Emptying Units- Safety requirements for process unit controllers- Project Traceability Matrix (Test Phase), 775460-1-804, Rev. 6
Primary Dosing and PuO2 Can Receiving and Emptying Units - Safety requirements for process unit controllers- Project Traceability Matrix (Implementation Phase), 775460-1-804, Rev. 4
ETD Software Verification and Validation Plan (SVVP); Document No. 910002-1-802
ETD Software Requirements Specification (SRS); Document No. 910002-1-809
ETD Software Design Description (SDD), Document No. 910002-1-810
ETD Test Plan / Specification (Document No. 910002-1-812)
ETD Test Procedure and test cases (Document No. 910002-1-870)
ETD Task Reports (Document No. 910002-1-037)

ETD Verification and Validation Test report (Document No. 910002-1-854)
ETD Final Verification and Validation Report (Document No 910002-1-814)
Emulator Test Driver Traceability Matrix (Document No. 910002-1-804)
Software Developer's Workbench, Document No. 9700100-003, August 2006
Failure Modes and Effect Analysis, 775460-1-811, Rev. 0

Procedures

PPM 1.0, Application Project Administrative Controls, Rev. 14
PPM 10.0, Nonconformance and Corrective Action, Rev. 006
PPM 6.0, Test Control, Rev. 17
PPM 7.0, Application Program Development, Rev. 10
PPM 7.04, Software Tool Development

Software System Integration Deficiency Reports (SIDR)

SIDR 737, NNJ1A and NNJ1B Source Code Walkthrough Software Anomalies, reported March 7, 2012
SIDR 738, NNJ1A and NNJ1B Source Code Walkthrough Software Anomalies, reported March 29, 2012
SIDR 668, NNJ1A and NNJ1B Test Procedure and Test Case Development Anomalies, reported September 15, 2011
SIDR 761, Anomaly discovered during verification testing, reported April 17, 2012
SIDR 806, FAT Test Procedure Discrepancies, reported July 27, 2012,
SIDR 814, FAT Test Procedure Discrepancies, reported August 3, 2012
SIDR 838, Train A TCM faulted, reported August 15, 2012
SIDR 817, FAT Test Procedure Discrepancies reported August 2, 2012 incorporated by interim change notice ICN 465 Rev 1 to correct expected values in FAT procedures
SIDR 664, Discrepancies found during NNJ1 Verification Test Cases, dated September 15, 2011
SIDR 720, Control Protocol Converters need requalification, dated November 9, 2011
SIDR 666, NNJ1 AandB.PT2 file has discrepancies, dated September 14, 2011
SIDR 621, SRS document changes, dated August 22, 2011
SIDR 613, SW version 4.7.0 TCM model number discrepancy, dated July 25, 2011

Program Drawings

775460-1A-700 Weigh scales: NBX1WE1903 1/2, Rev. 1, Sheet 2 of 41
775460-1A-700 Weigh scales: NBX1WE1903 1/2, Rev. 4, Sheet 2 of 41
775460-1A-700 NPG Process Unit, Rev. 4, sheet 27 of 68
775460-1A-700 NPG Process Unit, Rev. 2, sheet 27 of 68
775460-1A-700 NDP Process Unit, Rev. 4.0 Sheet 80 of 83
775460-1A-700 NDP Process Unit, Rev. 4.0 Sheet 62 of 83

Miscellaneous

775460-1B-700-SDC-1, Rev. 1 Program revision associated with SIDRs 731 and 737, March 8, 2012
775460-1B-700-SDC-2, Program revision associated with SIDR 738, April 2, 2012
Function_Block Generate_Container_Weight, Rev. 3
NNJ1 HVT/FAT Prejob briefing and PRC (project review committee) meeting, May 17, 2012

SPLC Project Test Readiness Review/ Pre-Job Briefing for NNJ*SPLC0001 Validation Testing, Briefing, July 16, 2012
775460-1-809, SRS NNJ*SPC0001, Rev. 7
775460-1B-870-10-22, Appendix 22 Verification Test Case for MOX NNJ1B NDP_Process_Unit, Rev. 1
775460-1-810, SDD, Rev. 3
775460-1-810, SDD, Rev. 2
775460-1-810, SDD, Rev. 9
775460-1A-902-2, FAT, Rev. 1

Configuration Management

ARR 987, MOX Software Configuration Management Plan (SCMP) not followed 775460-1-803, NNJ1 Master Configuration List, Rev. 19
P.O. 10888-B-1964, Purchase Order Review Sheet – Changer Order to incorporate RFCP-1964-021, -022, and -024, Rev. Mod/014
P.O. 10888-B-1964, Purchase Order Review Sheet – Changer Order to incorporate RFCP-1964-011 and -023, Rev. Mod/013
DDR 029, Document Review/Release for Design Phase exit results for SDD change from Rev. 0 to Rev. 1, dated October 17, 2011
DDR 023, Document Review/Release for ownership change and SDD issues as Rev. 0, dated August 16, 11
SDC 950001-775460-1-701-SDC-5, Software Development Checklist, Analog range check sheet 2 corrected per SIDR 777, dated July 16, 2012

IEEE Standards

IEEE 828-1998, IEEE Standard for Software Configuration Management Plans
IEEE 1042-1987, IEEE Guide to Software Configuration Management
IEEE 1074-1997, IEEE Standard for Developing Software Lifecycle Processes
IEEE 1012-1998, IEEE Standard for Software Verification and Validation
IEEE 379-1994, IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems
IEEE 352-1987, IEEE Guide for General Principles of Reliability Analysis of Nuclear Power Generating Station Safety Systems
IEEE 7-4.3.2-1993, IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations