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

November 14, 2011

EA-09-117

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. 70-3098/2011-003 AND NOTICE OF VIOLATION

Dear Mr. Trice:

During the period of July 1 through September 30, 2011, the US Nuclear Regulatory Commission (NRC) completed inspections of construction activities related to the construction of the Mixed Oxide Fuel Fabrication Facility. The purpose of the inspections was to determine whether activities authorized by the construction authorization 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 these inspections, a violation of NRC requirements was identified: Inadequate qualitative and or quantitative acceptance criteria provided in work packages. 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 being cited in the Notice because it was identified by the NRC. The circumstances surrounding the violation 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 IMPEMENTATION OF CORRECTIVE ACTION," is available on the NRC's Web site. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 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 by William Gloersen Acting For/

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 70-3098/2011-003 w/attachment

cc w/encls: (See next page)

cc w/encls:

Mr. Clay Ramsey, 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

Mr. 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, & 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 & 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

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ADAMS: ■Yes ACCESSION NUMBER: ML11318A279 ■ SUNSI REVIEW COMPLETE

OFFICE	RII:DCP	RII:DCP	RII:DCP				
SIGNATURE	/RA/	via email	via email				
NAME	WGloersen	M. Shannon	B. Adkins				
DATE	11/14/2011	11/14/2011	11/14/2011				
E-MAIL COPY?	YES	YES	YES	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\CCI\DCP\CPB1\MOX FFF\INSPECTION\INSPECTION REPORTS\2011\2011-003.1\DRAFT REPORTS\MOX IR 2011-003.1 R0.DOCX

Letter to Kelly Trice, President and Chief Operating Officer from Deborah Seymour, Chief Division of Construction Projects, Construction Projects Branch 1 dated November 14, 2011.

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NOTICE OF VIOLATION

Shaw AREVA MOX Services
Aiken, South Carolina

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

During Nuclear Regulatory Commission (NRC) inspection activities conducted July 1 through September 30, 2011, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Condition 3.A of NRC Construction Authorization (CA) No. CAMOX-001, Revision (Rev.) 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide 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. 9, Change 1, Section 5, Instructions, Procedures and Drawings, Section 5.2.1, Types of Implementing Documents, states that, "The type of document to be used to perform work shall be appropriate to the nature and circumstances of the work being performed." Section 5.2.2.D requires quantitative or qualitative acceptance criteria sufficient for determining activities were satisfactorily accomplished and Section 5.2.2.F requires quality verification points and hold points.

Contrary to the above, on or before September 30, 2011, the documents used to perform work were not appropriate to the nature and circumstances of the work being performed, as evidenced in the following examples:

1. The document used to perform work was not appropriate to the nature and circumstances of the work being performed, for the installation of the structural steel for KCD-Tank 1000. Specifically, work package 10-CP20-2-KCD-TK1000-2000-M Step 2.12, signed on November 17, 2010, (a quality control (QC) hold point) did not provide adequate quantitative or qualitative acceptance criteria for QC personnel to confirm that the structural steel location(s), orientation(s), elevation(s) and levelness requirements were satisfactorily accomplished.

2. The document used to perform work was not appropriate to the nature and circumstances of the work being performed, for the installation of tank KCD-TK4100. Specifically, work package 10-CP27-KCD-TK4100-M did not provide adequate work instructions specifying the required sequencing of hex nut installation and torque requirements resulting in the improper field installation of KCD-TK4100. This resulted in MOX Services improperly installing the standard hex nut first at the full rated torque value, followed by the hex jam nut at 50 percent of its rated torque value, for KCD-TK4100.

3. The document used to perform work was not appropriate to the nature and circumstances of the work being performed, for the field installation of a 3-tank structure installed in Room C-134.

Specifically, work package 10-CP20-2-KCD-TK1000-2000-M did not provide adequate work instructions specifying the special torque requirements identified in DCS01-KCD-DS-CAL-L-12089-1, KCD TK1000 / KCD TK2000 / KCK TK4100, American Society of Mechanical Engineers Qualification Calculation of Oxalic Mother Liquors Recovery Tanks, that allow the base plate to slide to accommodate thermal expansion of the frame under process cell accident conditions. This resulted in the improper field installation the 3-tank structure.

This is a Severity Level IV violation (Enforcement Policy 6.5.d) (Violation (VIO) 70-3098/ 2011-003-001)

Pursuant to the provisions of 10 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 CRR 19.11, you may be required to post this Notice within two working days.

Dated at Atlanta, Georgia this 14th day of November, 2011.

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2011-003
Applicant:	Shaw AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	July 1 – September 30, 2011
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 A. Masters, Senior Construction Inspector, Construction Inspection Branch 2 (CIB2), Division of Construction Inspection (DCI), RII L. Castelli, Senior Construction Inspector, Construction Inspection Branch 1 (CIB1), DCI, RII J. Kent, Construction Inspector, CIB1, DCI, RII T. Fanelli, Construction Inspector, CIB1, DCI, RII N. Karlovich, Construction Inspector, CIB1, DCI, RII D. Edwards, Construction Project Inspector, CPB1, DCP, RII A. Allen, Enforcement and Investigation Coordinator, RII D. Harmon, Construction Inspector, CIB3, DCI, RII D. Arroyo, Quality Assurance Engineer, Mixed Oxide and Deconversion Branch (MODB), Fuel Cycle Safety and Safeguards (FCSS), Headquarters (HQ)
Accompanying Personnel:	D. Seymour, Branch Chief, CPB1, DCP, Region II K. Steddenbenz, Construction Project Inspector), CPB1, DCP, RII, (Trainee) C. Smith-Standberry, Construction Inspector, CIB1, DCI, RII (Trainee) S. Smith, Construction Inspector, CIB2, DCI, RII (Trainee) C. Oelstrom, Construction Inspector, CIB2, DCI, RII (Trainee) J. Vasquez, Construction Inspector, CIB2, DCI, RII (Trainee) S. Soto, Technical Reviewer, MODB, FCSS, HQ (Trainee)
Approved by:	D. Seymour, Branch Chief, CPB1, DCP, RII

EXECUTIVE SUMMARY

Shaw AREVA MOX Services
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report No. 70-3098/2011-003

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), and applicable industry standards. This included, as applicable, the following inspection attributes: design control; software design; software instrumentation and control; installation of mechanical components; installation and test control of concrete; control of materials, equipment, and services; and problem identification, resolution, and corrective action. The inspections also focused on Shaw AREVA MOX Services' (MOX Services') oversight of subcontractor activities. The inspectors reviewed applicable portions of MOX Services' program to assess the adequacy of the program and whether it was effectively implemented.

The principle systems, structures and components (PSSCs) discussed in this inspection report include: PSSC-009, Criticality Controls; PSSC-031, Material Handling Controls; PSSC-032, Material Handling Equipment; PSSC-023, Fluid Transport Components; and PSSC-036, MOX Fuel Fabrication Building Structure (including vent stack). Non-PSSCs discussed in this inspection report included: Quality Assurance Problem Identification and Resolution program.

The inspections identified the following aspects of the applicant's programs as outlined below.

Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130) and Control of Materials, Equipment, and Services (IP 88108)

Routine inspections were conducted by the resident inspectors from July 1 – September 30, 2011. The inspections involved the observation and evaluation of the applicant's programs for facility construction of PSSCs and included non-PSSC related activities related to control of materials, equipment and services; inspection, problem identification, resolution, and corrective action; and mechanical components. Other than as noted in Section 3.b below, 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 2)

PSSC Related Inspections

PSSC-009, Criticality Controls; PSSC-031, Material Handling Controls; and PSSC-032, Material Handling Equipment

The review determined that the software safety and interface requirements for safety programmable logic controller (SPLC) NNJ*SPLC0001 for the MOX Fuel Fabrication Facility (MFFF) were accurately translated to the Software Requirements Specification (SRS) and were determined to be traceable to the applicant's software requirements identified in the design/licensing basis documents including the CAR and the MPQAP. The SRS was determined to adequately meet the requirements of the Institute of Electrical and Electronics Engineers (IEEE) Standard 830, IEEE Recommended Practice for Software Requirements Specification, per applicant commitments in the CAR. No findings of significance were identified. (Section 3.a)

PSSC-023, Fluid Transport Systems

Three examples were identified for failure to provide work instructions that were appropriate to the nature and circumstances of the work being performed. Failure to provide appropriate work instructions resulted in the improper installation of tanks and structural support steel in the BAP. This is identified as Violation (VIO) 70-3098/2011-003-001. (Section 3.b)

PSSC-036, MOX Fuel Fabrication 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 and included installations of embedded plates and ground cables, heavy lifts of equipment and supplies, verification of equipment placements by surveys, rebar installation, placement of concrete, welding, non-destructive testing, installation of tanks, assembly of gloveboxes 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.c)

Non-PSSC Related Inspections

Followup of Confirmatory Action Letters or Orders (IP 92703)

The inspectors concluded that MOX Services completed all corrective actions and enhancements identified in Confirmatory Order EA-09-117. No findings of significance were identified. (Section 4)

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

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. (Section 5.a).

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

The inspectors verified that MOX Services was adequately implementing a measuring and test equipment program in accordance with the requirements of Section 12 of the MPQAP. No findings of significance were identified. (Section 5.b)

REPORT DETAILS

1. Summary of Facility Status

During the period, the applicant continued construction activities of principle structures systems, and components (PSSCs). Construction activities continued related to Release 2, 3A and 3B activities which included multiple inside and outside walls, elevated floors, and roof of the Mixed Oxide (MOX) Process Building (BMP), Aqueous Polishing Building (BAP), and the Shipping Receiving Building (BSR). MOX Services continued installation of Quality Level (QL)-1 tanks during this inspection period. Fifty-eight tanks had been installed at the time of this inspection. The applicant continued with the application of coatings on the walls and ceilings of the BMP and BAP lower level rooms and hallways. Other construction activities included installation of process piping and supports in the BAP, installation of ventilation system ductwork and supports in the BAP and BMP, installation of cable trays (temporary supports), and installation of rod storage rack neutron absorber shield panels.

2. Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130) and Control of Materials, Equipment, and Services (IP 88108)

a. Scope and Observations

The inspectors routinely attended the applicant's construction plan-of-the-day meetings and civil engineering meetings. The inspectors routinely held discussions with Shaw AREVA MOX Services' (MOX Services') design engineers, field engineers, quality control/assurance personnel, batch plant personnel, steel workers, and subcontractor (Alberici, Superior, Electric Boat, Egizzi, SM&E) 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 maintained at various work sites. The inspectors monitored the status of work package completion to verify construction personnel obtained proper authorizations to start work, monitor progress and to ensure work packages were kept up-to-date as tasks were completed.

The inspectors routinely verified that adequate staffing was available for construction activities, changing weather conditions were taken into account for planned construction activities, and construction activities were conducted in a safe manner. The inspectors also observed proper communication in the work areas, observed that the work force was attentive, workers adhered to procedures, observed proper communication between supervisors and workers, noted adequate cleanliness of the construction areas, and noted that hazardous materials were properly stored and/or properly controlled when in the field.

The inspectors routinely reviewed various corrective action documents. The review included non-conformance reports (NCRs), condition reports (CRs), root causes and supplier deficiency reports (SDRs); and reviewed the closure of selected NCRs and CRs. The inspectors concluded that the applicant was appropriately identifying conditions adverse to quality in their corrective action system. The applicant identified these items during routine daily activities, special inspections, audits, and self assessments. The applicant routinely evaluated the significance of the adverse conditions, completed corrective actions in a timely manner, and properly evaluated

adverse conditions for applicable reporting requirements. The inspectors noted that the applicant entered issues identified during self assessments into the corrective action system.

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

In the area of vendor oversight, the residents reviewed Quality Assurance (QA) Surveillance Reports URSW-11-VS199 and SR-URS-11-VS196, conducted April and May 2011, respectively. The residents reviewed QA surveillance reports to determine if MOX Services conducted proper oversight of the vendor responsible for fabrication of the NXR glovebox. The scope of the review focused on vendor document submittals, welding filler metal control, weld examination, weld repair, cleanliness, material traceability, training and qualification, and inspection. The residents also reviewed Shop Inspection Report URSW-11-SIR166 to determine if MOX Services completed surveillances of actual welding and fit-up activities related to the fabrication process.

b. Conclusions

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

3. PSSC Related Inspections

a. PSSC-009 (Criticality Controls), PSSC-031 (Material Handling Controls), PSSC-032 Material Handling Equipment

(1) Software Quality Attribute (Draft IP 88112, Software Design and IP 88140, Instrumentation and Controls)

(a) Scope and Observations

1) General

From July 18 - 22, 2011, the inspectors reviewed documents, interviewed responsible personnel and assessed implementation of the Shaw AREVA MOX Services software requirements phase for safety programmable logic controller (SPLC) NNJ*0001 for the MFFF. The inspectors verified that software requirements were developed in accordance with applicable codes, standards and regulations. Samples were selected from the Primary Dosing Unit (NDP), Secondary Dosing Unit (NDS), and Ball Milling Unit (NBX) controllers associated with NNJ*0001 to determine if the software requirements were traceable and adequately translated by the vendor into the Software Requirements Specification (SRS). The documentation reviewed included the SRS, SPLC Technical Specification, SPLC Procurement Specification, SPLC General Operating Principles, the Safety Requirements Documents (SRDs), Nuclear Safety Evaluations (NSEs), Nuclear Criticality Safety Evaluations (NCSEs), and associated Requirements Traceability Matrices. Additional documents are listed in the references.

2) Software Requirements Specification

The inspectors reviewed the SRS to verify that software requirements were implemented in accordance with the design basis of the Construction Authorization Request (CAR) and the MOX Project Quality Assurance Plan (MPQAP). The inspectors compared the SRS to Regulatory Guide 1.172, Revision 3, and the Institute of Electrical and Electronics Engineers (IEEE) Standard 830-1998, IEEE Recommended Practice for Software Requirements Specification, to verify the software vendor had followed the commitments of MFFF. The inspectors verified that software requirements were individually identifiable, unambiguous, and verifiable. The inspectors determined that the SRS adequately met the requirements of the IEEE standard and the MFFF commitments.

3) Software Interface Requirements

The inspectors selected a sample of software interface requirements from the SPLC General Operating Principles document to determine if the software vendor accurately translated the software interface requirements into the SRS and vice versa. The inspectors reviewed the software traceability matrix to determine if software interface requirements defined in the SRS were traceable to the source requirements and vice versa. The inspectors verified that the software interfaces requirements were adequately identified in the SRS.

4) Traceability of Nuclear Safety Requirements

The inspectors verified that software requirements were traceable from the design/licensing basis documents to the SRS and vice versa. The inspectors selected a sample of nuclear safety requirements associated with nuclear criticality safety (PSSC-009), material handling controls (PSSC-031) and container load drops (PSSC-032) from the NDP, NBX and NDS SRDs to determine if the safety requirements were accurately translated by the vendor into the SRS. The inspectors reviewed the logic diagrams and flowcharts contained in the SRDs to determine if the software logic adequately implemented the nuclear safety requirements credited in the Integrated Safety Analysis Summary (ISAS). The inspectors verified that the nuclear safety requirements in the SRS were traceable both forwards and reverse to the requirements identified in the SRDs, ISAS, NSE and NCSE.

The backwards traceability path began with the SRS and proceeded to the Safety Requirements for Process Units Controllers document (SRDs) where each requirement referenced a Process Hazards Analysis (PrHA) event number. Each PrHA event number was traced back to an ISAS event number through the use of the applicable process unit's NCSE-D or NSE document.

(b) Conclusion

The inspectors determined that the software requirements were adequately defined and traceable. The software vendor accurately translated nuclear safety requirements, and software interface requirements into the SRS. No findings of significance were identified.

b. PSSC-023 (Fluid Transport Systems)

(1) Installation Attribute (IP 88136, Mechanical Components and IP 88133, Structural Steel and Supports)

(a) Scope and Observations

The inspectors conducted a walkdown to verify that structural steel, slab tanks, and annular tanks installed in the BAP were installed in accordance with approved design drawings and specifications. During the walkdowns, the inspectors noted inconsistencies related to installation of the tank and structural support hex nuts. The work packages for installation of supports and tanks were then reviewed in detail. The inspectors noted that the work packages did not provide acceptable guidance for installation of the hex nuts as detailed in the following three examples:

Example 1: The inspectors noted that the work package for installation of the structural steel used to support tanks TK-1000 and TK-2000 did not provide acceptable guidance for quality control (QC) to ensure that the tanks were at the proper location, orientation, elevation and levelness. Specifically, Work package 10-CP20-2-KCD-TK1000-2000-M, step 2.12, did not provide the quantitative or qualitative acceptance criteria necessary for determining that the previously listed activities had been satisfactorily accomplished. Other than a survey completion signature, there was no documentation to show that the item relied on for safety critically dimensions and tolerances had been met.

The MOX MPQAP, Revision (Rev.) 9, Change 1, Section 5.2.2.D, requires quantitative or qualitative acceptance criteria sufficient for determining activities were satisfactorily accomplished. Contrary to this requirement, work package 10-CP20-2-KCD-TK1000-2000-M, QC hold point step 2.12, dated November 17, 2010, required QC to confirm the structural steel location, orientation, elevation and levelness as stated in the Equipment Location Drawings, however, the document did not provide adequate quantitative or qualitative acceptance criteria to perform these tasks. This issue was identified as the first example of Violation (VIO) 70-3098/2011-003-001, Failure to Provide Work Instructions Appropriate to the Nature and Circumstances of the Work Performed. This issue was entered into the MOX Services corrective action program as Condition Report CR-11-569 and CR-11-525.

Example 2: The inspectors noted that work package 10-CP27-KCD-TK4100-M did not provide adequate work instructions specifying the required sequencing of hex nut installation and torque requirements resulting in the improper field installation of KCD-TK4100. During the walk-down, the inspectors noted that MOX Services was not installing standard hex nuts and hex jam nuts in a consistent manner. Specifically, MOX Services installed the hex jam nut first followed by the standard hex nut for some process tank installations and vice versa for others. Hex nuts and hex jam nuts were used in conjunction with high strength bolts to connect structural steel and process equipment (slab tanks and annular tanks) to the concrete embedded plates contained in the facility floors and walls. The inspectors reviewed work package 10-CP27-KCD-TK4100-M to determine if MOX Services provided adequate work instructions including proper sequencing of hex nut installation and torque requirements for KCD-TK4100. Step 2.12 of work package 10-CP27-KCD-TK4100-M required MOX Services to torque the hex nuts in accordance with ECR-00167, Rev. 1; DCS01-BAA-DS-SPE-B-09350; and Project Procedure (PP) 11-6. Contained within the technical justification of ECR-00167-1 was a reference to ECR-006734, General Installation Instructions and Torque

Values for Process Equipment Hex Jam Nuts. ECR-006734 requires that hex jam nuts used with a standard hex nut in thread locking applications be installed on the threaded fastener first and tightened to a value of 50 percent of the torque for the standard hex nut, unless otherwise noted on the drawings. Afterwards, the standard hex nut shall be installed and, keeping the jam nut from rotating, tightened to its full value of torque obtained from the applicable torque table. Correct installation of the jam nuts ensures that the nuts are locked together by opposing forces to prevent future loosening of the hex nuts during facility operations. MPQAP, Rev. 9, Change 1, Section 5, Instructions, Procedures and Drawings, Section 5.2.1, Types of Implementing Documents, states that, "The type of document to be used to perform work shall be appropriate to the nature and circumstances of the work being performed."

Contrary to the above, MOX Services failed to provide work instructions that are appropriate to the nature and circumstances of the work being performed for KCD-TK4100. Failure to provide appropriate work instructions resulted in improper field installation of KCD-TK4100. Specifically, MOX Services improperly installed the standard hex nut first at the full rated torque value, followed by the hex jam nut at 50 percent of its rated torque value, for KCD-TK4100. Failure to perform work with documents that are appropriate to the nature and circumstances of the work being performed for KCD-TK4100 was identified as the second example of VIO 70-3098/2011-003-001. This issue was entered into the MOX Services corrective action program as NCR CE-11-3357 and CR-11-278.

Example 3: The inspectors noted that work package 10-CP20-2-KCD-TK1000-2000-M did not provide adequate work instructions specifying the special torque requirements identified in DCS01-KCD-DS-CAL-L-12089-1, KCD TK1000 / KCD TK2000 / KCK TK4100, American Society of Mechanical Engineers Qualification Calculation of Oxalic Mother Liquors Recovery Tanks for the field installation of a 3-tank structure installed in Room C-134. During the walk-down, the inspectors also noted that standard hex nuts hex jam nuts associated with the 3-tank structure in Room C-134 were improperly installed. The inspectors reviewed DCS01-KCD-DS-CAL-L-12089-1, KCD TK1000 / KCD TK2000 / KCK TK4100 – ASME Qualification Calculation of Oxalic Mother Liquors Recovery Tanks, to determine the method used by MOX Services for qualification of the base plate studs at floor and wall embedments. The inspectors observed that the calculation invoked special torque requirements to allow the base plate to slide to accommodate thermal expansion of the frame under process cell accident conditions.

The calculation states, that upon installation of the base plates, the jam nuts shall be threaded onto all studs and tightened to a torque of 65 foot-pounds (ft-lbs) plus or minus (+/-) 20 ft-lbs. After this, the hex nuts shall be threaded onto each stud and, holding the jam nut in position, the hex nut shall be torqued to a value of 275 ft-lbs +/- 25 ft-lbs.

In addition to the calculation, the inspectors reviewed work package 10-CP20-2-KCD-TK1000-2000-M, to determine if MOX Services provided adequate work instructions appropriate to the nature and circumstances of the work being performed. Step 2.13 of 10-CP20-2-KCD-TK1000-2000-M requires MOX Services to torque the structural steel anchor bolt hex nuts in accordance with ECR 06177. ECR-06177 includes a reference to ECR-006734 which requires hex jam nuts to be installed first at 50 percent torque followed by standard hex nuts at 100 percent torque.

Based on the results of their review, the inspectors concluded that MOX Services improperly installed the 3-tank structure in Room C-134. MOX Services failed to provide

work instructions that were appropriate to the nature and circumstances of the work being performed for the 3-tank structure in Room C-134. Failure to provide appropriate work instructions resulted in improper field installation of the 3-tank structure associated with KCD-TK1000, KCD-TK2000, and KCD-TK4100. Specifically, MOX Services improperly installed the standard hex nut first at the full rated torque value, followed by the hex jam nut at 50 percent of its rated torque value, for KCD-TK4100. Failure to perform work with documents that are appropriate to the nature and circumstances of the work being performed for the 3-tank structure was identified as the third example of VIO 70-3098/2011-003-001. This issue was entered into the MOX Services corrective action program as NCR EN-11-3517 and CR-11-278.

(b) Conclusion

Three examples were identified for failure to provide work instructions that were appropriate to the nature and circumstances of the work being performed. Failure to provide appropriate work instructions resulted in the improper installation of tanks and structural support steel in the BAP. This is identified as VIO 70-3098/2011-003-001.

c. PSSC-036, MOX Fuel Fabrication Building Structure (including vent stack)

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

(a) Scope and Observations

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

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

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

The inspectors observed the installation of the grounding system for the reinforcing steel including embedded grounding posts for future equipment installation. During the placements, the inspectors observed proper lift heights and observed MOX Services' field engineers and QC personnel performing inspections of the reinforcing steel, embed plates, embed piping, cleanliness prior to placements, and detailed observations of the placements.

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

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

July 14, 2011, BAP-W202.1/BSR-W 205.2, BAP/BSR Interior Wall, 456 cubic yards
July 21, 2011, BSR-F105.2, BSR Elevated Floor, 265 cubic yards
July 28, 2011, BMP-W318.3, BMP Interior Wall, 132 cubic yards
August 5, 2011, BAP- F202/204/BMP-W115.4, BAP Elevated Floor, 339 cubic yards
August 10, 2011, BMP-W320.1, BMP Interior Wall, 79 cubic yards
August 11, 2011, BAP-W201.2B, BAP Interior Wall, 95 cubic yards
August 12, 2011, BSR-W103C, BSR Interior Wall, 200 cubic yards
August 17, 2011, BMP-F309/313/315.2/311.2, BMP Elevated Floor, 780 cubic yards
August 24, 2011, BMP-Gabion Wall-W004B, BMP Exterior Wall, 94 cubic yards
August 25, 2011, BMP-R3.2, BMP Roof, 325 cubic yards
August 30, 2011, BAP-W206, BAP Interior Wall, 246 cubic yards
September 8, 2011, BAP-W207/209, BAP Interior Wall, 218 cubic yards
September 8, 2011, BAP-W101/BMP-F214, Walls and Floors, 61 cubic yards
September 13, 2011, BMP-F319, BMP Elevated Floor, 50 cubic yards
September 15, 2011, BMP-F314/315/316, BMP Elevated Floor, 640 cubic yards

September 19, 2011, BMP-Gabion Wall-W008B, Exterior Wall, 88 cubic yards
September 24, 2011, BSR-F201.3, BSR Elevated Floor, 313 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, work package 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 embedded plates and ground cables, heavy lifts of equipment and supplies, verification of equipment placements by surveys, rebar installation, placement of concrete, welding, non-destructive testing, installation of tanks, assembly of gloveboxes 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.

4. Closure of Confirmatory Order EA-09-117: Confirmatory Order Modifying Construction Authorization (Effective Immediately) (IP 92703, Follow-up of Confirmatory Action Letters or Orders)

a. Scope and Observations

Confirmatory Order EA-09-117 was issued on November 24, 2009, to document the results of an Alternative Dispute Resolution (ADR) meeting held on October 8, 2009, between the NRC and MOX Services. ADR is a process in which a neutral mediator with no decision-making authority assists the parties in reaching an agreement or resolving any differences regarding their dispute. The ADR meeting was the result of an NRC investigation to determine whether a former contractor employee at the MOX facility deliberately directed or allowed a junior civil structural engineer (CSE) to sign his signature to vendor data review forms without identifying the CSE as a signer. The NRC conducted an inspection during the week of August 1, 2011 to verify that MOX Services completed all actions identified in Sections III and V of the Confirmatory Order (CO). Specifically, Section III of the CO documents specific corrective actions and enhancements taken by MOX Services (prior to conduct of the ADR meeting) to prevent similar incidents, preclude future violations, and to address NRC concerns. In addition, Section V of the CO required MOX Services to complete three additional corrective actions and enhancements prior to the end of calendar year 2010. Section V of the CO states that within three months of completion of the terms of the CO, MOX Services will provide the NRC with a letter discussing its basis for concluding that the CO has been satisfied. MOX Services issued a letter, DCS-NRC-000291, on March 29, 2011 to document the closure of all actions identified in CO.

(1) Closure of Actions, Section III (3) and V of CO EA-09-117

The inspectors reviewed CR 20080295 to determine if MOX Services promptly initiated a CR to document the circumstances of the incident. The inspectors verified that the CR was classified at a significance level of “B” given the seriousness of the issue and its potential impact on quality. The inspectors verified that MOX Services performed an

investigation into the circumstances of the incident including the identification of causal factors and performance of an apparent root cause evaluation. The inspectors verified that MOX Services performed a review of affected drawings and travelers to verify changes were properly incorporated into the vendor drawings. The inspectors reviewed the CR to ensure that MOX Services performed an adequate extent of condition review to confirm that the issue was limited to the 37 travelers in question. The inspectors verified that MOX Services conducted a review of the document type thought to be most susceptible to a similar cause. The inspectors reviewed the results of a technical review performed on affected travelers and documents in question to ensure that no technical issues had gone unidentified.

The inspectors reviewed QA Surveillance QA-09-173, which reviewed vendor submittals, including drawing submittals, from contractors to assure each was properly identified, submitted, reviewed, and approved, and to assure each was consistent with project commitments and the design basis. The inspectors noted that the results of the surveillance were less than adequate; however, MOX Services issued multiple CRs to address each of the identified issues. The inspectors reviewed the associated CRs to verify that MOX Services was adequately implementing the identified corrective actions. The inspectors verified that MOX Services continued to perform QA audits and surveillances of vendor submittals including drawings to ensure design requirements were properly implemented in the field through the life of the construction phase. During 2010, MOX Services performed a total of five QA surveillances of vendor submittals including drawings.

The inspectors observed the implementation and tracking of the completion of training related to Material False Statements and Signatures (LISC-1000). The inspectors reviewed the computer based training (CBT) training provided all MOX Services project personnel, including onsite contractors, on the definition and consequences associated with material false statements and obligations as a signer of pertinent project records. This training was provided in the Consolidated Annual Training (CAT) training.

The inspectors verified the issuance of a new Management Policy MD-013 on Delegation of Signatures, which was applicable to all personnel who are assigned to and perform work on the MOX Services Project. Inspectors reviewed MD-013, discussed the process of the delegation of signature with the Records Management Manager, and reviewed examples of use of a delegation of authority and their associated documents.

The inspectors also verified the issuance and revisions of a formal memorandum to all engineering personnel in reference to the requirements of Engineering Directive (ED) 17 regarding delegation of signature authority and confirmed that ED-17 included examples of how to sign a delegated signature.

The inspectors reviewed the Safety Conscious Work Environment (SCWE) Survey that was conducted in February 2008. The inspectors also reviewed a memo sent from MOX Communications, to all employees on August 12, 2008, that announced an All Hands meeting on August 18 and 19, 2008, in which SCWE was discussed. The inspectors reviewed the 2010 MOX Project Site-wide SCWE survey along with an analysis of the results. The inspectors reviewed the 2011 MOX Project Site-wide SCWE survey, along with a draft analysis of the 2011 results.

The inspectors reviewed a copy of the Safety Culture and SCWE at the MOX Project, SCWE QAQC 1017 Computer Based Training, along with a list of employees/contractors

who had completed the CBT through August 2, 2011. A list of supervisors and managers who had completed QAQC 8000, SCWE for Managers, through August 2, 2011, was also reviewed. For MOX employees and/or contractor personnel who did not have access to a computer, the inspectors reviewed a roster of employees and onsite contractors who had completed the SCWE QAQC classroom training through August 2, 2011. Random interviews throughout the facility verified that selected employees and onsite contractors completed either the SCWE CBT or SCWE classroom training. Through interviews with the Employee Concerns Program (ECP) manager, the inspectors also confirmed that SCWE training was conducted as part of the ECP CAT.

In addition, the inspectors reviewed results of pulsing surveys that were conducted by the ECP manager between January 2010 and July 2011. The pulsing surveys graphically compared the SCWE environment among various organizations, including onsite contractor organizations. As reported by the ECP manager, the pulsing surveys were generally initiated at the request of the manager to proactively address specific organizational challenges, since the MOX Project Site-wide SCWE survey was only administered on an annual basis. The inspectors reviewed ECP exit surveys for 2010 and 2011, along with a breakdown of the results by organization.

As stated above, the inspectors verified that MOX Project Site-wide SCWE surveys were conducted in June 2010 and June 2011. The next MOX Project Site-wide SCWE survey will be conducted in June 2012. The ECP manager stated that the MOX Project Site-wide 2012 SCWE survey results will be presented in a new format that is similar to that used by Shaw Services to present SCWE information gleaned from other Shaw Services sites, such as Vogtle and Summer. The new format will provide a more detailed breakdown and analysis of the SCWE survey results.

b. Conclusion

The inspectors concluded that MOX Services completed all corrective actions and enhancements identified in CO EA-09-117. No findings of significance were identified.

5. 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 encompassed 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' corrective action program (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, NCRs, and ECRs generated by the applicant to verify that there was proper documentation, prioritization, and resolution of problems

identified. To verify compliance with the applicant's approved procedures, the inspectors reviewed the classification of the condition, timeliness of management actions, and timeliness and adequacy of corrective actions of CRs.

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 PP 3-6, Corrective Action Process, to evaluate the adequacy of the process and to verify that site procedures contained provisions for identifying, reporting, and documenting conditions adverse to quality.

The inspectors reviewed various MOX Services' CAP procedures and verified that the applicant had a program for performing a sufficient analysis of the issues, determining the cause of the problem(s), and taking the necessary corrective action(s) in order to prevent recurrence.

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

Adverse conditions identified at the MFFF were classified using multiple systems within the MOX Services CAP structure, which included the issuance of CRs, NCRs, or ECRs.

As required by project procedure PP 3-6, Corrective Action Process, which described the corrective action process, MOX Services initiated CRs to document adverse conditions. Adverse conditions identified in CRs were classified into one of four significance levels, A, B, C, or D, where A was the most significant and constituted a significant condition adverse to quality.

The inspectors reviewed a sample of CRs to verify that the CRs: (1) had been assigned a significance level consistent with the criteria in PP 3-6; (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 PP 3-5. The inspectors reviewed a sample of NCRs and verified that nonconforming conditions were appropriately linked to an associated CR.

PP 9-21, Engineering Change Request, established the process for initiating and processing changes to issued engineering documents. The inspectors reviewed a sample of ECRs to verify issuance was in accordance with procedures.

(c) Documentation and Reporting of Conditions Adverse to Quality

The inspectors attended management training related to condition report investigation. Training objectives included defining the tasks of the Responsible Employee during an investigation; the process used to assign actions based on the investigation; the Responsible Manager's role; and the verification process following the completion of all required actions.

The inspectors reviewed a sample of CRs from different areas to verify that the applicant adequately documented conditions adverse to quality in accordance with their procedures and the MPQAP.

(d) Follow-up, Closure, and Trending

The inspectors reviewed the following implementing procedures with regard to corrective action follow-up, closure, trending, and root cause analysis to verify compliance with Section 16, Corrective Actions of the applicant's MPQAP:

- PP 1-7, MOX Fuel Fabrication Lessons Learned Program
- PP 3-2, Trend Analysis
- PP 3-5, Control of Non-Conforming Items
- PP 3-6, Corrective Action Process
- PP 3-25, Root Cause Analysis
- PP 9-21, Engineering Change Requests

The inspectors reviewed a sample of lessons learned documentation to verify the adequacy of the lessons learned process. The inspectors verified that applicable conclusions resulting from lessons learned reports were associated with an action tracking item to ensure a condition report was initiated if a condition adverse to quality was identified.

The inspectors reviewed a trend report, which included all adverse trends and recommendations. The recommendations were tracked through the use of a condition report that was reviewed and found completed and signed off.

The inspectors reviewed a sample of trend reports to verify that adverse trending patterns identified were properly documented, distributed, and appropriate corrective actions were taken. The inspectors reviewed documentation for closure of adverse trends to verify the documentation was complete and properly filed.

PP 3-25, Root Cause Analysis (RCA), described the process used to identify and implement a root cause analysis to eliminate or reduce the recurrence of identified significant conditions adverse to quality and applicable conditions adverse to quality. The inspectors reviewed samples of RCA reports for conformance to this procedure, including format, content, and traceability to the initiating CR. The inspectors reviewed a

sample of CRs, NCRs, and ECRs to verify the reports had adequate closure in accordance with governing project procedures.

(e) (URI) 70-03098/2011-003-002: Quality Classification Level Change in ECR 8982

On November 22, 2010, MOX Services approved ECR-8982. The ECR stated, in part, all loads requiring seismically qualified uninterruptable power from the Essential System were moved to an emergency uninterruptable power supply. This change downgraded the quality classification level of the Essential System from QL- 2 to QL-4. The affected document in the ECR was DCS01-AAJ-DS-DOB-E-40111-3, Basis of Design for Electrical Systems Components. According to PP 9-3, Design Control, Section 3.12.6.1, "when a specification revision downgrades the specification from QL-1 or QL-2 to a lower quality level such as QL-3 or QL-4, then the revision implementing the downgrade shall have a QA review to concur with the justification for the downgrade." From initial reviews of this issue, specifications were revised to include the quality level downgrade, but were not documented or referenced by this or any other ECR and the QA review was not completed. There was also no separate Quality Review completed to support the specification changes. The NRC inspectors determined that further review of ECR-8982 and the applicable design documentation was needed to evaluate this issue.

(2) Conclusion

The inspectors verified that the applicant adequately identified issues and entered conditions adverse to quality into their corrective action program in accordance with project procedures. No findings of significance were identified.

The NRC inspectors opened URI 70-3098/2011-003-002: Quality Classification Level Change in ECR 8982, to evaluate this issue.

b. Quality Assurance: Inspection, Test Control, and Control of Measuring and Test Equipment (IP 88109)

(1) Scope and Observations

The inspectors performed an inspection at the MOX Services Measuring and Test Equipment (M&TE) shop located at the Process Assembly Facility (PAF) to determine if MOX Services was adequately implementing the requirements of Section 12, Measuring and Test Equipment, of the MPQAP. The inspectors verified that MOX Services established controls for tools, instruments, gauges, and other M&TE used for quality-affecting activities. The inspectors verified that MOX Services developed and was properly implementing a computer system for tracking issuance and calibration due dates of M&TE. The inspectors selected several samples of M&TE stored in the calibration lab to determine if the M&TE was properly marked including a unique serial number, calibration date, and calibration due date. The inspectors reviewed the corresponding calibration data sheets for the selected M&TE samples from the calibration lab. The inspectors verified that the calibration data sheets were complete including the M&TE serial number, description of the M&TE, calibration standards used, name of the calibration lab, as-found and as-left data, calibration date, and calibration due date. The inspectors verified that the as-found data was within the acceptance criteria identified on the calibration data sheet. The inspectors verified that the calibration lab was an approved lab on the MOX Services Approved Suppliers List (ASL). The inspectors verified that MOX Services had a system for tracking the use of

M&TE in the field including the issuance of usage logs. The inspectors verified that MOX properly segregated M&TE that was out-of-calibration.

(2) Conclusion

The inspectors verified that MOX Services was adequately implementing an M&TE program in accordance with the requirements of Section 12 of the MPQAP. No findings of significance were identified.

6. Follow-up of Previously Identified Items

a. (Closed) VIO 70-3098/2010-003-008, Failure to Implement Controls for QL-1 Software in Accordance with the MPQAP and Design Basis of the CAR

(1) Scope and Observations

VIO 70-3098/2010-003-008 documented the failure of the MFFF software development program to adequately include NRC and licensing requirements and commitments into safety software development plans. MFFF's software development lifecycle omitted necessary phases and activities needed to properly implement safety software development.

The NRC inspectors evaluated the corrective actions implemented to resolve the VIO as proposed in response letter DCS-NRC-000286 dated November 23, 2010, and implemented by CR 10888-MOX-CR-10-425. The inspectors interviewed responsible engineers and reviewed finalized software planning documents to verify that quality, management, and technical requirements, referenced in the MFFF Basis of Design (BOD) and MPQAP, were adequately specified in the safety software development program. The inspectors re-examined the licensee's software development planning activities against applicable standards and regulatory guides to determine if the identified activities were complete and that MFFF adequately incorporated them into the software development plans.

CR-10-425, Flow Down of Licensing Commitments, was developed by the licensee to assess and implement their corrective actions. The inspectors reviewed the following documents that were addressed by this report:

- Traceability and gap analysis assessed the extent of the omission of regulatory and licensing requirements from the safety software development program.
- DCS01-CCJ-EW-NTE-C-36018-0, MFFF Safety Control System Software Project Management Plan, as compared to the requirements in IEEE 1074-1997, IEEE 1058, Regulatory Guide (RG) 1.173
- DCS01-CCJ-EW-NTE-C-36017-0, MFFF Safety Control System Software Life Cycle Process, as compared to the requirements in IEEE 1074-1997, RG 1.173
- DCS01-CCJ-EW-PAQ-Q-36019-0, MFFF Safety Control System Software Quality Assurance Plan, as compared to the requirements in IEEE 730-1998
- DCS01-AAJ-EW-PPE-Q-36020-0, MFFF Safety Control System Software Verification and Validation Plan, as compared to the requirements in IEEE 1012-1998, RG 1.168
- DCS01-AAJ-EW-PGC-Q-36021-0, MFFF Safety Control System Software Configuration Management Plan, as compared to the requirements in IEEE 1042-1993, RG 1.169.

The inspectors noted that the licensee performed a traceability and gap analysis to identify the extent of omitted regulatory and licensing requirements and commitments. The inspectors interviewed responsible managers and engineers to assess the details of the gap analysis and to assess the applicability of identified requirement gaps to the findings of the VIO. The inspectors noted that the gap analysis used a clear and methodical approach to identify the extent of deficiencies in the software development program. The inspectors determined that the gap analysis adequately identified the omitted requirements and commitments that need to be included into the software development plans.

The inspectors examined the applicant's Software Project Management Plan (SPMP), to assess the applicant's compliance to IEEE 1074, RG 1.173, and the results of the gap analysis. The purpose of the SPMP is to develop and define the complete scope of software project activities and provide acceptance criteria to demonstrate satisfaction with the products delivered to meet the objectives of the MFFF safety control system. The inspectors determined that the SPMP adequately reflected the requirements in both the IEEE standard and RG.

The inspectors examined the applicant's Software Life Cycle Process (SLCP) plan, to assess the applicant's compliance to IEEE 1074, RG 1.173, and results of the gap analysis. The purpose of the SLCP is to establish the software life cycle model needed to develop high integrity safety software. The SCLP correlated software development activities with MFFF's organizational process assets and imposes additional constraints where applicable, additional phases or sub-phases where the activities are executed. The inspectors determined that the SCLP adequately reflected the requirements in both the IEEE standard and RG.

The inspectors examined the applicant's Software Quality Assurance Plan (SQAP), to assess the applicant's compliance to IEEE Std. 730 and results of the gap analysis. The purpose of the SQAP is to establish the equality assurance activities needed for the development delivery, operation, and retirement of the MFFF safety control system. The safety control system executes the active engineering controls that are defined in the Integrated Safety Analysis (ISA) summary. The inspectors determined that the SQAP adequately reflected the requirements in both the IEEE standard.

Inspectors examined the applicant's Software Verification and Validation Plan (SVVP), to assess the applicant's compliance to IEEE 1012-1998, RG 1.168, and the results of the gap analysis. The purpose of the SVVP is to establish the verification and validation activities needed for the development delivery, operation, and retirement of the MFFF safety control system. The inspectors determined that the SVVP adequately reflected the requirements in both the IEEE standard and RG.

Inspectors also reviewed the applicant's Software Configuration Management Plan (SCMP), to assess the applicant's compliance to IEEE 1042-1993, RG 1.169, and the results of the gap analysis. The purpose of the SCMP is to define what configuration management activities are to be done, how they are to be done, who is responsible for doing specific activities, when they are to happen, and what resources are required. The inspectors determined that the SCMP adequately reflected the requirements in both the IEEE standard and RG.

(2) Conclusions

No findings of significance or violations of regulatory requirements were identified during the inspection and based on these results the team closed the violation.

b. (Closed) IFI 70-3098/2010-03-10, Review of Final Evaluation of Anomalous Concrete Area Detected by Non-Destructive Examination

(1) Scope and Observations

During the July 2010 civil inspection, the inspectors noted that a non-destructive examination test report, Document Number 08716-10888-S-00003274-0003, recommended further analysis of a potentially anomalous concrete area identified near wall intersection BMP P-2.4. A consulting firm, Concrete Engineering Specialist performed the non-destructive examination of various walls in the facility and identified one area with an anomalous condition. This issue was captured in the applicant's corrective action program under CR-10-0274 and NCR-EN-10-2114.

The consultant had conducted non-destructive testing on approximately 500 square feet of wall area. Of this total area, one location of approximately 4 square feet indicated a potential anomalous condition. During the current inspection period, the certificate holder used a hydro-laser spray to excavate the wall location. During the excavation, observers did not note any anomalous condition that would indicate voiding of the concrete in the subject area. The area was subsequently repaired per site procedures. The certificate holder concluded that no further corrective actions were necessary and NCR-EN-10-2114 was closed.

(2) Conclusions

The certificate holder excavated the suspect area and did not identify any anomalous condition that would indicate voiding of the concrete. The area was repaired and the non-conformance report was closed with no further corrective actions required. IFI 70-3089/2010-003-010 is closed based on completion of corrective actions.

7. Exit Interviews

The inspection scope and results were summarized throughout this reporting period and by regional inspectors on July 21, July 22, and August 4, 2011; and by the senior resident inspector on October 5, 2011. No dissenting comments were received from the applicant. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes was not included in the report.

SUPPLEMENTAL INFORMATION

1. PARTIAL LIST OF PERSONS CONTACTED

MOX Services

R. Alley, Engineering Assurance Manager
H. Baldner, Compliance
G. Bell, Manger Software Design Group
E. Chassard, Executive Vice President & Deputy Project Manager
M. Gober, Vice President Engineering
D. Gwyn, Licensing Manager
W. Hennessey, Nuclear Safety Analysis Manager
D. Ivey, QA Manager
A. Johnson, Training Manager
L. Lamb, Vice President Facility Design and Construction
R. Large, Lead Construction Engineer
E. Najmola, Vice President Construction
J. O'Dell, Compliance Manager
A. Olorunniwo, Civil/Structural Manager
B. Pemberton, Electrical and I&C Manager
J. Peregory, Quality Control Manager
D. Saylor, Employee Concerns Manager
N. Simpson, Compliance Engineer
R. Whitley, Vice President Project Assurance
K. Trice, President and Chief Operating Officer
R. Whitley, Quality Assurance/Control Manager
L. Wood, Records Management

2. INSPECTION PROCEDURES (IPs) USED

IP 88108	Quality Assurance: Control of Materials, Equipment and Services
IP 88109	Quality Assurance: Inspection, Test Control, and Control of Measuring and Test Equipment
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action
IP88112	(Draft) Inspection of Safety-Related Software Design for Fuel Fabrication Facilities
IP 88130	Resident Inspection Program For On-Site Construction Activities at the Mixed-Oxide Fuel Fabrication Facility
IP 88132	Structural Concrete Activities
IP 88133	Structural Steel and Supports
IP 88134	Piping Relied on for Safety
IP 88135	Pipe Supports and Restraints
IP 88136	Mechanical Components
IP88140	Instrumentation and Control Systems
IP92703	Follow-up of Confirmatory Action Letters or Orders

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
EA-09-117	Closed	Confirmatory Order (Section 4)
70-3098/2011-003-001	Open	VIO: Inadequate Work Package Qualitative/Quantitative Acceptance Criteria. (Three examples) (Section 3.b)
70-3098/2011-003-002	Open	URI: Quality Classification Level Change in ECR 8982 (Section 5.a)
70-3098/2010-003-008	Closed	VIO: Failure to Implement Controls for QL-1 Software in Accordance with the MPQAP and Design Basis of the CAR (Section 6.a)
70-3098/2010-003-010	Closed	IFI: Review of Final Evaluation of Anomalous Concrete Area Detected by Non-Destructive Examination (Section 6.b)

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System
ADR	Alternative Dispute Resolution
ANS	American Nuclear Society
ANSI	American National Standards Institute
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 Processing Building
BOD	Bases of Design
BSR	Shipping and Receiving Building
CA	Construction Authorization
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAR	Construction Authorization Request
CAT	Consolidated Annual Training
CBT	Computer Based Training
CFR	Code of Federal Regulations
CIB2	Construction Inspection Branch 2
CO	Confirmatory Order
CPB1	Construction Projects Branch 1
CR	Condition Report
CSE	Civil Structural Engineer
DC	Direct Current
DCI	Division of Construction Inspection
DCP	Division of Construction Projects

DCR	Design Change Request
DCS	Duke, Cogema, Stone & Webster
ECP	Employee Concerns Program
ECR	Engineering Change Request
ED	Engineering Directive
ETAP	Electrical Transient Analysis Program
FTR	Final Technical Review
FTS	Fluid Transport System
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
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
NBX	Ball Milling Unit
NCR	Non-conformance Report
NCSE-D	Nuclear Criticality Safety Evaluation-Design
NDP	Primary Dosing Unit
NDS	Secondary Dosing Unit
NIMS	Nuclear Incident Monitoring System
NQA-1	NQA-1-1994, Quality Assurance Requirements for Nuclear Facilities Applications
NRC	Nuclear Regulatory Commission
NPD	Primary Dosing Unit
NPLC	Normal Programmable Logic Controller
NSE	Nuclear Safety Evaluation
PAF	Process Assembly Facility
PIRCA	Problem Identification, Resolution and Corrective Actions
PrHA	Process Hazards Analysis
PP	Project Procedure
PSSC	Principal System, Structure, and Component
QA	Quality Assurance
QAPD	Quality Assurance Plan Document
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
Rebar	Reinforcing bar
RG	Regulatory Guide
RII	Region II
Rev.	Revision
RIR	Receiving Inspection Report
RTM	Requirements Traceability Matrix
S&ME	Soils and Materials Engineering, Inc.

SCAQ	Significant Condition Adverse to Quality
SCMP	Software Configuration Management Plan
SCWE	Safety Conscious Work Environment
SDR	Supplier Deficiency Report
SLCP	Software Life Cycle Plan
SPLC	Safety Programmable Logic Controller
SPMP	Software Project Management Plan
SQAP	Software Quality Assurance Plan
SRD	Safety Requirements Document
SRS	Software Requirements Specification
SSCs	Systems, Structures, and Components
SVVP	Software Verification and Validation Plan
URI	Unresolved Item
WPS	Weld Procedure Specification

5. LIST OF PSSCs REVIEWED

PSSC-009	Criticality Controls
PSSC-023	Fluid Transport Components
PSSC-031	Material Handling Controls
PSSC-032	Material Handling Equipment
PSSC-036	MOX Fuel Fabrication Building Structure (including vent stack)

6. RECORDS AND DOCUMENTS REVIEWED

Drawings

DCS01-ECB-DS-SCE-E-26007, SH.01, Rev.0

Calculations

DCS01-EEJ-DS-CAL-E-25093, Rev.13, MFFF Electrical Distribution System Calculation

Procedures

PP 1-3, Revision 11, Project Training, April 27, 2009
PP 1-10, Revision 1, Subcontractor Training and Qualification, March 2, 2010, Shaw AREVA MOX Services Procedures
PP 1-2, Preparation of Project Procedures
PP 1-3, Project Training
PP 1-5, Review of Documents
PP 1-7, MOX Fuel Fabrication Facility Lessons Learned Program
PP 3-2, Trend Analysis
PP3-5, Control of Non-Conforming Items, Revision 6
PP 3-6, Corrective Action Process
PP 3-25, Root Cause Analysis
PP 8-6, Licensing Basis Configuration Management
PP9-3, Design Control, Revision 18
PP9-6, Engineering Calculations, Revision 9
PP9-14, Design Process, Revision 6

PP9-16, Basis of Design Documents, Revision 7
PP 9-21, Engineering Change Request

PP 11-44, Work Package Planning, Development, Approval, and Closure
PP 11-12, Placement of Concrete, Embedded Structural Items and Accessories

Condition Reports

CR-10-322
CR-10-323
CR-10-324
CR-10-325
CR-10-425
CR-08-254 R1
CR-08-295
CR-09-082
CR-09-135
CR-09-147
CR-09-148
CR-09-149
CR-09-150
CR-09-151
CR-11-312
CR-11-313
CR-11-444
CR-10-295
CR-10-371
CR-10-383
CR-10-443
CR-10-654
CR-11-112
CR-10-405
CR-10-424
CR-10-692
CR-11-227
CR-10-430
CR-10-503
CR-11-056
CR-10-310
CR-10-388
CR-10-382
CR-11-373
CR-10-346
CR-10-290
CR-10-284
CR-10-308
CR-10-574
CR-11-257
CR-10-372
CR-11-041

CR-11-040
CR-11-289
CR-10-544
CR-10-478
CR-10-545
CR-10-581
CR-11-282
CR-10-350
CR-10-449
CR-10-528
CR-10-651
CR-10-413
CR-10-676
CR-10-318
CR-10-379
CR-11-209
CR-11-294
CR-11-420
CR-11-186
CR 11-188
CR 10-685
CR 10-677
CR 10-465
CR 10-412
CR 10-366
CR 10-320
CR 10-300
CR 10-296
CR-11-022
CR-11-258
CR-11-042
CR-11-079
CR-11-281
CR-11-004

Non-Conformance Reports (NCR):

QC-10-2294
QC-10-2295
CE-10-2135
CE-10-2053
CE-10-2186
CE-10-2477
QC-10-2069
QC-10-2301
QC-10-2399
QC-11-2949
QC-11-2921
CE-10-2205
QC-10-2314

QC-10-2052
QC-10-2180
CE-10-2401
QC-10-2310
AT-11-3207
QC-10-2164
QC-10-2507
CE-10-2259
AT-10-2710
AT-10-2411
AT-11-2808
AT-11-2932
AT-10-2427
QC-10-2389
QC-10-2505
QC-10-2550
QC-10-2549

Quality Assurance Surveillances:

QA-09-0173
QA-10-0166
QA-10-0196
QA-10-0308
QA-10-0332

Engineering Change Requests

ECR-001077, Primary Blend Scrap Ball Milling Units (NBX/NBY) SRD Running Authorization and IROFS Changes, Rev. 0
ECR-001078, Primary dosing and PuO2 Can Receiving & Emptying Units (NDP/NDD) SRD Authorization and IROFS Changes, Rev. 0
ECR-001081, Final Dosing Unit (NDS) SRD Running Authorization and IROFS Changes, Rev.1
ECR-00218
ECR-00164
ECR-00166
ECR-00170
ECR-00172
ECR-00182
ECR-00193
ECR-00246
ECR-00314
ECR-00321
ECR-00274
ECR-00366
ECR-01005
ECR-00415
ECR-00246
ECR-001749

ECR-004369
ECR-002827
ECR-006561
ECR-008114
ECR-008178
ECR-008571
ECR-008778
ECR-006333
ECR-006507
ECR-006920
ECR-008823
ECR-008982
ECR-011690
ECR-011240

Root Cause Analysis (RCA)

RCA 10-002

Specifications

DCS01-CCJ-EW-SPE-C-36007-4, Technical Specification for Safety Programmable Logic Controllers
DCS01-CCJ-DS-CCT-E-40576,-2, Procurement Specification for Safety Programmable Logic Controllers
DCS01-CCJ-EW-SPE-N-36002-4, Safety PLC General Operating Principles
08716-00001964_00000-0765-A, Software Requirements Specification
DCS01-EEJ-DS-SPE-E-25232-2, Three-Phase Static Uninterruptible Power Supplies
DCS01-EEJ-DS-SPE-E-25134-2, Procurement Specification for Batteries, Battery Disconnect Switches and DC Distribution Switchboards
DCS01-EEJ-DS-SPE-E-25236-1, Procurement Specification for EDGs

Surveillance Reports (SRs):

SR-QA-11-0266
QC 10-0203
SR-CE-11-0277
SR-CE-09-0370

Trend Report:

SQAP-027

Training Records:

LICS-1000 Material False Statements and Signature Completion List – (First Two Classes), June 2009
LICS-1000 Material False Statements and Signature Completion List – from June 1, 2009 to August 2, 2011

Late Training Report for the week of August 11, 2011
Course Title: Condition Report Investigation, held June 29, 2011

Lessons Learned (LL):

LL-2010-053 LL-2010-183 LL-2010-206 LL-2010-294 LL-2010-304

LL-2011-088 LL-2011-068 LL-2011-101 LL-2011-099 LL-2011-203

Inspection Report
S562-11-027, Rev. 4

Design Documents
DCS01-AAJ-DS-DOB-E-40111-3, Basis of Design for Electrical Systems

Nuclear Safety Documents

DCS01-NDP-CG-NTE-C-08024-1, MOX Process Primary Dosing and PuO_2 Can Receiving & Emptying Units Safety Requirements for Process Unit Controllers

DCS01-NDS-CG-NTE-C-08026-1, MOX Process Final Dosing Unit NDS Safety Requirements for Process Unit Controllers

DCS01-NBX-CG-NTE-C-08028-1 Ball Milling Unit – Safety Requirements for Process Unit Controllers

DCS01-NDP-DS-ANS-H-35016-3, Nuclear Criticality Safety Evaluation (NCSE-D) of Primary Dosing Unit

DSC01-NDS-DS-ANS-H-35021-3, Nuclear Criticality Safety Evaluation (NCSE-D) of the Final Dosing Unit

DCS01-AAS-DS-ANS-H-38373-4 Nuclear Safety Evaluation (NSE) of Load Handling for the Mixed Oxide Fuel Fabrication Facility

DCS01-CCJ-EW-NTE-C-36018-0, MFF Safety Control System Software Project Management Plan
DCS01-CCJ-EW-NTE-C-36017-0, MFFF Safety Control System Software Life Cycle Process
DCS01-CCJ-EW-PAQ-Q-36019-0, MFFF Safety Control System Software Quality Assurance Plan
Software Verification and Validation Plan
DCS01-AAJ-EW-PGC-Q-36021-0, MFFF Safety Control System Software Configuration Management Plan

Miscellaneous Documents

DCS01-AAJ-DS-TRD-D-40122-2, Functional Classification List (FCL)
DCS-NRC-000291, Report of Completed Actions Required under NRC Confirmatory Order EA-09-117, dated November 24, 2009
EA-09-117, Confirmatory Order Modifying Construction Authorization (Effective Immediately)

LICS-1000 Material False Statements and Signature, Shaw AREVA MOX Services, dated October 22, 2010 (Presentation)
LICS-1000 Material False Statements and Signature, Shaw AREVA MOX Services, review date October 22, 2010 (Training Review Form)
Material False Statements and Signature Computer Based Training (CBT) as of August 2, 2011
Management Policy MD-013, Delegation Signatures, Revision 0, effective date September 29, 2009
Nuclear Quality CAT2010 Review
Engineering Directive 17-08, Delegation of Signature Authority, August 25, 2008
Engineering Directive 17-13, Delegation of Signature Authority, February 14, 2011
2008 SCWE Survey
2010 MOX Project Site-wide SCWE
2011 MOX Project Site-wide SCWE Survey (copy of electronic survey)
2011 MOX Project Site-wide SCWE Survey (Paper Copy)
2011 Shaw Nuclear AP 1000 SCWE Survey
ECP Exit Interview Survey
ECP Exit Survey Results 2010
ECP Exit Survey Results 2011
Computer Based Training, Safety Culture & SCWE at the MOX Project, dated July 20, 2011
Supervisor Actions to Enhance Safety Culture, presented by contractor
2011 Employee Concerns Program CAT
MOX Services, LLC, Project-Wide SCWE Results Presentation
MOX Human Performance, Defenders of MOX, Team, Community and Environment presentation
MOX Project, Shaw AREVA MOX Services, LLC, Employee Concerns Program Brochure
SCWE QAQC 1017, Computer Based Training (CBT), list of completions through August 2, 2011
SCWE QAQC 1017, Classroom list of completions through August 2, 2011
SCWE for Managers QAQC 8000 – list of completions through August 2, 2011

Traceability Matrix

08716-00001964_00000-0776-A, Safety PLC General Operating Principles, Project Traceability Matrix, Revision A
08716-00001964_00000-0769-0, Primary Dosing and PuO2 Can Receiving & Emptying Units- Safety Requirements for Process Unit Controllers -Project Traceability Matrix, Rev. 0
08716-00001964_00000-0771-A, Final Dosing Unit Safety Requirements for Process Unit Controllers Project Traceability Matrix

Service Requests

B1964-SR-00035, March 15, 2011
B1964-SR-00037, March 15, 2011
B1964-SR-00036, March 15, 2011
B1964-SR-00041, April 27, 2011