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

October 29, 2010

Mr. Kelly D. Trice
President and Chief Operating Officer (Acting)
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. 70-3098/2010-003 AND NOTICE OF VIOLATION

Dear Mr. Trice:

During the period of July 1 through September 30, 2010, 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, three violations of NRC requirements were identified: (A) failure to adequately perform final inspections; (B) failure to to implement the time out process; and (C) failure of the software development plan to address certain requirements specified in the MOX Project Quality Assurance Plan (MPQAP). The violations were evaluated in accordance with the NRC Enforcement Policy available on the NRC's Web site at www.nrc.gov. The violations are cited in the enclosed Notice of Violation (Notice) and are being 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.

In regards to Violation A (70-3098/2010-003-006) in the enclosed Notice of Violation, the NRC has concluded that the information regarding the reason for the violation, the corrective actions taken and planned to be taken to correct the violation and prevent recurrence, and the date when full compliance will be achieved, is already adequately addressed on the docket in this inspection report, therefore no response to this letter regarding Violation A (70-3098/2010-003-006) is required.

In regards to Violations B (70-3098/2010-003-007) and C (70-3098/2010-003-008) in the enclosed Notice of Violation, 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/

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 70-3098/2010-003 w/attachment

cc w/encls: (See next page)

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.

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Enclosures:
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NAME	MShannon	BAdkins	WGloersen	BDavis	JHeisserer	TFanelli	AMasters
DATE	10/28/2010	10/28/2010	10/29/2010	10/29/2010	10/29/2010	10/29/2010	10/29/2010
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
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Letter to Kelly Price from Deborah A. Seymour dated October 29, 2010.

SUBJECT: MISED OXIDE FUEL FABRICATION FACILITY – NRC INSPECTION REPORT 07-3098/2009-004

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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, 2010, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. Condition 3.A of NRC Construction Authorization 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, dated June 9, 2010).

   MPQAP, Revision 9, Change 1, Section 10, Inspection, Section 10.2.6, Final Inspection, requires, in part, that finished 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.

   Contrary to the above, prior to August 12, 2010, MOX Services failed to adequately perform final inspection as required to verify the quality and conformance of the item to specified requirements as evidenced by the following examples:

   1. MOX Services failed to perform the necessary inspections to ensure that the formwork for concrete pour BMP F-214/216.2 was free of trash, debris, or other construction material prior to the placement of concrete as required by American Concrete Institute (ACI) 349-97, Section 5.7; ACI-301-99, Section 2.2.3.3; and Section J, Concrete Placement, of MOX Services Specification, DCS01-BKA-DS-SPE-B-09330-5.

   2. MOX Services failed to perform the necessary inspections to ensure that slab tank KPA-8500 was installed in accordance with design drawing 006315-M-1800-4 and the requirements of Section 3.2.B.4 of DCS01-BKA-DS-SPE-B09329, Structural Anchors in Concrete Spacing Requirements for Attaching to Embedded Plates for Quality Levels 1, 2, 3, and 4. Specifically MOX Services failed to meet the minimum edge distance requirement of 1.5 inches between the edge of the embedded plate and tank connector plate.

   This is a Severity Level IV violation (VIO) (Supplemental II) (VIO 70-3098/2010-003-006)

B. Condition 3.A of NRC Construction Authorization No. CAMOX-001, 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 located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MPQAP dated March 26, 2002, and supplements thereto (MPQAP, Rev. 9, Change 1, dated June 9, 2010).

MPQAP, Revision 9, Change 1, Section 5, Instructions, Procedures, and Drawings, Section 5.1, requires that quality-affecting activities be prescribed by and performed in accordance with documented, approved QA procedures and other approved implementing documents (drawings, specifications, etc.) appropriate to the MFFF Project work scope.

Project Procedure (PP) 3-10, Stop Work Process, defines the responsibilities and process for MOX Services project personnel to suspend/stop work activities when deemed necessary. A Time Out is defined as a temporary suspension/stoppage of work activities where an error, omission, or other issues have the potential to adversely affect safety, quality, or the environment, but does not represent an imminent danger. Section 3.2.1 requires the concern identifier to suspend/stop work and assist in actions to place work in a safe condition. Section 3.2.2 requires the supervisor of the work to (1) take immediate action on every concern identified regardless of initial evaluation of its validity and (2) determine if the concern identified potentially warrants suspending work and being handled as a Time Out.

PP 11-12, Placement of Concrete, Embedded Structural Items and Accessories, Section 3.9.8, states, in part, ensure all necessary precautions have been made for the applicable weather forecast i.e. hot, cold, rainy, etc. Do not begin to place concrete while rain, sleet or snow if falling unless adequate protection is provided. Do not allow rainwater to increase mixing water or to damage the surface of the concrete.

Contrary to the above, on August 18, 2010, MOX Services failed to perform quality-affecting activities prescribed by and performed in accordance with documented, approved QA Procedures as required by the MPQAP, Section 5. Specifically, MOX Services failed to implement the time out process as defined in MOX Services PP 3-10 during a rainstorm that occurred during placement of concrete for BMP W217.8. Failure to implement the time out process resulted in a failure to meet Section 3.9.8 of PP11-12, Placement of Concrete, Embedded Items, and Accessories, by allowing rainwater to increase the mixing water of the concrete.

This is a Severity Level IV violation (Supplemental II) (VIO 70-3098/2010-003-007)

C. Condition 3.C of NRC Construction Authorization No. CAMOX-001, Rev. 2, dated June 12, 2008, in part, authorizes MOX Services to construct the facility in accordance with the design bases of the Principal Structures, Systems, and Components (PSSCs) described in the Construction Authorization Request (CAR).

The design basis for PSSCs described in Section 11.6.7 of the CAR states in part that application software for digital computers used in safety systems is developed, reviewed, verified and that configuration control is managed using the methods and practices identified in Regulatory Guide (RG) 1.173, Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants; Institute of Electrical and Electronics Engineers (IEEE) 1074-1997, IEEE Standard for Developing Software Life Cycle Processes; IEEE 828-1998, IEEE Standard for Software Configuration Management Plans; and IEEE 730-1998 IEEE Standard for Software Quality Assurance Plans.

Condition 3.A of NRC Construction Authorization No. CAMOX-001, 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 located at the Department of Energy's Savannah River Site, in accordance with the statements,

representations, and conditions of the MPQAP dated March 26, 2002, and supplements thereto (MPQAP, Rev. 9, Change 1, dated June 9, 2010).

MPQAP, Section 3.2.7, Computer Software Control, requires, in part, that, computer software requirements apply to the software used to produce or manipulate data used directly in the design, analysis, and operation of structures, systems, and components (SSCs). The application of specific requirements shall be prescribed in plans for computer software quality assurance and written policies and procedures. Development of software must address each of the seven phases of the software life cycle (SLC) - Requirements, Design, Implementation, Test, Installation and Checkout, Operation and Maintenance, and Retirement. A software requirements review is performed at the completion of the software requirements documentation, and a configuration baseline shall be defined at the completion of each major phase of software development. In addition, the plan for controlling software program quality assurance shall identify software products to which it applies; organizations responsible for performing the work and achieving software quality and their tasks and responsibilities; and methods for error reporting and corrective action. Moreover, individuals or organizations developing and supplying quality assurance (QA) software under subcontract to the applicant shall be required to have a plan(s) for software quality assurance that meets the requirements of this section and the user organization shall determine the adequacy of this plan.

MPQAP section 4.2.1, Procurement Document Control, requires, in part, that procurement documents issued for SSCs or services shall include the following provisions: Technical requirements including specific documents (such as standards, regulations, procedures or instructions) describing the technical requirements of the material, equipment or services to be furnished, shall be specified along with their revision level or change status.

RG 1.173 requires, in part, that all the inputs, outputs, activities, pre-conditions, and post-conditions mentioned by IEEE Std. 1074 shall be described or accounted for in the applicant's life cycle model. The descriptions of input information, life cycle activity, and output information that are required by IEEE 1074 must identify applicable regulatory requirements, design bases, and related guidance.

IEEE 1074 is an organizing standard that ensures that activities deemed important to software quality are performed and related properly to each other, and that, the descriptions of input information, life cycle activity, and output information must identify applicable regulatory requirements, design bases, and related guidance. IEEE 1074-1997 defines the process by which a Software Life Cycle Process (SLCP) is created. Annex A activity groups identify the mandatory activities that initiate, monitor, and control a software project throughout its life cycle. The activities identified in Annex A shall be mapped onto the Software Life Cycle Model (SLCM) including in part, project management activities groups consisting of project initiation activities, project planning activities, and project monitoring and control activities.

IEEE 730-1998, requires, in part, that the Software Quality Assurance Plan (SQAP) shall list the name(s) of the software items covered by the SQAP and the intended use of the software; describe the procedures for reporting, tracking, and resolving identified problems; and state the methods to assure the software supplier receives adequate and complete requirements.

IEEE 828-1998, requires, in part, that the Software Configuration Management Plan (SCMP) shall define the activities to incorporate the externally developed items into the project Configuration Items (CIs) and to coordinate changes to these items with their development organizations. Section 4.3.6 includes requirements for subcontractor control, and that the SCMP shall define activities to incorporate the externally developed items into the project CIs.

Contrary to the above, prior to August 9, 2010, the applicant failed to meet Section 3.2.7, Computer Software Control, and Section 4.2.1, Procurement Document Preparation, of the MOX MPQAP, and the applicable software codes and standards specified in Section 11.6.7 of the CAR, as evidenced by the following examples:

1. The applicant failed to include the requirements of IEEE Std. 1074 in procurement or technical specifications to the subcontractor developing Quality Level (QL)-1 software as required by Section 4.2.1 of the MPQAP;

2. The applicant failed to develop the required SLCP as prescribed by RG 1.173 including the mandatory activities in IEEE 1074 Annex A needed to develop project management activities groups consisting of project initiation activities, project planning activities, and project monitoring and control activities;

3. The SLC used by the applicant's subcontractor for safety software development does not use a seven phase life cycle as required by Section 3.2.7.A of the MPQAP; specifically, the subcontractor's SLC combines the requirements and design life cycle phases into a single phase;

4. The applicant failed to identify in the SQAP: (1) software products to which it applies and (2) methods for error reporting and corrective action as required by Section 3.2.7.C of the MPQAP and IEEE 730-1998;

5. The applicant failed to incorporate and establish configuration baselines after the requirements phase as required by Section 3.2.7.B of the MPQAP;

6. The applicant failed to (1) identify what configuration audits and reviews of subcontractor items will be held, (2) how external code, documentation, and data will be tested, verified, accepted, and merged with the project software, and (3) define activities to incorporate the externally developed items into the project Configuration Items (CI)s as required IEEE 828-1998.

This is a Severity Level IV violation (Supplemental II) (VIO 70-3098/2010-003-008)

In regards to Violation A, the NRC has concluded that the information regarding the reason for the violation, the corrective actions taken and planned to be taken to correct the violation and prevent recurrence, and the date when full compliance will be achieved, is already adequately addressed on the docket in Inspection Report 70-3098/2010-003, therefore no response to this letter regarding Violation A is required. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to Notice of Violation," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to the

Resident Inspector and the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice.

In regards to Violations B and C, 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 29th day of October 2010.

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2010-003
Applicant:	Shaw AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	July 1 – September 30, 2010
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 J. Calle, Senior Construction Inspector, Construction Inspection Branch 3 (CIB3), Division of Construction Inspection (DCI), RII B. Davis, Senior Construction Inspector, Construction Inspection Branch 2 (CIB2), DCI, RII J. Lizardi, Construction Inspector, CIB2, DCI, RII D. Harmon, Construction Inspector, CIB3, DCI, RII J. Heisserer, Construction Inspector, CIB3, DCI, RII T. Steadham, Construction Inspector, CIB3, DCI, RII J. Seat, Construction Inspector, CIB2, DCI, RII E. Heher, Construction Inspector, CIB2, DCI, RII L. Castelli, Senior Construction Inspector, Construction Inspection Branch 1 (CIB1), DCI, RII T. Fanelli, Construction Inspector, CIB1, DCI, RII J. Kent, Construction Inspector, CIB1, DCI, RII E. Sanchez, Construction Inspector, CIB3, DCI, RII A. Masters, Senior Construction Inspector, CIB2, DCI, RII
Accompanying Personnel:	D. Arroyo, Quality Assurance Engineer, Nuclear Material Safety and Safeguards (NMSS) S. Cleavenger, Quality Assurance Engineer, NMSS J. Moorman, Branch Chief, DCI, CIB3 D. Edwards, Construction Inspector (trainee), CPB1, DCP, RII S. Smith, Construction Inspector (trainee), CIB2, DCP, RII J. Marcano, Civil Engineer, NMSS A. Chowdhury, Center for Nuclear Waste and Regulatory Analysis (CNWRA) G. Adams, CNWRA J. Allen, Student Engineer, CCI, RII M. Pietrykowski, Student Engineer, CCI, RII
Approved by:	D. Seymour, Chief, CPB1, DCP

EXECUTIVE SUMMARY

Shaw AREVA MOX Services
Mixed Oxide Fuel Fabrication Facility (MFFF)
NRC Inspection Report No. 70-3098/2010-003

Routine inspections were conducted by the resident inspectors from July 1 - September 30, 2010, and by regional specialists from June 28 – July 2, July 6 – 8, July 12 – 15, August 9 – 12, August 9 - 13, and August 17 - 23, 2010. The inspections involved the observation and evaluation of the applicant's programs for facility construction of principal structures, systems, and components (PSSCs) and included the following: (1) quality assurance (QA) activities related to program development and implementation; (2) design and document control; (3) problem identification, resolution and corrective action; (4) structural concrete activities; (5) piping systems relied on for safety; (6) nuclear welding; (7) instrumentation and control systems; and (8) supplier/vendor inspection. Inspection activities also focused on follow-up of previously identified items.

The PSSCs discussed in this inspection report include: PSSC-004 (C2 Confinement System); PSSC-005 (C3 Confinement System); PSSC-006 (C4 Confinement System); PSSC-009 (Criticality Control); PSSC-017 (Emergency Generator Ventilation System); PSSC-023 (Fluid Transport Systems); PSSC-024 (Gloveboxes); PSSC-035 (Missile Barriers); PSSC-036 (MOX Fuel Fabrication Building Structure (MFFBS) (including vent stack)); PSSC-041 (Process Cells); PSSC-044 (Process Cell Exhaust System); PSSC-045 (Process Safety Control Subsystem); PSSC-050 (Supply Air System); and PSSC-053 (Waste Transfer Line).

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, material procurement, fabrication and assembly, testing and inspection, and design control. 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 inspectors reviewed procedures associated with problem identification and corrective actions to resolve previous problems with materials and components. 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)

Construction activities related to PSSC-024, PSSC036, and PSSC-053 as described in Table 5.6-1 of the MFFF CAR were adequately performed and included installations of embed 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, 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 2).

Design and Document Control (IP 88107)

Design control and documentation were evaluated in accordance to the requirements specified in MOX Services' MPQAP and project procedures. Based on the evaluation, no items of safety significance were identified. However, the following unresolved items (URIs) were noted: URI 70-

3098/2010-003-001, Review of Calculations Related to Design Specification for Concrete Embedments; URI 70-3098/2010-003-002, Design Control Review Related to Metal Fabrications Specification; URI 70-3098/2010-003-003, Corrective Actions Related to Concrete Embed Plate Procurement; URI 70-3098/2010-003-004, Review of Stud Weld Procedure Qualification; and URI 70-3098/2010-003-005, Review of Potential Non-Conforming Stud Welds (Section 3).

Problem Identification, Resolution, and Corrective Action (IP 88110)

The requirements for problem identification and resolution specified in the MPQAP and 10 CFR 50, Appendix B that were reviewed have been implemented adequately. Measures were established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, nonconformances, 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. No findings of significance were identified (Section 4).

MOX Services 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. No findings of significance were identified (Section 4).

Structural Concrete Activities (IP 88132)

Embedded plates were properly installed, rebar was properly installed, concrete testing activities were adequate, field preparation of concrete test cylinders and temporary storage of the cylinders was acceptable. No issues were identified concerning the field testing (slump, temperature, and air entrainment). Testing to date indicated that the concrete placed at the MFFF met design strength requirements. No findings of significance were identified (PSSC-035, PSSC-036, and PSSC-041) (Section 5.a).

Reviewed items related to structural concrete were in accordance with MOX Services' MPQAP and project procedures. No items of significance were identified (PSSC-035, PSSC-036, and PSSC-041) (Section 5.b).

One example of a violation (VIO) was identified for failure to adequately perform inspection activities to ensure that the concrete formwork was free of trash, debris, or other construction material prior to placement of concrete. This is identified as the first example of VIO 70-3098/2010-003-006 (PSSC-036) (Section 5.c).

One example of a VIO was identified for failure to adequately perform inspection activities to ensure correct installation of a slab tank in the BAP. This is identified as the second example of VIO 70-3098/2010-003-006 (PSSC-036) (Section 5.d).

A violation was identified for failure implement the stop work/time out procedure requirements during adverse weather conditions during placement of MOX Process Building (BMP) wall 217.8. The violation is identified as VIO 70-3098/2010-003-007 (PSSC-036) (Section 5.e).

Piping Systems Relied on for Safety (IP 88134)

Piping was procured in accordance the purchase specifications; piping chemical and physical properties as reported on the CMTR were in accordance with material specifications, piping was properly stored, and piping systems were fabricated and installed in accordance with American Society of Mechanical Engineers (ASME) B31.3 code requirements. No findings of significance were identified (PSSC-023) (Section 6).

Nuclear Welding General Inspection Procedure (IP 55050)

Reviewed items related to nuclear welding were in accordance with MOX Services MPQAP and project procedures. No findings of significance were identified (PSSC-023) (Section 7).

Instrumentation and Control Systems (IP 88140)

The inspectors reviewed the applicant and subcontractor software development plans and associated documents related to the planning phase for the safety control system (PSSC-009, Criticality Control and PSSC-045, Process Safety Control Subsystem). The inspectors identified one violation of NRC requirements with six examples (VIO 70-3098/2010-003-008) (Section 8).

Vendor Oversight Activities (IPs 88111, 88115, and 88139)

Intermech's 10 CFR Part 21 program and procedure were consistent with the regulatory requirements of 10 CFR Part 21. No findings of significance were identified (PSSC-004, PSSC-005, and PSSC-006) (Section 9.a).

Other than minor issues with the procedures, MOX Services was assuring that Intermech's procedures met the applicable MPQAP and technical requirements. Based on the vendor's QA procedures and documents reviewed, no findings of significance were identified (PSSC-004, PSSC-005 and PSSC006) (Section 9.b).

MOX Services performed adequate oversight of fabrication activities related to PSSC-004, PSSC-005, PSSC-006, PSSC-017, PSSC-044 and PSSC-050 in accordance with the applicable specifications, procedures and the MPQAP. No findings of significance were identified (Section 9.c).

Follow-up of Previously Identified Items (IPs 88107, 88110, 88131, and 88132)

The inspectors reviewed and evaluated Shaw AREVA MOX Services' corrective actions related to previously opened items. Based on the review of the associated documentation, the implemented corrective actions, and discussions with applicant's staff, the following items were closed: VIO 70-3098/2009-010-01, VIO 70-3098/2009-010-03, VIO 70-3098/2009-03-02, VIO 70-3098/2009-03-04, VIO 70-3098/2009-03-03, VIO 70-3098/2009-03-01, and IFI 70-3098/2008-01-01 (Sections 11.a, b, c, d, e, f, and g).

IFI 70-3098/2010-003-01 was opened for the review of final evaluation of anomalous concrete area detected by non-destructive examination near concrete wall intersection in MOX Processing Building (BMP), and documented in Condition Report (CR) -10-0274 and Non-Conformance Report (NCR) -EN-10-2114 (Section 11.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 2, 3A and 3B activities which included multiple inside and outside walls and various elevated floors of the Mixed Oxide (MOX) Process Building (BMP), Aqueous Polishing Building (BAP), and the Shipping Receiving Building (BSR). The Mixed Oxide Fuel Fabrication Facility (MFFF) project continued installation of Quality Level (QL) QL-1 tanks during this inspection period. Approximately 28 tanks have been installed to date. Thirty-four tanks are presently stored in the Process Assembly Facility. The applicant has also started 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 and installation of ventilation system ductwork and supports in the BAP.

2. Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130), and Inspection, Test Control, and Control of Measuring and Test Equipment (IP 88109)

a. Routine Inspection Activities

(1) Scope and Observations

During the inspection period, the inspectors observed the following activities associated with PSSC-036 (MOX Fuel Fabrication Building Structure (MFFBS) (including vent stack)), and PSSC-024 (Gloveboxes) as described in Table 5.6-1 of the MFFF Construction Authorization Request (CAR):

(a) Installation of structural reinforcing steel in the BMP, the BAP, and BSR;
(b) Installation of embedded piping, embedded support plates, and plant grounding system in all three buildings;
(c) Concrete placements in walls and floors of the BMP, BAP, and BSR;
(d) Operation of the concrete batch plant;
(e) Receipt of cement, fly ash, sand and gravel;
(f) Concrete testing in the field (slump, air entrainment, and temperature);
(g) Installation of building grounding cables in various floors and walls;
(h) Surveys (proper positioning/location) of embedded piping and embedded plates;
(i) Cleanliness of areas prior to concrete placement, and maintenance of cleanliness during the concrete placements;
(j) Lifting and installation of QL-1 tanks;
(k) Installation of coatings in the BAP and BMP;
(l) Assembly of gloveboxes and associated equipment in the assembly building;
(m) Installation of process piping and supports in the BAP;
(n) Installation of ventilation system supports in the BAP

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 MOX Project Quality Assurance Plan (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 Quality Assurance (QA) programmatic requirements. Specifically, the inspectors verified that installations were in accordance with applicable field drawings and met the general construction notes detailed on the following drawings: (1) MFFF, Concrete and Reinforcing General Notes, DCS01-01352, Revision (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 routinely attended the applicant's construction plan-of-the-day meetings and civil restraints meetings. The inspectors routinely held discussions with Shaw AREVA MOX Services' (MOX Services) civil engineers, field engineers, quality control/assurance personnel, batch plant personnel, steel workers, and Alberici 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 each work site. 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.

(2) Conclusions

Construction activities related to PSSC-024, PSSC-036, and PSSC-053 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, 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.

3. Design and Document Control (IP 88107)

a. Scope and Observations

This inspection was conducted to verify whether design and document control measures were implemented in accordance with the MPQAP, Rev. 9, Change 1. This was accomplished through document review and discussions with MOX Services personnel.

The inspectors reviewed the latest revision of MOX Services' project procedures: PP9-21, Engineering Change Requests; PP9-3, Design Control; and PP3-5, Control of Non-Conforming Material. The inspectors reviewed a sample of civil engineering related NCRs, CRs, and engineering change requests (ECRs). The sample of documents reviewed was selected from those associated with QL-1 construction and design activities. The NCRs, CRs, and ECRs generated by the applicant were reviewed to verify proper documentation and disposition. The inspectors also reviewed construction specifications, design documents, and procurement records.

The inspectors reviewed specification DCS01-XGA-DS-TRD-B-09053-C, Technical Requirements Document for the Design of Concrete Embedments, QL-1a-IROFS, December 6, 2007. Table 2-1, located in Section 2.1.2, specified a yield strength of 30 kilo pounds per square inch (ksi) to be used in the design basis for embed plates containing stainless steel Nelson H4L, A276 Type 316L anchors. The specified yield strength of 30 ksi did not meet the requirements of American Welding Society (AWS) D1.6-1999, Section 7.3, which requires a yield strength of 35 ksi. In addition, Table 2-1 of the MOX specification also required the stainless steel anchors receive post annealing, further reducing the yield strength to 25 ksi. The post annealed yield strength is lower than that specified in the specification and was used in calculations, thus creating a potential design deviation. MOX Services initiated CR 10888-MOX-CR-10-458 to evaluate the potential impacts. Further review of this issue is necessary and is being identified as Unresolved Item (URI) 70-3098/2010-003-001, Review of Calculations Related to Design Specification for Concrete Embedments.

The inspectors also reviewed construction specification DCS01-BAA-DS-SPE-B-09352, Metal Fabrications for Quality Level 1, 2, 3 and 4, Quality Level 1a Items Relied on for Safety (IROFS), Rev. 0. Section 2.2.A.5e of the construction specification specifies stainless steel headed studs to be A276 Type 316L post annealed Nelson H4L studs. AWS D1.6-1999 requires a 35 ksi yield strength for stainless steel studs. The stainless steel post annealed studs specified in the specification had a yield strength of 25 ksi, which did not meet the requirements of AWS D1.6-1999. MOX Services initiated CR 10888-MOX-CR-10-458 to evaluate the accuracy of the construction specification. Further review of this issue is necessary and is being identified as URI 70-3098/2010-003-002, Design Control Review Related to Metal Fabrications Specification.

Construction specification DCS01-BAA-DS-SPE-B-09352, Rev. 0, was referenced in procurement contract, No. 10888-S1381, with Specialty Maintenance and Construction Incorporated (SMCI) who procures and fabricates the embed plates for MOX Services. SMCI sent Supplier Request for Information (SRFI) 1381-0027, Rev. 0, on January 22, 2007, to MOX Services, indicating that the post annealed stainless steel studs required in the construction specification did not meet the requirements of AWS D1.6-1999. Although MOX Services agreed with SMCI in their reply to the SRFI, MOX Services did not initiate a deficiency action request (DAR) in accordance with procedure PP3-6, Corrective Action Process, Rev. 7, to evaluate the accuracy of the construction

specification, procurement package, and other potentially affected documents. Upon identification by the NRC Inspectors, MOX Services initiated CR 10888-MOX-CR-10-501, to evaluate the concern. Further review of this issue is necessary and is being identified as URI 70-3098/2010-003-003, Corrective Actions Related to Concrete Embed Plate Procurement.

The inspectors requested the AWS qualification tests for American Society of Testing Materials (ASTM) A-108, Grade 1015 Stud Base to 304 Stainless Steel Plate, and welding procedures for stud welding applications. At the time of the inspection, MOX services could not provide the requested documentation. Further review of this issue is necessary and is being identified as URI 70-3098/2010-003-004, Review of Stud Weld Procedure Qualification.

The inspectors observed several embed plates in a storage area that appeared to have non-conforming stud welds. Once informed by the NRC Inspectors, MOX Services Quality Control (QC) personnel evaluated the stud welds and determined that the welds did not contain a 360 degree flash in accordance with AWS D1.1-1998, Section 7.4.7 requirements. MOX Services initiated NCR QC-10-2310 to evaluate the welds. Further review of this issue is necessary and is being identified as URI 70-3098/2010-003-005, Review of Potential Non-Conforming Stud Welds.

b. Conclusions

Design control and documentation were evaluated in accordance to the requirements specified in MOX Services' MPQAP and project procedures. Based on the evaluation, no items of safety significance were identified. However, additional inspection activities are required to evaluate the following URIs: URI 70-3098/2010-003-001, Review of Calculations Related to Design Specification for Concrete Embedments; URI 70-3098/2010-003-002, Design Control Review Related to Metal Fabrications Specification; URI 70-3098/2010-003-003, Corrective Actions Related to Concrete Embed Plate Procurement; URI 70-3098/2010-003-004, Review of Stud Weld Procedure Qualification; and URI 70-3098/2010-003-005, Review of Potential Non-Conforming Stud Welds.

4. Problem identification, Resolution and Corrective Action (IP 88110)

a. Scope and Observations

The scope of the inspections encompassed a review of various MFFF 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 process. This included, as applicable: material procurement, construction, design and engineering, testing and inspection, records management, handling, and vendor related activities.

The inspection also focused on MOX Services oversight of subcontractor and supplier activities. The inspectors reviewed applicable portions of MOX Services corrective action program (CAP) to assess the adequacy of the program and whether it has been effectively implemented. The inspectors reviewed procedures associated with problem identification and corrective actions to resolve previous problems with materials, components and construction activities.

The inspectors reviewed several CRs, NCRs and engineering change requests (ECRs) generated by the applicant to verify that there was proper documentation, prioritization and resolutions of problems identified. The inspectors reviewed the classification of the condition, timeliness of management review, and timeliness of corrective actions for CRs, for compliance with the applicant's approved procedures. The inspections identified and focused on the following aspects of the applicant's programs as outlined below.

(1) Procedures

The inspectors reviewed the applicant's 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 the various MOX 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.

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

Problems identified at the MFFF were classified using multiple systems within the MOX Services CAP structure. In addition to the issuance of CRs, the following administrative control programs were used to report and disposition problems: the control of nonconforming items, ECRs, human engineering discrepancies, and conduct of testing. As identified in PP 3-6, which controls the corrective action process, MOX initiated CRs to document problems including programs, processes, recurring equipment issues, equipment issues that require further investigation, human performance issues, failures, malfunctions, deficiencies, deviations, potential items for improvement, conditions adverse to quality, and significant conditions adverse to quality (SCAQs). Problems identified on CRs were classified into one of four significance levels (A, B, C, or D, where A was the most significant and constitutes a significant condition adverse to quality). Attachment C of PP 3-6 provided examples of conditions and problems that were associated to each significance level to aid personnel in the classification of issues. The inspectors reviewed a sample of CRs to verify that the CRs: (1) had been assigned a severity level consistent with the criteria identified in PP 3-6, (2) had unique identifiers for tracking, and (3) adequately described the problem for which the CR had been initiated.

PP 3-6 also established guidance for determining that a SCAQ exists. This procedure defined a SCAQ as a deficiency that would seriously impact an item from performing its intended function of assuring compliance to 10 CFR Part 70.61 and which, if left uncorrected, could have a serious effect on safety or operability. PP 3-6 required that measures be taken to determine the cause and preclude repetition of SCAQs. The procedure also required that all SCAQs be classified as significance level A CRs. MOX had not issued any significance level A CRs in the past 12 months. As part of its review of CRs and other administrative control program documents issued in the past year, the inspectors focused on verifying that the problems identified on the sample of documents reviewed (i.e., CRs, ECRs, etc.) did not rise to the level of a SCAQ.

PP 3-5, Control of Nonconforming Items, described the process for the control of nonconforming items and required all organizations and individuals at MOX Services to promptly initiate a nonconformance report to identify and control nonconforming conditions. PP 3-5 defined a non-conformance as a deficiency in characteristic or process that renders the quality of an item unacceptable or indeterminate. The procedure identified examples of nonconformances as follows: (1) failure to meet technical or quality requirements; (2) suspect or counterfeit items; (3) physical defects; (4) test failures; (5) incorrect, incomplete, or inadequate documentation; or (6) a deviation from prescribed processing, inspection, or test procedures.

PP 3-5 required the NCR Coordinator to review NCRs to determine if there was a condition adverse to quality that warranted issuance of a CR. PP 3-5 required the NCR Coordinator to use procedure PP 3-6 in the evaluation of whether or not an NCR required issuance of a CR. PP 3-6 also clarified that "This procedure does not apply to material non-conformances; they are documented in accordance with PP 3-5, Control of Nonconforming Items." 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 nonconformances that were within the scope of the NCR-related deficiencies identified in PP 3-5.

Form PP 3-5A, Nonconformance Report, which provided step by step instructions for the completion of NCRs, instructed the NCR Coordinator to check the appropriate box on the NCR to determine if a CR was required. Specifically, block number 27 of the NCR form, form PP 3-5A, contained a box for the user to check yes or no in reference to whether or not a CR was required, and if so, to specify the CR number. The inspectors reviewed a sample of NCRs and verified that nonconforming conditions that constituted conditions adverse to quality and extended beyond the nonconforming condition to include a condition adverse to quality, such as a process, procedure, or personnel-type issue, were linked to a CR.

As part of the MFFF CAP review, the inspectors attended two Management Review Committee (MRC) meetings in order to evaluate the applicant's process for review of recently initiated CRs, threshold values 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.

(3) Documentation and Reporting of Conditions Adverse to Quality

As described by PP 3-6 the documentation process of adverse conditions was controlled by unique identification. It required a clear description and disposition of the adverse condition and the basis for closure and submittal of the final package to the Project Records Center (PRC). The procedure also described the responsibilities for the staff with regards to the corrective action process.

MOX Services described, within PP 3-6, two methods for documenting problems: electronically or manually. The primary method was electronically through their Quality Assurance Information System (QAIS). The QAIS database and the records submittal were reviewed to verify compliance to the requirements of Section 17 of the MPQAP and with their records management procedure PP 3-4, respectively. If QAIS was not available, the procedure instructed the staff to document any problems manually in form PP 3-6F, Condition Report. Both the electronic and manual methods allowed for the

initiation of CRs anonymously. The procedure delineated the process by steps and required the documentation of the conditions to include at a minimum: (1) how it was found; (2) who was notified; (3) a description of the condition; (4) the specific documents affected; and (5) any immediate remedial actions taken.

The CR is submitted through the electronic system, and the responsible supervisor will be notified by email that a CR is available for its review. The supervisor is responsible for the determination of the validity of the condition, approval of the CR, documentation of any immediate/remedial actions taken and an indication of the status. After the supervisor, the CR is submitted to the Management Review Committee (MRC) for their review. The MRC will evaluate the significance level, screen the CR to determine if a stop work is warranted and determine if any reporting is required. The MRC will document any significance level changes and assign the responsible manager for further investigation and if the performance of a root cause analysis was required. When all of the actions are completed, the responsible manager documents the verification and submits the CR for closure.

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 actions 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.

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

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

- PP 1-7, MOX Fuel Fabrication Facility Lessons Learned Program
- PP 3-2, Trend Analysis
- PP 3-6, Corrective Action Process
- PP 3-25, Root Cause Analysis

The inspectors reviewed a sample of corrective action reports and verified that the reports had proper follow-up, timely and adequate closure, trending reports that specified adverse trending patterns and adequate root cause analysis report generation, as applicable. The inspectors also reviewed implementing procedures for the MFFF lessons learned program. The inspectors verified that the procedures were reviewed to verify the adequacy of the lessons learned organization, lessons learned reviews were part of corrective actions reports, and that an updated and maintained lessons learned log existed.

MOX MPQAP Section 16.6.2 states that MOX Services shall verify implementation of corrective actions taken for reported conditions adverse to quality and close the related corrective action documentation in a timely manner when actions were complete. For

significant conditions adverse to quality, the MOX Services Quality Assurance organization will verify implementation of corrective actions. The inspectors evaluated the Escalation of Differences (EOD) program as part of the corrective action close out process. The only EOD generated, CR-07-0134, was reviewed for timeliness requirements and completeness in accordance with PP 3-6 Section 3.7, Escalation of Differences, and Attachment E, Escalation of Differences Guidelines.

MOX MPQAP Section 16.6.3 states that the MOX Services Quality Assurance organization shall establish criteria for determining nonconformance trends. Procedure PP 3-02, Trend Analysis, described the process for regularly informing MOX Services management on the status of the implementation of the MOX Services QA Program and also established the process for identifying quality-related trends. The inspectors evaluated all five Calendar Year Quarterly reports from the first quarter of 2009 to the first quarter of 2010 (reporting periods 21 to 25) for compliance to this process and to identify any adverse trends that were not being reported adequately.

PP 3-25, Root Cause Analysis, established a team based Root Cause Analysis (RCA) process that identified and implemented solutions to eliminate (or significantly reduce) the recurrence of identified CAQs. This process defined the primary effect and the cause and effect relationships that created the CAQ. The inspectors reviewed three samples of RCA reports for conformance to this procedure. Format and content of the report, as well as traceability to the initiating CR, were evaluated by the inspectors.

MOX Procedure PP 1-7, MOX Fuel Fabrication Facility Lessons Learned Program, described the Lessons Learned program that reviewed events occurring outside of MFFF for relevance to the MFFF program. The objectives of this program were to (1) improve performance in the areas of quality, health and safety, security, operations, and environment protection through best practices or process improvement initiatives; (2) prevent similar events, conditions and experiences from resulting in negative performance; (3) promote effective work and business practices; and (4) identify trends and help demonstrate solutions to problems. The inspectors conducted interviews with the Lessons Learned Coordinator regarding the lesson learned process to verify adequate implementation. Samples of lessons learned topics selected from the lessons learned logs (2009-2010 timeframe) were reviewed to verify proper documentation and availability.

(5) Assessment of Safety Conscious Work Environment (SCWE)

The inspectors evaluated the applicant's SCWE through a review of the applicant's Employee Concerns Program (ECP) procedure, and by conducting random interviews of the applicant's staff, including the ECP manager. The inspectors interviewed 11 site personnel, across various work groups and various levels of responsibility to determine the extent of familiarity with the ECP site wide.

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 inspectors determined that the licensee's ECP training was comprehensive based on a review of the slides used for the training. The ECP is also included in the Consolidated Annual Training (CAT) program required at the MFFF. In addition, the MFFF recently instituted a new SCWE/Safety Culture Training module for all managers and supervisors on site.

The applicant's staff and contractors that were interviewed had adequate knowledge of the applicant's ECP. They understood how to use it and were comfortable with identifying issues and discussing concerns with supervision without fear of reprisal. The participants indicated that employees were encouraged to identify safety concerns, management visibly supported a SCWE, methods used by employees to report concerns were readily accessible, and no pushback or retaliation had been observed as a result of employee concerns. The inspectors determined that most personnel interviewed were aware of the different avenues through which they could express concerns, including the CAP, informing their supervision, contacting the ECP coordinator, or contacting the NRC.

b. Conclusions

The requirements for problem identification and resolution specified in the MPQAP and 10 CFR 50, Appendix B, that 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, nonconformances, 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. No findings of significance were identified.

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.

5. Structural Concrete Activities (IP 88132)

a. Resident Inspector Review of Concrete Placement Activities (PSSC-036)

(1) Scope and Observations

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 MFFBS. Table 5.6-1 of the CAR specifies the MFFBS as PSSC-036.

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 the off-site materials laboratory (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 visited the off-site materials laboratory (S&ME) where they performed direct observation of cylinder break tests.

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

July 7, 2010, BMP-W219A M Line, BMP Interior Wall, 45 cubic yards
July 8, 2010, BMP-W314.2, BMP Interior Wall, 46 cubic yards
July 10, 2010, BAP-F133/137 Topping Slab, BAP Elevated Floor, 6 cubic yards
July 10, 2010, BMP-F215/216, BMP Elevated Floor, 458 cubic yards
July 16, 2010, BSR-W108, BSR Interior Wall, 60 cubic yards
July 16, 2010, BSR-F317.1, BSR Elevated Floor, 14 cubic yards
July 16, 2010, BMP-W307, BMP Interior Wall, 157 cubic yards
July 21, 2010, BMP-F308.1, BMP Interior Wall, 123 cubic yards
July 23, 2010, BMP-F221A, BMP Elevated Floor, 24 cubic yards
July 28, 2010, BMP-F214/F216, BMP Elevated Floor, 486 cubic yards
July 30, 2010, BMP-F223, BMP Elevated Floor, 72 cubic yards
August 4, 2010, Gabion Wall 008, 70 cubic yards
August 4, 2010, BMP-W304.1, BMP Interior Wall, 117 cubic yards
August 6, 2010, BMP-W208.2, BMP Interior Wall, 62 cubic yards
August 14, 2010, BMP-W314.4, BMP Interior Wall, 16 cubic yards
August 14, 2010, BMP-W313.5/315.1, BMP Interior Wall, 155 cubic yards
August 17, 2010, BMP-W313.3A, BMP Interior Wall, 10 cubic yards
August 18, 2010, BMP-W217.8, BMP Interior Wall, 135 cubic yards
August 19, 2010, BMP-W121A.5/W121A.6, BMP Interior Wall, 18 cubic yards
August 19, 2010, BMP-F301 Curb, BMP Elevated Floor, 8 cubic yards
August 24, 2010, BMP-W314.3, BMP Interior Wall, 92 cubic yards
August 25, 2010, Gabion Wall 007, 109 cubic yards
August 26, 2010, Gabion Wall 001.6, 102 cubic yards
August 27, 2010, BMP-W223A.2/W219A.9, BMP Interior Wall, 125.5 cubic yards
August 31, 2010, BMP-W314.5 Beam, 4.5 cubic yards
September 01, 2010, BAP-W109.1.3/W112.3, BAP Interior Wall, 88 cubic yards
September 01, 2010, BMP-W313.6, BMP Interior Wall, 33 cubic yards
September 08, 2010, BMP-W313.3B, BMP Interior Wall, 49 cubic yards
September 10, 2010, BMP-F220, BMP Elevated Floor, 239 cubic yards
September 10, 2010, BSR-W202, BSR Interior Wall, 300 cubic yards
September 10, 2010, BMP-W219 10-Line, BMP Interior Wall, 68 cubic yards
September 16, 2010, BMP-W308.1, BMP Interior Wall, 65 cubic yards
September 16, 2010, B.T.S Footers CP-16, 52 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.

(2) Conclusions

Embedded plates were properly installed, rebar was properly installed, concrete testing activities were adequate, field preparation of concrete test cylinders and temporary storage of the cylinders was acceptable. No issues were identified concerning the field testing (slump, temperature, and air entrainment). Testing to date indicated that the concrete placed at the MFFF met design strength requirements. No findings of significance were identified.

b. Region II Based Review of Concrete Placement Activities (PSSC-036)

(1) Scope and Observations

The inspectors observed construction activities associated with reinforcing steel installation, concrete placement, concrete batching, and material receipt to verify conformance with specified requirements. The inspectors reviewed a sample of vendor design drawings, and construction documentation. Condor Drawing 6102, MOX Gabion Wall, Rev. 0, was reviewed to verify conformance with MOX Services' design drawing requirements. Work packages (WP) 09-CP20-3B-BMP-W314C, Installation of Forms, Rebar, Structural Embedded Items and Concrete, and WP 09-CP20-2-MFFF-GW001-C, Installation of Forms, Rebar, Structural Embedded Items and Concrete (Wall Pour 17'-6" to 35'-0"), were reviewed to determine whether structural concrete construction activities were adequately controlled and documented. The inspectors observed the concrete placement for BMP wall 314.3 and verified construction activities were conducted in accordance with applicable requirements. The inspectors observed concrete testing for pours BMP 314.3 and Gabion Wall 007 were observed to verify concrete temperature, slump, air content, and unit weight tests were performed in accordance with applicable ASTM standards.

The inspectors verified that the batch plants were inspected and certified to National Ready Mixed Concrete Association standards, and that the equipment used in batching and testing concrete constituents contained current calibrations. Mixer uniformity test reports were reviewed to ensure compliance with ASTM C-94. The storage of aggregates was observed to verify conformance with construction specification DSC01-BKA-DS-SPE-B-09325-4, Mixing and Delivering for Quality Level QL-1a (IROFS) and QL-2 Concrete, Rev. 4. The inspectors verified that there were provisions for maintaining concrete temperature within specification for production of concrete during hot weather. Material test reports for fly ash were reviewed to verify conformance with ASTM standards. Holcim Portland Cement Material Certification Reports for cement were also reviewed to verify conformance with ASTM standards. Procedures PP11-3, Batch Plant Operating Instructions, Rev. 2, and PP11-5, Batch Plant Testing and Calibration Instructions, Rev. 1 were reviewed to verify adequate controls were in place. The latest batch plant audit report No. DCS-09-A01, Batch Plant Operations, was reviewed to determine if deficiencies identified in the report were adequately documented and corrected.

(2) Conclusion

The inspectors concluded that reviewed items related to structural concrete were in accordance with MOX Services MPQAP and project procedures. No findings of significance were identified.

c. Cleanliness Inspection Prior to Start of Elevated Floor Placement BMP F-214 (PSSC-036)

(1) Scope and Observations

On July 28, inspectors observed the midnight shift placement activities related to BMP F-214/216.2. After placement activities had started, the inspectors observed that there was still debris in the floor area where concrete was going to be placed. MOX field engineering and QC personnel were informed of the observation and most of the debris was removed. Further review noted that the contractor foreman, MOX field engineering, and MOX QC personnel had completed their pre-placement cleanliness inspections, but had failed to identify the debris still in the placement.

ACI-349-97, Section 5.7, Preparation of Equipment and Place of Deposit, requires that all debris be removed from spaces to be occupied by concrete. MOX Services Specification, DCS01-BKA-DS-SPE-B-09330-5, Placing Concrete and Reinforcing Steel, requires, in part, that formwork shall be free of trash, debris, metal or wood scraps, loose soil or other construction material that would have a deleterious effect on the strength, durability and finished appearance of the concrete. MOX Services Work Package, WP09-10888-C-1935-BMP-F214-C/216-C, Concrete Placement Pre-Pour Checklist (Form PP11-12A), established a QC hold point to verify cleanliness including that the formwork is free of trash, debris, and other construction material before starting placement of concrete.

Contrary to the above, on or before July 28, 2010, the work package hold point for cleanliness was signed off as complete; however, the applicant failed to adequately perform the final inspection to verify that the formwork for concrete pour BMP F-214/216.2 was free of trash, debris, or other construction material prior to the placement of concrete. Failure to perform an adequate final inspection to verify that the formwork was free of trash, debris, and other construction material before starting placement of concrete is considered a violation of NRC requirements and is identified as the first example of VIO 70-3098/2010-003-006: Failure to Adequately Perform Inspection Activities. This issue was entered into MOX Service's corrective action program as NCR QC-10-2181.

Subsequently, MOX Services revised PP 11-35 to include a caution for construction engineers and QC inspectors to re-verify areas inspected if the inspection results may have changed due to conditions such as adverse weather, provided additional training regarding attention to detail related to cleanliness requirements, removed the QC inspector assigned to back shift activities, took disciplinary actions against construction supervision, and initiated condition report CR 10-451 to address the procedural issues. The inspectors concluded that the information regarding the reason for the violation, the corrective actions taken to correct the violation and prevent recurrence were adequate.

(2) Conclusion

One example of a violation was identified for failure to adequately perform inspection activities to ensure that the concrete formwork was free of trash, debris, or other construction material prior to placement of concrete. This is identified as the first example of VIO 70-3098/2010-003-006.

d. Installation of Structural Attachment to Embedded Plate (PSSC-023)

(1) Scope and Observations

The inspectors checked for proper installation of tanks including structural attachment to embedded plates. The inspectors conducted a walk-down of tank installations in the lower level of the BAP to determine if the tanks were installed in accordance with the applicable design drawings, specifications, and work instructions. During the inspection activities, the inspectors observed that a tank structural support was installed on the edge of an embedded plate and was in conflict with design requirements. The inspectors noted that the welding supervisor, the welding field engineer and the QC inspector had completed inspections of the support installation.

DCS01-BKA-DS-SPE-B09329, Structural Anchors in Concrete Spacing Requirements for Attaching to Embedded Plates for Quality Levels 1, 2, 3, and 4, section 3.2.B.4 requires that the edge of an attachment be a minimum of 1½ inches from the edge of an embedded plate with deformed bars unless otherwise specified on the design drawings. Premier Technology, Inc. design drawing 006315-M-1800-4, Revision 1, requires that the base plate be installed 1 ½ inches from the edge of the embed plate. MPQAP, Revision 9, Change 1, Section 10, Inspection, Section 10.2.6, Final Inspection, requires that finished 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.

Contrary to the above, MOX Services failed to perform an adequate final inspection to verify that slab tank KPA-8500 was installed in accordance with section 3.2.B.4 of DCS01-BKA-DS-SPE-B09329 and design drawing 006315-M-1800-4, Revision 1, as contained in Work Package 09-10888-C1935-KPA-TK8500-M. Specifically, the location of the tank base plate was approximately ½ inch from the edge of the embedded plate. Failure to install slab tank KPA-8500 in accordance with documented, approved QA procedures and other approved implementing documents is considered a violation of NRC requirements and is identified as the second example of VIO 70-3098/2010-003-006: Failure to Adequately Perform Inspection Activities. This issue was entered into MOX Services corrective action program as NCR QC 10-2268.

Subsequently MOX Services completed an analysis (DCS01-KPA-DS-CAL-L-12538-0) that qualified the as-left condition of the structural attachment to the embed plate. In addition, an extent of condition review was completed to identify any other similar non-conforming conditions. The field engineers and QC personnel were counseled on attention to detail related to design requirements for welding to embed plates.

(2) Conclusion

One example of a violation was identified for failure to adequately perform inspection activities to ensure correct installation of a slab tank in the BAP. This is identified as the second example of VIO 70-3098/2010-003-006.

e. Observation of Work Activities During Adverse Weather Conditions (PSSC-036)

(1) Scope and Observations

On August 18, 2010, a contractor was placing BMP Wall 217.8 when weather conditions deteriorated and resulted in heavy rainfall. The contractor did not cover the wall placement and continued placing concrete into the wall forms although excessive water had gathered within the forms. This caused the new concrete to be consolidated in the wall with the excessive water which could result in reduced strength of the concrete. Subsequent discussions with the field engineers and QC personnel indicated that they did not have a clear understanding of the stop work process contained in MOX Services procedure PP 3-10, Stop Work Process.

MOX Services PP3-10, Stop Work Process, defines the responsibilities and process for MOX Services project personnel to suspend/stop work activities when deemed necessary. According to PP3-10, Time Out, is defined as a temporary suspension/stoppage of work activities where an error, omission, or other issues have the potential to adversely affect safety, quality, or the environment, but does not represent an imminent danger. Section 3.2.1 requires the concern identifier to suspend/stop work and assist in action to place work in a safe condition. Section 3.2.2 requires the supervisor of the work to (1) take immediate action on every concern identified regardless of initial evaluation of its validity and (2) determine if the concern identified potentially warrants suspending work and being handled as a Time Out.

MPQAP, Revision 9, Change 1, Section 5, Instructions, Procedures, and Drawings, Section 5.1, requires that quality-affecting activities prescribed by and performed in accordance with documented, approved QA procedures and other approved implementing documents (drawings, specifications, etc.) appropriate to the MFFF Project work scope. MOX Services PP11-12, Placement of Concrete, Embedded Structural Items and Accessories, Section 3.9.8, requires, in part, to ensure all necessary precautions have been made for the applicable weather forecast i.e. hot, cold, rainy, etc., including not to begin to place concrete while rain, sleet or snow is falling unless adequate protection is provided. In addition, PP 11-12 specifies to not allow rainwater to increase mixing water or to damage the surface of the concrete.

Contrary to the above, on August 18, 2010, MOX Services failed to implement the time out process as defined in MOX Services PP 3-10 during a rainstorm that occurred during placement of concrete for BMP W217. Specifically, MOX Services failed to meet Section 3.9.8 of PP 11-12 by allowing rainwater to increase the mixing water content of the concrete. As a result, the quality and strength of the concrete for BMP W217.8 was subsequently determined by MOX Services engineering to be indeterminate. Failure to implement the Stop Work/Time Out requirements of MOX Services procedure PP 3-10 when conditions warranted work stoppage, is considered a violation of NRC requirements and is identified as VIO 70-3098/2010-003-007: Failure to Implement Stop Work/Time Out During Adverse Weather Conditions. This issue is documented in MOX Services corrective action program as CR 10-443 and NCR QC 10-2294.

(2) Conclusion

VIO 70-3098/2010-003-007 was identified for failure implement the stop work/time out procedure requirements during adverse weather conditions during placement of BMP wall 217.8.

6. Piping Systems Relied on for Safety (IP 88134)

a. Scope and Observations

The inspectors reviewed purchase documents including receipt inspection records to ensure that piping materials are in conformance with the purchase specifications. The inspectors reviewed certified material test reports to ensure that QL-1 piping material meets the required specifications for chemical composition and physical properties including heat treatment. The inspectors visited piping storage and laydown areas to ensure proper segregation, storage conditions, and storage identification. The inspectors reviewed work packages and observed installation of QL-1 piping including handling, cleanliness control, pipe layout, cutting, grinding, measurement of piping wall thickness, and use of temporary supports. The inspectors reviewed training records to ensure that personnel are suitably proficient and qualified to perform their assigned duties. The inspectors reviewed condition reports and nonconformance reports to ensure proper disposition of nonconforming items.

b. Conclusion

The inspectors concluded that piping was procured in accordance the purchase specifications; piping chemical and physical properties as reported on the certified material test report (CMTR) were in accordance with material specifications, piping was properly stored; and piping systems were fabricated and installed in accordance with American Society of Mechanical Engineers (ASME) B31.3 code requirements. No items of safety significance were identified.

7. Nuclear Welding General Inspection Procedure (IP 55050)

a. Scope and Observations

The inspectors reviewed work packages and design documentation to verify compatibility between base material and weld filler metal. The inspectors reviewed welding procedures for specification of essential variables and nonessential variables in accordance with the ASME B31.3 piping code. The inspectors performed an inspection of the rod room where MOX Services stores and issues weld filler metal. The inspectors observed non-destructive testing including liquid penetrant testing and radiography of pipe welds. The inspectors performed direct observation of fit-up and welding of BAP piping spools.

b. Conclusion

The inspectors concluded that reviewed items related to nuclear welding were in accordance with MOX Services MPQAP and project procedures. No items of safety significance were identified.

8. Instrumentation and Control Systems – Software Validation (IP 88140)

a. Scope and Observations

The inspectors examined the applicant's procurement documents for subcontracting the development of QL-1 software and related documents including the subcontract, procurement specification, technical specification, and vendor oversight plan. The inspectors also examined the applicant's and subcontractor's software development plans and associated documents related to the planning phase for the safety control system (PSSC-009, Criticality Control and PSSC-045, Process Safety Control Subsystem). The development plans included Software Quality Assurance Plans (SQAPs), Software Configuration Management Plans (SCMPs), and Software Verification and Validation Plans (SVVPs). Associated documents included procurement documents, Project Plans (PPs), and engineering guidelines (EGs). The inspectors examined the plans and associated documents to determine if the applicant adequately incorporated requirements from the MPQAP and the Instrumentation & Control (I&C) design bases for PSSCs from the CAR, into the software development plans. Additionally, the inspectors interviewed responsible personnel for the design, development, and quality of QL-1 software.

Inspectors examined applicant documents 1088-B-1964-Invensys, subcontract to develop software related to IROFS, DCS01 CCJ DS CCT E 40576, Procurement Specification for Safety Programmable Logic Controllers (SPLCs), DCS01 CCJ EW SPE C 36007, SPLC Technical Specification, and DCS01-CCJ-EW-SPE-C-36013, Software Design Group's (SDG's) Management Plan and Vendor Oversight (MPVO) for SPLC Systems Development.

The inspectors inquired about QL-1 software development work conducted by the SDG and determined that the SDG developed a Software Safety Plan (SSP), detailed Safety Requirement Descriptions (SRDs), Implementation Guideline for Safety PLC/Controller Interface Layer in the Normal PLCs, and Safety PLC General Operating Principles. The SDG uses these documents as inputs for the QL-1 software development. Additionally, the inspectors determined that the applicant has retained the scope for developing Human Machine Interface (HMI) QL-1 software that will interface with the subcontractor's software and the SDG will assume control of the subcontractor's software before installation and will integrate the HMI into the system. The inspectors determined that the applicant is the design authority, performing software engineering activities, and is responsible for managing and implementing the software project without required software development plans governing the SDG activities.

The inspectors compared results to the requirements established by MPQAP, Section 3.2.7, Computer Software Control, which states in part that computer software requirements apply to the software used to produce or manipulate data used directly in the design, analysis, and operation of SSCs. The application of specific requirements shall be prescribed in plans for computer software quality assurance and written policies and procedures. Development of software must address each of the seven phases of the software life cycle - Requirements, Design, Implementation, Test, Installation and Checkout, Operation and Maintenance, and Retirement. A software requirements review is performed at the completion of the software requirements documentation, and a configuration baseline shall be defined at the completion of each major phase of software development. In addition, the plan for controlling software program quality assurance shall identify software products to which it applies; organizations responsible

for performing the work and achieving software quality and their tasks and responsibilities; and methods for error reporting and corrective action. Moreover, individuals or organizations developing and supplying QA software under subcontract to the applicant shall be required to have a plan(s) for software quality assurance that meets the requirements of this section and the user organization shall determine the adequacy of this plan.

(1) Software Design Control

The MPQAP sections for software design control, 3.2.7.B Configuration Control, and 3.2.7.C Plans for Software Quality Assurance, document specific requirements for each of these design elements in addition to the design basis for the PSSCs. Section 11.6.7 of the CAR, Instrumentation and Control, references the following: (1) Regulatory Guide (RG) 1.173, Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants; (2) IEEE 1074-1997, IEEE Standard for Developing Software Life Cycle Processes; (3) IEEE 828-1998, IEEE Standard for Software Configuration Management Plans; and (4) IEEE 730-1998, IEEE Standard for Software Quality Assurance Plans. These documents were used for the management and control of QL-1 software development.

(2) Procurement Documents

MPQAP section 4.2.1, Procurement Document Control, states, in part, that procurement documents issued for SSCs or services shall include the following provisions: technical requirements including specific documents (such as standards, regulations, procedures or instructions) describing the technical requirements of the material, equipment or services to be furnished, shall be specified along with their revision level or change status. The inspectors reviewed procurement documents DCS01 CCJ DS CCT E 40576, Procurement Specification for Safety Programmable Logic Controllers (SPLCs) and DCS01 CCJ EW SPE C 36007, SPLC Technical Specification, issued for PSSCs services. The inspectors determined the applicant failed to include specifications, standards, and regulations describing the technical requirements of the services furnished. Specifically, the applicant failed to include the requirements of IEEE Std. 1074 in procurement or technical specifications to the subcontractor developing QL-1 software. This is identified as example 1 of VIO 70-3098/2010-003-008: Failure to Implement Controls for QL-1 Software in Accordance with the MQAP and Design Basis of the CAR.

(3) Life Cycle Processes

IEEE 1074 is a basis for developing specific Software Life Cycle Processes (SLCPs) that are consistent with regulatory requirements, as applied to software, for controlling and coordinating the design of safety system software. RG 1.173 stresses the importance of compliance with all of IEEE 1074 and imposes further requirements that comply with 10 CFR 50. The inspectors determined the applicant failed to develop an SLCP with the requirements for management activities groups containing activities such as project initiation activities, project planning activities, and project monitoring and control Activities as required by IEEE Std. 1074. This is identified as example 2 of VIO 70-3098/2010-003-008: Failure to Implement Controls for QL-1 Software in accordance with the MQAP and Design Basis of the CAR. The inspectors determined that the applicant is responsible for the development practices and quality of the QL-1 software. The inspectors noted that the applicant developed the SSP used by all software

development stakeholders including subcontractors and it provides the guidance on the development, review, reporting, and analysis of QL-1 software used when implementing IROFS. The applicant will perform various portions of the SLC themselves including the testing, installation and checkout, operations and maintenance, and retirement phases; therefore, a management plan developed from the activities mandated by RG_1.173 and IEEE 1074 is necessary to organize the methods and practices used to assemble QL-1 software components developed among multiple stakeholders into a final high quality safety system.

The inspectors examined the subcontractor's SQAP 08716-10888-B-00001964_00000-0050-F. The inspectors observed that the subcontractor did not implement the Software Life Cycle (SLC) requirements in the MPQAP. Section 3.2.7.A of the MPQAP states, in part, development of software must address each of the seven phases of the software life cycle: requirements, design, implementation, test, installation and checkout, operation and maintenance, and retirement. Contrary to the requirement, the applicant failed to implement the seven phase software lifecycle as required by Section 3.2.7.A of the MPQAP. Specifically, the applicant combined the requirements and design phases into a single phase. This is identified as example 3 of 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.

(4) Quality Assurance

The inspectors examined the applicant SDG's SQAP (DCS01-AAJ-EW-PAQ-Q-00002-2), the subcontractor's SQAP. The inspectors determined that neither the SDG nor Subcontractor SQAPs adequately implemented the MPQAP nor the design bases stated in the CAR because these plans did not meet all of the requirements specified in section 3.2.7.C of the MPQAP or IEEE 730-1998. For example, Section 1 of these SQAPs did not list the names of the software items nor state the portions of the software life cycle covered for each software item as required in Section 4.1 of IEEE 730-1998 and MPQAP section 3.2.7.C. This information is necessary for managing the quality assurance activities performed by different organizations for specific QL-1 software items. Furthermore, for QL-1 software items supplied to MOX Services, the SDG's SQAP did not adequately describe the procedures for reporting, tracking, and resolving identified problems nor state the methods to assure the software supplier receives adequate and complete requirements as required in sections 4.8 and 4.12 of IEEE 730-1998 and section 3.2.7.C of the MPQAP. These methods and procedures are necessary when managing and performing oversight of the subcontractor's development of QL-1 software. This is identified as example 4 of VIO 70-3098/2010-003-008: Failure to Implement Controls for QL-1 Software in accordance with the MQAP and Design Basis of the CAR.

(5) Configuration Control

The inspectors examined the applicant SCMP (DCS01-AAJ-EW-PGC-Q-00004-1) and subcontractor's SCMP (08716-10888-B-00001964_00000-0060-E, Rev 2) as well as the MPVO for SPLC Systems Development. The inspectors observed that the subcontractor's SCMP configuration baseline plan did not incorporate the requirements in the MPQAP. The MPQAP section 3.2.7.B, Configuration Control, requires a configuration baseline be performed after the requirements phase defined in section MPQAP 3.2.7.A. The inspectors determined that the applicant failed to incorporate and establish configuration baselines after the requirements phase because the

subcontractor standard SLCM did not match the SLCM defined by the MPQAP. The applicant did not impose these MPQAP requirements on the subcontractor. This is identified as example 5 of 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.

For in-process audits, the SDG's SQAP refers to the SDG's SCMP (DCS01-AAJ-EW-PGC-Q-00004). CAR section 11.6.7 requires the SCMP to conform to IEEE 828-1998, IEEE Standard for Software Configuration Management Plans. The inspectors determined that the SDG's SCMP did not adequately implement the design basis stated in the CAR because this plan did not meet all of the requirements specified in IEEE 828-1998. Section 4.3.6 identifies what configuration audits and reviews of subcontractor items will be held and how external code, documentation, and data will be tested, verified, accepted, and merged with the project software. The applicant failed to include this information in the SCMP. Section 3.6 of the SDG's SCMP addresses subcontractor control and refers to various oversight plans but neither of the SDG's SCMP or MPVO for SPLC Applications Development addresses these requirements. Section 3.6, Procured/Subcontracted software in the SDGs scope, addresses the control of a subcontractor by MFFF's SDG and refers to various oversight plans; however, the applicant did not address the IEEE 828-1998 Section 4.3.6 requirements for subcontractor control, in that the SCMP shall define activities to incorporate the externally developed items into the project Configuration Items (CI)s in Section 3.6 of the SDG's SCMP or DCS01-CCJ-EW-SPE-C-36013, the SDG's MPVO for SPLC Applications Development. This is identified as example 6 of VIO 70-3098/2010-003-008: Failure to Implement Controls for QL-1 Software in accordance with the MQAP and Design Basis of the CAR.

b. Conclusion

The inspectors reviewed the applicant and subcontractor software development plans and associated documents related to the planning phase for the safety control system associated with PSSC-009 (Criticality Control) and PSSC-045 (Process Safety Control Subsystem). The inspectors identified one violation of NRC requirements with six examples. VIO 70-3098/2010-003-008: Failure to Implement Controls for QL-1 Software in accordance with the MQAP and Design Basis of the CAR.

9. Vendor Oversight Activities – Intermech (IPs 88111, 88115, and 88139)

During August 9-12, 2010, an inspection of MOX Services' oversight of one of its vendors was conducted at Intermech, Inc. in Aiken, SC. The activities observed during the inspection included the inspection of fabrication activities of selected QL-1 ventilation system ductwork associated with the C2 Confinement System (PSSC-004), the C3 Confinement System (PSSC-005), the C4 Confinement System (PSSC-006), the Emergency Generator Ventilation System (PSSC-017), the Process Cell Exhaust System (PSSC-044), and the Supply Air System (PSSC-050); as well as vendor implementation of the applicant's MPQAP requirements.

a. 10CFR, Part 21, Inspection – Facility Construction (IP 88111)

(1) Scope and Observations

The inspectors reviewed Intermech's procedure for the reporting of defects and noncompliance to determine whether the procedure effectively implemented the

requirements of 10 CFR, Part 21. The inspectors assessed whether Intermech implemented the posting requirements of 10 CFR 21.6 by reviewing two posted locations at the facility for conformance.

The inspectors reviewed five purchase orders from Intermech to various subsuppliers to determine if Intermech properly invoked the requirements of 10 CFR 21.31 by specifying the applicability of Part 21 in the procurement documents.

The inspectors reviewed Intermech procedure QFP-AFAB-15.20, Rev. 1, to determine if Intermech had effectively implemented the requirements of 10 CFR 21.21 (a). The inspectors reviewed the procedure to verify that it included controls to evaluate identified deviations and to evaluate the effectiveness of those controls. Additionally, the inspectors reviewed the procedure to determine if it identified a specific director or responsible officer of the company to notify of identified defects or failures to comply and whether all applicable reporting requirements and time constraints were adequately implemented into the procedure. No significant issues were identified.

The inspectors reviewed seven records of an evaluated deviation that did not result in the identification of a defect or failure to comply to determine:

- If the item was identified for evaluation consistent with established procedures;
- If the information and data used in the evaluations appeared to be factual and complete; and,
- If the evaluation that a substantial safety hazard or failure to comply did not exist was a logical conclusion of the evaluation.

The inspectors reviewed Intermech's controls and procedures describing maintenance of records to verify adequate implementation of the requirements of 10 CFR 21.51. The inspectors observed designated document storage locations and interviewed personnel to determine if Intermech was maintaining applicable Part 21 related records and evaluations in accordance with Basic Requirement 17 and Supplement 17S-1 of NQA-1-1994 Part I as revised by NQA-1a-1995 addenda, and Regulatory Guide 1.28, Rev. 3, as required per the MOX Services contract with Intermech. No findings of significance were identified.

(2) Conclusions

Based on the documents reviewed, the inspectors concluded that the Intermech 10 CFR Part 21 program and procedure were consistent with the regulatory requirements of 10 CFR Part 21. No findings of significance were identified.

b. Supplier/Vendor Inspection (IP 88115)

(1) Scope and Observations

The inspectors reviewed the Intermech quality assurance program, implementing procedures and the three selected procurement documents to verify they met the applicable quality and technical requirements, and to determine if they:

- Required that the suppliers implement documented QA programs with appropriate controls, consistent with the requirements of 10 CFR 70.22 (f) and the MOX MPQAP before the initiation of work.

- Required that the suppliers implement controls for documenting and reporting deficiencies and maintaining adequate quality consistent with the MOX MPQAP.
- Included requirements to pass down the applicable technical and quality requirements to any sub-tier material supplier.

The inspectors noted that MOX Services reviewed and approved Intermech's QA program and implementing procedures. The inspectors reviewed Intermech procedure QFP AFAB 16.10, Corrective and Preventative Action, and verified conformance with 10 CFR 50 Appendix B, as implemented by NQA-1-1994. The inspectors also reviewed the procedure that controlled the generation of NCRs, Intermech procedure QFP AFAB 15.10, Control of Nonconforming Items.

The inspectors reviewed MOX Services specification DCS01-QGA-DS-SPE-V-15890, Rev. 2, as amended with engineering change requests, to verify conformance with technical requirements. The inspectors reviewed the purchase orders and determined that the applicable technical requirements, including material dimensions, types and grades from the specification, were included in the purchase orders.

The inspectors reviewed the results of receipt inspections for material arriving at Intermech to determine if the material met the technical requirements contained in the purchase order. The inspectors reviewed certificates of conformance and certified material test reports for the base metals, galvanizing processes for carbon steel, and for markers used on stainless steel and verified that the technical and quality requirements were met. For material that did not meet all requirements, the inspectors verified that the items were properly labeled and segregated to preclude their use prior to a proper disposition of the respective issue.

(2) Conclusions

Other than minor issues with the procedures, MOX Services was assuring that Intermech's procedures met the applicable MPQAP and technical requirements. Based on the vendor's QA procedures and documents reviewed, no findings of significance were identified. (PSSC-004, PSSC-005 and PSSC006).

c. Ventilation and Confinement Systems (IP 88139)

(1) Scope and Observations

The inspectors reviewed procedures, specifications, work packages and personnel certifications associated with the activities related to the C2 Confinement System (PSSC-004), the C3 Confinement System (PSSC-005), the C4 Confinement System (PSSC-006), the Emergency Generator Ventilation System (PSSC-017), the Process Cell Exhaust System (PSSC-044), and the Supply Air System (PSSC-050). This review was to determine if construction activities were accomplished according to design requirements and if the craft and inspection personnel performing construction work on safety related ventilation and confinement systems were qualified to perform their assigned work.

Specifically, the inspectors performed document reviews and work observations to determine if the observed welded connections conformed to established requirements for weld identification, use of appropriate weld procedures, and control of welding materials. The inspectors performed direct observations and independent evaluations of

work performance, work in-progress and completed work for PSSC-044 and PSSC-050 to verify the activities were being accomplished in accordance with NRC requirements, the Intermech QA plan, Intermech procedures, and MOX specifications. The inspectors also interviewed craft personnel and QC personnel performing the observed activities to assess whether their knowledge of the job and procedures was satisfactory.

The inspectors reviewed the training and qualification records for the qualified personnel involved in the observed activities to verify they met the requirements of the QA program applicable procedures. This review included welder and QC inspector qualifications as well as nondestructive examiner qualifications, specifically visual examination qualifications. The inspectors also reviewed welding procedure specifications and procedure qualification records to verify compliance with AWS D9.1 Sheet Metal Welding Code. The inspectors reviewed various certified material test reports (CMTRs) to verify that the sheet metal and weld filler metal met the specified technical requirements.

The inspectors also reviewed Intermech procedures associated with the identification and control of items, to verify that the established measures for identification and control of materials, parts and components were in accordance with ASME NQA-1-1994, and to verify traceability to the approved design basis. The inspectors performed walk downs of the Intermech warehouse to assess how sheet metal, angle iron, and weld materials were being stored to ensure that:

- Access was controlled to the storage area to maintain the quality of the materials received;
- An adequate marking system was used to maintain the identity of materials in storage;
- Materials were protected from the environment, weather, and cross-contamination from other materials (e.g. stainless steel segregated from carbon steel);
- Cutting and grinding tools were controlled to prevent cross-contamination and that hardened steel tools were adequately cleaned prior to being used with stainless steel; and
- Nonconforming materials were adequately identified and segregated.

The inspectors interviewed Intermech shop personnel to assess their knowledge of the job and of the requirements to maintain segregation between tools used on stainless steel and carbon steel, quality requirements for documenting work completed, cleaning of hardened steel tools, and requirements to maintain heat code traceability when cutting materials.

The inspectors reviewed the adequacy and effectiveness of the Intermech system of records and document controls. The inspectors reviewed procedures QFP-AFAB-6.10, Rev. 1 and QFP-AFAB-17.10, Rev. 1 to determine if the procedures contained appropriate requirements for the adequate control of quality records consistent with the MOX Services MPQAP, NQA-1-1994 Part I as revised by NQA-1a-1995 addenda, and Regulatory Guide 1.28, Rev. 3.

To assess implementation of the document control program, the inspectors performed field walk downs of the document control area and temporary storage locations for quality records to determine if they complied with the applicable storage requirements. The inspectors reviewed numerous randomly selected documents including specifications, engineering change notices, drawings and procedures to determine if

they were legible and if they were being properly maintained, stored, and updated. The inspectors also assessed whether superseded documents were either identified as such or destroyed and that applicable distribution logs were being maintained.

The inspectors interviewed Intermech staff, including QA, document control, procurement, engineering and shop personnel, to assess their knowledge of the document control procedure requirements and to determine if the implementation of the document control program met those requirements.

(2) Conclusions

Based on the sample reviewed, the inspectors concluded that the applicant performed adequate oversight of fabrication activities related to PSSC-004, PSSC-005, PSSC-006, PSSC-017, PSSC-044 and PSSC-050 in accordance with the applicable specifications, procedures and MPQAP. No findings of significance were identified.

10. Geotechnical and Foundation Activities (IP 88131)

(a) Scope and Observations

During the period, the inspectors reviewed work packages and procedures related to installation of the QL-1 waste process line previously installed between the BAP and the future security fence location. During the review, the inspectors noted that MOX Services did not have a qualified/approved compaction plan for compacting the backfill under, around and above the waste process piping. Civil engineering personnel indicated that the process being used to compact the backfill was acceptable and that they would provide the written justification for the process that had been used. Pending receipt and review of the technical justification showing that a qualified/approved compaction plan was not needed, this item is being identified as Unresolved Item (URI) 70-3098/2010-003-009: Review Technical Justification for not Having a Qualified Compaction Plan.

(b) Conclusions

URI 70-3098/2010-003-009 was identified for review of the technical justification for not having a qualified/approved compaction plan related to installation of the waste process line from the BAP to the future security fence boundary.

11. Follow-up of Previously Identified Items

The following items were reviewed for completion of corrective actions:

a. (Closed) VIO 70-3098/2009-010-01: Failure to Promptly Identify, Evaluate, Correct, and Document Conditions Adverse to Quality, as Required by PP 3-6, Corrective Action Process

(1) Scope and Observations

On and before June 22, 2009, the applicant failed to implement certain MPQAP and MFFF project procedure requirements. Specifically as required by Procedure PP3-6, Corrective Action Process, the applicant failed to promptly identify, evaluate, correct and document conditions adverse to quality, as noted in the following examples:

(a) On February 19, 2009, the applicant failed to promptly evaluate conditions adverse to quality when a MOX Processing Building (BMP) F201 placement was performed with improper clearance distance between embedded plates and reinforcing bars as required by American Concrete Institute (ACI) Code 117-90.
(b) On April 21, 2009, the applicant failed to promptly document conditions adverse to quality when the rebar clear spacing in placement BMP F126 did not met ACI 349-97 code requirements.

On June 28 to July 8, 2010, NRC inspectors reviewed Condition Report (CR)-09-0259 which documented the applicant's failure to promptly identify, evaluate, correct and document conditions adverse to quality. The applicant's evaluation concluded that the issue was an isolated case of not following the procedure correctly. After reviewing this document the inspectors determined that adequate corrective actions had been taken by the applicant to close this aspect ("…prompt documentation of condition adverse to quality.") of the violation.

For the abovementioned example (a), the applicant generated NCR -QC-09-0652 to evaluate the concrete placed with improper clearance distance between embedded plates and reinforcing bars. After reviewing this document the inspectors determined that the applicant provided adequate justification to conclude that the as-built condition is acceptable.

For the abovementioned example (b), the applicant generated CR-09-0244 to evaluate the condition of having reinforcing bar (rebar) clear spacing not meeting the ACI 349-97 code requirements. As part of the corrective actions prescribed in this CR, the applicant qualified and evaluated the potential impacts of the described ACI 349-97 nonconformance, and provided adequate technical justification to conclude that the as-built condition is acceptable. Based on the review, the inspectors determined that the corrective actions prescribed by CR-09-0244 adequately evaluated the conditions adverse to quality in accordance with the applicant's CAP.

During the review of the supportive technical documentation in CR-09-0244, the inspectors found that the non-destructive examination (NDE) test report Document No. 08716-10888-S-00003274_0003), used to justify the concrete bonding within the installed reinforcing bars, recommended further analysis of an anomalous concrete area identified near concrete wall intersection BMP P-2.4. This condition was already captured in the applicant's CAP under CR-10-0274 and NCR-EN-10-2114 to address the issue of not promptly identifying the condition, and to perform further analysis of the anomalous area in the wall. The inspectors will follow-up the resolution of the CR and NCR during a future inspection as Inspector Follow-up Item (IFI) 70-3098/2010-003-010: Review of Final Evaluation of Anomalous Concrete Area Detected by Non-destructive Examination.

(2) Conclusions

VIO 70-3098/2009-010-01: Failure to Promptly Identify, Evaluate, Correct, and Document Conditions Adverse to Quality, as required by PP 3-6, Corrective Action Process, is closed based on the documentation reviewed, and interviews held with MOX Services' personnel. The inspectors will follow-up the resolution of CR-10-0274 and NCR-EN-10-2114 during a future inspection as IFI 70-3098/2010-003-010: "Review of Final Evaluation of Anomalous Concrete Area Detected by Non-destructive Examination.

b. (Closed) VIO 70-3098/2009-010-03: Failure to Provide Adequate Documented Justification for Changes to a Final Design

(1) Scope and Observations

The inspectors reviewed CR-09-0096 which evaluated the lack of documented technical justification in ECR-001784. The corrective actions prescribed in CR-09-0096 were reviewed and found to be appropriate to address this violation. The inspectors also reviewed NCR-QC-09-0656 and ECR-002281. The inspectors determined that the applicant provided adequate justification to qualify the as-built condition.

(2) Conclusions

VIO 70-3098/2009-010-03, Failure to Provide Adequate Documented Justification for Changes to a Final Design, is closed based on the review of the associated documentation and implemented corrective actions.

c. (Closed) VIO 70-3098/2009-03-02: Inadequate Procedures for Documentation of Design Verifications

(1) Scope and Observations

The inspectors noted that this issue was placed into the applicant's corrective action program as CR 09-0247. The corrective actions associated with this violation were reviewed and found to be appropriate to address this violation. The corrective actions included revision to the design control procedure PP 9-3, Design Control, development of a design verification checklist, and additional training for qualification as a design verifier.

(2) Conclusions

VIO 70-3098/2009-03-02, Inadequate Procedures for Documentation of Design Verifications, is closed based on the review of the associated documentation and implemented corrective actions.

d. (Closed) VIO 70-3098/2009-03-04: Inadequate Documentation of Work Activities

(1) Scope and Observations

The inspectors noted that this issue was placed into the applicant's corrective action program as CR 09-0319. The corrective actions associated with this violation were reviewed and found to be appropriate to address this violation. The corrective actions included revision to the work package development procedure, PP 11-44, Work Package Planning, Development, Approval, Closure; development and implementation of a form for surveillances of completed work associated with suspended work packages; revision to the affected work package; additional training; and reinstallation of the Lenton coupler. The inspectors also independently verified, by contacting the coupler manufacturer that reinstalling the couplers would have no adverse effects.

(2) Conclusions

VIO 70-3098/2009-03-04, Inadequate Documentation of Work Activities, is closed based on the review of the associated documentation and implemented corrective actions.

e. (Closed) VIO 70-3098/2009-03-03: Inadequate Technical Justification for Engineering Design Changes

(1) Scope and Observations

The inspectors noted that this issue was placed into the applicant's corrective action program as CR 09-0261. The corrective actions associated with this violation were reviewed and found to be appropriate to address this violation. The corrective actions included issuance of ECR-002730, Revision 3, providing information on actual in place installation of several penetrations in the BMF (MOX Fuel Fabrication) - BMP area floor, and technical justifications for the engineering design changes. The corrective actions also included issuance of ECR-003745, ECR-003846, ECR-004107, and ECR-004767 to provide technical justifications for the relocation and addition of penetrations and corresponding calculations to show that the design analyses for the floor areas were still valid.

(2) Conclusions

VIO 70-3098/2009-03-03, Inadequate Technical Justification for Engineering Design Changes, is closed based on the review of the associated documentation and implemented corrective actions.

f. (Closed) VIO 70-3098/2009-03-01: Inadequate Design Change

(1) Scope and Observations

This item was placed in the applicant's CAP as CR 09-0261. The corrective actions associated with this violation were reviewed and found to be appropriate to address this violation. The corrective actions included (1) investigate and evaluate the affected wall, (2) issue an ECR to provide modifications as needed and re-qualify the affected wall, (3) evaluate other walls in the BMP, BSR (Shipping and Receiving Building) and BAP (Aqueous Polishing Building) to identify areas with similar problems and initiate ECRs as necessary to correct. CR 09-0261 lists ECR-003745, ECR-003846, ECR-004194, ECR-004767, and several others ECRs that reevaluated and seismically qualified the walls affected by the relocation and addition of penetrations.

(2) Conclusions

VIO 70-3098/2009-03-01, Inadequate Design Change, is closed based on the review of the associated documentation and implemented corrective actions.

g. (Closed) IFI 70-3098/2008-01-01: Review of Final Controlled Low Strength Material (CLSM) Analysis

(1) Scope and Observations

This IFI was opened to evaluate the adequacy of partially placing CLSM as foundation backfill, instead of exclusively placing engineered soil backfill material as originally designed. When this IFI was opened, the applicant had not completed the design analysis to assess the final as-built condition and the lateral loading effect of the CLSM on the MFFF structure. During this inspection, the inspectors reviewed the final CLSM analyses performed to evaluate the effect of the partial use of CLSM as foundation backfill for MFFF. The final CLSM analyses qualified the CLSM placement under the design dead and equipment loads. These design analyses included the CLSM placements under BMF and BMP mat foundation and on several BMF walls. The combined use of CLSM and engineered soil backfill resulted in changes to the magnitudes of design loads in MFFF's mat foundations and walls. The remaining design margin in these structural members varies from more than 5 up to 29 percent. This means that the structure can withstand the design dead and equipment loads.

(2) Conclusions

The partial use of CLSM was found to be acceptable for the MFFF's structure, including for its mat foundation, based on the analysis of dead and equipment loads. However, the adequacy still needs to be demonstrated for all the design load combinations, including seismic loads. The applicant had issued CR 09-0399, Cumulative Effect of Structural Issues on ANSYS, to conduct 3-dimensional structural analysis for the final MFFF as-built condition, and to assess the effect of all the design changes made, during construction, to the structural and foundation systems of this building. This structural analysis will evaluate the final as-built structure under all the loading combinations. Review of this as-built analysis to the MFFF will be done as part of the follow-up on IFI 70-3098/2009-04-02, Review and Evaluate Responses from RCA-09-04. IFI 70-3098/2008-01-01, Review of Final CLSM Analysis, was administratively closed based on the future follow-up on IFI 70-3098/2009-04-02.

12. Exit Interviews

The inspection scope and results were summarized throughout this reporting period by the senior resident inspector on October 8, 2010, and by region based inspectors on July 8, July 15, August 13, September 15, and September 23, 2010. On October 28, 2010, the NRC discussed a re-characterization of an inspection finding pertaining to one of MOX Services' vendors. 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.

1. PARTIAL LIST OF PERSONS CONTACTED

MOX Services

M. Bagale, VP Process Unit Design and Commissioning
L. Brown, Manager of Quality Assurance Programs
F. Cater, Civil/Structural Manager
R. Daniels, Lead Chemical and Mechanical Manager
J. Gomez, Electrical/I&C Manager
D. Gwyn, Licensing Manager
D. Ivey, Quality Assurance Manager
D. Kehoe, Compliance Manager
L. Lamb, Vice President Engineering
H. Lawrence, Vice President Construction
J. Peregory, Quality Control Manager
G. Shell, MOX Services QA VP Project Assurance
K. Trice, MOX Project Manager and President
R. Whitley, Quality Assurance/Quality Control Manager

MOX Vendor - Intermech Personnel

D. Callahan, Intermech Site QA Manager
J. Canup, Bahnson QA Manager
S. Low, Intermech Project Manager

2. INSPECTION PROCEDURES (IPs) USED

IP 55050	Nuclear Welding General Inspection Procedure
IP 88107	Design and Documentation Control
IP 88109	Inspection, Test Control, and Control of Measuring and Test Equipment
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action (Construction, Pre-Operation, and Operation)
IP 88111	10 CFR, Part 21, Inspection-Facility Construction
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 88131	Geotechnical/Foundation Activities
IP 88132	Structural Concrete Activities
IP 88134	Piping Systems Relied on for Safety
IP 88139	Ventilation and Confinement Systems
IP 88140	Instrumentation and Control Systems

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
70-3098/2010-003-001	Opened	URI: Review Calculations Related to Design Specification for Concrete Embedments (Section 3.a)

70-3098/2010-003-002	Opened	URI: Design Control Review Related to Metal Fabrications Specification (Section 3.a)
70-3098/2010-003-003	Opened	URI: Corrective Actions Related to Concrete Embed Plate Procurement (Section 3.a)
70-3098/2010-003-004	Opened	URI: Review of Stud Weld Procedure Qualification (Section 3.a)
70-3098/2010-003-005	Opened	URI: Review of Potential Non-Conforming Stud Welds (Section 3.a)
70-3098/2010-003-006	Opened/ Closed	VIO: Failure to Adequately Perform Inspection Activities (Section 5.c and 5.d)
70-3098/2010-003-007	Opened	VIO: Failure to Implement Stop Work/Time Out During Adverse Weather Conditions (Section 5.e)
70-3098/2010-003-008	Opened	VIO: Failure to Implement Controls for QL-1 Software in accordance with the MQAP and Design Basis of the CAR (Section 8.a)
70-3098/2010-003-009	Opened	URI: Failure to Provide a Compaction Plan as required by Subpart 2.5 of NQA-1 (Section 10)
70-3098/2010-003-010	Opened	IFI: Review of Final Evaluation of Anomalous Concrete Area Detected by Non-destructive Examination (Section 11.a)
70-3098/2009-010-01	Closed	VIO: Failure to Promptly Identify, Evaluate, Correct, and Document Conditions Adverse to Quality (Section 11.a)
70-3098/2009-010-03	Closed	VIO: Failure to Provide Adequate Documented Justification for Changes to a Final Design (Section 11.b)
70-3098/2009-03-02	Closed	VIO: Inadequate Procedures for Documentation of Design Verifications (Section 11.c)
70-3098/2009-03-04	Closed	VIO: Inadequate Documentation of Work Activities (Section 11.d)
70-3098/2009-03-03	Closed	VIO: Inadequate Technical Justification for Engineering Design Changes (Section 11.e)

70-3098/2009-03-01	Closed	VIO: Inadequate Design Change (Section 11.f)
70-3098/2008-01-01	Closed	IFI: Review of Final CLSM Analysis (Section 11.g)

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
BAP	Aqueous Polishing Building
BMF	MOX Fabrication Building
BMP	MOX Processing Building
BSR	Shipping and Receiving Building
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAR	Corrective Action Report
CAR	Construction Authorization Request
CAT	Consolidated Annual Training
CFR	Code of Federal Regulations
CI	Configuration Items
CIB1	Construction Inspection Branch 1
CIB2	Construction Inspection Branch 2
CIB3	Construction Inspection Branch 3
CNWRA	Center for Nuclear Waste and Regulatory Analysis
CPB1	Construction Projects Branch 1
CR	Condition Report
DAR	Deficiency Action Request
DCI	Division of Construction Inspection
DCP	Division of Construction Projects
EOD	Escalation of Differences
ECP	Employee Concerns Program
ECR	Engineering Change Request
EG	Engineering Guidelines
GET	General Employee Training
HMI	Human machine Interface
I&C	Instrumentation and Software
IEEE	Institute of Electrical and Electronics Engineers
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IROFS	Item Relied on for Safety
ITL	Independent Testing Laboratory
ksi	kilo pounds per square inch
LL	Lessons Learned
MFFF	MOX Fuel Fabrication Facility
MFFBS	MOX Fuel Fabrication Building Structure
MOX	Mixed Oxide

MOX Services	Shaw AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
MPVO	Management Plan and Vendor Oversight
MRC	Management Review Committee
NCR	Non-conformance Report
NDE	Non Destructive Examination
NMSS	Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
PI&R	Problem Identification & Resolution
PLC	Programmable Logic Controller
PP	Project Procedure
PRC	Project Records Center
PSSC	Principal System, Structure, and Component
QA	Quality Assurance
QAIS	Quality Assurance Information System
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
RCA	Root Cause Analysis
Rebar	Reinforcing bar
Rev.	Revision
RG	Regulatory Guide
RII	Region II
S&ME	Soils and Materials Engineering Inc.
SCADA	Supervisory Control and Data Acquisition
SCAQ	Significant Condition Adverse to Quality
SCMP	Software Configuration Management Plan
SCWE	Safety Conscious Work Environment
SDG	Software Design Group
SDG	Software Development Group
SDR	Supplier Deficiency Report
SLC	Software Life Cycle
SLCM	Software Life Cycle Model
SLCP	Software Life Cycle Process
SMCI	Specialty Maintenance and Construction Incorporated
SPLC	Safety Programmable Logic Controller
SQAP	Software Quality Assurance Plan
SRD	Safety Requirement Description
SRFI	Supplier Request for Information
SSC	Structures, Systems, and Components
SSP	Software Safety Plan
SVVP	Software Verification and Validation Plan
URI	Unresolved Item
VIO	Violation
WP	Work Package

5. LIST OF PSSCs REVIEWED

PSSC-004 C2 Confinement System
PSSC-005 C3 Confinement System
PSSC-006 C4 Confinement System
PSSC-009 Criticality Control
PSSC-017 Emergency Generator Ventilation System
PSSC-023 Fluid Transport Systems
PSSC-024 Glovebox
PSSC-035 Missile Barriers
PSSC-036 MOX Fuel Fabrication Building Structure (including vent stack)
PSSC-041 Process Cells
PSSC-044 Process Cell Exhaust System
PSSC-045 Process Safety Control Subsystem
PSSC-050 Supply Air System
PSSC-053 Waste Transfer Line

6. PARTIAL LIST OF DOCUMENTS REVIEWED

Shaw Areva MOX Services Documents:

Development Plans

DCS01-AAJ-EW-PGC-Q-00004-1, SDG Software Configuration Management Plan, January 2010
DCS01-AAJ-DS-PQI-X-40012-1, Applicant Fuel Fabrication Facility Configuration Management Plan, April 2007
DCS01 AAJ EW PAQ Q 00002-2, SDG Software Quality Assurance Plan July 2009
DCS01 AAJ EW PPE Q 00005-2, SDG Software Verification and Validation Plan January 2010
08716-10888-B-00001964_00000-0060-E, Subcontractor Software Configuration Management Plan July 6, 2009
08716-10888-B-00001964_00000-0050-F, Subcontractor Software Quality Assurance Plan July 2, 2009
08716-10888-B-00001964_00000-0052-F, Subcontractor Software Verification and Validation Plan July 9, 2009

Procedures:

EG 212, SDG Software Change Request and Software Problem Reporting Process, Rev. 1
PP 1-7, MOX Fuel Fabrication Facility Lessons Learned Program, Rev. 2
PP 3-2, Trend Analysis, Rev. 3
PP3-6, Corrective Action Process, Rev. 7
PP 3-6, Corrective Action Process, Rev. 13
PP 3-5, Control of Non-Conforming Items, Rev. 6
Form PP 3-5A, Nonconformance Report, Rev. 7
PP3-16, Supplier Verification, Rev. 6
PP 3-25, Root Cause Analysis, Rev. 3
PP3-28, Quality Control Receiving Inspection, Rev. 2
PP9-3, Design Control, Rev. 16

PP9-3, Design Control, Rev. 17
PP 9-13, Software Development and Acceptance, Revision 7
PP9-14, Design Process, Rev. 5
PP9-21, Engineering Change Requests, Rev. 6
PP9-21, Engineering Change Requests, Rev. 7
PP10-8, Requisitioning Items and Services, Rev. 8
PP 10-14, Supplier/Subcontractor Submittal Document Management, Rev. 5
PP 10-25, Vendor Evaluation, Rev. 0
PP11-3, Batch Plant Operating Instructions, Rev. 2
PP11-5, Batch Plant Testing and Calibration Instructions, Rev. 1
PP11-44, Work Package Planning, Development, Approval, and Closure, Rev. 4
PP11-58, Weld Filler Material Control, Rev. 1

Specifications

DCS01 CCJ DS CCT E 40576, Procurement Specification for Safety Programmable Logic Controllers, March 16, 2010
DCS01 CCJ EW SPE C 36007, Safety PLC Technical Specification, March 16, 2010
DCS01-CCJ-EW-SPE-C-36013-1, SDG Management Plan and Vendor Oversight for SPLC Systems Development, Revision 1, December 16, 2009
DCS01-QGA-DS-SPE-V-15890, Rev. 2
1088-B-1964-Invensys, Subcontractor Full contract, November 29, 2007
Applicant Solicitation No. 10888-R-50010, Solicitation/Award for Requirements Subcontract, Subcontractor, November 27, 2007
DCS01-BKA-DS-SPE-B-09325-4, Mixing and Delivering for Quality Level QL-1a (IROFS) and QL-2 Concrete

Purchase Orders:
10888-B-00004024, releases 2 through 11

Condition Reports

CR-09-0247
CR-09-0319
CR-09-0259
CR-09-0244
CR-10-0102
CR-10-0274
CR-09-0096
CR-09-0063
CR-09-0168
CR-10-0331
CR-09-0261
CR-09-0237
CR-09-0247
CR-09-0364
CR-07-134
CR-09-007
CR-09-168
CR-09-198
CR-09-487

CR-09-384
CR-09-236
CR-09-358
CR-09-367
CR-09-390
CR-09-396
CR-09-399
CR-09-401
CR-09-450
CR-09-238
CR-09-318
CR-09-387
CR-09-402
CR-09-427
CR-09-420
CR-09-442
CR-09-432
CR-09-338
CR-09-428
CR-09-419
CR-09-463
CR-09-007
CR-09-412
CR-09-478
CR-09-351
CR-09-384
CR-09-322
CR-09-237
CR-09-472
CR-09-184
CR-09-346
CR-09-390
CR-09-237
CR-09-399
CR-09-385
CR-10-093
CR-10-092
CR-10-091
CR-10-036
CR-10-124
CR-10-133
CR-10-237
CR-10-364
CR-10-171
CR-10-360
CR-10-058
CR-10-102
CR-10-422
CR-10-431
CR-10-465
CR-10-425 – Flowing Down Licensing Commitments

CR-10-426 – Vendor Evaluation of Safety PLC
CR-09-071
CR-09-072
CR-09-073
CR-10-209

Non-Conformance Reports (NCR):

NCR-QC-09-0652
NCR-CE-1085
NCR-QC-09-0933
NCR-EN-10-2112
NCR-QC-09-0656
AT-10-1731
AT-10-1538
BK-09-1071-S
CE-09-1232
CE-10-1747
CE-10-1955
CE-10-1585-S
CE-10-2102
CE-09-1027
CE-10-1485
CE-09-1027
QC-09-1324-S
QC-10-1536
QC-10-1861
QC-09-1296-S
QC-09-1374
QC-10-1900
QC-10-2084
QC-10-1520
QC-10-1493-S
QC-09-1033-S1
QC-10-1489
QC-10-1508
QC-10-1677
QC-10-1559
QC-10-1508
QC-10-1520
QC-10-1499
QC-10-1875, Material received unsealed with surface rust, April 21, 2010
QC-10-2072, CMTR not provided, June 15, 2010
NCR-AT-10-1731
EN-10-1846
CE-10-1863
CE-10-1853
QC-10-1645
CE-10-1822
EN-10-1845

Engineering Change Request (ECR):

ECR-003603
ECR-002730
ECR-007562
ECR-004439
ECR-001784
ECR-002281
ECR-004439
ECR-003745
ECR-003846
ECR-004107
ECR-004767
ECR-002730
ECR-004194
ECR-004165
ECR-004160
ECR-004483
ECR-003873
ECR-005739
ECR-003674, Rev. 2
ECR-003833, Rev. 0
ECR-003887, Rev. 1
ECR-004920, Rev. 2
ECR-005376, Rev. 0
ECR-002071, Rev. 3
ECR-004472, Rev. 0
ECR-002266, Rev. 1
ECR-004439, Rev. 1
ECR-005721, Rev. 0
ECR-000395, Rev. 2
ECR-003068, Rev. 1
ECR-000253, Rev.1
ECR 006200, Rev. 1
ECR 006592, Rev. 1
ECR 006185, Rev. 0
ECR-000613, Rev. 0
ECR-001931, Rev. 4
ECR-007563, Rev. 0
ECR-007957
ECR-007422, Rev. 0

Lessons Learned

LL-2010-19
LL-2010-083
LL-2010-055
LL-2009-283
Lessons Learned Log 2009
Lessons Learned Log 2010

Root Cause Analysis Reports

RCA-09-001
RCA-09-004
RCA-09-005
RCA-10-001

Trend Analysis Reports

Shaw/AREVA MOX Services, LLC Quality Assurance Program Report SQAP-21
Shaw/AREVA MOX Services, LLC Quality Assurance Program Report SQAP-22
Shaw/AREVA MOX Services, LLC Quality Assurance Program Report SQAP-23
Shaw/AREVA MOX Services, LLC Quality Assurance Program Report SQAP-24
Shaw/AREVA MOX Services, LLC Quality Assurance Program Report SQAP-25

Audit Reports

INT-09-VE255, Intermech audit, November 5, 2009
INT-10-VS126, Intermech audit, June 28, 2010
INT-10-VE126, Intermech audit, April 21, 2010
INT-10-VS167, QA source surveillance report, May 27, 2010
DCS-09-A01, Batch Plant Operations, dated March 9, 2009
SA-09-A08, ATG Procurement
SA-09-A05, Engineering and Document Control

Work Packages:

WP 09-10888-C-1935-BMP-W116/W118B-C
WP 09-10888-C-1935-BAP-RM-121C
WP 09-10888-C-1935-BMP-F215-C
WP 09-10888-C-1935-BMP-F216-C
WP 09-10888-C-2697-BMP-W219A-C
WP 09-CP20-3B-BMP-W314-C
WP 09-CP20-3B-BMP-W314C, Installation of Forms, Rebar, Structural Embedded Items and Concrete
WP 09-CP20-2-MFFF-GW001-C, Installation of Forms, Rebar, Structural Embedded Items and Concrete (Wall Pour 17'-6" to 35'-0")

Drawings

08716-10888-B-00004419-0048 A, MOX Gabion Wall– Condor Drawing 6102, Rev. 0
DCS01-BMF-DS-PLF-B-01703, MOX Fuel Fabrication Facility, BMP, BAP & BSR Areas, Concrete and Reinforcing Gabion Wall, Elevation View E-E, Rev. 1, Sheet 1 of 1, Rev. 1

Material Test Reports:

Holcim Portland Cement Material Certification Report for Test Period June 1 -2, 2010
Holcim Portland Cement Material Certification Report for Test Period April 6-7,-2010
Tec Services Report of Fly Ash Test Sample I.D. No. WA021610, date sampled February 16, 2010

Tec Services Report of Fly Ash Test Sample I.D. No. WA051510, date sampled May 15, 2010
Tec Services Report of Fly Ash Test Sample I.D. No. WA042210, date sampled April 22, 2010

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QFP AFAB 2.10, Quality Assurance Program, Rev. 2
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QFP AFAB 6.10, Document Control, Rev. 1
QFP AFAB 9.10, Control of Special Processes, Rev. 1
QFP AFAB 9.20, Weld Filler Material Control, Rev. 1
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QFP AFAB 15.10, Control of Nonconforming Items, Rev. 1
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500105-7579859-OP, June 17, 2010
500105-7581458-OP, July 30, 2010
500105-7578644-OP, August 2, 2010
500105-7578348-OP, May 18, 2010
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Condition Reports:

CAR-AFAB-001
CAR-AFAB-002
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Non-Conformance Reports (NCR):

NCR-AFAB-001
NCR-AFAB-002
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Audit Report V-08-08, Laboratory Testing
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CMTR for weld filler metal heat # 739540
CMTR for weld filler metal heat # 739058
CMTR for sheet metal heat #6TK5
CMTR for sheet metal heat #6DN2
Work Data Package BAP-L1-A11-HSA-11
Work Data Package BAP-L1-A10-HSA2-05
Work Package BAP-L1-A11&12-POE2-06
Work Package BAP-L1-A11&12-POE2-02
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Welder Procedure Qualification Records for Welders IAS-2, IAS-7 and IAS-9
Certification Record for Employee 5412, VT Level II
Certification Record for R.H, Level III for VT, MT, PT
Certification Record for Lead Auditor T.P.