



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

April 30, 2010

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

**SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT
NO. 70-3098/2010-001 AND NOTICE OF VIOLATION**

Dear Mr. Stinson:

During the period of January 1 through March 31, 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 regarding the failure to provide adequate design review for design changes, failure to ensure that quality affecting activities are prescribed and performed with quality assurance approved documents, and failure to adequately identify test requirements and evaluate test results. 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.

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 IMPLEMENTATION 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 document 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

Enclosure: 1. Notice of Violation
 2. NRC Inspection Report 70-3098/2010-001 w/attachment

cc w/encl: (See next page)

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," a copy of this document 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.

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Construction Authorization No. CAMOX-001

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1. Notice of Violation
 2. NRC Inspection Report 70-3098/2010-001 w/attachment

cc w/encl: (See next page)

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OFFICE	RII: DCP	RII: DCP	RII: DCI	RII: DCI	RII:DCP		
SIGNATURE	Via Email	WBG	Via Email	Via Email	DAA		
NAME	M. Shannon	W. Gloersen	K. O'Donohue	AMasters	DAyres		
DATE	4/21/2010	4/26/2010	4/23/2010	4/22/2010	4/29/2010		
E-MAIL COPY?							

cc w/encls:

Mr. Clay Ramsey, Federal Project Director
NA-262.1
P.O. Box A
Aiken, SC 29802

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

A.J. Eggenberger, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Ave., NW, Suite 700
Washington, DC 20004

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

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

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

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

Diane Curran
Harmon, Curran, Spielberg & Eisenberg, LLP
1726 M St., NW, Suite 600

Washington, DC 20036

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

Letter to David Stinson from Deborah A. Seymour dated April 30, 2010.

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION
REPORT 70-3098/2009-004

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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 January 1 through March 31, 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 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. 8, dated August 20, 2009).

MPQAP, Rev. 8, Section 3, Design Control, Subsection 3.2.2, states, in part, that changes from specified standards, including the reasons for the change, shall be identified, approved, documented and controlled. Section 3.2.4 states, in part, that design reviews shall be controlled and performed to ensure the design inputs were correctly selected and incorporated. Section 3.2.5 states, in part, that changes to final designs and nonconforming items dispositioned "use-as-is" or "repair," shall have documented justification for use and are subject to the same design control measures as those applied to the original design.

Contrary to the above, prior to March 8, 2010, the applicant failed to provide adequate design review for design changes as noted in the following examples:

1. Non-destructive testing (NDT) data from work performed by Concrete Engineering Specialists, LLC (CES) was used as design input in Engineering Change Request (ECR) 5971, Rev. 1. The purpose of ECR 5971 was to justify the as-built condition of members M10A and N10. CES did not have quality assurance (QA) approved procedures for this activity, such that the data could be directly used as input for a quality level (QL)-1 quality-affecting design calculation. This resulted in a re-evaluation to determine if the structural members were adequate to support the loading based on data obtained by MOX Services personnel and QA program controls.
2. The design change approved by ECR 1833 for change in reinforcement installation of several columns and piers did not include a documented justification or an analysis to justify the design change. This resulted in the lack of assurance that the approved design change was adequate.

This is a Severity Level IV violation (Supplement II)

- 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 MOX Project Quality Assurance Plan (MPQAP) dated March 26, 2002, and supplements thereto (MPQAP, Rev. 8, dated August 20, 2009).

Condition 3.C of the CA authorizes MOX Services to construct the facility in accordance with the design bases of the Principle Structures, Systems, and Components (PSSCs) described in the Construction Authorization Request (CAR) dated October 31, 2002.

The MPQAP, Rev. 8, Section 5, Instructions, Procedures, and Drawings, subsection 5.1 requires, in part, that quality-affecting activities are prescribed by and performed in accordance with documented, approved QA procedures and other approved implementing documents (drawings, specifications, etc.) appropriate to the MOX Project work scope.

Design specification DCS01-BKA-DS-SSPE-B-09330-4, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3, and 4, Section 3.3.C.8 requires that for bending embedded reinforcement bars that the bar temperature must be greater than 60 degrees for the first bend, must be between 1,100 and 1,200 degrees for the second bend, and must be visually examined for cracking following the bending process.

American Concrete Institute (ACI)-117, Section 4.1 specifies that deviation from wall plumb is a maximum of +/- 1 inch for the complete structure and also vertical alignment must be less than 0.3 percent of any individual wall height.

MOX Services Project Procedure (PP)11-25, Control of Issued QL-1 and QL-2 Material, Section 3.3.1, Storage of QL-1 and QL-2 Material, states, in part, that QL-1 material that has been issued to the end user shall be protected and stored in an approved staging area. Section 3.3.1, further states, in part, that access to staging areas shall be controlled and limited to personnel designated by the cognizant Subcontract Technical Representative (STR) and or the Subcontractor.

PP11-26, Material Handling, Storage and Control, Section 3.7, Access Control, states, in part, that lay-down areas shall be secure and access shall be controlled by the Material Management Department. Section 3.8, Material Classification, states, in part, that Level D items may be stored outdoors in an area marked and designed for storage.

Contrary to the above, on or before March 22, 2010, quality affecting activities were not prescribed and/or performed in accordance with documented, approved QA procedures and/or other approved implementing documents appropriate to the MOX Project work scope as noted in the following examples:

1. The applicant used non-applicable implementing guidance provided in ECR 00-3281 to improperly exclude non-conformances in BAP W-110, which exceeded maximum clear cover requirements. During March 2010, non-conformances with maximum clear cover in BAP W-110 were not documented in the corrective action program because the MOX field engineers and quality control (QC) personnel believed that the evaluation contained in ECR 00-3281 bounded the non conforming condition. However, ECR 00-3281 only bounded conditions below elevation 0'-0" and the non conformances with BAP W-110 were above elevations 0'-0".

2. The applicant failed to implement the requirements of design specification DCS01-BKA-DS-SSPE-B-09330-4, Section 3.3.C.8. During January 2010, the certificate holder bent and re-bent numerous embedded hook bars in the Aqueous Polishing Building (BAP) precast slabs BAP F-123, F-141 and F-150 with temperatures constantly below 60 degrees and did not perform visual inspections following the bending process.
3. The applicant failed to provide adequate guidance to ensure that ACI-117, Section 4.1, Deviation from Plumb, was being met. During the week of March 22, 2010, it was noted that MOX Process Building (BMP) wall BMP W-214 was out of plumb by approximately 1.75 inches. Guidance was not provided in the work package to verify vertical alignment during and following the placement.
4. The applicant failed to implement procedures for the storage and control of QL-1 backfill material for PSSC-053, Waste Transfer Line. Documentation did not provide adequate guidance and procedures for the storage, control, and protection of QL-1 backfill material. Specifically, the applicant failed to adequately identify and segregate nonconforming soils in that nonconforming soils received from the on-site borrow pit, and stored in the two designated stockpiling areas were not adequately segregated, nor were adequate precautions established to preclude inadvertent use. As a result, QL-1 backfill material was neither controlled nor stored consistent with the MPQAP and project procedures.

This is a Severity Level IV violation (Supplement II).

- C. 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. 8, dated August 20, 2009).

Condition 3.C of the CA authorizes MOX Services to construct the facility in accordance with the design bases of the PSSCs described in the Construction Authorization Request (CAR) dated October 31, 2002.

The MPQAP, Rev. 8, Attachment I, ASME/NQA-1-1994 through 1995a, Part II Applicability to MOX Project provides no exceptions to Subpart 2.5, Section 5: Inspection of Soils and Earthwork. ASME/NQA-1-1994, Part II, Subpart 2.5, Section 5 provides requirements for qualification and in-process testing of backfill material.

MPQAP, Rev. 8, Section 11, Test Control, states, in part, that test planning shall include identification of items to be tested, test requirements and acceptance limits, including levels of precision and accuracy. Section 11, Test Control, further states, in part, that test results shall be documented and their conformance with acceptance criteria shall be evaluated by a qualified individual within the responsible organization to ensure that test requirements have been satisfied.

Contrary to the above, on or before March 8, 2010, the applicant failed to adequately identify test requirements and evaluate test results for QL-1 backfilling activities

pertaining to PSSC-053, Waste Transfer Line. Prior to March 8, 2010, documentation required to verify conformance of QL-1 fill material did not adequately identify all items to be tested as required by ASME NQA-1-1994 Part II, Subpart 2.5, Section 5. Additionally, test results were not adequately evaluated by responsible personnel to ensure conformance with established acceptance criteria. The inadequate review of test documentation resulted in the inadvertent use of non-conforming material in a QL-1 application.

This is a Severity Level IV violation (Supplement II).

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 license 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 30th day of April 2010.

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-3098

Construction
Authorization No.: CAMOX-001

Report No.: 70-3098/2010-001

Applicant: Shaw AREVA MOX Services

Location: Savannah River Site
Aiken, South Carolina

Inspection Dates: January 1 – March 31, 2010
March 3 – March 4, 2010
March 8 – March 11, 2010

Inspectors: M. Shannon, Senior Resident Inspector, Construction Projects Branch 1
(CPB1), Division of Construction Projects (DCP), Region II (RII)
W. Gloersen, Senior Project Inspector, CPB1, DCP, RII
A. Masters, Senior Construction Inspector, CIB2, DCI, RII
J. Lizardi, Construction Inspector, CIB2, DCI, RII
E. Heher, Construction Inspector, CIB2, DCI, RII
C. Abbott, Construction Inspector, CIB2, DCI, RII

Accompanying
Personnel: A. Chowdhury, Ph.D., Center for Nuclear Waste Regulatory Analyses
(CNWRA)
J. Marcano, Technical Reviewer, Mixed Oxide and Uranium
Deconversion Branch (MOUDB), Fuel Cycle Safety and
Safeguards (FCSS), Nuclear Materials Safety and Safeguards (NMSS)
M. McCoppin, Acting Branch Chief, CIB2, DCI, RII
K. Morrissey, Project Manager, MOUDB, FCSS, NMSS
D. Tiktinsky, Project Manager, MOUDB, FCSS, NMSS

Approved by: Deborah A. Seymour, Chief, CPB1, DCP

EXECUTIVE SUMMARY

Shaw AREVA MOX Services Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) NRC Inspection Report No. 70-3098/2010-001

Routine inspections were conducted by the senior resident inspector from January 1 – March 31, 2010, and by regional specialists from March 3 – 4, and March 8 – 11, 2010. The inspections involved the observation and evaluation of the applicant's programs for facility construction of principle structures, systems, and components (PSSCs) and included quality assurance (QA) activities related to design verification and documentation control; problem identification, resolution and corrective actions; structural concrete activities; and geotechnical foundation activities.

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 records management. 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-036 as described in Table 5.6-1 of the MFFF CAR were adequately performed and included installations of embedded plates and ground cables, heavy lifts of equipment and supplies, verification of equipment placements by surveys, welding, non-destructive testing, 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 items of safety significance were identified (Section 2).

Design and Documentation Control (IP 88107)

The first example of violation (VIO) 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes was identified for failure to provide adequate design review for a design change approved by Engineering Change Request (ECR) 005971 (PSSC-036) (Section 3).

Structural Concrete Activities (IP 88132)

Embedded plates were properly installed; cleanliness was adequate, concrete testing activities were adequate and concrete placement activities were appropriate (PSSC-036) (Section 4.a and 4.b).

The first example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents, was identified for failure to meet procedural requirements for bending numerous embedded reinforcement bars in the Aqueous Polishing Building (BAP) precast slabs (PSSC-036) (Section 4.c).

The second example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents was identified for failure to meet procedural requirements in that an inappropriate engineering evaluation as being used to justify non conformances with maximum clear cover in BAP W-110 (PSSC-036) (Section 4.d).

The third example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents was identified for failure to provide/meet procedural requirements in that adequate guidance for ensuring that wall vertical alignment was maintained during and following placement activities was not provided resulting in a MOX Process Building (BMP) W-214 being placed outside ACI-117 code vertical alignment requirements (PSSC-036) (Section 4.e).

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). The inspectors noted that the temporary storage boxes were properly heated for the cold weather conditions. Testing to date indicated that the concrete placed at the MFFF met design strength requirements (PSSC-036). No items of safety significance were identified (Section 4.f).

Geotechnical and Foundation Activities (IP 88131)

The fourth example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents, was identified for failure to provide adequate procedural guidance and control for QL-1 backfill material for PSSC-053, Waste Transfer Line (Section 6).

An additional violation, VIO 70-3098/2010-001-003: Failure to Adequately Identify Test Requirements and Evaluate Test Results for QL-1 Backfilling Activities Pertaining to PSSC-053, Waste Transfer Line, was identified for failure to adequately identify test requirements and evaluate test results for QL-1 backfilling (Section 6).

Quality Assurance: Program Development and Implementation (IP 88106)

The roles, responsibilities, and programmatic interfaces of the various functional areas of the project were acceptable. Adequate information pertaining to construction scheduling activities associated with the PSSCs was provided. No items of safety significance were identified (Section 7).

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

The applicant had established a program and procedures that adequately implemented the corrective action program in accordance with the applicant's MPQAP. No items of safety significance were identified (Section 8).

Follow-up of Previously Identified Items

Unresolved Item (URI) 70-3098/2009-004-001: Review of Applicant's Evaluation of Column Design Changes, was closed and dispositioned as the second example of violation 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes (Section 9).

AV 70-3098/2009-009-001: Completeness and Accuracy of Information, was administratively closed based on the successful results of the ADR session (Section 9).

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 24 tanks have been installed to date. Seventeen 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 civil installation of waste process lines.

2. Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130)

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 (including vent stack)) and PSSC-053 (Waste Transfer Line) 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 the BSR;
- (b) Installation of embedded piping and embedded support plates in the 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;
- (l) Assembly of first two glove boxes and associated equipment;
- (m) Installation of waste transfer lines from BAP to waste process facility;

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) MOX Fuel Fabrication Facility, Concrete and Reinforcing General Notes, DCS01-01352, Revision (Rev.) 9 (Sheet 1 of 2); and (2) MOX Fuel Fabrication Facility, 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, Titan steel workers, Baker Construction, 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-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, welding, non-destructive testing, 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 items of safety significance were identified.

3. Design and Documentation Control (IP 88107)

a. Scope and Observations

From March 8-11, 2010, the inspectors reviewed Shaw Areva MOX Services (MOX Services) design and document control documentation for proper implementation in accordance with MPQAP, Rev. 8. The inspectors reviewed a sample of controlled design documents including engineering change requests (ECRs), and CRs in civil engineering related areas. A sample of construction and design documents were reviewed and selected from those associated with PSSC-036 and PSSC-053.

The inspectors reviewed design specifications and procedures to verify proper implementation of requirements necessary to control design activities for the MFFF. The inspectors reviewed DCS01-AAJ-DS-DOB-B-40103-2, National Nuclear Security Administration (NNSA) Technical Baseline, Basis of Design for Structures, Quality Level 1a (Item Relied on for Safety (IROFS)), and DCS01-AAJ-DS-ECA-D-40124-1, NNSA Technical Baseline, MFFF Deviation Log Quality Level 1a (IROFS). The inspectors also reviewed MOX Services project procedures (PP), PP9-21, Engineering Change Request, Rev. 7; PP9-3, Design Control, Rev. 17; PP3-6, Corrective Action Process, Rev. 10; PP9-6, Calculations, Rev. 8, PP9-14, Design Process, Rev. 4, and PP8-6, Licensing Basis Configuration Management, Rev. 7.

Discussions about the design process for identifying potential impacts to the licensing basis were held. These discussions were conducted to determine whether recently made design changes may alter MFFF facility licensing basis. No findings of significance were identified.

Through discussions with MOX Services staff and review of QA documentation, the inspectors verified the implementation of procedures related to design control. The inspectors reviewed ECR 005971, Rev. 1, which was to justify the as-built condition of columns M10A and N10 and to evaluate through calculations if those structural members were adequate to support the loading. Non-destructive testing (NDT) data from work performed by Concrete Engineering Specialists, LLC (CES) was used as direct design input of that ECR. The inspectors observed that CES did not have QA approved procedures for performing these activities, such that the data could be directly used as input for a QL-1 quality-affecting design calculation. This resulted in a re-evaluation to determine if the structural members were adequate to support the loading based on data obtained by MOX Services personnel and QA program controls. This issue was captured in the applicant's corrective action program as 10888-MOX-CR-10-102. This issue was identified by the NRC and is the first example of Violation (VIO) 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes for failure to provide adequate design review for the design change approved by ECR 005971, Rev. 1.

b. Conclusion

The first example of violation 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes was identified for failure to provide adequate design review for a design change approved by Engineering Change Request ECR 005971.

4. **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 Baker, Construction Materials Testing Laboratory (QORE), 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 MOX Fuel Fabrication Building Structure (MFFBS). Table 5.6-1 of the CAR specifies the MFFBS as one of the PSSCs (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 and alignment. The inspectors selectively checked for proper embed plate placement by observing ongoing surveys, and verified embed plate support structures were properly restrained; verified cleanliness of the placement area; observed placement of embedded piping, installation of piping supports, mounting of piping to supports, and installation of galvanic sleeves between piping and supports. The inspectors also observed the installation of the grounding system for the reinforcing steel including embedded grounding posts for future equipment installation. During the placements, the inspectors observed proper lift heights and observed MOX Services' field engineers and quality control (QC) personnel performing inspections of the reinforcing steel, embed plates, embed piping, cleanliness prior to placements, and detailed observations of the placements.

During the concrete placements, the inspectors observed operations at the batch plant and at the point of placement. Concrete placement and onsite testing activities were in accordance with procedural requirements. Minor difficulties observed during the placements were independently identified by on-going QC inspections and corrected by the applicant.

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 (QORE) for curing and later testing. The inspectors noted that the storage containers were properly heated for cold weather storage. Batch plant operators correctly implemented procedural requirements and were in constant communication with the concrete placement crews.

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

January 6, 2010, BMP W-215.1, .2 and .3, BMP Interior Wall, 49 cubic yards
 January 11, 2010, BAP W-112.2, BAP Interior Wall, 106 cubic yards
 January 12, 2010, BMP W-215.3, BMP Column, 10 cubic yards
 January 12, 2010, BAP Panel 121, 8 cubic yards
 January 13, 2010, BSR W-110.4, BSR Interior Wall, 18 cubic yards
 January 14, 2010, BSR W-105.7 line, BSR Interior Wall, 57 cubic yards
 January 14, 2010, BMP W-123A3.1, BMP Interior Wall, 23 cubic yards

January 15, 2010, BMP W-121B, BMP Interior Wall, 53 cubic yards
January 15, 2010, BMP W-128A.1, BMP Interior Wall, 24 cubic yards
January 19, 2010, BMP F207 and 208, BMP Elevated Floor, 484 cubic yards
January 20, 2010, BMP W-214.3, BMP Interior Wall, 75 cubic yards
January 22, 2010, BSR Security Door 5000, 3 cubic yards
January 23, 2010, BMP F-209/213, BMP Elevated Floors, 80 cubic yards
January 26, 2010, BAP W102/106 and BSR W-105, Interior Walls 106 cubic yards
January 27, 2010, BMP W 216.1, BMP Interior Wall, 101 cubic yards
January 28, 2010, BMP W-126/128A.2, BMP Interior Wall, 112 cubic yards
January 29, 2010, BMP W-126/128A.3, BMP Interior Wall, 104 cubic yards
February 2, 2010, BMP W-215.5, BMP Interior Wall, 127 cubic yards
February 3, 2010, Gabion Wall 001, 102 cubic yards
February 3, 2010, BMP F-163, BMP Elevated Floor, 7 cubic yards
February 3, 2010, BSR W-105A.3, BSR Interior Wall, 84 cubic yards
February 3, 2010, BAP W-109.1.1, BAP Interior Wall, 7 cubic yards
February 4, 2010, BAP W-107B.4, BAP Interior Wall, 79 cubic yards
February 4, 2010, BAP Topping Slab 123, 12 cubic yards
February 11, 2010, BMP W-216.2, BMP Interior Wall, 127 cubic yards
February 15, 2010, BMP W-217.1, BMP Interior Wall, 21 cubic yards
February 16, 2010, BMP W-126/128A.4, BMP Interior Wall, 135 cubic yards
February 19, 2010, BAP Topping Slabs 141/150, 16 cubic yards
February 19, 2010, BMP W-217.2, BMP Interior Wall, 41 cubic yards
February 19, 2010, BMP F-210/212.1, BMP Elevated Floor, 185 cubic yards
February 24, 2010, BMP W-126.5, BMP Interior Wall, 50 cubic yards
February 25, 2010, BMP F-301, BMP Elevated Floor, 337 cubic yards
February 27, 2010, BMP F-218, BMP Elevated Floor, 17 cubic yards
March 3, 2010, BAP W-108A.3, BAP Interior Wall, 15 cubic yards
March 4, 2010, Gabion Wall 001.3.1, Exterior Wall, 29 cubic yards
March 5, 2010, BSR W-202.1, BSR Interior Wall, 180 cubic yards
March 5, 2010, BMP F-211.1, BMP Elevated Floor, 30 cubic yards
March 6, 2010, BMP F-123, BMP Elevated Floor, 84 cubic yards
March 6, 2010, BMP W-218.1, BMP Interior Wall, 29 cubic yards
March 16, 2010, BMP W-128.5, BMP Interior Wall, 38 cubic yards
March 17, 2010, BMP W-217.4, BMP Interior Wall, 47 cubic yards
March 17, 2010, Gabion Wall 000.3, 55 cubic yards
March 18, 2010, BMP W-217.5/213B.1, BMP Interior Wall, 100 cubic yards
March 18, 2010, BSR W-103.7.1, BSR Interior Wall, 38 cubic yards
March 18, 2010, BMP W-218.2/214.5, BMP Interior Wall, 102 cubic yards
March 19, 2010, BMP F-225, BMP Elevated Floor, 4 cubic yards
March 19, 2010, BMP W-215A.6, BMP Interior Wall, 40 cubic yards
March 19, 2010, BMP F-302, BMP Elevated Floor, 260 cubic yards
March 19, 2010, BMP F-211, BMP Elevated Floor, 250 cubic yards
March 29, 2010, BMP W-126A.1, BMP Interior Wall, 66 cubic yards
March 31, 2010, BMP W-218.3 S line, BMP Interior Wall, 30 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.

During the inspection period, the inspectors evaluated the adequacy of ongoing structural concrete activities conducted by Baker Concrete Construction Inc., Alberici Construction, Soils Materials Engineering Excellence (S&ME) (formerly QORE) and MOX Services. This inspection focused primarily on steel reinforcement storage and handling, steel reinforcement specifications, and the concrete testing laboratory. MOX Services' Construction Specification, DCS01-BKA-DS-SPE-B-09328-3, Section 03201, Concrete Reinforcement for Quality Level 1a (IROFS), 2, 3, and 4, Rev. 3, and DSC01-BKA-DS-SPE-B-09330-4, Section 03301, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3, and 4, Rev. 4, were reviewed for adequacy. QA documentation and implementation procedures were also reviewed by the inspectors to verify whether activities performed onsite were in accordance with internal procedures, specifications and NRC regulations.

(2) Conclusions

The inspectors concluded that embedded plates were properly installed; cleanliness was adequate, concrete testing activities were adequate and concrete placement activities were appropriate (PSSC-036). Installation of reinforcement bar will be discussed in the following sections. No items of safety significance were identified.

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

(1) Scope and Observations

This portion of the inspection focused on the structural concrete activities associated with safety related construction of PSSC-036. The intent of the inspection was to determine, by direct observation and independent evaluation, whether work and inspection performance related to the QL-1 structural concrete construction activities were accomplished in accordance with design specifications, drawings, procedures, and regulatory requirements. The inspection focused on reinforcing steel installation, concrete pre-placement preparation, bending reinforcing bars, and placement procedures.

The inspectors reviewed PP11-26, MOX Construction Material Management Storage, Handling and Control of Material, Rev. 2, and PP3-28, Quality Control Receiving Inspection, Rev.2, for adequacy. The inspectors observed storage of QL-1 embed plates after receipt inspection located in the Lay-down Yard Release 1 to verify proper identification, storage and segregation of non-conforming items in accordance with procedures. The inspectors also observed in-process installation of embed plates to the forms. Receipt Inspection Reports (RIR) for embed plates receipt inspections and Non-Conformance Reports related to embed plates listed in the "Records and Documents Reviewed" section were reviewed to verify proper documentation. The inspectors interviewed QC receipt inspection personnel to determine if proper procedures were used during their receipt inspections of embed plates. Specification DCS01-BKA-DS-CGD-M-65829-0, Commercial Grade Dedication Evaluation for Steel plates QL-1, IROFS, was reviewed for adequacy. The procurement documents between MOX Services and the embed plates supplier, Specialty Maintenance & Construction, Inc. (SMCI), were reviewed to verify that applicable regulations were included. The inspectors also reviewed procedure PP3-12, Supplier Evaluation, Rev. 9, and QA Audit Report, SMCI-09-VE38, for the latest audit performed to evaluate SMCI, to verify it was in accordance with procedures. No findings of safety significance were identified.

The inspectors observed concrete pre-placement activities, including in process installation of reinforcing bars, for the BSR area W103.7.1 and BMP area W128 on March 9, 2010. Field drawings 1612, 1614, 1615, associated with these concrete placements were reviewed and found to be adequate. Reinforcing steel was properly installed in the areas verified by the NRC inspectors. Exceptions to design were documented by the applicant within the ECR requirements. The inspectors observed, in process, reinforcing bar bending for fabricating special shape bars. MOX Services Construction Specifications DCS01-BKA-DS-SPE-B-09328-3, Section 03201, Concrete Reinforcement for QL 1a (IROFS), 2, 3, and 4, Rev. 3, DCS01-BKA-DS-SPE-B-09325-4, Construction Specification Section 03051, Mixing and Delivering for Quality Level 1a (IROFS), and DSC01-BKA-DS-SPE-B-09330-4, Section 03301, Placing Concrete and Reinforcing Steel for QL 1, 2, 3, and 4, Rev. 4 were reviewed for adequacy. PP11-12, Placement of Concrete, Embedded Structural Items and Accessories, Rev. 0, PP11-45, Bending Reinforcing Steel, Rev. 1, and PP11-4, Batch Plant Mix Design and Validation Instructions, Rev. 0 were reviewed and found to be adequate. The inspectors held discussions with MOX Services staff about the different types of concrete mix designs, and quality assurance controls implemented to ensure the use of the correct design concrete mix.

(2) Conclusion

The inspectors concluded that observed rebar and embedded plates were properly installed, cleanliness was adequate, and concrete pre-placement activities were appropriate. No findings of safety significance were identified.

c. Bending of Embedded Reinforcement Bar (PSSC-036)

(1) Scope and Observations

During January 2010, the inspectors noted that numerous embedded hook reinforcement bars in the BAP precast slabs (BAP topping slabs F-123, F-150 and F-141) were being bent to allow placement of floor reinforcement. Once the floor reinforcement was installed the hook reinforcement bars were being bent back to original position as close as possible. A subsequent review of the work package found that bending of the bars was controlled by Design Specification DCS01-BKA-DS-SSPE-B-09330-4, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3, and 4. Section 3.3 C.8 of this specification specified that for bending bars that the bar temperature must be greater than 60 degrees for the first bend, must be 1,100 to 1,200 degrees for the second bend and must be visually examined for cracking following either bending process. The inspector noted that both the first and second bends were/or had been performed at temperatures less than 60 degrees and that no visual examinations had been documented.

10 CFR 50, Appendix B, Criterion V and the applicant's MPQAP, Section 5 require that "quality affecting activities are prescribed by and performed in accordance with documented, approved QA procedures and other implementing documents (drawings, specifications, etc) appropriate to the MOX Project work scope." Contrary to this requirement, during January 2010, quality affecting activities were not performed in accordance with design specification DCS01-BKA-DS-SSPE-B-09330-4, Placing Concrete and Reinforcing Steel for Quality Level 1, 2, 3, and 4, in that the minimum temperature requirements for bending the reinforcement bar had not been met and inspections for cracking had not been performed or documented. The failure to meet the

minimum temperatures for bending the reinforcement bar and the lack of documented inspections for indications of cracking is considered to be a violation and is identified as the first example of VIO 70-3098/2010-001-002, Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents. This issue was captured in the certificate holder's corrective action program as NCR CE-10-1585 and CR-10-58.

(2). Conclusions

The first example of a violation was identified for failure to ensure that quality affecting activities are provided and performed with QA approved documents, in that the applicant failed to meet procedural requirements for bending numerous embedded reinforcement bars in the BAP precast slabs.

d. Guidance for Determining Proper Reinforcement Bar Placement (PSSC-036)

(1) Scope and Observations

The inspectors noted that BAP W-110 was nearing completion and that the vertical lap reinforcement extending out of the walls below site elevation 0'-0" did not meet maximum clear cover requirements. The assigned QC inspector was asked to provide justification for the non conformance. The QC inspector provided an engineering evaluation, ECR 00-3281, dated December 21, 2009. A review of ECR 00-3281 by the NRC inspector noted that the evaluation was limited to BAP walls with maximum clear cover non conformances below elevation 0'-0" and did not provide the needed evaluation for the non conformances noted with wall BAP W-110 which was above elevation 0'-0". On March 22, 2010, NCR 10-1733 was initiated to address the maximum clear cover non conformances with the west side of wall BAP W-110. On March 26, 2010, NCR 10-1768 was initiated to address the maximum clear cover non conformances with the east side of BAP W-110. ECR-6190 was completed and provided technical justification for the maximum clear cover non conformances noted in the two above NCRs.

10 CFR 50, Appendix B, Criterion V and MPQAP, Section 5 require that "quality affecting activities are prescribed by and performed in accordance with documented, approved QA procedures and other implementing documents (drawings, specifications, etc) appropriate to the MOX Project work scope." Contrary to this requirement, during March 2010, quality affecting activities were not performed in accordance with proper implementing documents in that ECR 00-3281 which provided justification for maximum clear cover non-conformances below elevation 0'-0" was being used to justify maximum clear cover non-conformances above elevation 0'-0" in the BAP building. The inspectors noted that the justifications provided in ECR 00-3281 did not apply to justify maximum clear cover non-conformances above elevation 0'-0". Using an inappropriate engineering evaluation to justify non conformances with maximum clear cover was considered to be a violation and is identified as the second example of VIO 70-3098/2010-001-002, Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents. This issue was captured in the applicant's corrective action program as NCR CE-10-1733, NCR QC-10-1768, ECR-6190 and Condition Report CR-10-161.

(2). Conclusions

The second example of a violation was identified for failure to ensure that quality affecting activities are provided and performed with QA approved documents, in that the applicant failed to meet procedural requirements in that an inappropriate engineering evaluation was being used to justify non-conformances with maximum clear cover in BAP W-110.

e. Guidance for Ensuring that Wall Framework is Positioned Within Design Tolerances (PSSC-036)

(1) Scope and Observations

Following the placement of BMP elevated floor BMP F-302, during the week of March 22, 2010, the inspector observed the survey results for placement of the third level walls associated with BMP W-314. The survey indicated that the "T" line wall in BMP W-314 did not meet minimum clear cover on the west side and did not meet maximum clear cover on the east side. The inspector observed that the "T" line wall on the second floor of the BMP (BMP W-214) was not in the same position/plane as the third level wall and was misaligned by approximately 1.75 inches. This misalignment caused the third level reinforcement bars to not meet the minimum and maximum clear cover requirements. BMP W-214 also did not meet the American Concrete Institute (ACI)-117, Section 4.1 requirements for deviation from wall plumb which is a maximum of +/- 1 inch for the complete structure and less than 0.3 percent of the wall height. For BMP W-214 a maximum of approximately ¾ inch would be allowed for deviation from plumb.

The inspector reviewed the guidance provided in the work package for verification steps that the walls were plumb. The work package provided a pre-placement check of wall vertical alignment, but failed to provide a post placement check for wall vertical alignment. Because of the tight tolerances for maximum clear cover, post placement plumb alignment of the walls is necessary in order to prevent exceeding ACI Code requirements related to maximum clear cover ("d" dimension). The inspector also noted that guidance provided by ACI 347, Guide to Formwork for Concrete, Section 3.6.2 states that "During and after concreting, but before initial set of the concrete, the vertical alignment of formwork systems should be checked...Formwork should be continuously watched so that any corrective measures found necessary can be promptly made."

10 CFR 50, Appendix B, Criterion V and the MPQAP, Section 5 require that "quality affecting activities are prescribed by and performed in accordance with documented, approved QA procedures and other implementing documents (drawings, specifications, etc) appropriate to the MOX Project work scope." During March 2010, quality affecting activities were not performed in accordance with proper implementing documents in that BMP W-214 was placed without ensuring that the ACI-117, Section 4.1 code requirements for wall vertical alignment were met. Actual vertical alignment was off by approximately 1.75 inches and the ACI-117 code allowable would have been approximately .75 inches. The failure to provide adequate procedural guidance for ensuring proper wall vertical alignment is considered to be a violation and is identified as the third example of VIO 70-3098/2010-001-002, Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents. This issue was captured in the certificate holder's corrective action program as NCR CE-10-1798, NCR QC-10-1810 and CR 10-173.

(2) Conclusions

The third example of a violation was identified for failure to ensure that quality affecting activities are provided and performed with QA approved documents, in that the applicant failed to provide procedural requirements in that adequate guidance for ensuring that wall vertical alignment was maintained during and following placement activities was not provided, which led to BMP W-214 being placed outside ACI-117 code vertical alignment requirements.

f. Concrete Testing (PSSC-036)

(1) Scope and Observations

During this inspection period, the inspectors observed the field testing of the concrete prior to placement and the field preparation of the concrete compressive test cylinders. No issues were identified concerning the field testing (slump, temperature, and air entrainment) and no significant issues were identified concerning storage of the cylinders prior to testing. The cylinder storage containers were observed to be properly heated for cold weather conditions. The inspectors reviewed the Concrete Statistical Summaries used to trend the results of the compressive test of the concrete cylinder specimens. The summaries indicated that the concrete installed at the MFFF met the design strength requirements.

(2). Conclusions

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). The inspectors noted that the temporary storage boxes were properly heated for the cold weather conditions. Testing to date indicates that the concrete placed at the MFFF met design strength requirements (PSSC-036). No items of safety significance were identified.

6. Geotechnical and Foundation Activities (IP 88131)

a. Scope and Observations

The inspection focused on the applicant's implementation of QL-1 geotechnical and foundation activities associated with PSSC-053 Waste Transfer Line. By document review and discussions with personnel performing activities related to the QL-1 activity the inspectors were able to determine whether activities were accomplished in accordance with design specifications, drawings, procedures, and regulatory requirements.

During the inspection, the inspectors reviewed completed QL-1 work packages as well as applicable project procedures and specifications for adequacy. The inspectors reviewed work package (WP) 09-10888-B2272-C-0013 and WP 09-10888-C-1935-OSUG-KLPTB-C. The inspectors reviewed MOX Services construction specification DCS01-WRT-DS-SPE-B-09307-2 Excavation, Backfilling and Compaction for Utilities, Rev. 2, and DCS01-WRT-DS-SPE-B-09304-3 Excavation, Backfilling, and Compaction for Structures, Rev. 3. The inspectors also reviewed PP9-19, Geotechnical Exploration and Testing, Rev. 1, PP11-26, Material Handling, Storage and Control, Rev. 1, PP11-25,

Control of Issued QL-1 and QL-2 Material, Rev. 0, as well as PP3-5, Control of Non-Conforming Items, Rev. 4.

The inspectors reviewed selected project procedures and other controls related to the use of the QL-1 backfill material used for the waste transfer line. MPQAP, Rev. 8, Section 5, Instructions, Procedures, and Drawings, requires, in part, that quality-affecting activities are prescribed by and performed in accordance with documented, approved QA procedures and other approved implementing documents. Section 5 further states, in part, that use of approved procedures for quality-affecting activities is an important management measure implemented to ensure consistent application of requirements. Specifically, the inspectors reviewed the following MOX Services Project Procedures:

- PP3-5, Control of Non-Conforming Items, Section 3.3.3, Control of Non-Conforming Items, states, in part, that QC for QL-1 shall ensure measures have been taken to control/prevent inadvertent use or installation of the nonconforming item.
- PP11-25, Control of Issued QL-1 and QL-2 Material, Section 3.3.1, Storage of QL-1 and QL-2 Material, states, in part, that QL-1 material that has been issued to the end user shall be protected and stored in an approved staging area. Section 3.3.1, further states, in part, that access to said staging areas shall be controlled and limited to personnel designated by the cognizant Subcontract Technical Representative (STR) and or the Subcontractor.
- PP11-26, Material Handling, Storage and Control, Section 3.7, Access Control, states, in part, that lay-down areas shall be secure and access shall be controlled by the Material Management Department. Section 3.8, Material Classification, states, in part, that Level D items may be stored outdoors in an area marked and designed for storage that is well drained; preferably gravel covered or paved.

The inspectors observed that the applicant failed to adequately implement procedures for the storage and control of QL-1 backfill material for PSSC-053, Waste Transfer Line. Documentation did not provide adequate guidance and procedures for the storage, control, and protection of QL-1 backfill material. On and before March 8 through 11, 2010, the applicant failed to adequately identify and segregate nonconforming soils, in that nonconforming soils received from the on-site borrow pit, and stored in the two designated stockpiling areas were not adequately segregated, nor were adequate precautions established to preclude inadvertent use. As a result, QL-1 backfill material was not controlled and stored consistent with MPQAP and project procedures. The fourth example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved, was identified for failure to implement adequate procedural guidance and control for QL-1 backfill material used for backfill of the waste transfer lines.

The inspectors also reviewed work packages WP 09-10888-B2272-C-0013 and WP 09-10888-C-1935-OSUG-KLPTB-C that contained information related to PSSC-053 Radioactive Waste Lines and the Thrust Block associated with the Radioactive Waste Lines, respectively. The QL-1 work packages documented geotechnical results, hydrostatic leak test results, as well as appropriate QC signoffs and QC hold points. Hydrostatic leak test results were in compliance with PP11-46 Hydrostatic/Pneumatic Test Procedure. The backfill material test results for the on-site borrow pit were included in the work package and contained results for dry density, moisture content, specific gravity, liquid limit plasticity determinations, and gradation. The inspectors reviewed

these results to verify adequacy of material used according to MOX Services construction specification DCS01-WRT-DS-SPE-B-09307-2, Rev. 2.

MPQAP, Rev. 8, Section 11, Test Control, states, in part, that test planning shall include identification of items to be tested, test requirements and acceptance limits, including levels of precision and accuracy. Section 11, Test Control, further states, in part, that test results shall be documented and their conformance with acceptance criteria shall be evaluated by a qualified individual within the responsible organization to ensure that test requirements have been satisfied.

The inspectors observed that the applicant failed to adequately identify test requirements and evaluate test results for QL-1 backfilling activities pertaining to PSSC-053, Waste Transfer Line; thus resulting in the installation of nonconforming material. Specifically, sample number SF-12 of test report number 41184, dated July 29, 2009, did not meet specification acceptance criteria stated in construction specification DCS01-WRT-DS-SPE-B-09307-2, Rev. 2. Field density reports numbered 41948, 41964, 41999, 42001, dated during August 11-19, 2009, provided information regarding material from the representative SF-12 sample being used as QL-1 bedding, haunching, and initial backfill. This condition was captured by the applicant in Nonconformance Report EN-10-1737, dated March 22, 2010.

The inspectors also identified that controls necessary to verify conformance of QL-1 fill material did not adequately identify all items to be tested as required by ASME NQA-1-1994 Part II, Subpart 2.5, Section 5, Inspection of Soils and Earthwork, which MOX Services was committed to without exceptions as stated in Attachment I of the MPQAP. MOX Services construction specification DCS01-WRT-DS-SPE-B-09307-2 listed the tests to be performed and inspected. However, the specification was not in full compliance with testing requirements in NQA-1, Subpart 2.5, Subsection 5, Inspection of Soils and Earthwork. American Society for Testing Materials (ASTM) D422, D1557, D2216, D2922, D3017 and D4318 tests were being performed; however, ASTM D4253 and D4254 were not being performed in accordance with Subsection 5. Specifically, construction specification DCS01-WRT-DS-SPE-B-09307-2 did not make provisions for maximum and minimum index density of soils using ASTM D4253 and ASTM D4254; nor did test documentation provide evidence of required data.

VIO 70-3098/2010-001-003: Failure to Adequately Identify Test Requirements and Evaluate Test Results for QL-1 Backfilling Activities pertaining to PSSC-053, Waste Transfer Line was identified for the failure to adequately evaluate test results, as well as identify and perform all test requirements for QL-1 backfilling activities pertaining to PSSC-053, Waste Transfer Line. This resulted in installation of nonconforming material.

b. Conclusion

The fourth example of VIO 70-3098/2010-001-002: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved, was identified for failure to provide adequate procedural guidance and control for QL-1 backfill material for PSSC-053, Waste Transfer Line.

VIO 70-3098/2010-001-003: Failure to Adequately Identify Test Requirements and to Evaluate Test Results, was identified for failure to adequately identify necessary test requirements and to properly evaluate test results for QL-1 backfilling.

7. **Quality Assurance: Program Development and Implementation (IP 88106)**

a. Scope and Observations

The inspectors reviewed selected elements of the applicant's functional organization and criteria of the QA programmatic structure. The elements were reviewed to ensure that the QA program was implemented in accordance with the MPQAP. Elements selected for inspection included the organizational structure and classification of structures, systems, and components.

The roles, responsibilities, and programmatic interfaces of the various functional areas of the project were defined in the QA program. In addition to verifying the roles and responsibilities, the lines of authority, delegation of authority, functional responsibilities, and interfaces for managing, performing and execution of work were properly defined, established and functioning.

The inspectors discussed with the applicant the association of CAR safety functions and CAR events to integrated safety analysis summary (ISAS) safety functions and ISAS events along with the association of ISAS events with the IROFS and components. In addition, the inspectors noted that the applicant was in the process of associating the various IROFS with each PSSC. Lastly, the inspectors discussed with the applicant the PSSC construction schedule and the level of detail provided in the schedule.

b. Conclusions

The roles, responsibilities, and programmatic interfaces of the various functional areas of the project were acceptable. Adequate information pertaining to construction scheduling activities of the PSSCs was provided. No items of safety significance were identified.

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

a. Scope and Observations

NCRs, CRs, and ECRs generated by the applicant were reviewed to verify the proper documentation and resolutions of problems identified onsite. The inspectors noted that these items were adequately documented in the Corrective Action Program. Review of MOX Services' procedures and interviews with the applicant's staff confirmed that a process exists for documenting and reporting conditions adverse to quality to appropriate levels of management responsible for the conditions, and to the organization responsible for the condition.

The inspectors determined that the applicant had established adequate procedures for the identification and resolution of conditions adverse to quality, as required by Section 16, Corrective Action, of the MPQAP.

b. Conclusions

The applicant had established a program and procedures that adequately implemented the corrective action program in accordance with the applicant's MPQAP. No items of safety significance were identified.

9. **Follow-up of Previously Identified Items**

- a. Unresolved Item (URI) 70-3098/2009-004-001: Review of Applicant's Evaluation of Column Design Changes, was reviewed for disposition.

1. Scope and Observations

During NRC inspection from October 19-22, 2009, the inspectors reviewed MOX Services design and document controls for proper implementation in accordance with MPQAP, Rev. 8. The inspectors noticed that several columns and piers within the MFFBS were constructed differently from the original design and some were accepted "use as is" and some of the columns were modified through the ECR process. URI 70-3098/2009-004-001: Review of Applicant's Evaluation of Column Design Changes, was opened in NRC Inspection Report 70-3098/2009-004 because more information was necessary to determine the adequacy of the applicant's design evaluation of the columns. After further review of applicant's evaluation, it was noted that the approved design change in ECR 1833 did not include an adequate evaluation to justify the design change implemented. This resulted in the lack of assurance that the approved design change was adequate. This issue was dispositioned as the second example of VIO 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes.

2. Conclusion

URI 70-3098/2009-004-001: Review of Applicant's Evaluation of Column Design Changes, was closed and dispositioned as the second example of VIO 70-3098/2010-001-001: Failure to Provide Adequate Design Review for Design Changes.

- b. Apparent Violation (AV) 70-3098/2009-009-001: Completeness and Accuracy of Information.

1. Scope and Observations

NRC Inspection Report 70-3098/2009-009 referred to an investigation initiated on July 29, 2008, by the U.S. Nuclear Regulatory Commission's (NRC) Office of Investigations (OI) at the MFFF. The purpose of the investigation was to review the facts and circumstances surrounding the falsification of vendor data review forms (travelers) and the submission of incomplete and inaccurate information to the NRC. Based on the results of the OI investigation, an apparent violation (AV) of NRC requirements was identified. MOX Services requested Alternative Dispute Resolution (ADR) with the NRC in an attempt to resolve this issue. In a letter dated November 24, 2009, a Confirmatory Order was issued to MOX Services as a result of a successful ADR session. In consideration of the commitments discussed in the Confirmatory Order, the NRC agreed to refrain from issuing a Notice of Violation or other enforcement action for the matters discussed in the NRC's letter to MOX Services of July 29, 2009 (EA-09-117). The NRC will evaluate the implementation of MOX Services commitments during future inspections. For administrative purposes, AV 70-3098/2009-009-001 will be closed.

2. Conclusion

AV 70-3098/2009-009-001: Completeness and Accuracy of Information, was administratively closed based on the successful results of the ADR session.

10. Exit Interviews

The inspection scope and results were summarized throughout this reporting period by the senior resident inspector on April 1, 2010 and region based inspectors on March 4 and March 11, 2010. 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 this report.

1. PARTIAL LIST OF PERSONS CONTACTED

Applicant Personnel

M. Bagale, Vice President Process Unit Design and Commissioning
F. Carter, Civil/Structural Engineering Manager
R. Daniels, Lead Chemical and Mechanical Engineer Manager
J. Gomez, Electrical/I&C Engineering 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. Peregoy, Quality Control Manager
G. Shell, Project Assurance Manager
D. Stinson, President and Chief Operating Officer
K. Trice, Vice President Facility Design and Construction
R. Whitley, Quality Assurance/Quality Control Manager

Other individuals contacted included supervisors, engineers, and inspection, measurement, and testing technicians.

2. INSPECTION PROCEDURES (IPs) USED

IP 88106 Quality Assurance: Program Development and Implementation
IP 88107 Quality Assurance: Design and Documentation Control
IP 88110 Quality Assurance: Problem Identification, Resolution and Corrective
IP 88130 Resident Inspection Program for On-Site Construction Activities
IP 88131 Geotechnical/Foundation Activities
IP 88132 Structural Concrete Activities

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
70-3098/2009-04-01	Closed	URI: Review of Applicant's Evaluation of Column Design Changes (Section 9)
70-3098/2009-09-01	Closed	AV: Completeness and Accuracy of Information (Section 9)
70-3098/2010-01-01	Open	VIO: Failure to Provide Adequate Design Review for Design Changes, two examples (Sections 3 and 9)
70-3098/2010-01-02	Open	VIO: Failure to Ensure that Quality Affecting Activities are Prescribed and Performed with QA Approved Documents, four examples (Sections 4.c, 4.d, 4.e and 6)

70-3098/2010-01-03 Open

VIO: Failure: Failure to Adequately Identify Test Requirements and Evaluate Test Results (Section 6).

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ADAMS	Agency-Wide Document Access and Management System
ASTM	American Society of Testing and Materials
AV	Apparent Violation
BAP	Aqueous Polishing Building
BMF	Fuel Manufacturing Building
BMP	MOX Process Building
BSR	Shipping Receiving Building
CAR	Construction Authorization Request
CES	Concrete Engineering Specialists
CFR	Code of Federal Regulations
CR	Condition Report
DAR	Deficiency Action Request
ECR	Engineering Change Request
FCSS	Fuel Cycle Safety and Safeguards
IP	Inspection Procedure
IROFS	Item Relied on for Safety
MFFBS	MOX Fuel Fabrication Building Structure
MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
MPQAP	MOX Project Quality Assurance Plan
NCR	Nonconformance Report
NDT	Non-Destructive Testing
NMSS	Nuclear Materials Safety and Safeguards
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
OI	Office of Investigation
PP	Project Procedure
PSSC	Principle Structures, Systems, and Components
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
QORE	Construction Materials Testing Laboratory
Rebar	Reinforcing bar
Rev.	Revision
RIR	Receipt Inspection Report
SDR	Supplier Deficiency Report
S&ME	Soils Materials Engineering Excellence
SMCI	Specialty Maintenance and Consulting, Inc.
STR	Subcontract Technical Representative
URI	Unresolved Item
VIO	Violation
WP	Work Package

5. LIST OF PSSCs REVIEWED

PSSC-036 MOX Fuel Fabrication Building Structure (including vent stack)
 PSSC-053 Waste Transfer Line

6. LIST OF DOCUMENTS REVIEWED

Shaw/Areva MOX Services Procedures:

PP3-5, Control of Non-Conforming Items, Rev. 4
 PP3-12, Supplier Evaluation, Rev. 9
 PP3-28, Quality Control Receiving Inspection, Rev. 2
 PP8-6, Licensing Basis Configuration Management, Rev. 7
 PP9-3, Design Control, Rev. 16
 PP9-3, Design Control, Rev. 17
 PP9-6, Calculations, Rev. 9
 PP9-14, Design Process, Rev. 4
 PP9-18, Commercial Grade Item Evaluations, Rev. 4
 PP9-19, Geotechnical Exploration and Testing, Rev. 1
 PP9-21, Engineering Change Requests, Rev. 6
 PP9-21, Engineering Change Requests, Rev. 7
 PP11-4, Batch Plant Mix Design and Validation Instructions, Rev. 0
 PP11-12, Placement of concrete, Embedded Structural Items and Accessories, Rev. 0
 PP11-25, Control of Issued QL-1 and QL-2 Material, Rev. 4
 PP11-26, MOX Construction Material Management Storage, Handling and Control of
 Material, Rev. 2
 PP11-45, Bending Reinforcing Steel, Rev. 1
 PP11-46, Hydrostatic/Pneumatic Test Procedure, Rev. 0

Other Procedures:

CTL-NDT-MOX-001: Procedure for NDT of Concrete Wall Repairs and Embed Plates,
 dated 4/16/09
 MOX Services Transmittal of Submittals and Request for Approval from SMCI,
 Transmittal number 10888P2575-ST-00019 (SMCI procedure with traveler
 instructions)

Condition Reports (CR):

CR 2009-0244
 CR 2009-0259
 CR 2009-0450
 10888-MOX-CR-10-096
 10888-MOX-CR-10-101
 10888-MOX-CR-10-102
 10888-MOX-CR-10-112
 10888-MOX-CR-10-123

Non-Conformance Reports (NCR):

NCR QC 2009-0870-S

NCR QC 2009-0906
NCR QC 2009-0929 S
NCR BK 2009-0953-S
NCR QC 2009-0978
NCR QC 2009-0983-S
NCR QC 2009-1014
NCR EN 2010-1737
NCR EN 2010-1748

Engineering Change Request (ECR):

ECR-000664
ECR-001792
ECR-000376
ECR-000426
ECR-002628
ECR-004194
ECR-001770
ECR-001833
ECR-003282
ECR-003540
ECR-002882
ECR-002067
ECR-005934
ECR-005932

Specifications

DCS01-BKA-DS-SPE-B-09330-4, Construction Specification Section 03301, Placing Concrete and reinforcing Steel for Quality Level 1, 2, 3, & 4
DCS01-BKA-DS-SPE-B-09328-3, Construction Specification Section 03201, Concrete Reinforcement for Quality Level 1a (IROFS), 2, 3, & 4
DCS01-AAJ-DS-DOB-B-40103-2, NNSA Technical Baseline, Basis of Design for Structures, Quality Level 1a (IROFS)
DCS01-BKA-DS-SPE-B-09325-4, Construction Specification Section 03051, Mixing and Delivering for Quality Level 1a (IROFS)
DCS01-BKA-DS-CGD-M-65829-0, Commercial grade dedication Evaluation for Steel plates QL-1, (IROFS)
DCS01-WRT-DS-SPE-B-09307-2, Construction Specification, Section 02316-Excavation, Backfilling, and Compaction for Utilities, Quality Level 1a (IROFS)
DCS01-WRT-DS-SPE-B-09304-3, Excavation, Backfilling, and Compaction for Structures
DCS-01-BKA-DS-CGD-M-65905-0, Commercial Grade Item Evaluation for Fill Material From Onsite Borrow Pit, Quality Level 1, IROFS

Drawings:

Condor Rebar Consultants, Inc. Vendor Drawings:

1612 Rev. 1
1614 Rev. 1

1615 Rev. 1

Receipt Inspection Reports

QC-RIR-09-6384
QC-RIR-09-6722
QC-RIR-09-8962

Audit Reports

SMCI-09-VE38, SMCI Quality Assurance Program, dated 5/27/09

Work Packages:

WP-08-DE-AC56-99CH10888-C-0003
WP 09-10888-B2272-C-0013
WP-09-10888-C-1935-OSUG-KLPTB-C
WP-09-20888-C-2935-OSUG-KLPTB-C

Miscellaneous Documents

DCS 08716-10888-B-00003467_00000-0004-A, MB500 Mix Design
DCS01-AAJ-DS-ECA-D-40124-1, NNSA Technical Baseline, MFFF Deviation Log
Quality Level 1a (IROFS)
DCS01-BMF-DS-PLF-B-01352-14, MFFF-BMF Area Concrete and Reinforcing General
Notes
Approved Supplier List, Rev. 77, dated 2/9/10
Approved Commercial Grade Vendors List, Rev. 16, dated 2/8/10
CES Concrete Consolidation Report 08716-10888-S-00003274-003
08716-00002575-0115-A, SMCI Commercial Grade Dedication Critical Characteristics
Verification, dated 1/12/10
Solicitation # 10888-R-22784, Contract between SMCI and Shaw Areva MOX Services,
LLC, issued 5/16/08
Solicitation # 10888-R-50065, Contract between CES and Shaw Areva MOX Services,
LLC, issued 3/23/09
Deficiency Action Request (DAR) 07-026
IER M333-09-016
IER M333-09-006-007