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

February 10, 2012

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

SUBJECT: MIXED OXIDE FUEL FABRICATION FACILITY- NRC INSPECTION REPORT NO. 70-3098/2011-004

Dear Mr. Trice:

During the period from October 1 through December 31, 2011, the US Nuclear Regulatory Commission (NRC) completed inspections pertaining 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 this inspection, no violations or deviations were identified.

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.

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

Deborah A. Seymour, Chief
Construction Projects Branch 1
Division of Construction Projects

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

Enclosure: NRC Inspection Report 70-3098/2011-004 w/attachment

cc w/encl: (See next page)

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Letter to Kelly Trice, President and Chief Operating Officer from Deborah Seymour, Chief Division of Construction Projects, Construction Projects Branch 1 dated February 10, 2012.

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-3098
Construction Authorization No.:	CAMOX-001
Report No.:	70-3098/2011-004
Applicant:	Shaw AREVA MOX Services
Location:	Savannah River Site Aiken, South Carolina
Inspection Dates:	October 1 – December 31, 2011
Inspectors:	M. Shannon, Senior Resident Inspector, Construction Projects Branch 1 (CPB1), Division of Construction Projects (DCP), Region II (RII) B. Adkins, Resident Inspector, CPB1, DCP, RII L. Castelli, Senior Construction Inspector, Construction Inspection Branch 1 (CIB1), Division of Construction Inspection (DCI), RII B. Davis, Senior Construction Inspector, Construction Inspection Branch 2 (CIB2), DCI, RII L. Dumont, Construction Inspector, CIB1, DCI, RII D. Edwards, Construction Project Inspector, CPB1, DCP, RII E. Heher, Construction Inspector, CIB2, DCI, RII D. Failla, Construction Inspector, Construction Inspection Branch 3 (CIB3), DCI, RII T. Fanelli, Construction Inspector, CIB1, DCI, RII W. Gloersen, Senior Project Inspector, CPB1, DCP, RII D. Harmon, Construction Inspector, CIB3, DCI, RII C. Jones, Senior Construction Inspector, CIB1, DCI, RII N. Karlovich, Construction Inspector, CIB1, DCI, RII A. Masters, Senior Construction Inspector, CIB2, DCI, RII J. Seat, Construction Inspector, CIB2, DCI, RII S. Smith, Senior Construction Inspector, CIB2, DCI, RII J. Vasquez, Construction Inspector, CIB2, DCI, RII

Enclosure

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D. Tiktinsky, Senior Project Manager, MODB, FCSS

Approved by: D. Seymour, Branch Chief, CPB1, DCP, RII

EXECUTIVE SUMMARY

Shaw AREVA MOX Services
Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF)
NRC Inspection Report No. 70-3098/2011-004

The scope of the inspections encompassed a review of various MFFF activities related to Quality Level (QL)-1 construction for conformance to NRC regulations, the Construction Authorization Request (CAR), the MOX Project Quality Assurance Plan (MPQAP), and applicable industry standards. This included, as applicable, the following inspection attributes: quality assurance program development and implementation; design control; control of materials, equipment, and services; inspection; test control; control of measuring equipment; problem identification, resolution, and corrective action; 10 CFR Part 21 inspection; software quality assurance; control of the electronic management of data; supplier/vendor inspection; inspection of safety function interfaces; structural concrete; mechanical components; instrumentation and control systems; pipe supports and restraints; nuclear welding; and structural welding. The inspections also focused on Shaw AREVA MOX Services' (MOX Services) oversight of subcontractor activities. The inspectors reviewed applicable portions of the MOX Services' program to assess the adequacy of the program and whether it was effectively implemented.

The principle systems, structures and components (PSSCs) discussed in this inspection report include: PSSC-009, Criticality Controls; PSSC-011, Electrolyzer Structure; PSSC-023, Fluid Transport Components; PSSC-024, Gloveboxes; PSSC-026, Guide Sleeves; PSSC-031, Material Handling Controls; PSSC-032, Material Handling Equipment; PSSC-036, MOX Fuel Fabrication Building Structure (including vent stack); PSSC-039, Polytetrafluroethylene (PTFE) Insulator; and PSSC-048, Sintering Furnace. Non-PSSCs discussed in this inspection report included quality assurance program implementation.

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

Resident Inspection Program for On-Site Construction Activities (Inspection Procedure (IP) 88130) and Inspection of Safety Function Interfaces (IP 88116)

Routine inspections were conducted by the resident inspectors from October 1 – December 31, 2011. The inspections involved the observation and evaluation of the applicant's programs for facility construction of PSSCs and included non-PSSC related activities related to inspection of design control; control of materials, equipment and services; inspection; problem identification, resolution, and corrective action; safety function interfaces; and mechanical components. Construction activities were performed in a safe and quality related manner and in accordance with procedures and work packages. No findings of significance were identified (Section 2).

PSSC Related Inspections

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

The inspectors concluded that the software safety and performance requirements for safety programmable logic controller (SPLC) NNJ*SPLC0001 for the MFFF were adequately translated to the Software Requirements Specification (SRS) and were assessed to be traceable to the

applicant's software requirements identified in the design/licensing basis documents. No findings of significance were identified. (Section 3.a)

The review determined that MOX Services' oversight was adequate and the supplier/subcontractor for the safety programmable logic controllers (SPLC) had adequately translated the MOX Services software safety requirements for NNJ*SPLC0001 to the software requirements specification (SRS) and adequately completed verification and validation reviews. No findings of significance were identified (Section 3.a).

PSSC-011, Electrolyzer Structure; PSSC-026, Guide Sleeves; and PSSC-039, Polytetrafluroethylene (PTFE) Insulator

MOX Services performed adequate oversight of the vendor responsible for the manufacture of the electrolyzer structure, guide sleeves, and PTFE insulator in the areas of procurement; test control; control of materials, equipment, and services; corrective action; special processes; and quality assurance. No findings of significance were identified (Section 3.b).

PSSC-023, Fluid Transport Systems

Welding activities related to PSSC-023 as described in Table 5.6-1 of the MFFF CAR were adequately performed in accordance with MOX Services welding specifications, American Welding Society D1.6, 1999, Structural Welding Code - Stainless Steel; and American Society of Mechanical Engineers B31.3, 1998, Process Piping, code requirements. No findings of significance were identified (Section 3.c).

PSSC-024, Gloveboxes

MOX Services performed adequate oversight of the vendor responsible for the manufacture of the electrolyzer glovebox in the areas of procurement; corrective action; special processes; test control; and quality assurance. No findings of significance were identified (Section 3.d).

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

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

PSSC-048, Sintering Furnace

MOX Services performed adequate oversight of the vendors responsible for the manufacture of the sintering furnace in the areas of procurement; 10 CFR 21 compliance; inspection, test control, and control of measuring equipment; control of materials, equipment, and services; corrective action, special processes; and quality assurance. No findings of significance were identified (Section 3.f).

Non-PSSC Related Inspections

Quality Assurance: Program Development and Implementation (IP 88106)

The inspectors verified that the applicant had adequately implemented the management of self-assessments, quality assurance audits, and Quality Assurance (QA) indoctrination in accordance with the MPQAP and regulatory requirements. No findings of significance were identified (Section 4.a).

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

The inspectors verified that the applicant had adequately implemented inspection, test control and control of measuring and test equipment in accordance with the requirements of the MPQAP. No findings of significance were identified (Section 4.b).

Quality Assurance: Control of the Electronic Management of Data (IP 88113)

The inspectors verified that the applicant had adequately implemented the MPQAP requirements related to the control of the electronic management of data. No findings of significance were identified (Section 4.c).

Follow-up of Previously Identified Items (IP 88107, IP 88108, IP 88111, IP 88115)

The inspectors reviewed and evaluated MOX Services' corrective actions related to previously opened items. Based on the review of the associated documentation, the implemented corrective actions, and discussions with the applicant's staff, the following violations (VIO) and Unresolved Items (URI) were closed:

VIO 70-3098/2010-004-003, Failure to Accurately Translate Applicable Design Requirements to Design Documents
VIO 70-3098/2010-004-004, Failure to Maintain Accurate Procurement Documents
VIO 70-3098/2010-004-005, Failure to Ensure Supplier Services were in Accordance with Procurement Requirements.
URI 2010-004-007, Review of Receipt Inspection Documentation
URI 2010-004-008, Review of Embed Procurement Requirements

Inspector Follow-up Item (IFI) 70-3098/2010-004-009: Review of Commercial Grade Dedication Plan for Nelson Studs will remain open, to further review the implementation of the corrective actions associated with the commercial grade dedication of D2L deformed bars (Section 5).

REPORT DETAILS

1. Summary of Facility Status

During the period, the applicant continued construction activities of principle structures systems, and components (PSSCs). Construction activities continued related to Release 2, 3A and 3B activities which included multiple inside and outside walls, elevated floors, and roof of the Mixed Oxide (MOX) Process Building (BMP), Aqueous Polishing Building (BAP), and the Shipping Receiving Building (BSR). Shaw AREVA MOX Services (MOX Services) continued installation of Quality Level (QL)-1 tanks during this inspection period. Sixty-two tanks had been installed at the time of this inspection. The applicant continued with the application of coatings on the walls and ceilings of the BMP and BAP lower level rooms and hallways. Other construction activities included installation of process piping and supports in the BAP, installation of ventilation system ductwork and supports in the BAP and BMP, installation of cable trays (temporary supports) in the BAP and BMP, installation of conduit in the BAP and BMP, and installation of the rod storage racks in the BMP. The applicant continued to receive, store, manufacture, and test gloveboxes and process equipment at the Process Assembly Facility (PAF).

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

a. Scope and Observations

The inspectors routinely attended the applicant's construction plan-of-the-day meetings and civil engineering meetings. The inspectors routinely held discussions with MOX Services design engineers, field engineers, quality control/assurance personnel, batch plant personnel, steel workers, and subcontractors (Alberici, Superior, Electric Boat, Egizzi, SM&E) construction personnel in order to maintain current knowledge of construction activities and any problems or concerns.

The inspectors routinely reviewed the status of work packages maintained at various work sites. The inspectors monitored the status of work package completion to verify construction personnel obtained proper authorizations to start work, monitor progress and to ensure work packages were kept up-to-date as tasks were completed.

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

The inspectors routinely reviewed various corrective action documents. The review included non-conformance reports (NCRs), condition reports (CRs), root causes and supplier deficiency reports (SDRs); and reviewed the closure of selected NCRs and CRs. The inspectors concluded that the applicant was appropriately identifying conditions adverse to quality in their corrective action system. The applicant identified

these items during routine daily activities, special inspections, audits, and self assessments. The applicant routinely evaluated the significance of the adverse conditions, completed corrective actions in a timely manner, and properly evaluated adverse conditions for applicable reporting requirements. The inspectors noted that the applicant entered issues identified during self assessments into the corrective action system.

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

b. Conclusions

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

3. PSSC Related Inspections

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

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

(a) Scope and Observations

1) General

During the inspection conducted on October 17 - 20, 2011, the inspectors reviewed documents, interviewed applicant staff, and evaluated the implementation of the MOX Services software requirements phase for the safety programmable logic controller (SPLC) NNJ*0001. The inspectors assessed whether the software requirements were developed in accordance with the codes and standards committed to by the applicant as required by NRC regulations. Samples were selected from NNJ*0001 system performance and functional requirements to assess whether the traceability criteria were met. The inspectors reviewed the following documents: the Preliminary Hazard Analysis (PHA), Process Hazard Analysis (PrHA), System Requirements Specifications (SRS), SPLC Technical Specification, SPLC Procurement Specification, SPLC General Operating Principles, Safety Requirements Document (SRD), Nuclear Safety Evaluations (NSE), Nuclear Safety Criticality Evaluations (NSCE), and the Project Traceability Matrix (PTM). In addition, other documents reviewed are listed in the Records and Documents Reviewed section in the attachment of this inspection report.

2) Performance Requirements

The inspectors reviewed a sample of the system performance and functional requirements to assess whether traceability criteria were met. The inspectors reviewed the SPLC technical and procurement specifications. The inspectors assessed forward

and backward traceability between the SRD and the SRS using the PTM. The inspectors interviewed responsible personnel to clarify the translation of the system requirements into software specifications. The licensee took the initiative to develop a corrective action request, 10888-MOX-CR-11-598, to improve the clarity of the PTM. To assess the adequacy of the communication between the applicant and subcontractor, the inspectors reviewed a System Integration Deficiency Report documenting performance requirements issues.

3) Traceability of Nuclear Safety Requirements

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

4) Software Requirements Phase Documentation

The inspectors reviewed the Verification and Validation (V&V) Requirement Activity Summary Report to assess whether the V&V tasks, such as traceability analysis, software requirements evaluation, interface analysis, and criticality analysis, were documented in accordance with Institute of Electrical and Electronics Engineers (IEEE) 1012-1998, Software Verification and Validation.

The inspectors reviewed a triennial audit of Invensys to assess whether it was performed in accordance with the MOX Project Quality Assurance Plan (MPQAP) and the Quality Assurance (QA) audit procedure. The inspectors selected one audit finding and reviewed associated documentation to assess whether the applicant adequately addressed the audit finding. The inspectors selected a sample of engineering change requests (ECRs) to assess whether the proposed changes included adequate technical justification. The inspectors reviewed one condition report related to the requirements phase to assess whether it included adequate technical justification for the corrective actions listed.

The inspectors reviewed two supplier requests from Invensys that addressed internal consistency issues in the system requirement documents and the resulting engineering change request from Mixed Oxide Fuel Fabrication Facility (MFFF) to assess the corrective action process between the applicant and the vendor.

5) Software Requirements Safety Analysis

The inspectors traced three requirements in the PHA that required an interruption of the normal process to assess whether they were translated correctly into the SPLC GOP. The inspectors traced the PHA requirements using the SPLC GOP PTM to assess whether they were translated correctly into the SRS.

(b) Conclusion

The inspectors determined that no findings of significance were identified with the development of SRS, the translation of system requirements into the SRS, the interface process between the licensee and its subcontractor, Invensys, the applicant's disposition of ECRs, or the applicant's assessment of audit findings related to the software requirements phase.

(2) Vendor Software Quality (IP 88115, Supplier/Vendor Inspection (Construction Phase))

(a) Scope and Observations

1) Overview

An inspection of MOX Services oversight of subcontractor, Invensys, activities was conducted from December 5 – 16, 2011, by an independent review of the vendor's activities. The inspection was conducted to assess whether the Digital Instrumentation and Control (DI&C) software requirements phase development process met the requirements established in the licensing basis and was adequately implemented. In addition, Invensys' programs were inspected to verify compliance with 10 CFR Part 21 reporting requirements and Appendix B to 10 CFR Part 50 requirements for organizational independence, problem reporting and corrective action, and supplier controls.

The inspectors completed in-office reviews of MOX services and Invensys' project procedures from December 5 - 9, 2011. The second week of the inspection was conducted at Invensys' Lake Forest, California facility on December 12-16, 2011. The inspectors reviewed documents, interviewed MOX Services and Invensys staff, and evaluated the development and quality of SPLC NNJ*SPLC0001 software requirements and design phase activities.

The inspection activities areas included:

- Software Development Program
- Software Quality Assurance
- Independent Verification and Validation (V&V)
- Requirements Traceability and Translation
- V&V Requirements and Design Phase Documentation
- Software Safety
- Software Tools

2) Software Development Program

The inspectors reviewed Invensys Project Procedure Manual (PPM) and Quality Procedure Manual (QPM) and Project Quality Plan (PQP) to assess the adequacy of compliance to the MFFF licensing basis, Institute of Electrical and Electronics Engineers (IEEE) 1074-1997, Standard for Developing Software Life Cycle Processes; Regulatory Guide (RG) 1.173, Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants; IEEE 1012-1998, Standard for Software Verification and Validation; and RG 1.168, Verification, Validation, Reviews,

And Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants. The inspectors conducted interviews with Invensys and MOX Services personnel to clarify how the elements of the vendor development program met the MOX project requirements. The PPMs control the development of the safety control system and the QPM govern the quality activities at the Invensys Lake Forest Facility. The PQP governs control for the MOX project.

The inspectors reviewed the software development activities of the plutonium dioxide (PuO_2) Can Receiving and Emptying Unit Process Unit (NDD) to assess compliance with IEEE 1074-1997, Standard for Developing Software Life Cycle Processes, Section A.3, Development Activity Groups. The inspectors reviewed the MOX Services documents SRD, Nuclear Criticality Safety Evaluation – Designs (NCSE-Ds), Interface specification) and the Invensys phase output documents (Software Design Description (SDD), Software Requirements Specification (SRS)) to determine compliance with the activity groups required for development of a software project.

3) Software Quality Assurance

The inspectors reviewed the Invensys MOX Software Quality Assurance Plan (SQAP) and PPM 7.0, Application Program Development, to verify compliance with the requirements of IEEE 730-1998, Standard for Software Quality Assurance Plans.

The inspectors interviewed the project engineer and V&V manager, reviewed PPM 2.0, Design Control, sampled document review comment sheets (DRCS), and document review/release (DRR) sheets to verify that organizational independence between the design and V&V groups was implemented. The DRCSs reviewed were associated with the SDD, and the DRRs were associated with Revision 1 of the SRS and Revision 0 and 1 of the SDD.

The inspectors reviewed the training documentation for the project quality assurance engineer, the project engineer, a V&V reviewer, and the software design lead to verify that the training and certifications were in accordance with Invensys' SQAP, and corporate, quality, and program training procedures.

The inspectors interviewed the project quality assurance engineer and reviewed a software surveillance to verify it was performed in accordance with Invensys's procedures.

The inspectors reviewed Invensys' MOX project SQAP to verify that software quality assurance activities were implemented in accordance with the MPQAP, Invensys Nuclear Quality Assurance Manual (QM-2), and Invensys MOX PQP. The inspectors also reviewed the Invensys SQAP and PQP to verify they appropriately addressed 10 CFR Part 21 reporting requirements, and Appendix B to 10 CFR Part 50, requirements for organizational independence, problem reporting and corrective actions, and supplier controls. The inspectors selected a sample of Invensys' corrective action reports, NCRs, organizational descriptions, and supplier documentation to verify implementation of MOX project software requirements.

The inspectors conducted a review to determine if Invensys had issued any 10 CFR Part 21 evaluations or reports. In addition, the inspectors interviewed personnel to determine if sub-suppliers for software-related activities were required and if in-house commercial

grade dedication activities were expected for the MOX project. The inspectors completed a programmatic review and selected hardware component samples to verify implementation of MOX project requirements.

4) Verification and Validation (V&V)

The inspectors interviewed personnel and reviewed documentation related to V&V activities for MOX services project. The inspectors evaluated Invensys' Software Verification and Validation Plan (SVVP) for compliance with IEEE standard for Software Verification and Validation (IEEE 1012-1998) and RG 1.168, Revision 1; and to verify the plan addressed the required activities for all phases of the software lifecycle and requirements for an independent V&V organization. The inspectors reviewed the V&V Phase Summary Reports for both the requirements phase and the design phase. In addition, the inspectors reviewed the requirements and design phase task reports.

The inspectors reviewed PPM 7.01, Software Verification, and PPM 7.02, V&V Phase Summary Reports, to verify they met the requirements of IEEE 1012 and were adequately implemented for the MOX project. The inspectors reviewed the reports to assess and to verify that no inconsistency existed between the approved SVVP and the actual reports, and to verify that software design and requirements phase activities comply with IEEE 1012, IEEE 1074, and IEEE 830, Recommended Practice for Software Requirements Specifications.

The inspectors reviewed the phase summary and task reports required by IEEE 1012 to determine that they were developed in accordance with IEEE 1012 and Invensys project procedures. The inspectors reviewed the reports to verify they were consistent with the requirements of the SVVP.

The following Requirements Phase task reports were reviewed:

- Traceability Analysis task report
- Software Requirements Evaluation task report
- Configuration Management task report
- Baseline change assessment report
- Interface Analysis report
- Criticality, Hazard and Software Risk Analysis report

The following Design Phase task reports were reviewed:

- Traceability Analysis task report
- Software Design Evaluation task report
- Management Review of V&V task report
- Baseline Change Assessment report
- Interface Analysis report
- Criticality, Hazard and Software Risk Analysis report
- Software Security Assessment

5) Requirements Traceability

The inspectors traced requirements associated with the Primary Dosing and PuO_2 Can Receiving and Emptying Units (NDP/NDD) and reviewed Invensys' process and documentation for translating MOX Services safety requirements into software requirements and identifying and processing design questions. The inspectors assessed the quality of the SRS, the translation system requirements into safety requirements, safety requirements into software requirements, and the Invensys design control process including V&V reviews.

Two requirements for the NDD Safety Controller Interlock were traced using the PTM to assess forward and backward traceability and to assess the PTMs compliance with IEEE 1074-1997.

Two process hazards events in the PrHA associated with NDD were traced forward to the applicable software requirement to verify that the NDD safety requirements were correctly derived from the originating requirements, the software functional requirements were individually identified, that the safety control functions were specified and detailed in the software requirements, and that they were unambiguously stated. The inspectors traced the requirements from the PrHA, to the NSE, to the NCSE-D for NDP/NDD. The inspectors reviewed the Integrated Safety Analysis Summary (ISAS) to associate the event with the ISAS event NDD-02 and NDD-06 and then to trace the requirement to the SRD which references the safety function processing to an associated logic diagram.

The inspectors reviewed the MFFF Preliminary Hazard Analysis and the PrHA of the MFFF Powder Workshop to assess the forward traceability of the selected events to the SRS.

The inspectors traced three requirements associated with authorization safety keys, maintenance and standard cask exit, and measurement of uranium dioxide (UO_2) line feed. These requirements were traced forward and backward with the aid of the PTM from the Primary Dosing and PuO_2 Can Receiving and Emptying Unit (NDP/NDD) for the SPLC NNJ1 using the SRD, SRS, and the SDD in order to assess whether the translated requirements in the SRD were complete, correct and consistent.

The inspectors reviewed the translation of a requirement from the SRD to the SDD to verify that safety function associated with the requirement was implemented and that the translation of the requirement into the SRS was unambiguous and verifiable. The requirement was associated with jar overfill in the primary dosing process, which was associated with the ISAS accident NDP-05. The inspectors reviewed the MFFF process hazards analysis and nuclear criticality evaluation to associate the event listed in the SRD with the ISAS accident.

The inspectors reviewed information associated with the amount of PuO_2 in the jar in the primary dosing process to ensure requirements in the SRD were captured in the SRS and SDD.

The inspectors sampled DCRs to assess the process for identifying design issues associated with development and review of the SRS.

The inspectors reviewed the MOX services Technical Specification for SPLCs to assess the software design controls imposed on the vendor for identifying design questions to MOX services for resolution.

6) Software Safety

The inspectors reviewed the Invensys Criticality, Hazard and Software Risk Analysis for the Requirement and Design phases to evaluate compliance with the events listed in the MFFF Safety PLC System Preliminary Hazard Analysis. The inspectors assessed the criticality evaluations of the software integrity level for adequacy. The inspectors reviewed the hazards analysis to determine if revised or new hazards were identified and evaluated. The inspectors assessed the evaluation of the software contributions to system hazards, the software requirements that contribute to each system hazard and the validation that the software addresses, controls or mitigates each hazard.

7) Software Tools

The inspectors reviewed the Invensys TS 1131 Emulator Test Driver (ETD) SRS, ETD SDD, ETD SVVP, ETD Test Plan/Speciation and ETD Test Procedures and Test Cases, ETD V&V Test Report, and the ETD Final V&V Test Report to assess compliance to IEEE Std. 7-4.3.2-2003, Clause 5.3.2, Software Tools, Item a), as a non-safety-related tool being used for independent V&V for safety-related applications for MFFF. The inspectors reviewed the test cases and the test case procedures to verify correct ETD system operation. The inspectors reviewed the listed instructions and procedures that were provided for documenting all test case outputs and recording the results. Each test case provided line items which listed the TS1131 system requirements for the test cases. In addition, the inspectors reviewed the acceptance criteria for the test cases specified for proper operation and requirement conformance.

(b) Conclusion

The inspectors determined that, for the sample program elements selected, that Invensys PPMs, QPMs and PQP were appropriately implementing software activities and controls for the MOX project.

The inspectors concluded, for the samples selected, that MOX Services software safety requirements for NNJ*SPLC0001 were adequately derived from the system requirements, translated to the software requirements specification, verification and validation reviews were completed correctly and independently, requirements were traceable both forwards and backwards and software quality assurance organization and process activities for problem reporting and corrective action and supplier controls was adequate.

For the samples selected, the traceability matrix was found to adequately meet the requirements of IEEE-1074-1997. The inspectors determined that the NRC regulatory criterion, committed design standards and source design basis requirements were traceable to the SRS.

The inspectors determined that Invensys SQAP, PQP, and associated implementing procedures adequately met the MOX project, 10 CFR Part 21, Appendix B to 10 CFR Part 50, and software requirements for organizational independence, problem reporting

and corrective actions, and supplier controls. Additionally, the inspectors determined that, for the sample of corrective actions and non-conformances selected, that Invensys was appropriately implementing controls for MOX project.

The inspectors determined that for the samples selected, the Criticality, Hazard and Software Risk Analysis for the requirements and design phase was adequate. The inspectors determined that for the documents reviewed, the TS1131 ETD development, verification, and validation program, was adequate to demonstrate that the necessary features of the TS1131 ETD function as required, for MFFF applications.

The inspectors determined that no findings of significance were identified with the adequacy of MOX Services oversight of their subcontractor for the safety programmable logic controllers.

b. PSSC-011, Electrolyzer Structure; PSSC-026, Guide Sleeves; and PSSC-039, Polytetrafluroethylene (PTFE) Insulator

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

(a) Scope and Observations

The inspectors performed a review of the Mecachamie and Mecagest commercial procurement program. MOX Services listed procurement control as a critical characteristic for the Mecagest/Mecachamie work scope. The inspectors reviewed the commercial grade survey of Mecagest and Mecachimie (MECA-11-VS167) to determine if MOX Services adequately evaluated the ability of Mecagest/Mecachimie to procure QL-1 materials and components as commercial grade items. The inspectors reviewed DCS01-ZMJ-DS-CGD-M-65982-0, Commercial Grade Item Evaluation (CGIE) for the Mecachimie and Mecagest Assembly, Fabrication, Testing, and Installation Services and DCS01-ZMJ-DS-CCT-M-65788-0, Procurement Specification for the Fabrication of Build to Print Process Units. Based on a review of these documents, the inspectors noted that MOX Services had developed specific controls with respect to procurement of QL-1 items as commercial grade for the French Platform. First, MOX Services had limited procurement to Mecachimie only. Second, MOX Services was required to review all purchase orders developed by Mecachamie prior to release of the procurement to ensure that any applicable quality and technical requirements were correctly specified in the order. This control was identified as a MOX Services hold point. Third, all sub-tier activities or services being provided for QL-1 material were required to have critical characteristics for acceptance or specific quality controls identified by MOX Services. Fourth, the French Platform was required to have the necessary controls for maintaining (1) traceability of items transferred between the French Platform facilities and (2) cleanliness and storage requirements in the facilities. The release of QL-1 material from the supplier's warehouse or storage area for fabrication or assembly was identified as a MOX Services hold point. The inspectors also reviewed DMA AF 11 0097 A, MFFF Project Purchasing Activities. The inspectors verified that the French Platform procedures correctly implemented the controls identified by MOX Services with respect to procurement of QL-1 items as commercial grade. The inspectors were not able to select any samples of French Platform procurements for direct verification of the requirements listed above since Mecachamie has not yet procured any QL-1 materials or equipment for the MOX scope of supply. To date, all QL-1 materials and components

have been procured by MOX Services and sent directly to the Mecachamie/ Mecagest facilities for fabrication.

(b) Conclusion

The inspectors concluded that the commercial procurement program in-place at the French Platform facilities was adequate to support the verification of critical characteristics defined by MOX Services for the identified work scope. The inspectors concluded that MOX Services was performing adequate oversight of foreign vendor Mecagest in the area of procurement. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors reviewed DCS01-ZMJ-DS-CGD-M-65980-2, CGIE for Commercial Grade Survey of Mecachimie and Mecagest. Section 4.1 of the CGIE lists control of measuring and test equipment (M&TE) as a required commercial quality control necessary for the verification of critical characteristics. The inspectors reviewed MECA-11-VS167, Shaw Areva MOX Services Quality Assurance Commercial Grade Item Survey, to determine if MOX Services performed an adequate evaluation of the Mecagest M&TE program. The inspectors reviewed Mecagest M&TE procedures PES 003, Control of Measuring, Test and Inspection Equipment (Site of Saint Sauveur), and PES-036, Control of Inspection, Measuring and Test Equipment (Site of Valognes) to determine if the procedures contain the minimum requirements for control of M&TE. The inspectors observed Megagest quality control personnel perform dimensional measurements of various MOX machined parts. The inspectors verified that M&TE was properly calibrated and marked with a unique serial number, calibration date, and calibration due date. The inspectors conducted interviews with the Mecagest metrology staff and performed reviews of calibration records for selected M&TE samples. The inspectors verified that M&TE was properly stored. The inspectors verified that Mecagest has a process for handling out-of-tolerance M&TE including proper segregation to prevent further usage and a process for assessing the impact on previously accepted items. The inspectors verified that M&TE was calibrated against European national standards equivalent to U.S. standards such as the National Institute of Standards and Technology (NIST).

(b) Conclusion

The inspectors concluded that the commercial M&TE program in-place at Mecagest was adequate to support the verification of critical characteristics defined by MOX Services for the identified scope of supply. The inspectors concluded that MOX Services was performing adequate oversight of Mecagest in the area of M&TE. No findings of significance were identified.

(3) Control of Materials, Equipment, and Services Attribute (IP 88108 Control of Materials, Equipment, and Services and IP 88115, Supplier/Vendor Inspection)

(a) Scope and Observations

The inspectors conducted a tour of the Mechachimie warehouse where parts were stored for PSSC-026, Guide Sleeves and PSSC-039, PTFE Insulator. The inspectors verified that the raw material for making these parts was properly tagged with a MOX Services green tag to indicate that the material was accepted by the MOX quality control organization. The inspectors noted that MOX Services had assigned a full time warehouse person at the Mechachimie warehouse to ensure that QL-1 materials were properly tagged, stored, and distributed in accordance with MOX Services quality assurance requirements. The inspectors selected purchase order 5839, Revision 2, Cat. I.D. 23027, QC-RIR-11-04, Bar PTFE 35 mm ate. I.D. 23055 as an inspection sample. The inspectors verified that the material was properly stored on pallets inside a climate controlled warehouse. The inspectors noted that MOX Services had developed quality control hold points for the release of material for QL-1 work. These controls provided assurance that Mecagest only used accepted materials and parts for the fabrication of QL-1 components.

(b) Conclusion

The inspectors concluded that the commercial handling, shipping, and storage program in-place at the French Platform facilities was adequate. The inspectors concluded that MOX Services was performing adequate oversight of Mecagest in the area of handling, shipping, and storage. No findings of significance were identified.

(4) Corrective Action Program Attribute (IP 88110, Problem Identification, Resolution, and Corrective Action

(a) Scope and Observations

The inspectors determined that the applicant had verified that its vendor had established a process for controlling items that do not conform to specified procurement specification requirements. The inspectors verified that nonconforming materials, parts, or components were controlled by the vendor to prevent inadvertent installation or use. The inspectors also verified that there was a process in place to identify and correct deficiencies.

The inspectors verified that the vendor properly followed its internal procedure DMA AF 11-0097-0012 B, MFFF Project, Non-Conformance Management on October 17, 2011 for dispositioning non-conforming materials, parts, or components. The inspectors verified that the disposition of “use-as-is,” “reject,” “repair,” or “rework,” for nonconforming materials, parts, or components, was clearly identified and documented in NCRs. The inspectors verified that items that did not meet the original design requirements and were dispositioned “use-as-is” or “repair” were subjected to design control measures commensurate with those applied to the original design. The inspectors reviewed four NCRs generated by Mecagest and Mecachimie since the electrolyzer project initiation. The four NCRs pertained to examples of reject, rework, and re-use/use-as-is dispositions.

The inspectors also verified that MOX Services properly reviewed, evaluated, and approved the use-as-is disposition. The rejected and re-worked non-conforming material NCR dispositions were provided to MOX Services for information only as required by DMA AF 11-0097-0012 B, MFFF Project, Non-Conformance Management. The vendor closed the NCRs as specified in its internal procedural processes.

(b) Conclusion

The applicant provided adequate oversight of Mecagest to ensure the vendor had a program for the identification and control of non-conforming materials, parts, and components and that there was a process in place to identify and correct deficiencies. No findings of significance were identified.

(5) Special Processes Attribute (IP 55050, Nuclear Welding General Inspection Procedure)

(a) Scope and Observations

The inspectors reviewed Mecagest procedures used to control welding and non-destructive evaluation (NDE) in the manufacture of the colemanite concrete casing of the electrolyzer. Specifically the inspectors reviewed seven welding procedures, two NDE procedures, three welder qualification records, five procedure qualification records, and other miscellaneous procedures associated with the manufacture (listed in the attachment). The documents were reviewed to verify adequate implementation of the procurement requirements from MOX Services and the applicable requirements of ASME Boiler and Pressure Vessel Codes (BPVC) Sections VIII, V, and IX.

The inspectors observed the fit-up and welding of weld numbers 5.1 and 5.2 of the electrolyzer colemanite casing to verify the requirements of the Welding Procedure Specification (WPS) No. 50 Revision 2) were met. Specifically, the inspectors verified the following attributes:

- Correct welding procedure was available
- Welding procedure being used was the one listed in the weld map (permanent record)
- Welding procedure met the applicable requirements of ASME BPVC Section IX
- Weld maps were kept in an appropriate fire rated cabinet
- Work traveler had been adequately followed and completed prior to welding
- Tools used on the casing (stainless steel) were marked as being for use only on stainless steel to prevent contamination
- Correct filler metal was being used
- Base material and filler metal were adequately marked for traceability
- Filler metal was traceable to a certified material test report (CMTR)
- Welding parameters used met the requirements of the welding procedure (current and wire feed speed)
- Other miscellaneous requirements from the welding procedure, such as shielding and cleaning, were met

The inspectors also inspected the filler metal controls at Mecagest. This included a review of the filler metal control procedure, an interview with the responsible engineer, and an inspection of the cabinet and issuance log.

(b) Conclusion

The inspectors concluded that Mecagest was properly executing the requirements of ASME Section IX and ASME NQA-1, Basic Requirement IX. No findings of significance were identified.

(6) Quality Assurance and Vendor Oversight/Inspection Attributes (IP 88106, Quality Assurance: Program Development and Implementation, and IP 88115, Supplier/Vendor Inspection)

(a) Scope and Observations

Training and Qualification

The inspectors reviewed MOX Services procedure for the training program for Mecagest personnel (DMA AF-11-0097-0013 C, dated August 30, 2011) as part of the commercial grade dedication process. In addition to Mecagest's QA program, procedures were developed for additional QA training related to meeting the MPQAP. The procedure contained a matrix of required courses for staff depending upon the expertise of the individual and the activity that will be performed. The inspectors reviewed a list of Mecagest personnel that were qualified to perform work in support of the MFFF project. Six individual qualification records were selected and reviewed during the inspection. The inspectors verified that the individuals had received the proper training based on their area of work.

Commercial Grade Survey

The inspectors reviewed MOX Services audit of Mecagest performed in March 2009 and a commercial grade dedication survey of Mecagest performed in March 2011 to confirm the acceptability and implementation of the quality program at Mecagest. The inspectors verified that the commercial grade dedication survey performed by MOX Services to determine the adequacy of the Mecagest QA program with respect to the control of quality assurance related critical characteristics was performed on schedule and performed in accordance with the audit plan MECA-11-VS247, dated August 31, 2011.

Audits

The inspectors reviewed selected audits that were performed by Mecagest. The inspectors verified that the disposition of audit findings were processed in accordance with the vendor’s internal procedures,

In addition, the inspectors reviewed the qualifications for lead auditors and verified that the auditors completed the vendor’s training and qualification process in which they were required to demonstrate that they had the technical and regulatory knowledge which was sufficient to perform their auditing function.

(b) Conclusion

The inspectors concluded that Mecagest had (1) developed and implemented an adequate commercial quality assurance program for the control of critical characteristics

and (2) MOX Services had performed adequate oversight of Mecagest in the areas of quality assurance program and audits. No findings of significance were identified.

c. PSSC-023 (Fluid Transport Systems)

(1) Installation Attribute (IP 55100, Structural Welding General Inspection Procedure, IP 88143, Pipe Supports and Restraints, and IP 55050 Nuclear Welding General Inspection Procedure)

(a) Scope and Observations

The inspectors reviewed MOX Services procedures and instructions pertaining to pipe supports to determine whether the welding program documents were in compliance with the MPQAP and American Welding Society (AWS) D1.6, Structural Welding Code – Stainless Steel, 1999 edition. The inspectors observed welding of Fluid Transport System (FTS) piping supports in the BAP. Specifically, the inspectors observed welding of five field welds on three pipe supports.

The inspectors observed field welding of pipe supports to determine whether work orders, Welding Technical Specification (WTS) variables, surface cleaning, and interpass temperature were in compliance and controlled in accordance with MOX Services procedures and AWS D1.6, 1999. The inspectors examined field welds to determine whether weld surface finish and appearance, weld reinforcement, shape and size of fillet welds, removal of arc strikes, finish grinding of surface, and absence of surface defects were in compliance with procedures and AWS D1.6, 1999. The inspectors observed the following pipe support field welds:

- C135-PS-12299-FW001
- C134-PS-00220-FW001
- C134-PS-00246-FW003
- C134-PS-00356-FW001
- C134-PS-00356-FW002

The inspectors reviewed Welding Procedures, WTSs, and supporting Procedure Qualification Records (PQR) to determine whether base metal and filler metal combinations were in compliance with AWS D1.6, 1999. The inspectors reviewed welder qualification records to determine whether the welders performing field welding were qualified to weld under the respective procedure and the applicant had developed a system for maintaining a continuous record of welder qualification status. The inspectors interviewed MOX services personnel to determine whether welder qualification records were stored in accordance with the MPQAP and procedures for QA document storage.

The inspectors reviewed certified material test reports and certificates of compliance associated with the base metal and filler metal for one of the inspected supports to determine whether the material used for the support was in compliance with AWS D1.6, 1999 and applicable standards.

The inspectors walked down the filler metal control room to determine whether welding material was clearly identified and stored in accordance with procedures and AWS D1.6, 1999. The inspectors observed the issuance of filler material to determine whether proper dispersion and handling of welding material was in accordance with procedures.

The inspectors observed shielded metal arc welding electrodes to determine whether the electrodes were controlled to prevent moisture pickup and that the maximum out of oven time was in compliance with AWS D1.6, 1999.

The inspectors reviewed welding procedures, WTSs, and supporting PQRs to determine whether penetrating enhancing flux was qualified for use during welding in accordance with ASME B31.3, Process Piping Code,1996 edition through 1998 addenda.

(b) Conclusion

MOX Services performed welding activities in accordance with MOX Services welding specifications, AWS D1.6, 1999, and ASME B31.3, 1998, code requirements. No findings of significance were identified.

(2) Installation Attribute (IP 88143, Pipe Supports and Restraints)

(a) Scope and Observations

The inspectors reviewed MOX Services project procedure (PP) PP11-74, Piping Support Installation, to determine if MOX Services has identified the necessary steps to ensure that QL-1 pipe supports were installed with code requirements such as MSS SP-89-2003, Pipe Hangers and Supports – Fabrication and Installation Practices. The inspectors conducted walkdowns of the BAP to determine if MOX Services was adequately installing the pipe supports in accordance with applicable procedures and code requirements. The inspectors selected the following pipe supports as inspection samples:

- Support Number C134-PS-00465
- Support Number C134-PS-00474

The inspectors performed the following tasks to verify that the pipe supports were installed in accordance with approved drawings, specifications, and procedures:

1. Verify that the support was installed with the correct revision level of the drawing and any associated ECRs;
2. The support installation drawing matched the design drawing;
3. Correct attachment to the embedded plate while maintaining proper edge distance requirements between the support and the edge of the embed plate;
4. Configuration and orientation of the support;
5. Support members were the correct size, type, material grade, shape and fabricated in accordance with specified tolerances;
6. Support was in the correct location within specified tolerances;
7. Welding was complete and acceptable;
8. Bolt material was correct size, type, material, and grade

(b) Conclusion

The inspectors concluded that MOX Services adequately installed the pipe supports listed above in accordance with MOX Services specifications and code requirements. No issues of significance were identified.

d. PSSC-024, Gloveboxes

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

(a) Scope and Observations

The inspectors reviewed MOX Services audit report ACPP 09 VE01, Shaw Areva MOX Services Quality Assurance Audit Report ACPP-09, to determine if MOX Services performed an adequate audit of the Atelier de Construction du Petit Parc (ACPP) procurement program with respect to the requirements of Criterion IV, Procurement Document Control, and Criterion VII, Control of Purchased Items and Services of ASME Nuclear Quality Assurance (NQA) -1, 1994 with 1995 Addenda. The inspectors selected stainless steel plate material from the electrolyzer glovebox as an inspection sample. The inspectors reviewed the Certificate of Conformance (CoC) for 304 L stainless steel plate, heat no.90977. The inspectors verified that the CoC was; 1) identifiable by the purchase order number and a description of the material, 2) contained the specific purchase requirements met by the purchased material (ASTM A240-M09a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications), and 3) signed by the person responsible for the quality control of the item.

The inspectors reviewed the CMTR for the 304 L plate material and verified that the chemical properties were consistent with the requirements of the material standard. The inspectors reviewed Receipt Control Check List 24854/8988 to determine if the receipt inspection performed by ACPP was adequate to verify conformance to the required specifications in the purchase order.

The inspectors selected sub-supplier Hagtech to assess the implementation of the ACPP commercial grade dedication program. Hagtech provided QL-1 cutting and machining services for glovebox shell materials. The inspectors reviewed the ACPP commercial grade dedication procedure for compliance with published industry standards on commercial grade dedication issued by the Electric Power Research Institute (EPRI). The inspectors reviewed the commercial grade dedication procedure to determine if ACPP identified the necessary critical characteristics and quality assurance controls including material traceability and cleanliness to provide reasonable assurance that the services performed by Hagtech would not adversely impact the safety function of the glovebox material.

(b) Conclusion

The inspectors concluded that ACPP was properly executing the requirements of ASME NQA-1, Basic Requirements IV (Procurement Document Control) and VII (Control of Purchased Items and Services) with regards to the procurement of IROFS components. The inspectors concluded that MOX Services was performing adequate oversight of ACPP in the area of procurement. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors observed that the applicant had recently reviewed its vendor's program for controlling items that do not conform to specified procurement specification requirements during an audit of ACPP conducted in September 2011. This audit resulted in SDR ACPP-11-VE246-09, which basically identified that ACCP project procedure PR GE 8.3.01, Procedure for Controlling Non-Conformities, Revision C, January 5, 2009 lacked specificity on dispositioning non-conforming items. The inspectors reviewed three NCRs and verified that those nonconforming materials, parts, or components were adequately controlled by the vendor to prevent inadvertent installation or use. The three NCRs pertained to examples of reject, rework, and use-as-is dispositions. The inspectors also verified that there was a process in place to identify and correct deficiencies.

(b) Conclusion

The applicant provided adequate oversight of Atelier de Construction du Petit Parc (ACPP) to ensure the vendor had a program for the identification and control of non-conforming materials, parts, and components and that there was a process in place to identify and correct deficiencies. No findings of significance were identified.

(3) Special Processes Attribute (IP 55100 Structural Welding General Procedure)

(a) Scope and Observations

The inspectors selected two completed welds (S62 and S97) from Glovebox KDD 1000 and performed a vertical slice document review. Specifically, the inspectors verified that welding of gloveboxes at ACPP was performed in accordance with their approved QA program and MOX Services procurement specification as noted in the observations below:

- Quality records (i.e., weld maps) existed allowing welds to be traceable to the welder, welding procedure, and filler metal;
- The welding procedure (SA41 Revision 1) was qualified and met the other applicable requirements of AWS D1.6, 1999;
- The filler metal used was traceable to a CMTR that met the requirements of the classification; and
- Both welds were traceable to adequate records of the appropriate NDE (e.g. visual examination, liquid penetrant examination, and radio graphic examination)

The inspectors also performed a walk-down of the welding rod storage / issuance room and the shop floor to verify that ACPP met the requirements of their QA Program and the MOX Services procurement specification. Specifically the inspectors verified the following inspection attributes:

- Filler metal was adequately stored and protected (i.e., in appropriate containers, off the floor, and locked),

- Filler metal was issued under a process that ensured only the correct metal was used (via interview with the attendant),
- Filler metal on the floor was adequately controlled, and
- Shop and equipment was adequate to achieve quality and repeatable welding.

Additionally, the inspectors reviewed the following NDE procedures to verify they met the requirements of AWS D1.6 1999 and MOX Services procurement specification:

- Visual Testing Procedure, DPQ 10888-S-3383 00507 Revision 3
- Radiographic Inspection Procedure, DPQ 10888-S-3383 00503 Revision 3
- Penetrant Test Procedure, DPQ 10888-S-3383 00508 Revision 4

(b) Conclusion

The inspectors concluded that ACPP was properly executing the requirements of AWS D1.6 and ASME NQA-1, Basic Requirement IX. The inspectors concluded that MOX Services performed adequate oversight of ACPP in the area of welding and special processes. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors reviewed ACPP Internal Procedure, PR GE 7.6.01 Revision C. The inspectors verified that the procedure contained requirements to ensure that M&TE was properly identified (e.g., engraved on the instrument); frequency of calibration was established based on the type of instrument; and M&TE was properly labeled (stickers) to indicate the M&TE serial number, calibration date, and calibration due date. The inspectors selected various M&TE samples used for MFFF QL-1 measurements. Specifically, the inspectors selected measurement equipment PC 177. PC-177 was used to perform dimensional measurements of raw stainless steel plate used for the fabrication of the KDD-1000 glovebox (S4262 8988). Dimensional measurements were required in order for the verification of critical characteristics associated with the dedication of QL-1 raw material.

(b) Conclusion

The inspectors concluded that: 1) the ACPP M&TE program met the requirements of ASME NQA-1, Basic Requirement 12, and 2) MOX Services has performed adequate oversight of the ACPP in the area of M&TE. No findings of significance were identified.

(5) Quality Assurance and Vendor Oversight/Inspection Attributes (IP 88106, Quality Assurance: Program Development and Implementation, and 88115, Supplier/Vendor Inspection)

(a) Scope and Observations

1) Quality Assurance Program

The inspectors reviewed ACPP Quality Management Plan, Revision D, dated June 16, 2010 and ACPP Subcontract Quality Control Plan, AQC 10888-S-3383, Revision 3. The subcontractor quality control plan specified the quality control requirements implemented by ACPP to fulfill the requirements for orders referenced with ASME-NQA-1-1994. The qualifications of quality assurance personnel including auditors was provided in the document. The document also provided the names and qualifications of all of the staff that were approved to work on MOX including all inspectors and auditors.

2) Inspector Qualification

The inspectors reviewed a list of ACPP personnel that were qualified to perform work in support of the MFFF project. The inspectors selected and reviewed six individual qualification records based on their job positions. The inspectors verified that the individuals had received the proper training based on their area of work.

3) Quality Assurance Audits

The inspectors reviewed the ACPP procedure governing the performance of quality assurance audits (PR MA 8.2.01 Revision D, dated September 12, 2008).

The inspectors observed that for NQA-1 audits, ACPP used external auditors, which met the requirements of NQA-1.

The inspectors reviewed various internal and external audit reports for compliance with the ACPP audit procedure and the requirements of ASME NQA-1. The inspectors also reviewed audits performed by MOX Services to assess the adequacy of the ACPP quality assurance program for inclusion on the MOX Services Approved Suppliers List (ASL).

(b) Conclusion

The inspectors concluded that; 1) ACPP has developed and implemented a quality assurance program consistent with Basic Requirement 2, Quality Assurance Program of NQA-1 and 2) MOX Services has performed adequate oversight of ACPP in the area of quality assurance program and audits. No findings of significance were identified.

(6) Quality Assurance Interfaces Attribute (IP 88116, Inspection of Safety Function Interfaces)

(a) Scope and Observations

The inspectors reviewed the DCS01-NPG-DS-NTE-M-60777-B, Homogenizing and Pelletizing Unit (NPG/NPH) Component Classification Summary, to verify that the quality levels assigned to quality affecting structures, systems, and components (SSCs) and their associated activities were commensurate with the SSCs as defined in the ISA.

The inspectors selected various IROFS described in the ISA for the NPG unit to verify that QA controls for the assigned quality level were sufficiently applied to ensure design integrity through compliance with technical, engineering, safety, and design requirements. The inspectors verified that design inputs were consistent with the design basis and other design information or criteria documented in the ISA. The inspectors reviewed DCS01-NPG-DS-CGD-M-65900-0, Commercial Grade Item Evaluation for Lodige Powder Mixer, and DCS01-NPG-DS-CCT-M-40565-2, Procurement Specification for Powder Mixer Assemblies, to ensure that appropriate critical characteristics were determined for QL-1 IROFS.

(b) Conclusion

No findings of significance were identified.

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

(a) Scope and Observations

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

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

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

The inspectors evaluated the adequacy of ongoing concrete activities conducted by Alberici, Soil and Materials Engineers, Inc. (S&ME), and MOX Services. The inspection

of these activities focused on reinforcing steel bar installation, formwork preparation, pre-placement testing, and placement procedures associated with QL-1 concrete construction of the MFFF building structure.

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

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

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

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

October 3, 2011, BMP-W309.1/307.2, BMP Interior Wall, 86 cubic yards
October 4, 2011, BMP-W308.1/310.1, BMP Interior Wall, 146 cubic yards
October 6, 2011, BAP-C139/149 Pedestals, 3 cubic yards
October 7, 2011, BAP- W201.1B/206.3/210.2, BAP Interior Wall, 107 cubic yards
October 12, 2011, BMP-W319.1/320.3, BMP Interior Wall, 230 cubic yards
October 13, 2011, BMP-W320.1B, BMP Interior Wall, 95 cubic yards
October 13, 2011, BMP-R3.5, BMP Roof, 20 cubic yards
October 14, 2011, BAP-W207A.1, BAP Interior Wall, 115 cubic yards
October 19, 2011, BAP-W201.2B, BAP Interior Wall, 192 cubic yards
October 21, 2011, BMP-W317.3/319.4, Interior Wall, 217 cubic yards
October 24, 2011, BMP-R1.3/R2.3/R3.4, BMP Roof, 25 cubic yards
October 27, 2011, BMP-W319.2/323.1, BMP Interior Wall, 173 cubic yards
October 29, 2011, BMP-Gabion Wall-W013.1/014.1, 158 cubic yards
November 4, 2011, BMP-W317.2/319.3, BMP Interior Wall, 300 cubic yards
November 5, 2011, BSR-W203.3/204, BSR Interior Wall, 333 cubic yards
November 10, 2011, BAP-A-P-7 Rm141 TCO, Interior Wall, 14 cubic yards
November 11, 2011, BMP-W320.2/324.1/322.1, BMP Interior Wall, 340 cubic yards
November 11, 2011, BMP-324.3A, BMP Interior Wall, 30 cubic yards
November 18, 2011, BMP-F314.2/316.2, BMP Elevated Floor, 93 cubic yards

November 21, 2011, BAP-W210.2, BAP Interior Wall, 130 cubic yards
November 22, 2011, BMP-W317/313.8, BMP Interior Wall, 96 cubic yards
November 22, 2011, BAP-W208.1, BAP Interior Wall, 166 cubic yards
November 29, 2011, BSR-W203.2/206.4, BSR Interior Wall, 327 cubic yards
November 30, 2011, BAP-W209.1, BAP Interior Wall, 60 cubic yards
December 1, 2011, BMP-W321.1/323.2, BMP Interior Wall, 140 cubic yards
December 2, 2011, BMP-F320, BMP Elevated Floor, 26 cubic yards
December 9, 2011, BSR-W203.2/206.4, BSR Interior Wall, 327 cubic yards
December 9, 2011, BAP-F207A, BAP Elevated Floor, 72 cubic yards
December 14, 2011, BAP-W208.2, BAP Interior Wall, 102 cubic yards
December 16, 2011, BAP-W211.4/209.2, BAP Interior Wall, 130 cubic yards
December 17, 2011, BSR-W206.6, BSR Interior Wall, 44 cubic yards
December 19, 2011, BMP-W310.2/312, BMP Interior Wall, 268 cubic yards
December 20, 2011, BMP-W323.3/324.3, BMP Interior Wall, 360 cubic yards
December 22, 2011, BMP-Gabion Wall-W2B/3B, 230 cubic yards
December 28, 2011, BAP-TCO-C121, BAP Interior Wall, 12 cubic yards

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

(b) Conclusions

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

f. PSSC-048, Sintering Furnace

(1) Procurement Attribute (IP 88108, Control of Materials, Equipment, and Services, and IP 88115, Supplier/Vendor Inspection)

(a) Scope and Observations

The inspectors reviewed MOX Services audit of Furnaces Nuclear Applications Grenoble (FNAG), FNAG 09 VE51, to determine if MOX Services adequately evaluated the ability of FNAG to control its sub-suppliers with respect to ASME NQA-1 Criterion IV, Procurement Document Control, and Criterion VII, Control of Purchased Items and Services. No significant issues were identified by MOX Services in the audit with respect to procurement control.

The inspectors reviewed DCS01-PFE-DS-CCT-M-18157-5, Procurement Specification for the Sintering Furnace Units (PFE/PFF) to determine if procurement document

changes affecting the technical or QA program requirements were subject to the same degree of control as utilized in the preparation of the original documents.

The inspectors reviewed the purchase order (53-4600000477) between FNAG S.A.S. and Voith Ermo Industrial Services (Voith). The inspectors noted that the purchase order invokes AI262-PE-CC-0010, Procurement Specification for Furnaces, and AI262-PE-LST-0005, Document List Associated to the Procurement Specification for Furnaces. The inspectors reviewed AI262-PE-CC-0010-C, Procurement Specification for Furnaces. The inspectors reviewed the procurement specification to determine if it adequately specified 1) right of access requirements; 2) technical requirements including the applicable drawings, specifications, codes, standards, procedures, instructions, and regulations; 3) quality assurance requirements including the correct revision of NQA-1 and Regulatory Guide 1.28, and 4) appropriate test, inspection, and acceptance criteria. The inspectors verified that FNAG adequately translated the appropriate technical and quality assurance requirements identified in the MOX Services procurement specification into the specification developed for Voith.

The inspectors reviewed AI262-PE-EQ-0068-A, Supplier Qualification Record Voith Industrial Services, to determine if FNAG adequately evaluated the capability of Voith to provide the items and services specified in the procurement documents. The inspectors reviewed AI262-PE-RP-0032(A), Voith Ermo Industrial Services, to assess the audit FNAG performed on Voith to ensure that the audit covered the necessary quality assurance controls to provide the required scope of work.

(b) Conclusion

The inspectors concluded that 1) the sintering furnace was being procured in accordance with ASME Section VIII and ASME NQA-1 requirements and 2) MOX Services was performing adequate oversight of the sintering furnace vendors. No findings of significance were identified.

(2) 10 CFR Part 21 – Construction Attribute

(a) Scope and Observations

The inspectors reviewed AI262-PE-CC-0010, Procurement Specification for Furnaces, to determine if FNAG adequately flowed down the applicable requirements of 10 CFR Part 21 for the reporting of defects that could result in a substantial safety hazard. The inspectors noted that FNAG did not directly specify the applicability of 10 CFR Part 21 in the procurement specification. However, the inspectors noted that FNAG was not required by NRC regulations to flow down 10 CFR Part 21 requirements since both FNAG and Voith were foreign vendors. The procurement specification does, however, require Voith to report defects and non-compliances to FNAG after shipment. The NRC inspectors informed MOX Services that the nuclear industry agreed to include 10 CFR Part 21 reportability language in all foreign procurement documents as a result of a vendor workshop held between the industry and the NRC. FNAG developed a corrective action document to document this issue; however, this issue did not result in a violation of NRC requirements since the regulatory requirement was not enforceable for foreign vendors.

(b) Conclusion

Although the foreign vendors were not required by NRC regulations to flow down 10 CFR Part 21 requirements in procurement documents, the inspectors concluded that the foreign vendors were meeting the intent of 10 CFR Part 21 for reportability of defects that could result in a substantial safety hazard. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors performed a shop tour of the Voith facility and selected various samples of M&TE to verify that the M&TE was properly controlled and calibrated. The inspectors selected the following samples: 1) M&TE # 0116, Mahr Gmbtl Esslinger caliper (200 mm range) and 2) M&TE #0004A, Mitutoyo caliper (300 mm) to verify compliance with ASME NQA-1, Criterion 12 (Control of Measuring and Test Equipment) requirements. The inspectors verified that M&TE was assigned to specific QC and fabrication personnel in the shop. The name of the assigned person was noted on the current calibration record. The inspectors toured the M&TE shop to verify that M&TE was properly handled and stored to maintain the required accuracy. The inspectors verified that active M&TE was stored in locked cabinets and that only select QC and management personnel had access to the locked cabinets. The inspectors reviewed calibration records to ensure that the M&TE was properly calibrated in accordance with nationally recognized standards. The inspectors verified that Voith had established the required calibration frequency for the selected M&TE. The inspectors determined that the selected M&TE was calibrated in-house using calibration gauge blocks traceable to European national standards. The inspectors verified that the calibration blocks were controlled as part of the M&TE program. The inspectors reviewed the calibration certificate for the gauge blocks and verified they were properly calibrated. The inspectors noted that Voith provides training to shop personnel on the proper use of M&TE. The inspectors reviewed the storage area for out-of-calibration or damaged M&TE. The inspectors reviewed Voith Procedure PB-57, Control of Equipment Inspection, for compliance with ASME NQA-1, Criterion 12 requirements.

(b) Conclusion

The inspectors concluded that 1) the Voith M&TE program met the requirements of ASME NQA-1, Basic Requirement 12, and 2) FNAG has performed adequate sub-supplier oversight. No findings of significance were identified.

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

(a) Scope and Observations

The inspectors reviewed DCS01-PFE-EC-DPQ-M-01700-2, Identification and Traceability Plan, to determine if FNAG and Voith had established the necessary controls to ensure that only correct and accepted items were used and installed. The inspectors noted that the plan covers identification and traceability of raw materials

including proper markings such as material grade, heat number, and furnace number. The inspectors conducted a tour of the storage area dedicated for MFFF materials and equipment. The inspectors noted that controls were established to assure that only correct and accepted items were used or installed. Specifically, FNAG had established hold points in the production traveler to ensure that only accepted materials (e.g., sample results received and CGIE tests and inspections complete) were released to Voith for fabrication on the shop floor. The inspectors selected various samples of raw materials used for the MFFF furnace shell. The inspectors verified the materials were suitably marked to indicate material type, ASME and ASTM specifications, and heat number. The inspectors reviewed the material test reports, material sample results (independent laboratory), and completed commercial grade item evaluation records to ensure that the materials met the required chemical and physical properties specified in the design documents.

(b) Conclusion

The inspectors concluded that 1) Voith had adequate controls for the identification and control of items and 2) FNAG had performed adequate oversight of Voith with regards to identification and control of materials. No findings of significance were identified.

(5) Corrective Action Program Attribute (IP 88110, Problem Identification, Resolution, and Corrective Action)

(a) Scope and Observations

The inspectors reviewed QP 16-01, Corrective and Preventative Action Reports, Revision 2, and QP 15-01, Control of Non-Conforming Items, Revision 3 to verify that FNAG had a program established to identify and correct deficiencies and to properly disposition non-conforming materials and parts. The inspectors also reviewed NCR AI262-PE-NCR-0021 that pertained to the MOX Services contract. The inspectors verified that the NCR properly characterized, identified the cause and documented the disposition of the non-conformance. The inspectors also verified that FNAG had submitted the proposed disposition to MOX Services for review in accordance with QP 15-01 and QP 16-01. This NCR was still being reviewed by MOX Services at the time of this inspection.

(b) Conclusion

The applicant provided adequate oversight of FNAG to ensure the vendor had a program in place to identify and correct deficiencies and to properly disposition non-conformances. In addition, FNAG had performed adequate oversight of Voith with regards to identification and corrective action of problems. No findings of significance were identified.

(6) Special Processes Attribute (IP 55100, Structural Welding General Inspection Procedure)

(a) Scope and Observations

The inspectors reviewed a sampling of FNAG's procedures involving welding and NDE of the sintering furnace to verify they met the applicable code and MOX Services

procurement requirements. Specifically the inspectors reviewed WPSs, PQRs, welder performance qualifications (WPQs), the liquid penetrant examination (PT), radiographic examination (RT) and visual examination (VT) procedures, the filler metal control procedure, and various other procedures listed in the attachment.

Also the inspectors performed a walk-down of the filler metal storage room to verify that welding filler metal being used for the sintering furnace was controlled in accordance with the MOX Services quality requirements. Specifically, the inspectors verified that the filler metal storage room was kept locked, had monitored temperature and humidity controls, was kept organized and controlled to ensure only the correct filler metal was issued and used, and met the other requirements of the filler metal control procedure.

The inspectors also selected two welds (one completed and one in process) as samples to verify that welding and NDE met the applicable MOX Services quality and procurement requirements. The welds selected were PFF #1 and PFE #1. The inspectors visually examined the completed weld and the fit-up on the other weld. The inspectors also reviewed the VT and PT exam reports. The inspectors also verified that the in process welding was performed in accordance with the applicable procedure requirements and that the welding filler metal was controlled, had been issued, and used in accordance with the filler metal control procedure and WPS.

(b) Conclusion

The inspectors concluded that Voith Ermo was properly executing the requirements of ASME Section IX and ASME NQA-1, Basic Requirement IX. The inspectors concluded that MOX Services was performing adequate oversight of FNAG and FNAG was performing adequate oversight of Voith Ermo in the area of welding and special processes. No findings of significance were identified.

(7) Quality Assurance, Vendor Oversight/Inspection Attributes (IP 88106, Quality Assurance: Program Development and Implementation, and 88115, Supplier/Vendor Inspection)

(a) Scope and Observations

1) Quality Assurance Program

The inspectors reviewed QAP-PE-01, Revision 1, FNAG -QA Plan for MFFF Personnel. The inspectors noted that FNAG required all employees who perform quality-related work be trained according to their functions, education, experience and proficiency on the FNAG Quality Assurance Plan (QAP), quality procedures, and quality assurance organization during their orientation period and prior to their performance of activities affecting quality.

The inspectors examined FNAG's supplier qualification record for sub-supplier Voith. FNAG qualified Voith as a QL-1 supplier with specific restrictions related to commercial grade dedication, handling of projects including defective work, records, and documents.

The inspectors reviewed Voith–AA-71, Implementation and Manufacture of FNAG Projects, Revision 1. The inspectors verified that FNAG had listed the training requirements for staff, welders, inspectors and auditors in quality procedures.

The inspectors reviewed training records for selected individuals who were authorized to perform work for MOX Services. For each individual that was selected, the required training had been completed, documented and signed off by the instructor and the attendee.

2) Audits

The inspectors reviewed various audit reports performed by MOX Services conducted from 2009 to 2011. The inspectors noted that the audits verified the capability of FNAG to design, manufacture and supply the sintering furnace and other MOX related equipment. The inspectors verified that FNAG was placed on MOX Services Approved Suppliers List with some restrictions related to the audit findings.

In addition, the inspectors reviewed an audit performed by FNAG of Voith's QA program to determine that the program met the applicable requirements and was effectively implemented for furnace manufacture, inspection, and testing at their facility. The audit was conducted for the purpose of qualifying Voith as an approved supplier for FNAG. The inspectors verified that the audit was performed by a qualified auditor in accordance with QP 18-01, Qualification and Certification of Audit Personnel, and QP 18-02, Audits and Surveys. The inspectors verified that Voith Ermo was placed on the FNAG qualified supplier list following completion of the audit corrective actions.

In addition, the inspectors reviewed a sampling of the surveillances and examined in detail the evaluation performed during the June 2011 (FNAG-11-VS217) surveillance. No problem areas were noted.

(b) Conclusion

The inspectors concluded that FNAG was providing acceptable oversight of its sub-supplier Voith and MOX Services was providing proper oversight of FNAG in the areas of QAP, training and qualification of personnel, and audits. No findings of significance were identified.

4. Non-PSSC Inspections

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

(1) Scope and Observations

The inspectors reviewed the implementation of management self-assessments to determine whether the applicant's assessments evaluated scope, status, adequacy, programmatic compliance, and implementation effectiveness of QA and other management measures in their areas of responsibility. The inspection included reviews of a sample of three assessment reports, the assessment procedure, and interviews with responsible personnel. The inspectors evaluated whether procedures were implemented in accordance with the MPQAP, whether prompt corrective actions were provided in response to identified problems, and whether assessment results were adequately documented and submitted for management review.

In addition, the inspectors determined whether management self-assessments had been scheduled for all of the functional areas identified by the MPQAP. The sample of assessment reports reviewed by the inspectors were found to provide adequate review of associated quality activities and formally documented conditions that required follow up actions.

The inspection scope included a review of the implementation of quality assurance audits. The inspectors reviewed seven audit reports, four CRs for audit findings, audit program procedures, selected qualification records for auditors, and lead auditors, and interviewed selected personnel. The audit reports and audit schedules were reviewed to verify internal audits were adequately implemented and provided coverage commensurate with significance and performance history. The inspectors evaluated the use of audit plans and whether audit results were documented and communicated to audited managers. Findings from audits were reviewed to verify adverse conditions were entered into the corrective action system and required management responses according to established due dates. Responses and corrective actions for findings were reviewed for adequacy.

The inspectors determined that the applicant's audits over the past year had examined samples of activities associated with each of the 18 quality program elements defined in the MPQAP. The audit reports selected for review in this inspection were found to provide sufficient detail to substantiate audit determinations. Audits documented the performance of follow up verifications of responses to previous audit findings.

The inspection scope included a review of the QA indoctrination provided to personnel performing quality-affecting activities at the MFFF. The inspectors reviewed the training procedure and associated training lesson plan to verify that the program included the appropriate elements specified in the MPQAP. In addition, the procedure was reviewed to verify that all personnel performing quality-affecting activities receive QA indoctrination. No findings of significance were identified.

(2) Conclusion

Based upon the samples selected in this inspection, the implementation of management self-assessments and quality assurance audits met MPQAP and regulatory requirements. The implementation of QA indoctrination was also found to meet the applicable requirements. No findings of significance were identified.

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

(1) Scope and Observations

The inspectors reviewed design documents and procedures to ensure that inspections, test control and the use of M&TE were adequately addressed. The inspectors also reviewed documents used in the field and by QC personnel to ensure that the requirements of the design documents and procedures were appropriately translated into work packages and inspection plans. The inspectors observed a fit-up and tack inspection of field welds BMP0103-HDE23-D-M-0001-FW054 and BMP0103-HDE23-D-M-0001-FW056 to determine whether the inspections were conducted in accordance

with the project requirements and if the necessary hold points and documentation were adequate. The inspectors also reviewed QC personnel qualification records to determine whether the qualifications were current and in compliance with industry standards and procedures.

The inspectors reviewed MOX Services implementing procedures associated with the control of M&TE to determine whether the documents were in compliance with the MPQAP. The inspectors interviewed MOX Services staff to determine whether staff understood and handled M&TE in accordance with project procedures and requirements. The inspectors performed a walk-down of the M&TE storage area to determine whether calibrated and nonconforming M&TE were stored separately and in accordance with project procedures.

The inspectors reviewed certificates of calibration to determine whether M&TE used in the field was calibrated in accordance with industry standards and procedures. The inspectors observed the use of a calibrated torque wrench (CE 7980). Inspectors verified that the torque wrench (CE 7980) had the necessary markings to indicate its calibration and observed its use to ensure that it was handled in accordance with project procedures.

The inspections reviewed nonconformance reports associated with M&TE to determine whether the technical evaluation for out-of-calibration M&TE were dispositioned in accordance with procedures and the MPQAP. No findings of significance were identified.

(2) Conclusion

Based on the samples selected in this inspection, it was determined that MOX Services had adequately implemented established procedures and program activities associated with inspection, test control and control of M&TE.

c. Control of the Electronic Management of Data (IP 88113)

(1) Scope and Observations

The inspectors reviewed implementing procedures for the control of the electronic management of data to verify they were in accordance with Section 17 of the applicant's MPQAP. The inspectors specifically verified that electronic data was adequately protected, stored, complete and accurate, secure, and data transfers were properly controlled. The inspectors also verified that the applicant had established a framework in which record creation and maintenance occur.

The inspectors reviewed QA procedures for the storage of digital archive media, the control of documents and the Electronic Document Management System (EDMS). The inspectors conducted visits of the Primary Tape Storage Site (PTSS), Secondary Tape Storage Site (STSS), Project Records Center (PRC), and PRC vault. The inspectors verified the storage and transfer of media between the PTSS and STSS; the completeness and accuracy of the data input; and the creation and maintenance of records through interviews and sampling of stored records. The inspectors evaluated how data were transferred to ensure that it was error-free, and the input was recoverable. No findings of significance were identified.

(2) Conclusion

Based on inspection activities performed the applicant has adequately implemented the MPQAP requirements related to the control of the electronic management of data.

5. Follow-up of Previously Identified Items

a. (Closed) VIO 70-3098/2010-004-003: Failure to Accurately Translate Applicable Design Requirements into Design Documents

(1) Scope and Observations

On December 6, 2007, MOX Services failed to ensure that applicable AWS code requirements were correctly translated into design documents. Specifically, the AWS D1.6-1999, Structural Welding Code for Stainless Steel, Section 7.3, requires minimum yield strength of 35 thousand pounds per square inch (ksi) for stainless steel studs. Contrary to the AWS D1.6-1999 code, MOX Services' Technical Requirements Document (TRD) for the Design of Concrete Embedments, DCS01-XGA-DS-TRD-B-09053-C (TRD-09053), specified stainless steel post annealed studs with minimum yield strength of 30 ksi and tensile strength of 70 ksi. The TRD-09053 referenced the Requirements for Ductile Welded Studs used in Embed Plates calculation analysis, DCS01-XGA-DS-CAL-B-01231 (CAL-01231). The calculation used a yield strength value of 30 ksi as design input for stainless steel studs. The construction/procurement specification, Metal Fabrication for Quality Level 1, 2, 3, and 4, DCS-BAA-DS-SPE-B-09352 (SPE-09352), specified post annealed headed stainless steel studs from Nelson® Stud Welding (Nelson). The specification did not include the yield strength requirements. The post annealed yield strength was lower than that specified in the specification and was used in design calculations. This was documented as VIO 70-3098/2010-004-003 in NRC Inspection Report (IR) 70-3098/2010-004.

For the abovementioned violation and to evaluate the overall issues associated with Nelson studs and embed plates received from their vendor, SMCI, MOX Services generated CR 10-458. SMCI procures commercial grade concrete anchors (Nelson studs) and steel plate material, performs a CGD of these materials, and uses the materials to fabricate concrete embedment plates under a NQA-1 QA program. MOX Services issued ECR 008508 to correct the TRD-09053 to remove the post annealed requirement for stainless steel studs and specify minimum yield strength value of 40 ksi and minimum tensile strength value of 75 ksi. The CAL-01231 was revised and subsequently updated via ECR 008508 to remove the post annealed requirement and align the strength requirements with the TRD-09053. ECR 008509 was written to remove the post annealing requirement and specify, for the finished stainless steel headed studs, minimum yield strength of 40 ksi and minimum tensile strength of 75 ksi. The SPE-09352 was revised and issued to incorporate ECR 008509 and required verification of material properties of the finished stainless steel stud by independent testing.

MOX Services Quality Control (QC) re-performed receipt inspection of the embedment plate and Nelson stainless steel stud documentation packages to verify conformance to the requirements. The inspection and subsequent testing of samples of each heat received concluded post-annealed studs were received by MOX Services. These

nonconforming materials were documented in NCRs and dispositioned in accordance with MOX Project Procedure (PP) 3-5, Control of Nonconforming Items, Revision 7.

- NCR QC-10-2657 addressed a shipment of 345 loose studs that were never installed. The Nelson CMTR indicated that the studs, prior to the annealing process being performed, had yield strength of 76.3 ksi. MOX services required their embed plate vendor, SMCI, to perform subsequent testing of a sample of these studs and the test results indicated a yield strength that ranged from 27.9 to 28.4 ksi.

- NCR-QC-10-2660 addressed seven plates with non-conforming Nelson studs. The Nelson CMTR indicated that the studs had a yield strength of 28.9 ksi, which was less than specified. These plates were not installed.

- NCR-10-QC-2661 was initiated to evaluate eight plates from a heat number with an associated Nelson CMTR that indicated the yield strength as 89 ksi. Fourteen of the studs from this heat were subsequently tested and determined to be post-annealed, with results ranging from 28.2 to 31.8 ksi. As a result of this test, the six plates that were installed in December 2008 with this heat number were evaluated. This evaluation was documented in NCR-QC-2658.

ECR 010788 was initiated to perform an evaluation to determine the allowable capacity of the anchors associated with the post annealed studs. Non-conformances documented in NCR-QC-2657, NCR-QC-2660, and NCR-QC-2661 were all dispositioned as not meeting AWS D1.6 code requirements and were rejected and scrapped. NCR-QC-2658 used the evaluation in ECR 010788 to justify an exception from the AWS D1.6 code requirements for the six previously installed embed plates and was dispositioned them as “use-as-is.” The six plates were installed in the BAP in Room C-145. All other post annealed stainless steel studs were rejected and scrapped.

MOX services performed a 10 CFR Part 21 evaluation, Log Number 2010-05, to address the issue that MOX Services received and installed, six embed plates with Nelson post annealed stainless steel studs that did not meet the minimum yield strength requirements of AWS D1.6. This was contrary to the CoC received from Nelson® Stud Welding stating compliance with AWS D1.6 and CMTR indicating acceptable minimum yield strengths. CR-10-694 was issued to initiate the Part 21 evaluation. ECR 010788 was used as the basis for concluding that the deviation did not compromise the safety function of the studs for the six installed plates, therefore a substantial safety hazard did not exist.

Additionally, as part of their corrective actions, MOX Services initiated ECR 011334, which established the qualification process for the embed plate program. This program was established to confirm final compliance with requirements for all plates used for attachments. MOX Services also issued CR-11-687 to provide details regarding the Load Confirmation Program as part of the overall embedment qualification program. Closure of this condition report resulted in revisions to MOX procedures PP9-3, Design Control; PP11-62, Embedded Plate and Attachment As-Builts; and Engineering Guide (EG) 62, Load Tracking Program.

(2) Conclusions

VIO 70-3098/2010-004-003, Failure to Accurately Translate Applicable Design Requirements into Design Documents, was closed based on the review of the associated documentation and implemented corrective actions. Furthermore, the inspectors reviewed MOX Services' Part 21 evaluation and determined that it met regulatory requirements. No findings of significance were identified.

b. (Closed) VIO 70-3098/2010-004-004: Failure to Maintain Accurate Procurement Documents

(1) Scope and Observations

On February 19, 2007, MOX Services failed to change Purchase Order/Subcontract Number 10888-S1381 after agreeing with the supplier's/subcontractor's request to deviate from material requirements. Specifically, on November 16, 2006, SMCI submitted a Supplier/Subcontractor Request For Information (SRFI), 1381-0025 Revision 0, to MOX Services requesting a material deviation from Purchase Order/Subcontract Number 10888-S1381. SMCI requested to use 316L Nelson Studs (H4L) as supplied by Nelson, instead of post annealing the studs as required by MOX Services Specification DCS01-BAA-DS-SPE-B-09352-0, Section 2.2.5.E, which was referenced in the procurement contract between MOX Services and SMCI. On February 19, 2007, MOX Services concurred with SMCI's request to deviate from material requirements through SRFI 1381-0025, Revision 1. Although MOX Services concurred with the material deviation, MOX Services failed to change the procurement contract as required by MOX PP 10-15, Supplier/Subcontractor Requests, Revision 1. This was documented as VIO 70-3098/2010-004-004 in NRC IR 70-3098/2010-004.

For the abovementioned, the applicant generated CR-10-458 to evaluate the overall issues associated with Nelson studs and embed plates received from SMCI. As part of their corrective actions, the applicant revised construction/procurement specification DCS01-BAA-DS-SPE-B-09352-1 referenced in Purchase Order/Subcontract Number 10888-S1381, to properly specify the required mechanical properties satisfying AWS D1.6. The applicant issued Technical Document Change Notice (TDCN) 10888-P-TDCN-0001 to SMCI to inform the vendor of the requirement change for the mechanical properties of Nelson studs. The applicant also enhanced their training program for Subcontract Technical Representatives (STRs) and provided specific training to STRs and engineering staff regarding the proper use of Request for Change Proposals (RFCP) as the appropriate means for changing a contract in accordance with PP 10-10, Procurement Change Management, Revision 4.

(2) Conclusions

VIO 70-3098/2010-004-004, Failure to Maintain Accurate Procurement Documents, was closed based on the review of associated documentation and implement corrective actions. No findings of significance were identified.

c. (Closed) VIO 70-3098/2010-004-005: Failure to Ensure Supplier Services were in Accordance with Procurement Requirements.

(1) Scope and Observations

On or before August 23-27, 2010, MOX services failed to ensure supplier services were in accordance with procurement requirements. Specifically, AWS D1.1-1998, Structural Welding Code for Steel, Section 7.6.1(3), required welding procedure qualification for carbon steel studs welded to a base material other than Group I or II steels, listed in Table 3.1 of AWS D1.1-1998. AWS D1.1-1998, Section 7.6.4 and 7.6.6.1, required procedure qualification to be conducted by consecutively welding ten specimens for each diameter, position, and surface geometry using the recommended welding settings. Subsequently, the ten specimens were required to be tested by alternately bending 30 degrees in opposite directions in a typical test fixture shown as shown in Annex IX (ASW D1.1) until failure occurred. Alternatively, the studs may be bent 90 degrees from their original axis. Contrary to the above, MOX Services failed to verify that the stud welding of carbon steel studs to stainless steel embed plates performed by SMCI was in accordance with applicable AWS code requirements as specified by subcontract 10888-S13181. SMCI welded carbon studs to stainless steel embed plates, which was not a Group I or II material listed in Table 3.1, without a qualified stud welding procedure. Without a qualified welding procedure, the quality of the welding performed by SMCI was rendered indeterminate. This was documented as VIO 2010-004-005 in NRC IR 70-3098/2010-004.

For the abovementioned, the applicant generated CR-11-093 to correct this condition, and for SMCI to perform application tests to qualify the welding procedures. The inspectors reviewed the application specific qualification procedure for the dissimilar welds that was submitted by SMCI and approved by MOX Services. The application specific qualification did not result in changes to the weld procedure that was in place. CR-10-465 was also generated by MOX Services to implement the use of a Supplier Surveillance Report Checklist to improve the vendor surveillance function.

(2) Conclusions

VIO 70-3098/2010-004-005, Failure to Ensure Supplier Services were in Accordance with Procurement Requirements**,** was closed based on the review of the associated documentation and implemented corrective actions. No findings of significance were identified.

d. (Closed) URI 70-3098/2010-004-007: Review of Receipt Inspection Documentation

(1) Scope and Observations

Unresolved Item (URI) 70-3098/2010-004-007 was opened to document discrepancies identified in receipt inspection reports (RIR) of concrete embedment plates. Specifically, the receipt inspection reports (RIRs) were either missing CMTRs, contained CMTRs that did not match the material received, or contained CMTRs from non NQA-1 suppliers. The applicant identified these discrepancies in CR-10-495, CR-10-496, and CR-10-499, which were initiated as a result of MOX Services evaluation of previous NRC identified items documented in CR-10-458. This was documented as URI 70-3098/2010-004-007 in NRC IR 70-3098/2010-004.

Multiple RIRs for embed plates containing stainless steel Nelson studs were missing CMTRs or contained CMTRs that did not match the material associated with the RIR.

This condition was documented in CR-10-495 and CR-10-499. The cause of this condition was determined to be inadequate work preparation, performance, and unclear requirements. ECR 008509 was generated to identify the requirements for stainless steel Nelson studs. The inspectors reviewed ECR 008509 and project specifications, to ensure that the appropriate requirements had been incorporated. The applicant performed a complete documentation review of all Nelson studs received, to ensure that their documented properties met the requirements of the project specifications and ECR 008509. The licensee also performed independent testing on a sample of studs to verify that the properties of the studs met the design requirements. This review was documented by MOX Services in QC-RIR-CR-10-499. The inspectors reviewed the independent stud testing data to ensure that the studs met design requirements. The inspectors also reviewed a sample of embed plate RIRs to verify that the proper CMTRs were present and that the properties of the studs met design requirements.

One embed plate RIR was found to contain a CMTR from a non NQA-1 supplier. This CMTR was for raw plate material used to manufacture embed plates. SMCI procured this plate from Consolidated Power Supply (CPS), which was a NQA-1 supplier. CPS procured plate material from non NQA-1 suppliers, and performed a CGD of the plate material in order to sell it as a basic component. CPS performed independent testing of the plate material during the CGD process. The RIR in question contained the CMTR from CPS's non NQA-1 material supplier, but did not contain the CMTR generated by CPS's independent NQA-1 material tests. The required NQA-1 CMTR was available and incorporated into the RIR. This condition was documented by MOX Services in CR-10-496. The inspectors reviewed a sample of embed plate RIRs to ensure the appropriate CMTRs, from NQA-1 vendors, were incorporated.

(2) Conclusions

The inspectors concluded that the licensee implemented the corrective actions necessary to address the embed plate RIR discrepancies. URI 70-3098/2010-004-007 was closed, based on the review of the associated documentation and implemented corrective actions. No findings of significance were identified.

e. (Closed) URI 70-3098/2010-004-008: Review of Embed Procurement Requirements

(1) Scope and Observations

During a December 15, 2010, inspection, NRC inspectors identified a concern with the point of testing for the mechanical properties of studs supplied by Nelson. This concern was identified in NRC IR 70-3098/2010-004 as Unresolved Item (URI) 70-3098/2010-004-008, Review of Embed Procurement Requirements. Through interviews with the applicant and personnel from SMCI during the December 15, 2010, inspection, NRC inspectors identified that Nelson was testing the mechanical properties of their studs in either the raw material form or in the finished product form. The test data were then supplied to SMCI within CMTRs or CoC. AWS D1.1-1998 and AWS D1.6-1999, Section 7.3, allowed the manufacturer to supply the mechanical properties of the suds by testing the material after cold finishing or the full diameter finished studs. Although either method was acceptable by code, the process of manufacturing the studs often included annealing, cold drawing, hot finishing, or other processes that alter the properties of the material during the fabrication process. The differences in mechanical properties

between the raw material and post-fabrication could impact the design basis of the embed plates.

MOX Services generated CR 10-499 and CR 10-458 to evaluate the concerns related to Nelson studs and embed plates received from SMCI. The applicant's investigation verified that Nelson tested the physical properties of the studs in the cold drawn form and not in the finished stud form. SMCI conducted testing of all stainless steel stud heats, with the exception of three, and determined that the physical properties of the stainless steel studs did not meet Nelson's published values or those values listed on the CMTRs and CoCs supplied by Nelson. Specifically, the yield strength of the stainless steel studs was lower than the values provided on the CMTRs and CoCs. This was documented in SMCI NCRs 101221 and 101222 and MOX Services NCR EN-10-2718. The applicant issued ECR-0080509, Revision 4, to revise the yield values referenced in construction/procurement specification DCS01-BAA-DS-SPE-B-09352-1 referenced in Purchase Order/Subcontract Number 10888-S1381. The applicant also revised the specification to require the physical properties of the stud be tested in the finished form, not the cold drawn form to ensure all future studs meet the applicable requirements. As part of their corrective actions, the applicant initiated a review of the calculations within the embed program for all loaded embed plates, to ensure they meet all applicable design requirements.

Additionally, MOX Services initiated Action Tracking (AT) document 11-1947 to identify samples of the three heats of stainless steel studs that were identified as not having secondary independent testing. These heats will be documented in accordance with MOX Services PP3-5, Control of Nonconforming Items.

(2) Conclusions

URI 70-3098/2010-004-008: Review of Embed Procurement Requirements, was closed based on the review of associated documentation and implemented corrective actions. No findings of significance were identified.

f. (Discussed) Inspector Follow-up Item (IFI) 70-3098/2010-004-009: Review of Commercial Grade Dedication Plan for Nelson Studs

(1) Scope and Observations

IFI 70-3098/2010-004-009 was opened to document the need for additional inspector review of CGD plans of Nelson studs; specifically, the CGD plans used by SMCI, an NQA-1 vendor to MOX Services, for the dedication of Nelson studs used to manufacture NQA-1 concrete embed plates. SMCI procures commercial grade concrete anchors (Nelson studs) and steel plate material, performs a CGD of these materials, and uses the materials to fabricate concrete embedment plates under a NQA-1 quality assurance (QA) program.

The inspectors reviewed SDR SMCI-10-VE294-01, previously numbered as SDR SMCI-10-VS285-01, and noted that MOX Services had identified the following deficiencies with SMCI's CGD plan for Nelson D2L studs:

(a) SMCI provided MOX Services CMTRs that were independently validated and were from a lab that was audited as part of SMCI's dedication process. At the time MOX Services

identified the lack of independently validated CMTRs, there was no requirement upon SMCI to provide independently validated CMTRs. As part of the corrective actions for this deficiency, SMCI submitted revised CGD plans for Nelson D2L and H4L studs, which included a requirement to provide independent secondary laboratory testing, by an audited laboratory. MOX Services reviewed and approved the revised plan. Destructive tensile and chemical testing was also performed on a sample of in stock Nelson D2L and H4L studs, to verify conformance with specified requirements. MOX Services also reviewed these data and initiated corrective actions for any noted deficiencies. The inspectors reviewed the corrective actions and their implementation to verify adequacy.

The CGD plan did not identify the deformation dimensions of the D2L studs as a critical characteristic. The deformation dimensions were critical to ensure a proper interaction between the concrete and D2L studs. The deformations on Nelson D2L studs were required to conform to ASTM A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement, as required by MOX Construction Specification DCS01-BAA-DS-SPE-B-09352-0. To correct this, SMCI submitted a revised CGD plan for Nelson D2L studs which included deformation size, conforming to ASTM A496, as a critical characteristic. MOX Services reviewed and approved the revised plan. SMCI also inspected a sample of in stock Nelson D2L studs to ensure that deformations were in compliance with ASTM A496. These inspection data were also submitted to and reviewed by MOX, with no deficiencies identified.

The inspectors reviewed SMCI's CGD plan for Nelson D2L studs to ensure incorporation of deformation size as a critical characteristic. The inspectors also reviewed SMCI's CGD plan for Nelson H4L studs, to verify that the critical characteristics identified were adequate to ensure the studs would perform their intended safety functions. A sample of RIRs for embed plates procured from SMCI was reviewed, to verify incorporation of the proper CGD documentation. At the time of the inspection, the inspectors determined that additional review was needed of the CGD plan to verify that the critical characteristic of deformations on the D2L studs was implemented in accordance with the requirements of ASTM A496.

(2) Conclusions

IFI 70-3098/2010-004-009: Review of Commercial Grade Dedication Plan for Nelson Studs, will remain open to facilitate additional review of the CGD plan to verify that the critical characteristic of deformations on the D2L studs was being implemented in accordance with the requirements of ASTM A496.

6. Exit Interviews

The inspection scope and results were summarized throughout this reporting period and by regional inspectors on October 6, October 20, November 17, December 16, December 22, and by the senior resident inspector on January 6, 2012. Additional information was provided by MOX Services to regional inspection staff regarding IFI 70-3098/2010-004-009, and discussed during a teleconference on January 18, 2012. Subsequently, regional inspection staff re-exited with MOX Services during a teleconference on January 23, 2012. No dissenting comments were received from the

applicant. Although proprietary documents and processes may have been reviewed during this inspection, the proprietary nature of these documents or processes was not included in the report.

SUPPLEMENTAL INFORMATION

1. PARTIAL LIST OF PERSONS CONTACTED

MOX Services

R. Alley, Engineering Assurance Manager
K. Armstrong, Software Quality Assurance
R. Bailey, As-Built Coordinator
H. Baldner, Compliance Staff
G. Bell, Manager Software Design Group
A. Brack, Quality Control
K. Buchanan, DOE
F. Cater, NRC Interface & Issue Management / Equipment Qualification Manager
E. Chassard, Executive Vice President
J. Cockrell, Compliance
K. Dewitt, Safety PLC Lead
D. Gwyn, Licensing Manager
D. Harper, Lead QC Mechanical/Piping Inspector
D. Hosey, Project Manager
D. Ivey, Acting Quality Assurance/ Quality Control Manager
J. Jollie, Server Administrator
R. Jones, Chief Technology Officer
D. Kehoe, Shaw AREVA MOX Services, Compliance Manager
J. Keklak, QA Internal Audits
T. Lynch, Civil Engineering
S. Miller, Field Engineer/Survey Lead
J. Nadeau, Help Desk Manager
T. Nash, Software V&V Coordinator
J. O'Dell, Compliance Manager
A. Olorunniwo, Civil/Structural Manager
J. Peregoy, Quality Control Manager
M. Peters, Batch Plant Manager
R. Rutherford, Construction Engineering Manager
T. Shake, Security Manager
K. Trice, MOX President
K. Trosen, Materials Engineer
K. Toombs, Subcontractor Technical Representative
P. Vaughan, Civil Engineering, Subcontract Technical Representative
D. Washington, Lead Civil Field Engineer
R. Whitley, Vice President Project Assurance
P. Wilkie, Lead Welding Engineer
L. Wood, Document Control Manager
D. Yates, Compliance

ACPP

G. Houllegatte, Procurement Manager
O. Janssens, Commercial Grade Dedication Lead
J. Lecacheur, Welding Engineer
N. Lemonnier, Translator

I. Palma Da Silva, Quality Assurance Manager

FNAG/Voith Ermo

E. Cudet, Project Manager
T. Dasch, Welding Engineer
K. Grosse, Director
S. Lugenot, Quality Manager
M. Oppenlander, Manufacturing Leader
J. Wenzl, Quality Assurance Manager

Invensys

J. Adams, Invensys Operations Management, MOX Project V&V
J. Larson, Invensys Operations Management, Director, Nuclear QA/V&V
R. Marcum, Invensys Operations Management, Project Engineer
M. Shyu, Invensys Operations Management, MOX Project QA
S. Suvagondha, Invensys Operations Management, MOX Project IV&V Manager
M. Sweetman, Invensys Operations Management, Software Design Lead

Mecagest/Mecachimie

R. Allais, Procurement
G. Bougaran, Welding Engineer
E. Jamard, Quality Assurance
N. Lemonnier, Translator
S. Leronnier, President and CEO
S. Meslin, Project Manager
D. Robelet, Project Manager

Specialty Maintenance and Construction, Inc.

G. Lynn, Quality Assurance Manager
J. Shinn, Project Manager
T. Ennis, SMCI QA Corporate Director

2. INSPECTION PROCEDURES (IPs) USED

IP 55050	Nuclear Welding General Inspection Procedure
IP 55100	Structural Welding General Inspection Procedure
IP 88106	Quality Assurance: Program Development and Implementation
IP 88107	Quality Assurance: Design and Document Control
IP 88108	Quality Assurance: Control of Materials, Equipment and Services
IP 88109	Quality Assurance: Inspection, Test Control, and Control of Measuring and Test Equipment
IP 88110	Quality Assurance: Problem Identification, Resolution, and Corrective Action
IP 88111	10 CFR Part 21 Inspection–Facility Construction
IP88112	(Draft) Inspection of Safety-Related Software Design for Fuel Fabrication Facilities
IP 88113	Control of the Electronic Management of Data

IP 88115	Supplier/Vendor Inspection (Construction Phase)
IP 88116	Inspection of Safety Function Interfaces
IP 88130	Resident Inspection Program For On-Site Construction Activities at the Mixed-Oxide Fuel Fabrication Facility
IP 88132	Structural Concrete Activities
IP 88134	Piping Systems Relied on for Safety
IP88140	Instrumentation and Control Systems
IP 88143	Pipe Supports and Restraints

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
VIO 70-3098/2010-004-003	Closed	Failure to Accurately Translate Applicable Design Requirements into Design Documents (Section 5.a)
VIO 70-3098/2010-004-004	Closed	Failure to Maintain Accurate Procurement Documents (Section 5.b)
VIO 70-3098/2010-004-005	Closed	Failure to Ensure Supplier Services Were in Accordance with Procurement Documents (Section 5.c)
URI 70-3098/2010-004-007	Closed	Review of Receipt Inspection Documentation (Section 5.d)
URI 70-3098/2010-004-008	Closed	Review of Embed Procurement Requirements (Section 5.e)
IFI 70-3098/2010-004-009	Discussed	Review of Commercial Grade Dedication Plan for Nelson Studs (Section 5.f)

4. LIST OF ACRONYMS USED

ACI	American Concrete Institute
ACPP	Atelier de Construction du Petit Parc
ADAMS	Agency-Wide Document Access and Management System
ANS	American Nuclear Society
ASL	Approved Supplier List
ASME	American Society of Mechanical Engineers
ASME BPVC	American Society of Mechanical Engineers Boiler and Pressure Vessel Codes
ASTM	American Society of Testing and Materials
AT	Action Tracking
AWS	American Welding Society

BAP	Aqueous Polishing Building
BMP	MOX Processing Building
BOD	Bases of Design
BSR	Shipping and Receiving Building
CA	Construction Authorization
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAR	Construction Authorization Request
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CGIE	Commercial Grade Item Evaluation
CIB1, 2, 3	Construction Inspection Branch 1, 2, or 3
CMTR	Certified Material Test Report
CoC	Certificate of Compliance
CPB1	Construction Projects Branch 1
CPS	Consolidated Power Supply
CR	Condition Report
DCI	Division of Construction Inspection
DCP	Division of Construction Projects
DCS	Duke, Cogema, Stone & Webster
DI&C	Digital Instrumentation and Control
DRCS	Document review comment sheets
DRR	Document review/release
ECR	Engineering Change Request
ED	Engineering Directive
EDMS	Electronic Document Management System
EPRI	Electric Power Research Institute
ETD	Emulator Test Driver
FNAG	Furnace Nuclear Applications Grenoble
FTS	Fluid Transport System
GOP	General Operating Principles
IEEE	Institute of Electrical and Electronics Engineers
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
ISAS	Integrated Safety Analysis Summary
ITL	Independent Testing Laboratory
M&TE	Measuring and Test Equipment
MFFF	MOX Fuel Fabrication Facility
mm	Millimeter
MOX	Mixed Oxide
MOX Services	Shaw AREVA MOX Services
MPQAP	MOX Project Quality Assurance Plan
NCR	Non-conformance Report
NCR	Scrap Processing Unit
NCSE	Nuclear Criticality Safety Evaluation
NCSE-D	Nuclear Criticality Safety Evaluation-Design
NDD	PuO_2 Can Receiving and Emptying Unit Process Unit
NDE	Non-destructive Examination

NDP	Primary Dosing Unit
Nelson	Nelson® Stud Welding
NIST	National Institutes of Standards and Technology
NQA-1	NQA-1-1994, Quality Assurance Requirements for Nuclear Facilities Applications
NRC	Nuclear Regulatory Commission
NSE	Nuclear Safety Evaluation
NSCE	Nuclear Safety Criticality Evaluation
NXR	Powder Auxiliary Unit
PAF	Process Assembly Facility
PFE	Sintering Furnace
PFF	Sintering Furnace
PHA	Preliminary Hazards Analysis
PLC	Programmable Logic Controller
PRC	Project Records Center
PrHA	Process Hazards Analysis
PP	Project Procedure
PPM	Project Procedure Manual
PQP	Project Quality Plan
PQR	Procedure Qualification Record
PSSC	Principle System, Structure, and Component
PT	Liquid Penetrant Examination
PTFE	Polytetrafluroethylene
PTM	Project Traceability Analysis
PTSS	Primary Tape Storage Site
PuO_2	Plutonium Dioxide
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
QL	Quality Level
QL-1	Quality Level 1
QM-2	Invensys Nuclear Quality Assurance Manual
QPM	Quality Procedure Manual
Rebar	Reinforcing bar
RG	Regulatory Guide
RII	Region II
RFCP	Request for Change Proposals
RIR	Receipt Inspection Report
RT	Radiographic Examination
RTM	Requirements Traceability Matrix
S&ME	Soils and Materials Engineering, Inc.
SCAQ	Significant Condition Adverse to Quality
SDD	System Design Description
SDR	Supplier Deficiency Report
SMCI	Specialty Maintenance and Construction, Inc.
SPLC	Safety Programmable Logic Controller
SQAP	Software Quality Assurance Plan
SRD	Safety Requirements Document
SRFI	Supplier/Subcontractor Request for Information
SRS	Software Requirements Specification
SSCs	Systems, Structures, and Components

STR	Subcontract Technical Representative
STSS	Secondary Tape Storage Site
SVVP	Software Verification and Validation Plan
TDCN	Technical Document Change Notice
TRD	Technical Requirements Document
UO_2	Uranium dioxide
URI	Unresolved Item
VIO	Violation
Voith	Voith Ermo Industrial Services
VT	Visual Examination
V&V	Verification and Validation
WP	Work Package
WPQ	Welder Performance Qualification
WPS	Weld Procedure Specification
WTS	Welding Technical Specification

5. LIST OF PSSCs REVIEWED

PSSC-009	Criticality Controls
PSSC-011	Electrolyzer Structure
PSSC-023	Fluid Transport Components
PSSC-024	Gloveboxes
PSSC-026	Guide Sleeves
PSSC-031	Material Handling Controls
PSSC-032	Material Handling Equipment
PSSC-036	MOX Fuel Fabrication Building Structure (including vent stack)
PSSC-039	Polytetrafluroethylene (PTFE) Insulator
PSSC-048	Sintering Furnace

6. RECORDS AND DOCUMENTS REVIEWED

Drawings

DCS01-ZMS-DS-PLD-M-C134-PS-00356, QL-1 – Pipe Support
DCS01-ZMS-DS-PLD-M-B142B-HV-00006-SH1, QL-1 – Pipe Support
DCS01-ZMS-DS-PLD-M-C135-PS-12299-SH01, QL-1 – Pipe Support, Revision 1
DCS01-ZMS-DS-PLD-M-C134-PS-00246, QL-1 – Pipe Support, Revision 1
DCS01-ZMS-DS-PLD-M-C134-PS-00220, QL-1 – Pipe Support, Revision 1

Procedures

PP1-3, Project Training, Revision 11
PP3-04, Records Management, Revision 7
PP3-7, Revision 7, Audits
PP3-4, Records Management, Revision 7
PP3-6, Corrective Action Process, Revision14
PP3-8, Qualification and Certification of Auditors, Revision 7, Interim Change Notice (ICN) 1
PP3-11, Assessments, Revision 8, ICN 1
PP3-15, Control of Measuring & Test Equipment, Revision 4

PP3-27, Quality Control Personnel Certification, Revision 4
PP3-30, Quality Control Inspection Plans and Inspection Reports, Revision 2, ICN 3
PP3-32, Visual Welding Inspection Criteria, Revision 0
PP7-04, Document Control. Revision 6, ICN 1
PP7-09, Electronic Document Management System, Revision 3
PP8-3, Evaluation and Reporting of Defects and Noncompliance (10 CFR Part21), Revision 5
PP9-3, Design Control, Revision 19
PP9-21, Engineering Change Request, Revision 8
PP10-10, Procurement Change Management, Revision 4
PP10-14, Supplier/Subcontractor Technical Document Submittal Management, Revision 6
PP10-36, Shipping and Receiving of Material, Revision 0
PP11-5, Batch Plant Testing and Calibration Instructions, Revision 1, ICN 3
PP11-10,Control of Construction Tools and Construction Equipment, Revision 2
PP11 -35, Construction Inspection and Acceptance Testing, Revision 4, ICN 3
PP11-44, Work Package Planning, Development, Approval, and Closure, Revision 6, ICN 4
PP11-51, AWS D1.1 and D1.6 General Welding Procedure, Revision 1
PP11-53, ASME B31.3 General Welding Procedure, Revision 1
PP11-57, Materials, Revision 0
PP11-58, Weld Filler Material Control, Revision 2
PP11-60, Welder/Welding Operator Qualification, Revision 1
PP11-62, Embedded Plates & Attachment As-Builts, Revision 0
PP11-64, Weld Mapping and Weld Data Sheets, Revision 1
PP11-74, Piping Support Installation, Revision 0
PP11-77, Mechanical & Electrical Equipment Installation, Revision 0
PP14-03, Storage for Digital Archive Media, Revision 2
PP14-03, Storage for Digital Archive Media, Revision 2, ICN01

Condition Reports

CR 325, Weakness with SDG Submittal Process and Submittal Reviews for SPLCs, June 11, 2011
CR 10888-MOX-CR-11-567
CR 10888-MOX-CR-11-563
CR 10888-MOX-CR-11-566
CR 10888-MOX-CR-11-567
CR 10888-MOX-CR-11-336
CR 10-481, Management Awareness Audit Finding – Deficiencies with Civil Work Packages
CR 10-484, Management Attention Audit Finding - of Ineffective Corrective Actions for Previous Issues with Control of Chemicals
CR 10-485, Management Attention Audit Finding – Training Program Deficiencies
CR 11-084, Management Awareness Audit Finding – Failures to translate BOD Requirements Into Purchase Specifications
CR-11-653, NRC observation – Designations of Significance for Audit Findings
CR-11-656, NRC observation – Documentation of QA determinations of adequacy
CR-11-637, M&TE Submittal Issues
CR-11-566, Weld Temperatures Spot Checked with Uncalibrated Instrument
CR-10-648, Lapse of Humidity and Temperature Record

CR-11-281, Control of Measuring and Test Equipment (Calibration)
CR-11-042, Control of Measuring and Test Equipment
CR-016, Non M&TE Qualified Use for QL-1 Work
CR-11-510, An Assessment Performed by QC Does Not Comply With PP3-11
10888-MOX-CR-10-458
10888-MOX-CR-10-465
10888-MOX-CR-10-499
10888-MOX-CR-10-694
10888-MOX-CR-11-093
10888-MOX-CR-11-495
10888-MOX-CR-11-496
10888-MOX-CR-11-687
10888-MOX-CR-11-708
10888-MOX-CR-11-725

Non-Conformance Reports (NCR):

NCR QC-11-3557
QC-11-2824
QC-11-2878
QC-11-3286
QC-10-2255
QC-10-2459
QC-10-2180
QC-10-2552
QC-11-2734
QC-11-3213
NCR-QC-10-2657
NCR-QC-10-2658
NCR-QC-10-2660
NCR-QC-10-2661
NCR-EN-10-2718
SMCI-NCR-101221
SMCI-NCR-101222

Receipt Inspection Reports (RIRs)
QC-RIR-09-6897: RIR Inspection Summary
QC-RIR-09-7117: RIR Inspection Summary
QC-RIR-10-9308: RIR Inspection Summary
QC-RIR-11-26996: RIR Inspection Summary
QC-RIR-11-27371: RIR Inspection Summary

Engineering Change Requests

ECR 011297, Removal of bar code reader NCR*OT9000 used for entering PuO_2 content of J60U, Revision 0
ECR 013632, NXR SRD Signal Continuance Correction, Revision 0
ECR 013624, B1964-SR-00040 Questions Diagnostics Table of SPLC GOP, Revision 0
ECR 012624, SRD LD 101 3/9 Equipment Tag update, Revision 0
ECR 012670, GOP Fault Table Modification, Revision 0

ECR 001078, Primary Dosing and PuO_2 Can Receiving & Emptying Units (NDP/NDDD) SRD Running Authorization and IROS Changes, Revision 1
ECR 000978, Homogenizing and Pelletizing Units (NPG/H) SRD Running Authorization and IROFS Changes, Revision 2
ECR 000946, Scrap Processing Unit (NCR) SRD Running Authorization and IROFS Changes, Revision 2
ECR 006486, Revision to SPLC General Operating Principles DCS01 CCJ EW SPE N 36002 4, Revision 0
ECR 007069, DCS01-CCJ-DS-CCT-E-40576, Revision 0
ECR-008508, "Material Specified in TRD for Stainless Steel Studs (CR-10-458)," Revision 2
ECR-008509, "Material Specification of Stainless Steel Studs (CR-10-458)," Revision 2
ECR-008509, "Embed Physical Properties," Revision 4
ECR-010788, "Anchors for six (6) 9SB plates in room C-145 need to be checked for yield strength of 25 ksi," Revision 0
ECR-010930, "4SB Fabricated Below Allowable Tolerance Shown on Shop Drawing (Ref. 10888-MOX-CR-458)," Revision 0
ECR 001078, Primary Dosing and PuO_2 Can Receiving & Emptying Units (NDP/NDD) SRD Running Authorization and IROFS Changes, Revision 0
ECR 013799, Clarify Failure Detection for the Primary Dosing Unit, Revision 0

Audits and Assessments

Assessment CY11-P-003, 2010 Project Assessment, dated March 30, 2011
Assessment CY11-M-CON-001, Construction Management Assessment, dated May 12, 2011
Assessment CY10-M-ENG-012, Engineering Management Assessment, dated January 26, 2011
Audit SA-10-A03, MOX Construction, dated October 14, 2010
Audit SA-10-A04, Corrective Action Process, dated January 19, 2011
Audit SA-10-A06, Engineering, dated March 10, 2011
Audit SA-10-A07, Procurement, dated February 24, 2011
Audit SA-11-A01, Process Unit Design and Commissioning (PUDC), dated June 28, 2011
Audit SA-11-A02, QC Programs and Activities, dated June 20, 2011
Audit SA-11-A04, Construction Programs and Activities, dated August 24, 2011

Specifications

DCS01-KKJ-DS-SPE-M-15115-1, Construction Specification – Division No.15 Mechanical – Field Fabrication and Installation of Piping, Valves, and Specialty Items, QL-1, Revision 1
DCS01-KKJ-DS-NTE-L-16282-6, Welded Equipment and Piping – General Specification – For 304L Stainless Steel Materials, QL-1, Revision 6
DCS01-KKJ-DS-NTE-L-16279-5, Welded Equipment and Piping – General Specification – For 316L Stainless Steel Materials, QL-1, Revision 5
DCS01-AAJ-DS-DOB-M-40121-2, Basis of Design – Fluid Transport Systems Equipment and Piping, QL-1, Revision 2
Technical Specification for Safety Programmable Logic Controllers, DCS01-CCJ-EW-SPE-C-37007

DCS01-BAA-DS-SPE-B-09352, Metal Fabrication for Quality Level 1, 2, 3, and 4, Revision 1

Miscellaneous Documents

TRI-11-VE221, Safety Programmable Logic Control Software Audit, August 24, 2011
TRI-11-VE221-02, Supplier Requests were incorrectly being used as design input, 10/11/11
Project Conditional Release 775460-06, July 14, 2011
08716-00001964_00000-0765 Software Requirements Specification “NNJ*SPLC0001”, Revision 0
DCS01-CCJ-EW-SPE-N-36002-4 Safety PLC General Operating Principles, Revision 4
DCS01-CCJ-EW-NTE-C-36015-1, Safety PLC System Preliminary Hazard Analysis, Revision 1
B1964-SR-00036 – Resolution of issues with the SRD January 30, 2011
B1964-SR-00037 - Resolution of issues with the SRD March 14, 2011
08716-00001964_00000-0780 Verification and Validation (V&V) Requirement Activity Summary Report Revision 0
08716-00001964-00000-0809 System Integration Deficiency Report
Welding Technique Sheets: D1.6-GT-A-B-01, Revision 2; D1.6-GT-A/B-I/II-01, Revision 2; B31.3-GTAC-8-8-01, Revision0; D1.1-GM-I-II-01, Revision 1
Procedure Qualification Records: D1.6-GT-1-1G-P45; D1.6-GT-1-1F; D1.6-GT-1-2F; D1.6-GT-1-3F; D1.6-GT-1-4F; D1.6-GT-1-1G-L; D1.6-GT-1-1G-U; B31.3-GTAC-8-8-1-1/2-40;B31.3-GTAC-8-8-1-1-40; B31.3-GTAC-8-8-1-2-40; B31.3-GTAC-8-8-1-3/4-40; B31.3-GTAC-8-8-1-3/8-40; B31.3-GTAC-8-8-1-3/8-80; B31.3-GTAC-8-8-1-1/2-40; B31.3-GTAC-8-8-1-1/2-40; B31.3-GTAC-8-8-1-1/2-40;
Record of Welder Qualification for: P046; P038; P043; P029; P044; P047
Metallurgical Test Report 341466-01
Metallurgical Test Report IR-09-003-215
Certificate of Compliance for PO 10888-M-00006871
Certified Material Test Report for ARCOS S.O. 118142
Liburdi LDW Application, Mixing and Application Instruction for LDW-16 Catalyst
Record of Auditor/Lead Auditor Qualification for A. Johnston
Record of Auditor/Lead Auditor Qualification for G. Weston
Record of Auditor/Lead Auditor Qualification for J. White
Lesson Plan LP-TRNG 1210, MOX Services General Employee Training (GET) MPQAP, dated January 5, 2011
Certificates of Calibration: 853987, 854481, 857083, 914049, 914274, 931804
QC Qualification Record for Employee 1159482
Safety PLC System Preliminary Hazards Analysis, DCS01-CCJ-EW-NTE-C-36015-0
MOX Services Safety Requirements for the Primary Dosing and Puo2 Can Receiving and Emptying Unit, DCS01-NDP-CG-NTE-C-08024-1, January 28, 2009
MFFF Safety Control System, Software Quality Assurance Plan DCS01-CCJ-EW-PAQ-Q-36019-1, June 10, 2011.
MOX Project Quality Assurance Plan, Revision 10, Change 1, August 15, 2011.
Process Hazards Analysis of the MOX Fuel Fabrication Facility: Powder Workshop, DCS01-AAS-DS-ANS-H-38329-2, Revision 2
Nuclear Safety Evaluation of Load Handling for the MOX Fuel Fabrication Facility, DCS01 AAS DS ANS H 38373-4
Preliminary Hazard Analysis, DCS01-ZJJ-DS-ANS-H-38301

Software Requirements Specification NNJ1, 08716-00001964_00000-0765, Revision 2
Software Design Description NNJ1, 08716-00001964_00000-0784, Revision 1
Primary Dosing and PuO_2 Can Receiving & Emptying Units-Safety Requirements for Process unit Controllers Project Traceability Matrix (PTM), 08716-00001964_00000-0769, Revision 2
Primary Dosing and PuO_2 Can Receiving & Emptying Units NDP/NDD Safety Requirements for Process Units Controllers, DCS01-NDP-CG-NTE-C-08024-1, Revision 1
Nuclear Criticality Safety Evaluation (NCSE-D) of Primary Dosing Unit, DCS01-NDP-DS-ANS-H-35016-3, Revision 3
DCS01-XGA-DS-CAL-B-01231, Requirements for Ductile Welded Studs used with Embedded Plates, Revision 0
DCS01-XGA-DS-TRD-B-09053, Technical Requirements Document for the Design of Concrete Embedments, Revision 1
Action Tracking Item MOX-AT-11-1947
MFFF Engineering Guidelines, EG-62, Load Tracking Program, Revison 2
MOX Services Part 21 Evaluation Form, Log Number 2010-05
MOX Services White Paper on Stainless Steel Nelson Studs and Embed Plate Issue
Supplier Deficiency Report SMCI-10-VE294-01
SMCI QAP-16A, Quality Assurance Procedure for Dedication of Commercial Grade Items, Revision A, dated November 9, 2009
SMCI Commercial Grade Item Survey of Nelson Stud Welding, Survey 2007.06, dated April 17, 2007
SMCI Commercial Grade Item Survey of Nelson Stud Welding, Survey 1020604, dated May 7, 2010
SMCI Dedication Plan for: Nelson Stud, Deformed Anchors, D2LMS (Mild Steel), ASTM 108 in various sizes, Revision B, dated February 20, 2011
SMCI Dedication Plan for: Nelson Stud Headed Concrete Anchors H4LMS (Mild Steel), ASTM 108 in various sizes, Revision B, dated February 20, 2011
SMCI Dedication Plan for: Nelson Stud Headed Concrete Anchors H4LSS (Stainless Steel), ASTM 276 in various sizes, Revision B, dated February 20, 2011
SMCI Stud Log
SMCI Stud Test Data: 08716-00002575_-0204
SMCI Stud Test Data: 08716-00002575_-0205
SMCI Stud Test Data: 08716-00002575_-0206
SMCI Stud Test Data: 08716-00002575_-0207
SMCI Stud Test Data: 08716-00002575_-0208
SMCI Stud Test Data: 08716-00002575_-0209
SMCI Stud Test Data: 08716-00002575_-0210
SMCI Stud Test Data: 08716-00002575_-0211
SMCI Stud Test Data: 08716-00002575_-0212
SMCI Stud Test Data: 08716-00002575_-0213
SMCI Stud Test Data: 08716-00002575_-0214
SMCI Stud Test Data: 08716-00002575_-0243

Traceability Matrix

08716-00001964_0776-A Safety PLC General Operating Principles Project Traceability Matrix (PTM), Revsion A
08716-00001964-00000-0768 – PTM for Safety PLC Technical Specifications May 27, 2011

08716-00001964-00000-0778 – PTM for Safety PLC System Procurement Specifications May 27, 2011
08716-00001964-00000-00770C Scrap Process Unit PTM Revision 2
08716-00001964-00000-0773-A Powder Auxiliary Unit PTM Revision 0

Work Packages

WP 10-CP20-3A-BAP-W211-C
WP-10-CP27-KWD-TK2050-M
WP 11-CP20-BAP-TCO-001-C
WP-11-CP23-BMP0103-HDE23-D-M-0001

Inspection Plans

IP Number C112, Pre-placement Inspection, Revision 20
IP Number C103, Concrete Placement Inspection, Revision 10
IP Number C155, Structural Steel Inspection," Revision 2
IP Number C520, Installation of Hilti Undercut Concrete Anchors, Revision 0
IP Number E225-4, Cable Tray Installation, Revision 0
IP Number S501, Mechanical Splices, Revision 8
IP Number C114, Post-placement Inspection, Revision 2
IP Number S562, Piping Installation Inspection and Welding, Revision 5

Invensys Quality Procedures

Corporate Quality Procedure (CQP) 6, "Nuclear Supplier and Manufacturing Facility Approval," Revision 3, March 12, 2010.
CQP-14, Training, Revision 000
Project Procedure Manual (PPM) 1.0, "Application Project Administrative Controls," Revision 12, December 17, 2010.
PPM 2.0, Design Control, Revision 11
PPM 2.0, Software Requirements Specification and Design Description, Revision 001
PPM 3.0, Drawing Preparation & Control, Revision 9, August 6, 2010.
PPM 5.0, Materials & Services, Revision 10, November 11, 2011.
PPM 5.01, Source Evaluation & Vendor Selection, Revision 1, August 31, 2011.
PPM 6.0, Test Control, Revision 17, September 17, 2010.
PPM 7.0, Software Verification, Revision 9, August 6, 2010
PPM 7.02, V&V Phase Summary Reports, August 6, 2010
PPM 9.0, Personnel Training & Qualification
PPM 10.0, Nonconformance & Corrective Action, Revision 6, January 18, 2010.
Quality Procedure Manual (QPM) 1.1, Triconex Organization, Revision 10, March 20, 2009.
QPM 6.1, Source Evaluation and Supplier Selection, Revision 20, November 30, 2011.
QPM 14.0, Corrective and Preventive Action, Revision 9, February 6, 2009.
QPM 14.2, Corrective Action Document Processing, Revision 8, August 31, 2011.
QPM 18.0, Training, Revision 8
QPM 18.1, Audit Personnel Certification, Revision 10
QPM 18.2, Inspection and Test Personnel Certification
QPM 17.2, Quality Surveillances, Revision 6

Invensys Plans and Documents for the MOX Project

Invensys Software Design Description (SDD) for MOX Services (NNJ*SPLC0001), November 16, 2011
Invensys Project Quality Plan, Revision 1, July 27, 2011.
Invensys Project Quality Plan, Revision 0, December 16, 2010.
Invensys Software Verification and Validation (SVVP) Plan for MOX Services, March 8, 2011
Invensys Software Quality Assurance Plan for MOX Services (SQAP), Revision 0, February 24, 2011.
Invensys Verification and Validation (V&V) Requirement Activity Summary Report NNJ*SPLC001 Revision 0, March 13, 2011 and Revision 1, March 27, 2011
Invensys Project Traceability Matrix (PTM) for the Primary Dosing and PuO_2 Can Receiving and Emptying Unit for MOX Services, December 13, 2011
Invensys Operations Management Software Requirement Specification (SRS) (NNJ*SPLC0001) for MOX Services, August 15, 2011
Invensys Inspection and Test Plan for MOX Services, July 28, 2011
Invensys Verification and Validation (V&V) Test Plan (NNJ*SPLC0001) for MOX Services, March 1, 2011
Invensys Software Criticality, Hazard and Risk Analysis, Revision 0 and Revision 4
Invensys Nuclear Quality Assurance Manual (QM-2), Revision 4, August 31, 2011.
Invensys Nuclear Quality Assurance Manual QM-2, Revision 3, October 23, 2009.
Invensys Emulator Test Driver (ETD) Software Verification & Validation Plan (SVVP)
Invensys ETD Software Requirements Specification
Invensys ETD Software Design Description
Invensys ETD Test Plan/Specification
Invensys ETD Test Procedures and Test Cases
Invensys ETD Verification & Validation Test Report

Invensys System Integration Deficiency Reports (SIDAs)

SIDA 611, initiated July 1, 2011, disposition August 19, 2011.
SIDA 720, initiated November 9, 2011, disposition December 1, 2011.

Invensys Corrective/Preventive Action Requests (CPARs) and Action Request Reports (ARRs)

CPAR 2011-0055, initiated March 7, 2011, closed August 8, 2011.
ARR 875, initiated November 14, 2011, closed August 4, 2011.
ARR 946, initiated November 9, 2011.
ARR 949, initiated December 9, 2011.
ARR 950, initiated December 12, 2011.
ARR 951, initiated December 13, 2011.
ARR 953, initiated December 14, 2011.
ARR 955, initiated December 16, 2011.

Invensys Surveillance Reports

Surveillance 11-77, “MOX NNJ1 SPLC Project Surveillance: Readiness Review for Implementation Phase Activities,” dated December 9, 2011.

Invensys miscellaneous documents

Nuclear Approved Supplier List (NASL)," dated December 2, 2011.
Certificate of Conformance (CoC), "Invensys PO #4540104361, change order 2, dated March 31, 2010," dated April 13, 2010.
CoC, "Invensys PO #4540124737, change order 3, dated October 21, 2010," dated November 10, 2010.

Invensys Document Review/Release (DRR) and Document Review Comment Sheets (DRCS)

DRR 029, SDD Revision 0 to Revision 1 Review
DRCS associated with DRR 029
DRCS dated January 26 thru February 28, 2011 and March 18 thru March 24, 2011, and October 4 thru October 11, 2011.
DRR 023, SDD Revision 0 Review
DRR 046, SRS Revision 0 to Revision 1 Review

Invensys Training Documents

PPM Form 9-3 and Learning Management System Documents

IEEE 1074-1997, Standard for Developing Software Life Cycle Processes

RG 1.168, Verification, Validation, Reviews, And Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants

IEEE 730-1998, Standard for Software Quality Assurance Plans

Regulatory Guide 1.173**,** Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants

IEEE 830-1998, Recommended Practice for Software Requirements Specifications