



U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

DCS-NRC-000308  
12 September 2011

**SUBJECT:** Revision to Shaw AREVA MOX Services' Updated Reply to Notice of Violation 70-3098/2010-002-004

**REFERENCE:** Letter from Kelly Trice to U.S. Nuclear Regulatory Commission dated 01 September 2011 entitled "Shaw AREVA MOX Services Updated Reply to Notice of Violation 70-3098/2010-002-004 Inadequate CGD of QL-1 Materials"

This letter corrects an error in our letter of September 1, 2011. In that letter, we stated in Item 5 on Page 6 of the Enclosure, that document DCS01-ZMJ-DS-NTE-N-65973 had been revised. The revision was not approved until September 6, 2011. The Enclosure has been revised accordingly.

If you have any questions, please contact Jim O'Dell, Regulatory Compliance Manager, at (803) 819-2234.

Sincerely,

A handwritten signature in cursive script that reads "Kelly Trice".

Kelly Trice  
President and COO

Enclosure

cc: (See next page)

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Enclosure:

(1) Shaw AREVA MOX Services Revised Updated Reply to Notice of Violation 70-3098/2010-002-004 Inadequate CDG of QL-1 Materials

cc:

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EDMS: Corresp\Outgoing\NRC\2011 NRC\DCS-NRC-000308

Revised Update to Enclosure 1

Shaw AREVA MOX Services

Updated Reply to Notice of Violation 70-3098/2010-002-004  
Inadequate CGD of QL-1 Materials

(Reply to Violations 70-3098/2010-002-001, -002, and -003 remain unchanged)

**VIO: 70-3098/2010-002-004 Inadequate CGD of QL-1 Materials**

*Brief description of the issue:*

NRC inspection team noted that the project had incorrectly specified use of PMI for verification of 304L stainless steel material for commercial grade dedication (CGD) of QL-1 materials.

*Reason for the Violation:*

In accordance with the *MOX Project Quality Assurance Plan* MOX Services applies the Commercial Grade Dedication process to structures, systems, and components classified as Quality Level 1 (QL-1) Items Relied On For Safety (IROFS). MOX Services relied on a material identification and validation process as specified in commercial grade dedication document DCS01-ZMJ-DS-CGD-M-65858 Revision 2, *Commercial Grade Item Evaluation For Ferrous Steel Material for Gloveboxes and Subassemblies* (hereafter referred to as CGD-65858) and MOX Services specification DCS01-ZMJ-DS-NTE-N-65973 Revision 2, *Technical Basis for Generic Critical Characteristics for Acceptance for QL-1 Materials and Purchased Parts for the MFFF* (hereafter referred to as NTE-65973). In revision 2 of specification NTE-65973 positive material identification (PMI) was performed to confirm three critical metallic constituents (chromium, manganese, and nickel) of the raw material being received, S30403 (304L) stainless steel (SS) per ASTM A240/240M for verification of materials, alloy/type/grade/class, critical characteristics for austenitic stainless steel materials for glovebox fabrication.

As noted in the NOV, MOX Services did not perform a direct verification/validation of the non-metallic compounds (carbon content) of the material. Alternatively, the verification/validation of the carbon content was accepted by the MOX Services process established in the referenced specification as represented on a Material Test Report (MTR) provided by the material commercial supplier (mill). MOX Services did not perform a Commercial Grade (CG) Survey of this supplier and the supplier was not on the MOX Services Approved Supplier List (ASL). Flanders, the glovebox fabricator, is a MOX Services approved Appendix B supplier. Flanders also did not perform a CG Survey of this CG supplier and the supplier was also not on the Flanders ASL.

It was MOX Services' position that the process defined in revision 2 of NTE-65973 provided "reasonable assurance" that the requirements specified in procurement documents and the commercial grade dedication requirements were met. NTE-65973 revision 2 specifies several inspections and checks to identify any indications of fraudulent material and establishes reasonable assurance that the received material is correctly traceable to the MTR and is in compliance with the applicable ASTM.

The metallic constituent's verification methodology defined in the NTE-65973 revision 2 is based upon utilizing the capability of the PMI tool/technology to verify the metallic constituents of 304L SS as specified in ASTM A240 and as reported on the commercial supplier's MTR. ASTM A240 identifies the metallic constituents for S30403 (304L) SS

as chromium, manganese, and nickel. Following the NTE-65973 revision 2 process, if the values obtained from the PMI testing meet ASTM A240 and are within specified tolerance of values recorded by PMI, then the validity of the MTR and traceability to the material has been confirmed. Assuming these values were within specified tolerances; MOX Services determined that other reported characteristics of the material, as reported on the MTR, were valid and acceptable for use. This included the indicated carbon content which was reported on the MTR to be within the tolerance for carbon content as specified in ASTM A240.

MOX Services acknowledges that the material verification process provided in commercial grade dedication document CGD-65858 revision 2 and MOX Services specification NTE-65973 revision 2 did not directly measure the non-metallic compounds such as carbon, sulfur, silicon, phosphorus, and nitrogen. Therefore, due to this limitation, the use of PMI as was implemented in specification NTE-65973 revision 2 has been determined to not be considered adequate to differentiate between S30400 (304) and S30403 (304L) stainless steel materials.

The extent of condition applies to the MOX Services/Process Unit Design and Commissioning (PUDC) vendors/fabricators that have performed work on QL-1 components prior to 05 October 2010. Presently, this includes thirteen MOX Services, 10 CFR 50 Appendix B, NQA-1 approved glovebox vendors or fabricators in addition to numerous commercial grade vendors. The extent of condition also applies to QL-1 components fabricated or purchased directly by MOX Services.

**Corrective Action Steps Taken to Correct the Condition:**

1. MOX Services initiated CR 10-0312 on 25 June 2010 to document the NRC issues identified during the NRC Inspection at the Flanders facility. Investigation to complete the Extent of Condition was completed on 28 October 2010. The Extent of Condition review identified 47 Commercial Grade Item Evaluations (CGIEs) which utilized the methodology defined in NTE-65973 revision 2. MOX Services completed the revision of these 47 CGIEs on 15 February 2011 to utilize the current dedication methodology discussed below.
2. MOX Services is no longer using the "PMI" process as defined in NTE-65973 revision 2 for commercial grade dedication of materials/metals. The Vice President of Engineering issued interim guidance on the approach to be used during dedication for verification of metals. This interim action was necessary until the completion of the revision of all CGIEs utilizing the methodology defined in revision 2 of NTE-65973 (see item 1).
3. A third party nuclear industry expert with both NRC power reactor and DOE facility experience was brought on the project to provide his independent professional overview assessment of the MOX Services approach to commercial grade dedication of raw material (metals) and purchased product parts. This consultant was selected

because he has an extensive background directly involved with the nuclear industry practices of commercial grade dedication. He has provided consulting and training services to both the NRC staff, various NRC licensed facilities, and within the DOE complex. He has ready access to the current industry practices and is presently consulting with several nuclear power utilities and fuel cycle facilities in support of their efforts to design, construct, license, and operate nuclear facilities. This consultant was also utilized to review the MOX Services approach to this NOV response. MOX Services' goal was to ensure that their dedication approach was consistent with current industry practices.

4. Currently the MOX Services Commercial Grade Dedication methodology utilizes one or more of the following approaches, either individually or in some cases using a combination of methods.

EPRI Method 1, *Special Tests and Inspections* –

The Method 1 approach includes Product (chemical composition) Analysis to confirm the elemental composition for elements having an established limit/range and Mechanical Properties Tests to confirm the physical (tensile, yield, hardness when appropriate, etc.) values for properties having an established limit/range of the applicable referenced material standard (ASTM). Material product analysis must be performed by a qualified source. A qualified source may either be a laboratory or supplier that has been approved by MOX Services Quality Assurance organization by either an Appendix B Audit and placed on the MOX Services Approved Suppliers List or the MOX Services Quality Assurance organization has performed a Commercial Grade Survey of that laboratory/supplier and they are on the MOX Services Approved Commercial Grade Suppliers List. Likewise, this requirement can be extended to a MOX Services sub-tier approved Appendix B supplier.

Additionally, MOX Services has completed an extensive assessment into the development and implementation of material/metal testing using the Optical Emissions Spectroscopy (OES) technology. OES technology offers the increased testing/verification capabilities above that of X-Ray Fluorescence (XRF) in that it can identify the carbon content when testing specific grades of stainless steel where carbon content is a critical constituent. OES testing technology provides for direct verification of both heavy metal elements (including chromium, manganese, and nickel) and the lighter non-metallic elements (including carbon, sulfur, silicon, and phosphorus). MOX Services' investigations indicated that many NRC licensed nuclear utilities and other industry entities, such as Parsons (Salt Waste Processing Facility), Bechtel (UPF, WTP and CMRR projects), Entergy Corporation, routinely require positive material/metal identification for use as their acceptance method or utilize this technology as part of an over check process to monitor supplier performance and strict adherence to specification and/or purchase requirements.

The MOX Services has implemented the use of specialized OES Material & Test Equipment (M&TE) for testing/verification of material (metals). This test equipment utilizes the Optical Emission Spectroscopy (OES) technology. Several manufacturers/suppliers of OES analysis test equipment were evaluated and the product line (SPECTROTEST) manufactured by Ametek was ultimately selected and purchased.

The OES technology/analyzer vaporizes a minute quantity of the surface of the material sample using an arc or spark discharge. The atoms and ions contained in the vapor are excited into emitting photons. The photons are passed to the spectrometer optics, where it is dispersed into its spectral components. The emitted wavelengths and intensity of light is then analyzed and compared to a database of known values (Traceable to NIST standards) to provide the elemental composition and concentration of the sample. OES can be used to perform direct measurements and verification of the chemical composition of the elements identified in the applicable product material standards (ASTMs).

MOX Services has implemented an OES material testing approach which included developing a material test procedure (MOX Services project procedure PP-15-30) and the training and qualification/certification of the MOX Services personnel authorized (or others authorized by MOX Services) to perform this testing (MOX Services project procedure PP-3-36).

The program initiated involved identification of all indeterminate material, regardless of location or fabrication status. Revised commercial grade item evaluation (CGIE) packages were sent to all vendors performing fabrication or procurement of QL-1 items. Vendors were directed to develop non-conformance documents in accordance with their own quality assurance programs to document any discrepancies between the revised CGIEs and the processes previously used for dedication. They were additionally required to perform all future procurements in accordance with the revised CGIEs. MOX Project NCRs were initiated for all indeterminate materials located in MOX Services warehouses both at the Savannah River Site and at the French Platform facility which, at that time, was operating as a MOX Services facility. MOX Services formed a team to research these NCRs, disposition them and close them. This team has established various tools to disposition non-conforming materials when coupons are not available in sufficient quantity to perform chemical and physical testing at a qualified laboratory. The OES analyzers described above are the most frequently used tool, which is made more effective by a MOX Services generated engineering basis for the use of chemical composition to reasonably assure minimum tensile and yield strength for austenitic stainless steels (DCS01-ZMY-DS-NTE-M-65787). Another recently approved tool is a technical justification for the use of XRF to disposition non conforming material used in glovebox confinement boundaries (DCS01-ZMJ-DS-NTE-N-66041). These activities are tracked using action items associated with CR 10-0312 referenced above. At this time all actions are due for completion on or before 31 December 2011.

EPRI Method 2, *Commercial Grade Survey* -

Method 2 included satisfactory completion of commercial grade survey (or audits) of the participants (mill, distributors, fabricators, suppliers, etc.) in the material supply chain. Attempts to utilize this methodology as described in the original response document proved to be impractical.

5. MOX Services Engineering revised DCS01-ZMJ-DS-NTE-N-65973, Technical Basis for Generic Critical Characteristics for Acceptance for QL-1 Materials and Purchased Parts for the MFFF. NTE-65973, Revision 3, effective 06 September 2011, deletes the previous approach of using "PMI" to validate the supplier's MTR and accepting the reported carbon values reported on the MTR. That approach is the basis for the NOV. The NTE-65973 revision directs raw material (metals) verification/dedication to be performed using the present MOX Services methodology described above.
6. MOX Services Engineering initiated a revision to CGD-65858 Rev. 2, CGIE of Iron-Based Material in Non-Fluid Transport System Applications to clarify that this CGIE shall only be used for MFFF structural "dry" applications where there are no applicable Fluid Transport System (FTS) codes. The CGD implements the revised material verification/dedication approach described above. This CGD is applicable to MFFF glovebox structural applications. The revision to CGD-65858 was completed on 01 October 2010.
7. Due to the reduced scope of CGD-65858 as just described, MOX Services Engineering issued a new CGD-65964, *CGIE of S30403 (304L), S31603 (316L), Incoloy 800H & Titanium Grade 2 Metallic Standard Forms Used in Fluid Transport System Applications* on 15 October 2010. This CGD shall be used for design applications of process equipment that may be subject to chronic wetted environments and are classified within the MOX Services design process as Fluid Transport Systems (FTS) applications.

**Corrective Action Steps to Avoid Future Violations:**

1. MOX Services Engineering has changed the material verification process approach for commercial grade dedication of metals to be used in IROFS applications. Either Method 1, *Special Tests and Inspections* or Method 2, *Commercial Grade Survey* of the supply chain participants, or a combination of both methods may be utilized as discussed above.
2. As noted in the NRC NOV, there is at least one reference in the MOX Services Integrated Safety Analysis Summary (ISAS) where there is an incorrect statement that gloveboxes are required to be manufactured using 304L SS. MOX Services Engineering completed a review of the ISAS and the License Application and initiated an Engineering Change Request (ECR) ECR 009311 identifying the applicable sections of the ISAS and License Application requiring revision and has



initiated the MOX Services Licensing organization form for implementing those changes. MOX Services Licensing will incorporate these changes in a subsequent update of the LA.

3. Similar incorrect statements that gloveboxes are required to be manufactured using 304 L SS are contained in MOX Services specification DCS01-ZMJ-DS-SPE-M-19101, *Process Equipment Glovebox Design Requirements*. MOX Services, Title III Engineering initiated Engineering Change Request (ECR) ECR 009311 addressing the necessary correction and clarification in that specification. This ECR was completed/approved on 27 May 2011.

**Full Compliance:**

Full compliance shall be achieved when deficient conditions have been identified and a process is in place to bring resolution to those deficiencies. These actions will be completed prior to 31 December 2011. MOX Services will keep the NRC apprised of changes.