



May 29, 2015

U.S. Nuclear Regulatory Commission (NRC)
ATTN: Document Control Desk
Washington, D.C. 20555

RE: Response to NRC Inspection of ATC Nuclear Tennessee, Report 99901458/2015-201

Dear Sir/Madam:

The U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Oak Ridge, TN Argo Turboserve Corporation Nuclear- TN (ATC) Facility from March 16-20, 2015. During the inspection, three Notices of Non-Conformance were identified. Item Numbers 99901458/2015-201-01, 99901458/2015-201-02, and 99901458/2015-201-03 were issued associated with Criterion III "Design Control."

Based on evaluation under the Corrective Action Program, ATC Nuclear acknowledges these Non-Conformances and provides the attached response (9 pages).

Please direct any additional inquiries to Mr. Kevin Morrow, Quality Assurance Manager ATC - Nuclear Oak Ridge, TN at kmorrow@argoturbo.com or (865) 218 - 8277.

Respectfully,

Kevin W. Morrow
QA Manager
ATC Nuclear - TN

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I. **Notice of Nonconformance 99901458/2015-201-01:**

Criterion III, "Design Control," of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 states, in part, that "design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing program."

ATC Quality Assurance Manual (QAM), Section 3.0, "Design Control," states, in part, that "The adequacy of design shall be checked or verified by the performance of design review, by the use of alternate or simplified calculation methods, or by the performance of suitable testing program."

A. Contrary to the above, as of March 20, 2015, ATC failed to verify the adequacy of the design of circuit breakers for purchase order (PO) 415850 from TVA (Sequoyah Nuclear) through a suitable testing program. Specifically, seismic test plan SP12T1970-01-01, for a General Electric Manually Operated Model Breaker/Switch, Revision 0, dated December 12, 2013, stated that the safety function of the breaker was to close and carry the rated current/voltage when manually closed and to open when manually tripped. The test plan also stated that the breaker was seismically qualified in accordance with the Institute of Electrical and Electronics Engineer (IEEE) 344-1975 "IEEE Recommended Practices for Seismic Qualification for Class 1E Equipment for Nuclear Power Generating Stations." However, ATC failed to provide an appropriate analysis, in accordance with IEEE 344-1975, to address the multiple seismic tests of similar, but not equivalent, configurations. Specifically, during the seismic testing there were changes to internal components, breaker state (open/close), and mounting configuration. ATC did not have a documented analysis to supplement the testing that demonstrated that the breaker, in spite of the changes, could meet its performance requirements when subjected to seismic acceleration. In addition, the qualification testing, similarity analysis, and dedication plan failed to address the requirement that the breaker could be manually closed following a safe shut down earthquake (SSE) to carry the rated current/voltage. Therefore, the final qualification report does not demonstrate the breakers ability to perform its required functions following a seismic event.

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance:

ATC did not adequately document the test regimen performed on the subject circuit breaker in ATC Nuclear Report QTR12T1970-01-01 Revision 0. The report did not include sufficient details related to the qualification testing, and therefore makes it difficult to conclude that the requirements of IEEE 344-1975 were met.

Corrective steps that have been taken and the results achieved:

CAR 15T-14 has been issued to address Nonconformance 99901458/2015-201-01. A root cause analysis has been chartered and is in progress. As an interim action, an evaluation of the sequence of tests performed was conducted which demonstrates sufficient testing was conducted to demonstrate the breaker's ability to perform the required functions before, during, and after a seismic event.

Corrective steps that will be taken to avoid noncompliance's:

- I. Actions to prevent recurrence will include procedure revision to include specific additional requirements for Qualification Test Report content.
- II. Additional qualification testing detail from the evaluation action above will be incorporated into Qualification Test Report QTR12T1970-01-01.

Date when your corrective action will be completed:

ATC Nuclear expects completion of the proposed actions required under this notice of nonconformance as documented in CAR# 15T-14. The expected completion date is June 30, 2015.

II. **Notice of Nonconformance 99901458/2015-201-02:**

Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 states, in part, that "measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

ATC QAM, Section 3.0, "Design Control," states in part that "Materials, parts, equipment, and processes that are essential to the safety related functions of structures, systems and components shall be properly selected and reviewed for the suitability of application."

A. Contrary to the above, as of March 20, 2015, ATC's technical evaluation failed to identify appropriate acceptance methods to review the suitability of parts and materials for identified critical characteristics that are essential to the safety-related functions of 535 digital controllers and an Endeveco cable assembly.

Specifically, ATC failed to identify appropriate acceptance criteria to ensure that the voltage ratings of static random-access memory (SRAM) chips are compatible with the circuit board voltage ratings in 535 digital controllers to prevent a known failure mode. ATC CGD Plan (CGD14T2335-01-01) "Commercial Grade Dedication Plan for controller, digital model 535 single loop process," Revision 0, dated October 27, 2014, identified the SRAM chip as a critical characteristic. However, ATC used the SRAM chip part number as the only acceptance method to verify that the chip is compatible with the circuit board. Since the SRAM chip is procured from a commercial distributor, the part number verification alone does not verify the SRAM chip's voltage rating. As documented by ATC in a Part 21 notification (Agencywide Documents Access and Management System (ADAMS) Accession Number ML121910333), an incompatible SRAM chip would pass all functional testing and would degrade the circuit over time and could fail in-service. Therefore, ATC failed to identify appropriate acceptance criteria to ensure that the rating of the SRAM chip installed on a 535 digital controller is compatible with the circuit board rating in order to prevent a known failure mode.

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance:

On October 6, 2011, ATC Nuclear initiated a Root Cause Analysis after the 535 controller failures were reported in a Part 21 notification made by ATC Nuclear. The Root Cause Analysis performed by ATC Nuclear identified that the SRAM chip residing on the MPU board (U3) was replaced in 2010 by Moore Industries due to obsolescence and to make the assembly RoHS compliant. The results of ATC Nuclear's investigation also revealed that the replacement SRAM chip was not properly evaluated by Moore Industries' Engineering department during their lead to lead-free component transition for this product line. Specifically, it was discovered that the replacement SRAM chip operated at a lower-than-required voltage (3.6VDC), causing undeterministic behavior on the 535 controllers. As part of Moore Industries' transition from lead to lead-free components, ATC Nuclear learned that the Engineering department at Moore Industries instituted an interim process which permitted ordering different part numbers from the same manufacturer where the only change was moving to a lead-free part, without initiating a Request for Engineering Review (RER) form. The SRAM chip change and the instituted interim parts ordering process were not reported to ATC Nuclear under the established change notification process.

Corrective steps that have been taken and the results achieved:

CAR 15T-18 has been issued to address Nonconformance 99901458/2015-201-02. In addition, the following actions have been implemented by ATC Nuclear:

Incorporate into CGD15T0135 provisions to verify the presence of one of the acceptable SRAM Chips in position U3 on the processor board. **COMPLETE**

ATC Nuclear did not use the SRAM chip part number alone as the only acceptance method to verify that the chip is compatible with the circuit board. In addition to verifying that the non-conforming chip is not installed on 535 controllers, ATC Nuclear developed corrective actions outside of CGD14T2335-01-01 in conjunction with Moore Industries as a result of the Root Cause Analysis results that successfully helped isolate and prevent the condition from recurring, as evidenced by over 30 months of field operating experience without a 535 controller failure due to a SRAM chip. This objective evidence was provided to the NRC Inspectors during the inspection.

While ATC Nuclear has not "quantitatively" verified that the SRAM chips installed in 535 controllers are compatible with the circuit board, it has been confirmed that the suitability of the replacement SRAM chip was not caused by inadequate engineering. As part of the design process, Moore Industries selected the replacement, lead-free SRAM chip with identical performance characteristics and footprint as the original, obsolete chip. As documented in ATC Nuclear's Root Cause Analysis, the replacement chip was not evaluated by Moore Industries' Engineering department based on the assumption that the lead-free replacement (CY62256VNLL-70SNXI) was similar in form, fit, and functional performance as the original (CY62256L-70SNI), with the part number being the only difference that would denote a lead-free component. This process breakdown was acknowledged by Moore Industries, who immediately instituted several corrective actions to prevent recurrence. The actions implemented by Moore Industries were determined acceptable by ATC Nuclear after a survey was conducted in September 2012. Moreover, the combination of commercial grade dedication, commercial grade surveys, and special tests and inspections performed by ATC Nuclear have provided reasonable assurance that the non-conforming SRAM chip is no longer installed in 535 controllers and that the replacement SRAM chip is suitable for its intended function.

Corrective steps that will be taken to avoid noncompliance's:

ATC Nuclear will take the following actions to enhance the existing processes to be more in line with the expectation of the NRC, including the following:

Accelerate scheduling, performance, and completion of the triennial survey of Moore Industries to document in more detail the compatibility and suitability of the new SRAM chips installed. This will include reviews of design documentation and testing activities performed by Moore Industries. Survey to also include reestablishing confirmation of adequate procurement and engineering controls to assure the bill of materials (BOM) adequately reflects the components installed in the 535 controllers.

Verify conductance of special tests and inspections as part of commercial grade dedication activities to assure the controllers will perform as designed.

Revise additional product line procedure PA2000 GDP-02, Revision 10, to incorporate

provision to verify the presence of one of the acceptable SRAM Chips in position U3 on the processor board.

Date when your corrective action will be completed:

ATC Nuclear expects completion of the proposed actions required under this notice of nonconformance as documented in CAR# 15T-18. The expected completion date is August 26, 2015.

B. ATC failed identify appropriate acceptance methods to verify the fiberglass sleeve material of an Endevco cable assembly. ATC Commercial Grade Dedication (CGD) Plan (CGD12T2415-01-01) "CGD for an Endevco Cable Assembly" for PO 500574602 for Palo Verde," Revision 1 dated May 6, 2013, identified critical characteristics of the cable assembly. These critical characteristics included verifying that that the sleeve material was constructed out of fiberglass to prevent inadvertent grounding, and to withstand high temperatures on the cable. ATC's acceptance method for verifying the material of the sleeve was specified as visual; however, a visual examination does not provide reasonable assurance that the material is fiberglass and not a different plastic or polymer that would not be able to prevent inadvertent grounding or withstand high temperatures.

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance:

ATC Nuclear determined that the cause for this noncompliance was attributed to inadequate training of personnel.

Corrective steps that have been taken and the results achieved:

CAR 15T-09 has been issued to address Nonconformance 99901458/2015-201-02.

- i) The CGD Plan was retired from future use. CAR 15T-09 was added to the job history file for associated orders. (Assignee: QA, 04/01/15) **Complete**
- ii) An analysis of sleeve material was conducted proving the sleeve material. (Assignee: Lab Supervisor, 04/01/15) **Complete**
- iii) The associated ATC Job Record was addended with the confirmed material results. (Assignee: QA, 04/15/15) **Complete**

Corrective steps that will be taken to avoid noncompliance's:

- i) Training has been conducted on the lesson learned associated with this event.
(Assignee: QA, 05/01/15) **Complete**

- ii) A review for additional active orders was conducted associated with this part.
(Assignee: QA, 05/01/15) **Complete – No active orders in the system**

Date when your corrective action will be completed:

ATC Nuclear has completed the actions required under this notice of nonconformance and all actions were complete under the ATC Nuclear Corrective Action Program as documented in CAR# 15T-09. No further actions required.

III. **Notice of Nonconformance 99901458/2015-201-03:**

Criterion III, "Design Control," of Appendix B 10 CFR 50 states, in part, "measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

ATC QAM, Section 3.0, "Design Control," states, in part, that "Applicable design inputs, quality requirements and standards shall be appropriately specified and correctly translated into specifications, drawing procedures and instructions. Materials, parts, equipment and processes that are essential to the safety related functions of structures, systems and components shall be properly selected and reviewed for suitability of application."

A. Contrary to the above, as of March 20, 2015, ATC failed to ensure that measures were established for the review for suitability of application of parts and processes, including deviations between PO requirements and test procedures.

Specifically, ATC failed to ensure that deviations from qualification plan EMC11T3570-01-01 and the associated PO from TVA, were accounted for and bounded to show that the electromagnetic compatibility (EMC) testing requirements were met for a safety related Foxboro controller. Specifically, there was no documented engineering evaluation to ensure that the differences between the International Electromechanical Commission (IEC) revisions (i.e. changes in dB levels, test set up distances, equipment parameters, effective source impedances, insulation support, etc.) that were used during the testing and the IEC revisions specified on the qualification plan were accounted for and bounded to show that the test report met the qualification plan requirements.

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance:

ATC Nuclear develops EMC test plans that implement the most current revision for International Electrotechnical Commission (IEC) standards and in accordance with customer purchase order requirements. This is consistent with the recommended practices established by the EPRI EMC Working Group, which recommends the use of the most recent version of the standards referenced in EPRI TR-102323 including the IEC 61000 series of EMI/RFI test methods. ATC Nuclear also incorporates the guidance contained in RG 1.180 as part of EMC test plan development, which includes custom operating envelopes to represent the characteristic electromagnetic environment for nuclear power plants.

Corrective steps that have been taken and the results achieved:

CAR 15T-10 has been issued to address Nonconformance 99901458/2015-201-03.
Perform extent of condition review. (ENG, 05/15/15)

While ATC Nuclear acknowledges this finding, it has been established that changes in the recent versions of the IEC 61000 Series documents have improved the methodology and expanded the applicability of the standards. As stated by other facilities that have been cited with this nonconformance, newer IEC 61000 standard versions have not reduced the commitments originally established in EPRI TR-102323 or RG 1.180. Based on the above, ATC Nuclear determined that the EMI/RFI test methods established in the most recent versions of MIL-STD-461E and the IEC 61000 Series are adequate for use in establishing equipment EMC for nuclear power plant applications. Since there is no impact on any previous testing, an extent of condition beyond this review is not required.

Corrective steps that will be taken to avoid noncompliance's:

- i) Train ATC Nuclear personnel on identified discrepant condition and actions taken to prevent recurrence. (QA, 5/29/15)
- ii) As a preventative measure, ATC Nuclear will establish the basis for accepting the use of the most recently issued military and international commercial guidance for EMC testing, and include in Purchase Orders the specific standards and revisions for performance of EMI/RFI testing based on customer Purchase Order requirements.

Date when your corrective action will be completed:

ATC Nuclear has completed the actions required under this notice of nonconformance. All actions were completed under the ATC Nuclear Corrective Action Program as documented in CAR# 15T-10, opened on 3-18-2015.No further action is required.

B. ATC failed to ensure a deviation from PO 00031113, for capacitors to be used at Point Beach Nuclear Power Plant, was correctly identified on the certificate of conformance (COC). The licensee PO required a Foxboro capacitor (P/N H0183AC). ATC's COC to the licensee stated the item supplied was a Foxboro capacitor (P/N H0183AC); however, the actual item shipped to Point Beach Power Plant was a Nippon Chemi-Con capacitor (P/N 32D5941). Therefore, ATC failed to appropriately identify the correct part number and original equipment manufacturer of the capacitor. Since the end use of the capacitor was not specified in the PO, the licensee would need to be aware of the specific part number they are receiving to evaluate, if installing the capacitor into a qualified component, would challenge or invalidate the equipment qualification.

Reason for the noncompliance, or if contested, the basis for disputing the noncompliance:

The cause was determined to be an human performance-related error.

Corrective steps that have been taken and the results achieved:

- I. Evaluated acceptance data and provide basis / justification for COC Statement. The evaluation was documented in Equivalency Evaluation Report EER 12T2205-01-01 Rev 0. **COMPLETE**
- II. Revised COC as appropriate and submitted to customer. **COMPLETE**

Corrective steps that will be taken to avoid noncompliance's:

Train personnel on lessons learned associated with this event.

Date when your corrective action will be completed:

ATC Nuclear expects completion of the proposed actions required under this notice of nonconformance as documented in CAR# 15T-12. The expected completion date is June 15, 2015.