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Your Reference: NRC Vendor Inspection Report Number 99900404/2015-204

Subject: Reply to Notice of Nonconformance Cited in NRC Inspection Report No. 99900404/2015-204
Dated May 11, 2015

Westinghouse acknowledges receipt of NRC Inspection Report Number 99900404/2015-204 dated May 11, 2015 and the following Notices of Nonconformance: 99900404/2015-204-01, 99900404/2015-204-02 and 99900404/2015-204-03. Westinghouse takes any Notice of Nonconformance received from the NRC seriously, is taking appropriate actions to resolve these issues, and is committed to comply with the provisions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocess Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

Westinghouse also values the results from this review of the activities associated with the design, implementation, and testing of the Protection and Safety Monitoring System (PMS) for the Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3.

As requested, details of the corrective actions associated with these nonconformance issues are described in the attachment to this letter.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Richard Paese'.

Richard Paese, Acting Manager
AP1000 Instrumentation & Control Licensing

JE09
NRO

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Nonconformance 99900403/2015-204-01

Criterion III, "Design Control," of Appendix B to Title 10 of the Code of Federal Regulations, (10 CFR) Part 50 states, in part, that where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, it shall include suitable qualifications testing of a prototype unit under the most adverse design conditions.

Title 10 CFR 50.55a "Codes and Standards", Section (h)(3) "Protection and Safety Systems" states, in part, that applications for design approvals, design certifications, and combined licenses under Part 52 of Title 10, must meet the requirements for safety systems in Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991. Additionally, the AP1000 design control document commits to IEEE 384-1981, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits," in order to comply with 10 CFR 50.55(h) and IEEE Std. 603-1991.

Contrary to the above, WEC failed to include suitable qualification testing of a prototype unit under the most adverse design conditions as required above. Specifically, IEEE 384-1981, states in part, that the capability of the device to perform its isolation function shall be demonstrated by qualification test. The qualification shall consider the levels and duration of the fault currents on the non-Class 1E side. However, WEC failed to determine the maximum current transients in the design of the system or demonstrate by qualification test that the maximum levels and duration of the credible short-circuit currents applied to the isolation device's non-Class 1E side would not degrade the operation of the circuit connected to Class 1E side of the device.

Response:**1) *The reason for the noncompliance or, if contested, the basis for disputing the noncompliance:***

Westinghouse acknowledges the nonconformance and initiated a corrective action on March 26, 2015 within our corrective action program to address the Notice of Nonconformance 99900404/2015-204-01. The apparent cause analysis (ACA) has determined the following causes:

- *The test methodology was based on the heating effects of the fault (I^2T) but did not consider the magnetic effects (I^2) possible during the peak let through current of the fuse. IEEE 141-1993 was not considered as input during the creation of the testing methodology for Class 1E to non-Class 1E isolation barriers as a means of compliance with IEEE Std 384-1981.*
- *Maximum credible fault current is not documented in the design specifications. The design input documentation includes requirements for maximum credible fault voltage but does not include any details on maximum credible fault current.*
- *Testing considering the magnetic effects (I^2) of peak let through current was not performed. The analysis and testing for the isolation barriers considered the heat effects (I^2T) as the method of inflicted damage on the barrier and since the fusing incorporated in the design minimizes these effects at the higher current levels, the testing was focused at lower current levels, which were considered worst case.*

2) The corrective steps that have been taken and the results achieved:

A corrective action issue was initiated to perform an ACA and assign appropriate corrective actions in response to the nonconformance. The ACA evaluated the processes and procedures used to establish the credible fault testing criteria for isolation devices to determine if any revisions are required to assure adequate controls.

3) The corrective steps that will be taken to avoid noncompliance:

A corrective action plan has been established to:

- *Establish a standardized methodology for isolation barrier fault testing in accordance with IEEE Std 384-1981 considering the guidance related to low voltage fuses given in IEEE Std 141-1993 section 5.3.20.2. In addition to fault heating effects (I^2T), the methodology will include considerations for magnetic effects (I^2) for AP1000 PMS isolation barrier fault testing.*
- *Define the maximum credible fault currents for each AP1000 PMS isolation barrier circuit.*
- *Perform further testing, if required, to provide objective evidence of the AP1000 PMS isolation barrier capability with regard to the maximum credible fault current.*
- *Revise the Fault Testing Report for AP1000 Isolation Barriers incorporating the objective evidence of the AP1000 PMS isolation barrier capability with regard to the maximum credible fault current.*

4) The date when the corrective action will be completed:

The date when corrective actions will be completed is contingent on the results of the evaluations of the maximum credible fault currents described above. The evaluations will be completed by October 31, 2015. If additional fault testing is required a schedule will be developed based on the scope of the tests and availability of a test facility.

Nonconformance 99900404/2015-204-02

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." WEC procedure, EQ-EV-75-GEN, "Alternate Cabinet Shielding Effectiveness Acceptance Criteria Development," Section 5.0, "Conclusions," provides acceptable shielding criteria to demonstrate that the cabinets used for the U.S. AP1000 PMS are qualified to withstand electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of safety function. In cases where alternate cabinet qualification results are being used a combination of acceptance criteria including: frequency response, shielding effectiveness, and cabinet materials of construction shall be evaluated.

Contrary to the above, the NRC inspection team identified that WEC failed to meet the prescribed acceptance criteria defined in EQ-EV-75-GEN to demonstrate that the cabinets (Pentair) used for the U.S. AP1000 Plant Protection and Safety Monitoring System (PMS) were bounded by the Electromagnetic Compatibility (EMC) equipment qualification (EQ) testing performed on an alternate cabinet design (Corry) which formed the basis of WEC's acceptance of the Pentair cabinet design.

Response:**1) The reason for the noncompliance or, if contested, the basis for disputing the noncompliance:**

Westinghouse acknowledges the nonconformance and offers the following discussion regarding the circumstances which resulted in the nonconformance.

This issue has been entered into the Westinghouse corrective actions program and an ACA was performed and identified the following organizational issues:

- *The engineers who approved the qualification reports signed the documents without a disposition of an evaluation of the deviation taken from the test procedure during testing or evaluation of the test results.*
- *There is an inadequate process to ensure that restrictions identified during equipment qualification (EQ) testing are documented in the downstream EQ reports. Users of the Pentair cabinet were not aware that further testing or evaluations were required to demonstrate qualification.*
- *The ACA also identified inadequate work turnover during staff changes as contributing human performance factors.*

2) The corrective steps that have been taken and the results achieved:

An extent of condition was performed and all users of the Pentair cabinet were identified from the Westinghouse purchasing system.

Westinghouse contracted the test lab to perform the required post-processing of test data and provide an updated test report for the Pentair cabinet. The post-processed data shows that the EMC shielding effectiveness of the Pentair cabinet is equal to or better than the EMC shielding effectiveness of the Corry cabinet for most frequencies that are applicable to the required EMC testing. The differences are minor for the frequencies where the Pentair cabinet has less shielding effectiveness than the Corry cabinet.

The post-processed test data will be used to support evaluations of the EMC type testing results for the components mounted inside the cabinet to demonstrate that the use of the Pentair cabinet does not invalidate previous EMC type testing of the components using a Corry cabinet.

3) The corrective steps that will be taken to avoid noncompliance:

An evaluation of the EMC type testing for the safety systems components will be performed to demonstrate the equipment subjected to EMC type testing in a Corry cabinet remain qualified when installed in a Pentair cabinet. The evaluations will show that the equipment is not sensitive to EMC disturbances at the identified frequencies where the Pentair cabinet has less shielding effectiveness than the Corry cabinet, or that sufficient margin is available from the EMC test limits so that the differences in shielding effectiveness is acceptable.

If these evaluations cannot demonstrate qualification then additional EMC type testing of safety components will be performed in a Pentair cabinet at those frequencies where the Pentair EMC shielding effectiveness does not meet or exceed the EMC shielding effectiveness of the Corry cabinet. The EQ reports for the impacted safety systems will be updated to include this additional information.

The ACA identified the following corrective actions to prevent recurrence of this nonconformance:

- *The applicable Westinghouse EQ work instructions and procedures will be reviewed to ensure that the process for approving test reports requires that any deviations must include a disposition of that deviation before the report is approved.*
- *Westinghouse EQ work instructions and procedures will be reviewed to ensure adequate process controls are prescribed that any restrictions that result from EQ testing will be entered into the Westinghouse corrective actions program. The restrictions will be described in the EQ summary reports and associated technical documentation for the equipment being qualified.*
- *Westinghouse EQ personnel will be trained to any modified or new work instructions or procedures.*

4) *The date when the corrective action will be completed:*

The corrective actions will be completed by December 31, 2015.

Nonconformance 99900403/2015-204-03

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."

WEC 7.2, "Dedication of Commercial Grade Items," Section 7.2 states, in part, that "dedication activities required to ensure that a commercial grade item meets the quality and performance requirements specified for a SR [safety-related] application shall be described in the CDIs [commercial-grade dedication instructions]." In addition, Appendix H of WEC 7.2 describes the criteria to be used in the CDI and verified when utilizing a supplier which has obtained certification to ANSI/ISO/IEC 17025 from a U.S. accredited organization.

Contrary to the above, WEC failed to establish adequate measures for the selection and review for suitability of criteria to verify the critical characteristic for calibration of measuring and test equipment used for EMC testing services for U.S. AP1000 PMS. Specifically, for CDI-4064, EMC testing services that were performed by Keystone Compliance, LLC, Specifically, WEC failed to identify appropriate acceptance criteria, such as scope of the calibration lab's current certification and any technical requirements, such as accuracies, tolerances, and ranges of measuring and test equipment to be used, in order to verify that the equipment used for the EMC testing of PMS was appropriately calibrated.

Response:

1) *The reason for the noncompliance or, if contested, the basis for disputing the noncompliance:*

Westinghouse acknowledges the nonconformance and offers the following discussion regarding the circumstances which resulted in the nonconformance.

As documented in Commercial Grade Survey Report WES-2012-365-R, dated January 24, 2013, Westinghouse evaluated Keystone accreditation to an ISO 17025 program for EMC testing, as well as requirements that Keystone must have their test equipment calibrated by suppliers with an accredited ISO 17025 program.

The Method 2 Commercial Grade Survey (CGS) of Keystone performed in 2012 in accordance with CDI-4064, Revision 2, reviewed sample Inspection Measuring and Test Equipment (IM&TE) to

confirm that Keystone had an adequate procedure for calibration of IM&TE. However, CDI-4064 Revision 2, did not clearly provide instructions for the Westinghouse CGS team to verify that Keystone's quality assurance program appropriately addressed the flow down of technical requirements (i.e., the manufacturer's specifications for accuracies, tolerances, and ranges) to the calibration service provider; nor did it instruct the CGS team to verify Keystone's quality assurance program validated that the calibration service providers' ILAC accreditation covered the scope of contracted services.

2) *The corrective steps that have been taken and the results achieved:*

Westinghouse performed an additional review of the calibration of the instruments sampled during the CGS of Keystone. The results of this review found that the IM&TE were calibrated to the manufacturer's specifications for accuracies, tolerances, and ranges. The review also confirmed the calibration service provider's (i.e., Liberty Labs) ISO 17025 certification covered the scope of the calibration services. This provides reasonable assurance the IM&TE was appropriate for use in EMC testing of PMS equipment.

3) *The corrective steps that will be taken to avoid noncompliance:*

Westinghouse Level 3 procedure NA 7.4, "Preparation of Commercial Dedication Instructions (CDIs)" was updated to incorporate the guidance from EPRI 3002002982, "Guidance for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications Revision 1 to EPRI NP-5652 and TR-102260" which aligns it with NEI 14-05, Revision 1, "Guidelines for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services." This revision strengthens the Westinghouse CGS process by including instructions for verification of the published scope of the accreditation of calibration services is current and covers the contracted services, including necessary measurement parameters, range, and uncertainties.

CDI-4064 will be updated to align it with the new instructions in NA 7.4.

In addition, an extent of condition will be performed to further evaluate and, if required, revise Westinghouse processes and procedures to assure adequate controls are prescribed for assessing testing service providers.

4) *The date when the corrective action will be completed:*

All corrective actions will be achieved by December 31, 2015.