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Our ref: DCP_NRC_003218

June 18, 2012

Your ref: NRC Vendor Inspection Report Number 99900404/2012

Subject: REPLY TO NOTICE OF NONCONFORMANCES CITED IN NRC INSPECTION
REPORT NO. 99900404/2012-201 dated May 17, 2012

Westinghouse acknowledges receipt of NRC Inspection Report Number 99900404/2012-201, Notice of Nonconformance dated May 17, 2012 and the Notice of Non-Conformances: 99900404/2012-201-01, 99900404/2012-201-02, 99900404/2012-03, 99900404/2012-04 and 99900404/2012-201-05. Westinghouse takes any notice of nonconformance received from the NRC seriously and is taking appropriate actions to completely resolve these issues in a timely manner, and is committed to be in compliance with the provisions of Criterion III, "Design Control" 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 thorough review of our Equipment Qualification program and type testing activities. In consideration of NRC comments made both during the inspection and in the exit meeting, Westinghouse immediately initiated corrective actions to resolve the specific items identified in the Notice of Non-Conformances.

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

Very truly yours,

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

Richard A. Delong
Acting Director, New Plant Licensing

LE09
NRD

cc: Richard A. Rasmussen - U.S. NRC
Jeffery Jacobson - U.S. NRC
Laura Goossen - WEC
Brian Gaia - WEC
John Mallory - WEC
Thomas Ray - WEC
Paul Russ - WEC
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Nonconformance 99900404/2012-201-01

Criterion III, "Design Control," of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states, in part, that, "Where a test program is used to verify the adequacy of a certain design feature in lieu of other verifying or checking processes, it should include suitable qualification testing of a prototype unit under the most adverse design conditions."

Contrary to the above, as of March 30, 2012, WEC failed to verify the adequacy of certain design features and include the most adverse design conditions in the test program for performing functional testing of the squib valve actuators.

Specifically:

1. APP-PV70-VPH-001, "AP1000 Squib Valve Equipment Qualification Test Plan," Revision 0, did not include verification of the "no fire" feature of the squib valve actuators, which allows a small current to be applied to the actuators to verify bridge wire continuity during surveillance testing and also ensures against inadvertent spurious or induced signals.
2. APP-PV70-VPH-001, "AP1000 Squib Valve Equipment Qualification Test Plan," Revision 0, specified testing of the valves at a temperature which did not represent the most adverse design conditions with respect to operation of the valve.

Response (Item 1):

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

The "no fire" feature of the Squib Valve is detailed in the Squib Valve Actuator Design Specification (APP-PV98-Z0-001). Within the design specification, the initiator which ignites the actuator has a design requirement to not fire when "an applied current of 1 amp or less, supplying a minimum of 1 Watt for minimum of 5 minutes" (Section 5.2.2.1 of APP-PV98-Z0-001) is applied to it. This section further directs testing of the "no fire" to be in accordance with Section 6.3.3.5 of APP-PV98-Z0-001.

Section 6.0 of APP-PV98-Z0-001 is the "Testing/Qualification Requirements" for the Squib Valve Actuators. Section 6.3 provides the requirements for Production/Acceptance testing of the Squib Valve Actuators. Specifically, Section 6.3.3.5 provides the details of the no fire testing for production/acceptance initiators. This test is a destructive test that is only performed on a sample of initiators. Once a "no fire" test is performed, the initiator cannot be installed into an actuator cartridge.

When the Squib Valve qualification program was initially developed, a "no fire" test was not included due to the destructive nature of the test of APP-PV98-Z0-001. However, during the NRC inspection, the concern was raised that the EQ program was not performing a "no fire" test. After a review of the test equipment, it has been determined that the destructive "no fire" test can be performed on an initiator that will not be utilized to fire the actuator cartridges during testing. This additional data will help prove the adequacy of the design, but is not required to satisfy the qualification requirements in APP-PV98-Z0-001.

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

The test lab was contacted and they agreed that a "no fire" test could be performed in the current test program. A "pen and ink" change to add the "no fire" test been made to the procedure which has been reviewed and approved by Westinghouse. "No fire" tests are now being performed prior to test cartridge actuations.

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

The Squib Valve Qualification Test Plan (APP-PV70-VPH-001) will be revised to include a "no fire" test prior to test cartridge actuation in the IEEE portion of the test program.

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

The corrective action will be completed by June 29, 2012.

Response (Item 2):

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

During the recent NRC inspection of the Westinghouse Squib Valve EQ program, the NRC inspector inquired as to how the conditions at which the Squib Valves will be actuated during the ASME QME-1-2007 portion of the qualification program were determined. Specifically, the inspector was concerned that the temperatures which the Squib Valves are planned to operate at during the EQ testing are at an elevated temperature and the shear cap material becomes easier to shear as temperature increases.

ASME QME-1-2007 does not specifically address Squib Valves therefore, the Qualification Requirements for Power-Operated Valve Assemblies (Section QV-7400 of ASME QME-1-2007) was utilized as a basis for the ASME QME-1 qualification program. Per section QV-7460 of ASME QME-1-2007, the functional qualification is made up of several different activities:

The first activity is outlined in Section QV-7461 and involves establishing a "Qualified Valve Assembly" by qualifying a valve assembly to function under a specified set of conditions. In the case of the AP1000 Squib Valves, three valves built to the production valve drawings and quality requirements are the valve assemblies which are being qualified under a specified set of conditions. The specified sets of conditions are the design-basis conditions of the systems for which the Squib Valves are installed within the AP1000 plant.

The conditions under which the qualification will be performed are located within the Squib Valve datasheets (APP-PV70-Z0R-001) under "EQ test conditions." These test conditions envelop the design-basis conditions for which the system will be required to operate. This is in accordance with item 7 in Section QV-7461.1.

The next activity for functional qualification is located in section QV-7462. This activity involves the extrapolation of qualification to another valve assembly. Since the qualification of the Squib Valves is utilizing valves which are built to the same production valve drawings and quality

requirements, this section only applies in regards to utilizing one 8-inch High Pressure actuation to simulate the two applications the 8-inch High Pressure valves have within the AP1000 plant. This extrapolation is being documented and will be part of the final ASME QME-1 reports.

The final activity is outlined in Section QV-7463. This section is required to demonstrate the functional capability of the production valve assemblies. In regards to functional capability, item "g" of this section requires "Verify applicability of the functional capability (including stroke time) of the production valve for opening and closing under fluid conditions to the qualified valve through the use of specific test data or a test-based qualification methodology." In order to verify the applicability of the qualification testing to the production valves, lot acceptance testing (LAT) will be performed on the essential to operate parts of the valves.

The essential to operate parts are the actuators, tension bolts, and shear caps. Per Section 6.3 of APP-PV98-Z0-001, 10% of each lot of actuator cartridges will undergo destructive LAT. These units will be built to the same drawings and quality requirements as the units utilized for the qualification testing. The destructive test results will be evaluated to the same acceptance criteria as the qualification testing units. This will demonstrate that the production actuator cartridges are equivalent to the units utilized for qualification.

The tension bolts and shear caps also will undergo destructive LAT in accordance with Section 6.4.3 of APP-PV70-Z0-001. This testing will utilize an 80% nominal actuator load (same as ASME QME-1 testing) and will be operated at the most conservative valve operation conditions. The most conservative valve operation conditions have been determined by SPX in the Sensitivity Analysis which is included as Appendix B to SPX's Engineering Test Plan 4.1.431. Within this sensitivity analysis, SPX has identified the sensitivity of the design and production variables for the proper function of the Squib Valve. This information was utilized to determine the Squib Valve engineering prototype testing variations for demonstrating valve operability at all possible conditions.

Additionally, from this sensitivity analysis, the system conditions which provide the most conservative valve operation are identified as being no pressure at an ambient temperature. Destructive LAT will be performed on all tension bolt and shear cap lots of material that is installed in any Squib Valve ever built at the no pressure and ambient temperature condition. The LAT tension bolts and shear caps will be built to the same drawings and quality requirements as the production and qualification units.

The LAT testing provides more conservative test conditions in comparison to the system requirements which the EQ testing is performed to. This will provide testing evidence that the production valves will adequately operate at the system requirements in the plant and that the previously performed ASME QME-1 testing is applicable to these valves. The results of this testing will be included as part of the ASME QME-1 Applicability Report (Section QV-8320 of ASME QME-1-2007).

In regards to the NRC concern that APP-PV70-VPH-001 specified testing of the valves at a temperature which did not represent the most adverse design conditions with respect to operation of the valve, they are correct. However, testing which represents the most adverse

design conditions is being performed during the production destructive LAT and those results are utilized to demonstrate the production valve's qualification. These destructive test results are considered part of the overall Squib Valve Qualification.

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

The Westinghouse valve engineering group has reviewed the "EQ test conditions" in the Squib Valve datasheets (APP-PV70-Z0R-001) and has added a note to clarify that the test conditions are those required for all squib valve actuation parameters for the plant.

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

No additional corrective steps are required to avoid noncompliance. Testing of the Squib Valves at the most adverse design conditions for the valve will be performed as part of the destructive LAT and the results will be included as part of the ASME QME-1 qualification documentation at the conclusion of the qualification program.

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

The corrective action was completed on June 1, 2012. The Squib Valve datasheets (APP-PV70-Z0R-001) have been revised to add the note to clarify that the test conditions are those required for all squib valve actuation parameters.

Nonconformance 99900404/2012-201-02

Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, states, in part, that, "Measures shall be established for the identification and control of design interfaces..." Contrary to the above, as of March 30, 2012, WEC did not identify design interfaces sufficient to allow for the translation of the design basis into specifications. Specifically, APP-GW-J4-072 "Interface Specification for Squib Valve Controller," Revision 1, did not include the full range of temperatures that need to be considered when sizing the field run cable/connector systems located between the Plant Monitoring and Protection System, the Diverse Actuation System, and the squib valve actuators.

Response:

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

Table 2.2-1 in APP-GW-J4-072, Revision 0, gives wire resistances for anticipated cabling to be used in plant installations. This table lists resistances at 68°F, 122°F, and 417°F. However, the requirements given in APP-GW-J4-072 did not stress the fact that maximum resistance calculations must be done at the extreme temperature of 417°F, to ensure Squib Valve operation under the worst case conditions inside containment.

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

The following statement has been added to the two requirements that define the maximum initiator circuit resistance, R2.2.3-4 and R2.2.3-6:

"The maximum field wiring resistance shall be calculated at worst case conditions, including DBA environmental conditions inside containment as defined in Appendix B of APP-GW-VP-010."

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

A "system-level" evaluation will be performed to review interfaces between design groups and confirm that requirements are properly communicated and implemented to provide assurance that the Squib Valve opening function will be performed as expected. This evaluation will review interfaces between the valve initiator, the squib firing circuitry, the cabling between the valve and the I&C cabinets, and the surveillance procedures. This evaluation will be completed and documented by July 31, 2012.

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

APP-GW-J4-072, Revision 1, has been archived in the Westinghouse Document Control System as of May 31, 2012. The system level evaluation described in Item 3 above will be completed by July 31, 2012.

Nonconformance 99900404/2012-201-03

Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, states, in part, that, "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." Contrary to the above, as of March 30, 2012, WEC did not establish measures necessary to ensure that the design basis for the Diverse Actuation System was correctly translated into specifications, drawings, and instructions. Specifically, WEC did not perform a documented calculation or analysis to justify the selection of resistance values contained in APP-GW-J4-072, "Interface Specification for Squib Valve Controller," Revision 1, for the field run cabling located between the Diverse Actuation System and the squib valve actuators.

Response:

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

The reason for the noncompliance was that no clear requirement existed to perform a formal analysis. The Diverse Actuation System (DAS) is a non-safety system and it was not clear that this analysis needed to be formally documented. There was inadequate communication amongst the different Westinghouse groups to identify the need for this analysis.

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

Westinghouse recognizes the importance of justifying the resistance values in APP-GW-J4-072. Westinghouse has identified a need for the formal analysis and determined it will be documented in APP-DAS-J4-002. The purpose of the analysis will be to analyze the DAS power supply range and maximum total resistance of the cabling and connections within the DAS cabinet along with the maximum voltage drop across the DAS Squib Valve controller in an effort to justify the resistance values provided in APP-GW-J4-072. The scope of the data provided in APP-DAS-J4-002 will be limited to the DAS cabinet.

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

Westinghouse will prepare the formal analysis to document the resistance values identified in APP-GW-J4-072.

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

The corrective action will be completed by July 31, 2012.

Nonconformance 99900404/2012-201-04

Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50, states, in part, that, "Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery." Paragraph 7.6.2, "Qualification of Actuator Families," of Section 7, "Development of a Qualification Program," of WEC document APP-GW-VP-010, "Equipment Qualification Methodology and Documentation Requirements for AP1000 Safety-Related Valves and Valve Appurtenances," Revision 2, states, in part, that, "Parent actuators used to qualify a range of operator sizes shall be determined using Annex A of [Institute of Electrical and Electronics Engineers (IEEE)] Std. 382-1996 (Reference 2.3.7). [...] 'Parent' actuator sizes used to qualify a range of valve and actuator sizes shall be documented in a report and submitted to Westinghouse for approval." Contrary to the above, as of March 30, 2012, WEC failed to adequately examine analysis performed by the Limitorque Flowserve Corporation upon delivery. Specifically, WEC did not have objective evidence of review or acceptance of the report entitled "Limitorque Type SB Series Valve Actuator Test Specimen and Methodology for Westinghouse AP-1000 Environmental Qualification Testing." In addition, WEC failed to identify mathematical errors in the tables used to define the actuator groups.

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

The inspection identified that the Westinghouse review of the Flowserve Limitorque SB Actuator selection study was inadequate and did not discover several errors in the document. Several contributing factors to this were that a formal review of the document was not completed. At the time of the submittal by Flowserve Limitorque, the document submittal process was new and not fully understood. Failure to find the error was compounded by the confusing layout Flowserve Limitorque used in the report, which was not in compliance with IEEE Std 382-1996.

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

Westinghouse is working with Flowserve Limitorque to have the sizing methodology revised. Flowserve Limitorque is reviewing the data in the selection study and revising the report to reflect the correct selection of actuators to be tested for the family. Flowserve Limitorque is also revising the document to follow the format for the selection detailed in IEEE Std 382-1996.

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

Westinghouse personnel involved with the receipt, review, and approval of supplier documents are trained to Westinghouse Level 2 Quality Procedure NSNP 7.7, "Control of Supplier Generated Documents." Once Flowserve Limitorque revises this document, it will be submitted to Westinghouse using the Document Submittal Form and reviewed by Westinghouse personnel as required in Procedure NSNP-7.7.

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

The corrective action will be completed by July 31, 2012.

Nonconformance 99900404/2012-201-05

Criterion VI, "Document Control," of Appendix B to 10 CFR Part 50, states, in part, that, "Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality. These measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed." Paragraph 2.0, "Policy," of WEC document APP-GW-GEP-010, "Process and Procedures for AP1000 Internal Open Items and Holds," Revision 5, states, in part, that, "AP1000 Program participants are responsible for identifying, documenting, tracking, and closing Open Items and Holds that affect technical documents or drawings." Paragraph 8.5 of the procedure lists examples of open items which include "Incomplete or preliminary supporting calculations or analysis used as a design input." Contrary to the above, as of March 30, 2012, WEC did not appropriately control and distribute changes made to a design specification used for developing equipment qualification test plans and procedures for safety-related valve actuators. Specifically, APP-PV95-VP-001, "Equipment Design Requirements for Safety-Related Limitorque Motor Actuator Test Specimens," was developed using a draft version of the AP1000 Design Specification APP-PV95-Z0-001. WEC failed to identify the use of the draft design specification as an open item. As a result, a design specification to exclude aluminum in actuator components was omitted from the APP-PV95-VP-001 test plan.

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

APP-PV95-VP-001 was written and approved based on an alpha revision of APP-PV95-Z0-001. When APP-PV95-Z0-001 was revised to a numeric revision, there was no tracking mechanism for APP-PV95-VP-001 and was not listed as an affected document.

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

Westinghouse is performing a reconciliation evaluation between APP-PV95-VP-001, "Equipment Design Requirements for Safety-Related Limitorque Motor Actuator Test Specimen" used in the procurement of the test specimen and the latest revision of APP-PV95-Z0-001 to ensure the test specimens are representative to the actual production units.

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

All Design Change Proposals (DCP) are reviewed by EQ engineering for impacts through the guidance provided by Westinghouse Level 2 Quality Procedure NSNP 3.4.1, "Change Control Process for the AP1000® Program." These reviews ensure that all documents affected by the DCPs are listed on the impact form and tracked to ensure that the changes are incorporated once the DCP is approved. All appropriate personnel have been trained to procedure APP-GW-GEP-010, "Process and Procedures for AP1000 Internal Open Items and Hold" and NSNP3.4.1.

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

The corrective action will be completed by July 31, 2012.