

October 8, 2015

Mr. B. H. Whitley, Director
Regulatory Affairs
Southern Nuclear Operating Company, Inc.
42 Inverness Center Parkway
Birmingham, AL 35242

Mr. Ronald A. Jones, Vice President
New Nuclear Operations
South Carolina Electric & Gas Company
14368 State Highway 213
Jenkinsville, SC 29065

SUBJECT: SUMMARY OF NUCLEAR REGULATORY COMMISSION VENDOR
INSPECTIONS AFFECTING INSPECTIONS, TESTS, ANALYSES, AND
ACCEPTANCE CRITERIA

Dear Mr. Whitley and Mr. Jones:

As discussed at the February 7, 2013, public meeting and documented in Agencywide Documents Access and Management System (ADAMS) Accession number ML13036A419, the U.S. Nuclear Regulatory Commission (NRC) staff is informing holders of a combined license that incorporates by reference Appendix D of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Design Certification Rule for the AP1000 Design," of recent vendor issues identified in our inspections. These issues, if left uncorrected, are material to inspections, tests, analyses, and acceptance criteria (ITAAC). Attached is a summary of all vendor inspections performed since our last letter dated August 1, 2014, as they relate to ITAAC for Vogtle Units 3 and 4 and Summer Units 2 and 3. Each of the inspection findings below applies to all four of the new Vogtle and Summer units. The NRC will continue to issue these summary letters for future vendor inspections where ITAAC-related issues are identified.

The NRC's Vendor Inspection Program verifies effective licensee oversight of the supply chain through inspections of a sample of vendors. Licensees are ultimately responsible for vendor oversight and vendor performance. It is the agency's expectation that licensees consider NRC vendor inspection findings as potential weaknesses in their procurement programs.

Consistent with the guidance in the NRC-endorsed Nuclear Energy Institution (NEI) 08-01, Industry Guideline for the ITAAC Closure Process under 10 CFR Part 52, licensees should discuss the resolution of ITAAC findings (including potential ITAAC-related issues identified through vendor inspections) in their ITAAC closure notifications in accordance with 10 CFR 52.99(c)(1), "ITAAC closure notification." Section 52.99(c)(1) states, "The licensee shall notify the NRC that prescribed inspections, tests, and analyses have been performed and that the prescribed acceptance criteria are met. The notification must contain sufficient information to demonstrate that the prescribed inspections, tests, and analyses have been performed and that the prescribed acceptance criteria are met."

Although the NRC is currently planning to review the resolution of these vendor inspection issues through future inspections, you should not delay your ITAAC review and closure activities based on NRC inspection schedules.

Please contact the respective inspection team leader listed in the attachment, if you have any questions or need assistance regarding these matters.

Sincerely,

/RA/

Richard A. Rasmussen, Chief
Electrical Vendor Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket Nos.: 05200025
05200026
05200027
05200028

Enclosure:
Summary of NRC Vendor Inspections
Affecting ITAAC

B. H. Whitley, et al.

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Summary of NRC Vendor Inspections
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AP1000 CONTACTS

ADAMS Accession No.: ML15219A276 *via e-mail NRO-002

OFFICE	NRO/DCIP/EVIB	NRO/DNRL/LB4	NRO/DNRL/LB4	NRO/DCIP/IGCB
NAME	JJimenez	PKallan*	CPatel*	BAnderson*
DATE	08/07/2015	08/17/2015	08/28/2015	08/21/2015
OFFICE	NRO/DCIP/CIPB	RII/DCP/CPB2	NRO/DCIP/EVIB	NRO/DCIP/EVIB
NAME	JBeardsley*	RNease* (ALerch for)	EHuang*	JJacobson*
DATE	08/27/2015	09/16/2015	08/07/2015	08/17/2015
OFFICE	NRO/DCIP/MVIB	NRO/DCIP/EVIB	OGC	NRO/DCIP/EVIB
NAME	ERoach*	GGalletti*	SVrahoretis*	RRasmussen
DATE	08/26/2015	08/10/2015	10/06/2015	10/08/2015

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Summary of Nuclear Regulatory Commission Vendor Inspections Affecting Inspections, Tests, Analyses, and Acceptance Criteria

1. Curtiss-Wright Inspection

a. Inspection Scope

During the week of July 21-25, 2014, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Curtiss-Wright Qualtech NP (QualTech) facility in Huntsville, AL. This inspection evaluated Qualtech's quality assurance (QA) activities associated with the design control, qualification testing, commercial grade dedication, inspections, testing controls, measuring and test equipment, nonconformance, 10 CFR Part 21, oversight of contracted activities, procurement documents, audits, corrective actions, and qualification activities for electrical connectors for the Westinghouse Electric Company (WEC) AP1000 reactor design squib valves associated with inspection, tests, analyses, and acceptance criteria (ITAAC). The vendor inspection activities were documented in Inspection Report (IR) 99901441/2014-202 (Agencywide Document Access and Management System (ADAMS) Accession No. ML14231B268).

The lead for this inspection is Mr. Eugene Huang, who can be reached by phone at 301-415-4140 or via electronic mail at Eugene.Huang@nrc.gov.

b. Findings and Observations

b1. Affected ITAAC Numbers: 2.1.02.07a.i (24), 2.2.03.07a.i (170)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(24) The Class 1E equipment identified in Table 2.1.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.	i) A report exists and concludes that the Class 1E equipment identified in Table 2.1.2-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(170) The Class 1E equipment identified in Table 2.2.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	i) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.	i) A report exists and concludes that the Class 1E equipment identified in Table 2.2.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

IR 99901441/2014-201 contains one inspection finding associated with inspections, tests, analyses, and acceptance criteria (ITAAC) 2.1.02.07a.i and 2.2.03.07a.i. This finding is material to the acceptance criteria of the ITAAC.

IR 99901441/2014-201 states in part:

The NRC inspection team identified five examples where test requirements were not satisfied and there was no documentation of evaluations for test deviations identified. Specifically, Qualtech provided test report EGS-TR-HC 1741-01 to Rockbestos-Suprenant Cable Corporation (RSCC) for a loss of coolant accident/design basis accident (LOCA/DBA) environmental qualification test of Firewall III insulated wire/cable, which are used in the AP1000 squib valves. Some of the test documentation evaluated pertained to: (1) electrical current load applied during testing; (2) temperature applied during harsh environment test; (3) environmental pressure recorded for LOCA/DBA test; (4) photographic records of harsh environment testing; (5) functional testing of electrical connectors for 8-inch squib valves.

The NRC inspection team determined that although QualTech included all the raw data in the test report package, the failure to document and evaluate departures from specified test parameters introduced uncertainties regarding the acceptability of the results of the equipment qualification activities. If left uncorrected or unresolved, the capability of the squib valve connectors and the electrical cable to withstand harsh accident environments would be indeterminate.

This finding is material to the acceptance criteria of the ITAAC, specifically pertaining to the environmental qualification of the AP1000 wires, cables, and valves in accordance with Westinghouse AP1000 design requirements.

The NRC reviewed Qualtech's responses to 99901441/2014-201-03 and found that they were responsive to the Notice of Nonconformance (NON) (ADAMS Accession No. ML14307A578).

2. Westinghouse Vendor Inspection

a. Inspection Scope

During the week of March 23-27, 2015, the NRC staff conducted an inspection of the implementation of Westinghouse's (WEC's) QA program activities associated with the design, implementation, and testing of the Protection and Safety Monitoring System (PMS) systems for the Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 currently under construction. The vendor inspection activities were documented in IR 99900404/2015-204 (ADAMS Accession No. ML15113B277).

The lead for this inspection is Mr. Greg Galletti, who can be reached by phone at 301-415-1831 or via electronic mail at Greg.Galletti@nrc.gov.

b. Findings and Observations

b1. Affected ITAAC Number: 2.5.02.07a (534), 2.5.02.07e (538)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(534) The PMS provides process signals to the PLS through isolation devices.	Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed.	A report exists and concludes that the isolation devices prevent credible faults from propagating into the PMS.
(538) The PMS receives signals from non-safety equipment that provides interlocks for PMS test functions through isolation devices.	Type tests, analyses, or a combination of type tests and analyses of the isolation devices will be performed.	A report exists and concludes that the isolation devices prevent credible faults from propagating into the PMS.

IR 99900404/2015-204 contains an inspection finding associated with ITAACs 2.5.02.07a and 2.5.02.07e. This finding is material to the acceptance criteria of the ITAAC.

IR 99900404/2015-204 states:

The inspectors noted that the test report, APP-PMS-VPR-002, Section 6.2, "Test Conditions," subsection 6.2.1, "Common Mode" stated, in part, "the fault current applied during testing was 50A..., this test current setting is somewhat arbitrary." Further, the test report, Appendix B, "Transverse Fault Test Methodology Rationale," states, in part, "the adiabatic region is beyond the fault current capabilities of Westinghouse test equipment, which is limited to 60A." The test report specified the

maximum available short circuit currents are approximately 40,000 amperes at the batteries for the Direct Current (DC) system but it did not reference an available fault current for the Alternating Current (AC) system. The fuses used in the isolation devices specified (on the fuse peak let-thru current vs. available current curves) that they allowed AC peak let-thru currents ranging from approximately 250 to 2000 amperes. No objective evidence was available establishing the magnitudes of the DC peak let through currents, which could be greater than the AC currents. The inspectors noted that the maximum current transients in the design of the system were not determined by WEC, and the effects of the credible peak currents at the isolation devices was not tested as specified by IEEE 384-1981, Section 7.2.2.1 "Isolation Devices" subsection "General." Consequently, the qualification test did not demonstrate that most adverse current transients applied to the isolation device's non-Class 1E side would not degrade the operation of the circuit connected to the device Class 1E. 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. This item was identified as Nonconformance 99900404/2015-204-01.

This issue is material to the acceptance criteria of the ITAAC because the finding concerns the adequacy of the testing performed to ensure that the qualification was bounded by AP1000 design requirement.

The NRC reviewed WEC's responses to 99900404/2015-204-01 and found that they were responsive to the NON. NRC's acceptance of WEC's response to the IR was documented in ADAMS (ADAMS Accession No. ML15177A068).

b2. Affected ITAAC Numbers: 2.5.02.03 (525)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(525) The Class 1E equipment, identified in Table 2.5.2-1, has electrical surge withstand capability (SWC), and can withstand the 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 for the time required to perform the safety function.	Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment.	A report exists and concludes that the Class 1E equipment identified in Table 2.5.2-1 can withstand the SWC, EMI, RFI, and ESD conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

IR 99900404/2015-204 contains an inspection finding associated with ITAACs 2.5.02.03. This finding is material to the acceptance criteria of the ITAAC.

IR 99900404/2015-204 states:

The NRC inspection team reviewed APP-PMS-VBR-003, "Equipment Qualification Summary Report for PMS Cabinets and NIS Auxiliary Panels for Use in the AP1000 Plant," Revision 2, to verify that the AP1000 PMS cabinets were able to withstand EMI/RFI and ESD conditions that would exist during and following a design basis accident. EQ-QR-126, "Standard Pentair Seismic Cabinet," Revision 0, dated February 12, 2012, provided test results that showed that shielding measurements of the Pentair 21497 cabinet were generally equivalent to or better than the shielding effectiveness of the 7221 (Corry) cabinets. However, when the NRC team reviewed the horizontal and vertical door data comparison figures, it was noted that the Pentair cabinets did not provide equivalent or better shielding measurements in all cases, and there was no justification provided for acceptance of these conditions. The NRC noted that the figures did not meet the above criteria, and no justification was provided for acceptance of these conditions to ensure emissions and incoming RFI were suppressed in the Pentair cabinets.

In addition, the inspection team noted that there was no documented evaluation to discuss how the materials for the two cabinets were equivalent in regard to EMC properties since the Corry cabinets were constructed from ASTM A1008 CY Type B cold rolled steel and the Pentair cabinets were constructed from ASTM A1011 CS Type B hot rolled steel. The team determined that contrary to Criterion III "Design Control," of Appendix B to 10 CFR Part 50 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. This issue has been identified as Nonconformance 99900404/2015-204-02.

This issue is material to the acceptance criteria of the ITAAC because the finding concerns the adequacy of similarity analysis to show that the Pentair cabinets were bounded by the EMC EQ qualification of the Corry cabinets.

The NRC reviewed WEC's responses to 99900404/2015-204-02 and found that they were responsive to the NON. NRC's acceptance of WEC's response to the IR was documented in ADAMS (ADAMS Accession No. ML15177A068).

b3. Affected ITAAC Number: 2.5.02.03 (525)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(525) The Class 1E equipment, identified in Table 2.5.2-1, has electrical surge withstand capability (SWC), and can withstand the 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 for the time required to perform the safety function.	Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment.	A report exists and concludes that the Class 1E equipment identified in Table 2.5.2-1 can withstand the SWC, EMI, RFI, and ESD conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

IR 99900404/2015-204 contains an inspection finding associated with ITAAC 2.5.02.03. This finding is material to the acceptance criteria of the ITAAC.

IR 99900404/2015-204 states:

The NRC inspection team reviewed commercial grade dedication instruction (CDI) 4064 for EMC testing services performed by Keystone Compliance, LLC. WEC identified the control of measuring and test equipment (M&TE), calibrated by sub supplier Liberty, as a critical characteristic for the EMC testing in CDI-4064. The NRC noted that WEC accepted this critical characteristic by reviewing that the sub supplier, Liberty, had a certification from an accredited organization. However, WEC procedure 7.2 allows two methods to dedicate calibration services, (1) a survey of the commercial grade calibration service or (2) use of an alternate method when utilizing a supplier with ANSI/ISO/IEC 17025 certification from a U.S. accredited organization with specific criteria requirements. These requirements include the 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. WEC was not able to provide documentation to show that these specific requirements were verified. Specifically, WEC could not show that the measuring and test equipment used for the EMC testing of the PMS was appropriately calibrated. In addition, WEC failed to identify appropriate acceptance criteria or provide sufficient documentation to verify that the equipment used for the EMC testing was appropriately calibrated by Liberty.

The team determined that contrary to Criterion III of Appendix B to 10 CFR Part 50, "Design Control," 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. This item was identified as Nonconformance 99900404/2015-204-03.

This issue is material to the acceptance criteria of the ITAAC because the finding concerns the adequacy of establishing appropriate measures to assure services purchased through a subcontractor were adequately evaluated in support of qualification activities.

The NRC reviewed WEC's responses to 99900404/2015-204-03 and found that they were responsive to the NON. NRC's acceptance of WEC's response to the IR was documented in ADAMS (ADAMS Accession No. ML15177A068).

3. SPX Copes-Vulcan (ITAAC-Finding Closure)

a. Inspection Scope

On January 12-14, March 30-April 1, and July 8, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a limited scope inspection of SPX, Copes-Vulcan. The inspection was performed on the premises of Tech Source Engineering in Erie, Pennsylvania and Pennsylvania State University (Penn State) in State College, Pennsylvania, who are commercial contractors to SPX. The inspection was focused on the design validation testing of squib valve initiators in response to a previously identified NRC Nonconformance (99900080/2012-201-01). Squib valve initiators are components that are being supplied for use in safety-related applications in the Westinghouse AP1000 reactor design. As part of the inspection, the NRC also reviewed controls associated with the irradiation (both gamma and neutron) of the initiator samples being utilized in the testing program. Since neither Tech Source Engineering nor Penn State have a nuclear quality assurance program, this inspection focused on SPX's commercial grade dedication and oversight of these activities. The vendor inspection activities were documented in IR 99900080/2015-201 (ADAMS Accession No. ML15210A806).

The lead for this inspection is Mr. Jeffrey Jacobson, who can be reached by phone at 301-415-2977 or via electronic mail at Jeffrey.Jacobson@nrc.gov.

b. Findings and Observations

b1. Affected ITAAC Numbers: 2.1.02.12a.iv (56), 2.1.02.12a.v (57), 2.2.03.12.a.i (214), and 2.2.03.12a.ii (215)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
(56) The automatic depressurization valves identified in Table 2.1.2-1 perform an active safety-related function to change position as indicated in the table.	Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	A test report exists and concludes that each squib valve changes position as indicated in Table 2.1.2-1 under design conditions.
(57) The automatic depressurization valves identified in Table 2.1.2-1 perform an active safety-related function to change position as indicated in the table.	Inspection will be performed for the existence of a report verifying that the as-built squib valves are bounded by the tests or type tests.	A report exists and concludes that the as-built squib valves are bounded by the tests or type tests.
(214) The squib valves and check valves identified in Table 2.2.3-1 perform an active safety-related function to change position as indicated in the table.	Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design condition.	A test report exists and concludes that each squib valve changes position as indicated in Table 2.2.3-1 under design conditions.
(215) The squib valves and check valves identified in Table 2.2.3-1 perform an active safety-related function to change position as indicated in the table.	Inspection will be performed for the existence of a report verifying that the as-built squib valves are bounded by the tests or type tests.	A report exists and concludes that the as-built squib valves are bounded by the tests or type tests.

IR 99900080/2015-201 closes out inspection finding NON 99900080/2012-201-01 associated with ITAACs 2.1.02.12a.iv, 2.1.02.12a.v, 2.2.03.12a.i, and 2.2.03.12a.ii. IR 99900080/2012-201 originally only identified the finding as affecting ITAAC 12. The finding originally identified in IR 99900080/2012-201 was intended to reference all four ITAACs as described in IR 99900080/2015-201.

IR 99900080/2015-201 states:

During this inspection, the inspectors focused on testing being performed by SPX of the initiators, in response to a previously identified NRC Non-conformance 99900080/2012-201-01. The test program was designed to show that the performance of the initiators is repeatable, that the design contains sufficient margin, and that the initiators would not be adversely affected by radiation (both gamma and neutron) or by thermal aging. The testing reviewed during this inspection supplements the testing being performed on the entire explosive cartridge assembly as part of the Institute of Electrical and Electronics Engineers (IEEE) 323 Equipment Qualification program.

The inspectors concluded that the Bruceton testing results were sufficient to resolve the concerns raised previously in Nonconformance 99900080/2012-201-01 regarding the initiator performance. The inspectors determined that SPX had developed an appropriate method to adequately establish the performance of the initiator assemblies used in the AP1000 squib valves and that the testing was being conducted in compliance with Criterion XI, "Test Control," of Appendix B, to 10 CFR Part 50.

4. List of Items Opened/Closed, and Applicable ITAAC

Item Number	Status	Type	Applicable Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) from License Nos. NFP-91, NFP-92, NFP-93, and NFP-94
99900080/2012-201-01	Closed	NON	2.1.02.12a.iv (56) 2.1.02.12a.v (57) 2.2.03.12a.i (214) 2.2.03.12a.ii (215)
99901441/2014-201 -03	Open	NON	2.1.02.07a.i (24), 2.2.03.07a.i (170)
99900404/2015-204 -01	Open	NON	2.5.02.07a (534), 2.5.02.07e (538)
99900404/2015-204 -02	Open	NON	2.5.02.03 (525)
99900404/2015-204 -03	Open	NON	