

August 1, 2014

Mr. B. L. Ivey, Vice President,  
Regulatory Affairs  
Southern Nuclear Operating Company, Inc.  
40 Inverness Center Parkway, B022  
Birmingham, AL 35242

Ms. April R. Rice, Manager  
New Nuclear Deployment Licensing  
South Carolina Electric and Gas  
14368 State Highway 213  
Jenkinsville, SC 29065

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

Dear Mr. Ivey and Ms. Rice:

As discussed at the February 7, 2013, public meeting, 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 that, 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 September 26, 2013, as they relate to ITAAC for Vogtle Units 3 and 4 and Summer Units 2 and 3. Each of the inspection findings below apply 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."

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Although the NRC is currently planning to review the resolution of these items 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 No.: 05200025  
05200026  
05200027  
05200028

Enclosure:  
Summary of NRC Vendor Inspections  
Affecting ITAAC

B. Ivey, et al.

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Although the NRC is currently planning to review the resolution of these items through future inspections, you should not delay your process of ITAAC review and closure 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.

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**ADAMS Accession No.:** ML14111A071 \*via e-mail

NRO-002

<b>OFFICE</b>	NRO/DCIP/EVIB	NRO/DNRL/LB4	NRO/DNRL/LB4	NRO/DCIP/IGCB
<b>NAME</b>	JJimenez	DMcGovern*	LBurkhart*	BAnderson*
<b>DATE</b>	04/ 22 /2014	06/ 10 /2014	06/ 10 /2014	04/ 28 /2014
<b>OFFICE</b>	NRO/DCIP/CIPB	RII/DCP/CPB2	NRO/DCIP/MVIB	NRO/DCIP/EVIB
<b>NAME</b>	B.Lukes for JBeardsley*	DAyres*	JOrtega-Luciano*	JJacobson
<b>DATE</b>	05/ 9 /2014	04/ 28 /2014	04/ 22 /2014	04/ 29 /2014
<b>OFFICE</b>	NRO/DCIP/MVIB	NRO/DCIP/EVIB	OGC*	NRO/DCIP/EVIB
<b>NAME</b>	R.McIntyre for ERoach*	GGalletti*	MSpencer	RRasmussen
<b>DATE</b>	06/ 5 /2014	04/ 22 /2014	06/ 19 /2014	08/01/2014

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

1. Pentair Valves and Controls Vendor Inspection

a. Inspection Scope

During the week of June 24-28, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Pentair Valves and Controls (Pentair) facility in Mansfield, Massachusetts. This inspection evaluated Pentair's quality assurance (QA) activities associated with the design, fabrication, assembly, and testing of the PV-16, PV-18, and PV-62 auxiliary relief valves, vacuum breaker valves, and pressurizer safety valves, respectively, for the Westinghouse Electric Company (WEC) AP1000 reactor design. The vendor inspection activities were documented in Inspection Report (IR) 99901431/2013-201 (Agencywide Document Access and Management System (ADAMS) Accession No. ML13212A265).

During the week of February 12-13, 2014, the NRC performed a follow-up inspection that specifically evaluated Pentair's QA activities associated with the American Society of Mechanical Engineers (ASME) Qualification of Active Mechanical Equipment (QME)-1 functional qualification re-testing of the pressurizer safety valve (PV-62), for the WEC AP1000 reactor design and implementation of its Part 21 program. The vendor inspection activities were documented in IR 99901431/2014-201 (ADAMS Accession No. ML14073A652).

The lead for this inspection is Mr. Jonathan Ortega-Luciano, who can be reached by phone at 301-415-1159 or via electronic mail at Jonathan.Ortega-Luciano@nrc.gov.

b. Findings and Observations

b1. Affected ITAAC Numbers: 2.1.02.02a (13), 2.1.02.05a.ii (20), 2.1.02.08a.ii (29), 2.2.03.02a (159), 2.2.03.05a.ii (166)

<b>Design Commitment</b>	<b>Inspections, Tests, Analysis</b>	<b>Acceptance Criteria</b>
2.a) The components identified in Table 2.1.2-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built components as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built components identified in Table 2.1.2-1 as ASME Code Section III.

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
5.a) The seismic Category I equipment identified in Table 2.1.2-1 can withstand seismic design basis loads without loss of safety function.	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.
8.a) The pressurizer safety valves provide overpressure protection in accordance with Section III of the ASME Boiler and Pressure Vessel Code.	ii) Testing and analysis in accordance with ASME Code Section III will be performed to determine set pressure.	ii) A report exists and concludes that the safety valves set pressure is 2485 psig ± 25 psi.
2.a) The components identified in Table 2.2.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built components as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.3-1 as ASME Code Section III.
5.a) The seismic Category I equipment identified in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function.	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of safety function. For the PXS containment recirculation and IRWST screens, a report exists and concludes that the screens can withstand seismic dynamic loads and also post-accident operating loads, including head loss and debris weights.

IR 99901431/2013-201 contains one inspection finding associated with inspections, tests, analyses, and acceptance criteria (ITAAC) 2.1.02.02a, ITAAC 2.1.02.05a.ii, ITAAC 2.1.02.08a.ii, ITAAC 2.2.03.02a, and ITAAC 2.2.03.05a.ii. This finding is material to the acceptance criteria of the ITAAC.

IR 99901431/2013-201 states:

The NRC inspection team identified that Pentair had not established adequate design control measures for the implementation of a suitable testing program with respect to the seismic qualification of various AP1000 valves. Specifically, Pentair's qualification testing for the PV-16 auxiliary relief valves and the PV-62 pressurizer safety valves failed

to conform to the seismic qualification provisions specified in the Pentair Valve Qualification Test (VQT) Procedures and the WEC design specifications. Specifically, during the NRC's observed testing of the PV-16 valve, the NRC inspection team found that the test had been improperly set up to apply the static load in the front-to-back orientation (i.e., more rigid). However, the NRC confirmed with WEC that the intent of the AP1000 valve design specification is that the static load be applied to the least rigid axis during the QME-1 seismic qualification test.

The NRC inspection team also reviewed the valve capacities established by the National Board of Boiler and Pressure Relief Vessel Inspectors, including the applicable National Board Certification Number 15028 for the Pentair (Anderson Greenwood Crosby) HB series (Class 1) safety valve. Pentair Test Report TR-5509, Attachment VII, contained the Wyle report that indicated the resonance frequency of the valve in the side-to-side orientation (referred to as horizontal in the Wyle report) was lower than the front-to-back orientation (referred to as axial in the Wyle report). Based on the review of the test reports and photographs of the test setups, the NRC inspection team determined that the Pentair QME-1 seismic qualification tests for the PV-62 valve applied the static load in the front-to-back (i.e., more rigid) orientation.

As a third example, the Pentair QME-1 seismic qualification test for the AP1000 PV-62 valve included a flow test with the static load applied at a prorated pressure that allowed full flow through the valve at the Pentair test facility. However, Pentair's QME-1 qualification test procedure (VQT-38173) did not include a lift test at the design set pressure with an applied seismic static load. The NRC inspection team considered the absence of a seismic qualification test of the AP1000 PV-62 valve at the design set pressure to be an example of inadequate design control. Failure to perform this type of test does not ensure adequate QME-1 seismic qualification testing to demonstrate that the valve could perform its safety function to lift at the design set pressure under seismic conditions. These issues were identified as Nonconformance (NON) 99901431/2013-201-01.

This finding is material to the acceptance criteria of the ITAAC, specifically pertaining to the design and construction of the AP1000 valves in accordance with the ASME Code, Section III, requirements, as well as the ability of the valves to withstand seismic design basis loads without a loss of safety function and to provide overpressure protection.

The NRC reviewed Pentair's responses to NON 99901431/2013-201-01 and found that they were responsive to the NON. The NRC completed its review of Pentair's corrective actions during the February 12-13, 2014. NRC inspectors witnessed the retesting of the valves and determined that the re-test of the valves adequately closed the ITAAC-related findings. The closure of the ITAAC-related findings was documented in IR 99901431/2014-201 (ADAMS Accession No. ML14073A652) and in the NRC's acceptance of Pentair's response to the IR (ADAMS Accession No. ML14120A238).

## 2. SPX (Copes-Vulcan) Vendor Inspection

### a. Inspection Scope

During the week of September 23-27, 2013, the NRC staff conducted an inspection of the implementation of SPX's (Copes-Vulcan's) QA program activities associated with the design and manufacturing of the squib valves for the AP1000 reactor design. The inspection was

performed on the premises of UTC Aerospace Systems (UTC). The vendor inspection activities were documented in IR 99900080/2013-201 (ADAMS Accession No. ML13302B397).

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), 2.2.03.12a.i (214)

<b>Design Commitment</b>	<b>Inspections, Tests, Analysis</b>	<b>Acceptance Criteria</b>
12.a) 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.	iv) Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	iv) A test report exists and concludes that each squib valve changes position as indicated in Table 2.1.2-1 under design conditions.
12.a) 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.	i) Tests or type tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design condition.	i) A test report exists and concludes that each squib valve changes position as indicated in Table 2.2.3-1 under design conditions.

IR 99900080/2013-201 contains an inspection finding associated with ITAACs 2.1.02.12a.iv and 2.2.03.12a.i. This finding is material to the acceptance criteria of the ITAAC.

IR 99900080/2013-201 states:

The NRC determined that to date, SPX/UTC has relied on testing to demonstrate cartridge performance; however, the focus of the test program was primarily to ensure that proper cartridge output is achieved given cartridge ignition, rather than on ensuring cartridge ignition will reliably occur. The NRC inspection team determined that an insufficient number of cartridge firings were performed to statistically support that reliable ignition will occur. Furthermore, the large majority of the test firings were performed under ambient, as opposed to design basis conditions, and there was no demonstration that sufficient margin exists in this aspect of the design to account for changes in cartridge/initiator performance that could occur due to environmental or aging factors. Also, sufficient testing was not performed as necessary to account for differences in performance between manufacturing lots or other unknown factors that could affect ignitability of the cartridges. The NRC inspectors determined that contrary to Criterion III of Appendix B to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Design Control," SPX/UTC has not performed sufficient testing or analysis to validate the design, specifically the ability of the initiator to reliably ignite the explosive charge under all design basis conditions. This item is identified as Nonconformance 99900080/2013-201-01.

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 squib valve explosive cartridge will reliably ignite under all design basis conditions.

The NRC reviewed SPX's responses to NON 99900080/2013-201-01 and requested that SPX inform the NRC when they complete their plans for the enhanced testing program referred to in their response and when such plans would be available for NRC inspection. The NRC will review the implementation of SPX's corrective actions during a future NRC staff inspection to determine that full compliance has been achieved and maintained.

b2. Affected ITAAC Number: 2.1.02.12a.v (57), 2.2.03.12a.ii (215)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
12.a) 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.	v) 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.	v) A report exists and concludes that the as-built squib valves are bounded by the tests or type tests.
12.a) 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.	ii) 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.	ii) A report exists and concludes that the as-built squib valves are bounded by the tests or type tests.

IR 99900080/2013-201 contains an inspection finding associated with ITAACs 2.2.02.12a.v and 2.2.03.12a.ii. This finding is material to the acceptance criteria of the ITAAC.

IR 9900080/2013-202 states:

The NRC inspection team identified that UTC manufactures carbon potassium nitrate (CPN) from individual mix constituents procured from commercial suppliers. As defined in SPX/Copes-Vulcan Commercial Grade Dedication Instruction 399896, Revision 8, dated 5/16/2013, SPX's overall process for "dedicating" the explosive cartridges being manufactured by UTC, requires specific testing of each powder mix for heat of explosion and carbon content. The SPX dedication process does not, however, require that testing or methods be employed to verify the composition of the CPN individual mix constituents. While certificates of conformance were provided to UTC by the commercial suppliers of the mix constituents stating that the products meet the purchase specifications (which include purity requirements), the certificates of conformance were not validated by either UTC or SPX through an audit of the supplier or through any other means. While not a specific concern for powder lots that will actually be subjected to environmental qualification testing, the team was concerned that subsequently produced powder lots could contain contaminants that could degrade performance under design basis conditions but would not be detected by the currently specified dedication process. This concern would make it difficult to verify that any production cartridges containing explosive powder from a different lot were in fact bounded by components that were actually subjected to the qualification testing.



The team determined that contrary to Criterion III of Appendix B to 10CFR Part 50, "Design Control," SPX/UTC had not established sufficient measures for the review for suitability of application of the explosive powder which is a safety-related component within the squib valve system. Specifically, SPX/UTC had not identified all critical characteristics of the explosive powder mix nor had SPX/UTC instituted controls sufficient to ensure the absence of contaminants from the explosive powder mix through inspections, tests, or analysis. This item was identified as Nonconformance 99900080/2013-201-02.

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 production squib valves will be bounded by those that were tested through the qualification program.

The NRC reviewed SPX's responses to NON 99900080/2013-201-02 and requested that SPX inform the NRC when they complete their plans for the enhanced commercial grade dedication instructions for the explosive powder and when they will be available for NRC inspection. The NRC will review the implementation of SPX's corrective actions during a future NRC staff inspection to determine that full compliance has been achieved and maintained.

### 3. Westinghouse Electric Company Vendor Inspection

#### a. Inspection Scope

During the week of January 13 - 17, 2014, the NRC staff performed an inspection of the implementation of QA program activities associated with testing of safety-related components for the Vogtle and Summer new plant builds at WEC's facility in Warrendale, PA. The NRC staff evaluated the Component Interface Module (CIM) planning phase documentation associated with the CIM software lifecycle model, and inspected on-going cabinet hardware testing, and channel integration testing for the Protection and Safety Monitoring System as well as factory acceptance testing for the Diverse Actuation System. The vendor inspection activities were documented in IR 99900404/2014-201 (ADAMS Accession No. ML14058A995).

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](mailto:Greg.Galletti@nrc.gov).

b. Findings and Observations

b1. Affected ITAAC Numbers: 2.5.02.14 (553)

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
14. The Component Interface Module (CIM) is developed using a planned design process which provides for specific design documentation and reviews.	An inspection and or an audit will be performed of the processes used to design the hardware, development software, qualification and testing.	<p>A report exists and concludes that CIM meets the below listed life cycle stages. Life cycle stages:</p> <ul style="list-style-type: none"> <li>a. Design requirements phase, may be referred to as conceptual or project definition phase</li> <li>b. System definition phase</li> <li>c. Hardware and software development phase, consisting of hardware and software design and implementation</li> <li>d. System integration and test phase</li> <li>e. Installation phase</li> </ul>

IR 99900404/2014-201 contains two inspection findings associated with ITAAC 2.5.02.14. These findings are material to the acceptance criteria of the ITAAC.

IR 99900404/2014-201 states:

The inspectors initiated NON 99900404/2014-201-01 because WEC did not apply appropriate design control measures to correctly translate applicable regulatory requirements and the design basis into specifications, drawings, procedures, and instructions. Examples that illustrate the inspector findings are:

- (1) The WEC CIM-Safety Remote Node Controller (SRNC) management processes did not ensure that the requirements for all mandatory lifecycle activities were adequately translated in chronological relationship into WEC's chosen lifecycle model identified in Westinghouse Design Certification Document, Tier 1 Table [ITAAC] 2.5.2-8 #14a, including lifecycle activities specified by IEEE 1074-1995, IEEE 1012-1998, and IEEE 828-1990;
- (2) The WEC CIM-SRNC independent verification and validation (IV&V) process did not adequately translate the requirements specified by IEEE 1012-1998, for the IV&V effort to comply with the minimum set of V&V tasks described;
- (3) The WEC IV&V plan did not translate the requirement to verify that the integration and test plan was developed using the required design documents including: the Software Requirements Specification, Interface Requirements

Specification, Software Design Description, and the Interface Design Document Description; and

- (4) The WEC SCM plan did not adequately identify all Configuration Items (CI) and did not translate the requirement to verify the configuration audit of the software transfer procedure, 9006-0021 or to verify that 9006-0021 as a CI was listed in the SCM Plan.

The inspectors initiated NON 99900404/2014-201-02 because WEC did not apply appropriate design control measures to verify the adequacy of design associated with the performance of safety analyses, system requirements review, and concept documentation evaluation. Examples that illustrate the inspector findings are:

- (1) The WEC IV&V team did not verify that Hardware/Software/User System Requirements allocation was performed or that the safety analyses identified and analyzed the risk factors that may impair, prevent, or require technical trade-offs for accomplishing the technical objectives; and
- (2) The WEC IV&V team also did not identify or adequately address the two highest priority CIM-SRNC control ports that presented potential hazards as part of the Safety Hazard Analysis.

NONs 99900404/2014-201-01 and 99900404/2014-201-02 are material to ITAAC 2.5.02.14 because the findings concerns the adequacy of the development and implementation of the CIM planning phase activities which are an integral portion of the CIM software design lifecycle model.

The NRC will continue its review of the planned corrective actions discussed with WEC as well as a review of their full implementation during a future NRC staff inspection to determine that full compliance has been achieved and maintained.

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
99901431/2013-201-01	Closed	NON	2.1.02.02a (13) 2.1.02.05a.ii (20) 2.1.02.08a.ii (29) 2.2.03.02a (159) 2.2.03.05a.ii (166)
99900080/2013-201-01	Open	NON	2.1.02.12a.iv (56) 2.2.03.12a.i (214)
99900080/2013-201-02	Open	NON	2.2.02.12a.v (57) 2.2.03.12a.ii (215)
99900404/2014-201-01	Open	NON	2.5.02.14 (553)
99900404/2014-201-02	Open	NON	