



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

November 16, 2017

Mr. Al LaMastra  
Senior Director Engineering  
and Programs (Nuclear and Scientific)  
Valcor Engineering Corporation  
2 Lawrence Rd.  
Springfield Township, NJ 07081

SUBJECT: VALCOR ENGINEERING CORPORATION'S NUCLEAR REGULATORY  
COMMISSION INSPECTION REPORT NO. 99900728/I-2017-201, AND  
NOTICE OF NONCONFORMANCE

Dear Mr. LaMastra:

On October 9-12, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Valcor Engineering Corporation's facility (hereafter referred to as Valcor) facility in Springfield, NJ. The purpose of this limited-scope routine inspection was to assess Valcor's compliance with provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically-focused inspection specifically evaluated Valcor's implementation of the quality activities associated with the design, fabrication, and testing of the solenoid valves and replacement valve parts for the Westinghouse Electric Company AP1000 reactor design and for the domestic operating reactors. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of Valcor's overall quality assurance (QA) program.

During this inspection, the NRC staff inspected records associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 of the certified AP1000 Design Control Document. Specifically, these activities were associated with ITAAC Nos. 2.1.02.07a.i, 2.2.05.02a, 2.2.05.03a, and 2.2.05.04a, for Vogtle Electric Generating Plant, Units 3 and 4. The NRC inspection team identified one finding associated with the ITAAC contained in Section 4 of the attachment to this report. This finding is material to the ITAAC acceptance criteria for ITAAC No. 2.1.02.07a.i. Specifically, the NRC inspection team determined that Valcor failed to fully verify the adequacy of the design of the solenoid valves voltage controllers as part of the design validation process.

In addition, the NRC inspection team also found that the implementation of your QA program did not meet certain regulatory requirements imposed on you by your customers or NRC licensees. Specifically, the NRC inspection team determined that Valcor was not fully implementing its QA program in the areas of design control, control of purchase material, equipment, and services, and control of measuring and testing equipment. The specific findings and references to the

pertinent requirements are identified in the enclosures to this letter. In response to the enclosed notice of nonconformance (NON), Valcor should document the results of the extent of condition review for these findings and determine if there are any effects on other safety-related components.

Please provide a written statement or explanation within 30 days of this letter in accordance with the instructions specified in the enclosed NON. We will consider extending the response time if you show good cause for us to do so.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response (and if applicable), should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information would create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

**/RA/**

John P. Burke, Chief  
Quality Assurance Vendor Inspection Branch-2  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.: 99900728

Enclosures:

1. Notice of Nonconformance
2. Inspection Report No. 99900728/I-2017-201  
and Attachment

SUBJECT: VALCOR ENGINEERING CORPORATION'S NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NO. 99900728/I-2017-201, AND NOTICE OF NONCONFORMANCE

Dated: November 16, 2017

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## NOTICE OF NONCONFORMANCE

Valcor Engineering Corporation  
2 Lawrence Road  
Springfield, NJ 07081

Docket No. 99900728  
Report No. I-2017-201

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Valcor Engineering Corporation's (hereafter referred to as Valcor) facility in Springfield, NJ, from October 9, 2017, through October 12, 2017, Valcor did not conduct certain activities in accordance with NRC requirements that were contractually imposed upon Valcor by NRC licensees:

- A. Criterion III, "Design Control," of Appendix B, "Quality Assurance 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, "The design control measures shall provide for verifying the adequacy of the design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program."

Contrary to the above, as of October 12, 2017, Valcor failed to fully verify the adequacy of the design of the solenoid valves voltage controllers. Specifically, as part of the design validation process, Valcor did not perform sufficient testing or analysis to verify that the voltage controller would be capable of providing an acceptable output to the valves, including those valves defined as being in a harsh environment resulting from a design basis accident.

This issue has been identified as Nonconformance 99900728/I-2017-201-01.

- B. Criterion III 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 for the structures, systems and components."

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."

Contrary to the above, as of October 12, 2017, Valcor failed to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. In addition, Valcor failed to establish appropriate measures for source evaluation or inspection at the contractor or subcontractors. Specifically:

1. Valcor did not identify an appropriate set of critical characteristics for the voltage controller and the specified production testing was not adequate to fully verify the

performance of the controller. The production testing did not verify the pull-in output voltage of the controller under the full range of input voltages, contained an acceptance criteria for the controller output of 180 VDC plus or minus 10 percent without any appropriate justification, and was performed under less than fully loaded conditions.

2. Valcor did not establish the technical basis to verify the suitability of the materials for the selection of the sample population for nondestructive and destructive testing of O-Rings, helical springs, stop springs and other commercial-grade items as part of the commercial-grade dedication process.
3. Valcor did not the use correct sample size as to verify the suitability of the material of the O-Rings by a durometer and Fourier-transform infrared spectroscopy (FTIR) analysis, and other commercial-grade items by FTIR analysis as part the commercial-grade dedication process.
4. Valcor did not establish the acceptance criteria for the verification of material hardness properties of the O-Rings to ensure that they met the material specification as part of the commercial-grade dedication process. Valcor instead relied on a range value provided in the commercial supplier's Certificate of Conformance without performing a commercial-grade survey or source surveillance to verify their validity.
5. Valcor did not perform a commercial-grade survey or source surveillance of the commercial suppliers of the helical springs and top springs, to verify the validity of the Certificates of Conformance provided by these suppliers for the heat treatment and tensile strength, identified as critical characteristics.

This issue has been identified as Nonconformance 99900728/I-2017-201-02.

- C. Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50, states that "Measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits."

Certificate of Calibration No. 11000 for the rubber hardness test blocks from PTC Metrology, the calibration supplier, states that "Test Blocks are not to be used for Durometer calibration per ASTM D2240. Test blocks are intended to monitor changes in Durometer performance."

Note 2 in Section 10, "Report," of ASTM D2240, "Standard Test Method for Rubber Property - Durometer Hardness," 2015 Edition, states, in part, that "periodic checking of the operation and state of durometer calibration using commercially available rubber test blocks (refer to 7.8), specifically designed for this purpose, is recommended." Subsection 7.8 of Section 7, "Calibration," of ASTM D2240, states, in part, that "the rubber reference block(s) provided for verifying durometer operation and state of calibration are not to be relied upon as calibration standards."

Contrary to the above, as of October 12, 2017, Valcor failed to assure that measuring and test devices used in activities affecting quality were properly calibrated. Specifically, Valcor calibrated a durometer (serial No. 120978/KRW006) using a rubber test block kit (serial No. 120978/WDT004), contrary to the requirements of ASTM D2240. This durometer was

used during the commercial-grade dedication process to verify the material hardness properties of the O-Rings used in the solenoid valves.

This issue has been identified as Nonconformance 99900728/I-2017-201-03.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality Assurance Vendor Inspection Branch-2 Vendor Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each noncompliance: (1) the reason for the noncompliance or, if contested, the basis for disputing the noncompliance; (2) the corrective steps that have been and the results achieved; (3) the corrective steps that will be to avoid further noncompliance; and (4) the date when the corrective action will be completed. Where good cause is shown, the NRC will consider extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information (SGI) so that the NRC can make it available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information would create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this 16<sup>th</sup> day of November 2017.

**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS  
VENDOR INSPECTION REPORT**

Docket No.: 99900728

Report No.: 99900728/I-2017-201

Vendor: Valcor Engineering Corporation  
2 Lawrence Road  
Springfield, NJ 07081

Vendor Contact: Mr. Al LaMastra  
Senior Director Engineering  
and Programs (Nuclear and Scientific)  
Email: [ajlamastra@valcor.com](mailto:ajlamastra@valcor.com)  
Phone: 1-973-467-8400 ext. 7409

Nuclear Industry Activity: Valcor Engineering Corporation is an American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (B&PV) Code Certificate Holder holding an N, NS, and NPT stamp. Valcor's scope of supply includes, but is not limited to, design, fabrication, assembly, and testing of ASME B&PV Code Section III, Class 1, 2 & 3 valves, valve parts, appurtenances, piping, piping systems, piping sub-assemblies, pressure vessels, and safety-related non-ASME B&PV Code valve assemblies.

Inspection Dates: October 9-12, 2017

Inspectors: Yamir Diaz-Castillo NRO/DCIP/QVIB-2 Team Leader  
Thomas Herrity NRO/DCIP/QVIB-2  
Raju Patel NRO/DCIP/QVIB-2  
Jeffrey Jacobson NRO/DCIP/QVIB-1  
Katherine McCurry RII/DFFI/SB

Approved by: John P. Burke, Chief  
Quality Assurance Vendor Inspection Branch-2  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

## **EXECUTIVE SUMMARY**

Valcor Engineering Corporation  
99900728/I-2017-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Valcor Engineering Corporation's (hereafter referred to as Valcor) facility in Springfield, NJ, to verify that it had implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance 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." In addition, the NRC inspection also verified that Valcor implemented a program under 10 CFR Part 21, "Reporting of Defects and Noncompliance." Furthermore, the NRC inspection verified that Valcor had implemented a program in accordance with the applicable requirements of Section III, "Rules for Construction of Nuclear Facility Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code. This was the first NRC inspection at the Valcor facility.

This technically-focused inspection specifically evaluated Valcor's implementation of quality activities associated with the design, fabrication, and testing of the safety-related solenoid valves and valve replacement parts for the Westinghouse Electric Company AP1000 reactor design and for the domestic operating reactors. Specific activities observed by the NRC inspection team included:

- manual Gas Tungsten Arc Welding of a valve body and pipe nipple assembly for an ASME B&PV Code, Section III, Class 2 valve for Wolf Creek Generating Station, Unit 1
- post-emulsification fluorescent dye liquid penetrant testing of a body-pipe nipple assembly for an ASME B&PV Code, Section III, Class 2 valve for Wolf Creek Generating Station, Unit 1
- material verification using Positive Material Identification (PMI) as part of the commercial-grade dedication process of three valve bodies
- in-process inspection of a solenoid valve body, ASME B&PV Code, Section III, Class 2 for Palo Verde Nuclear Generating Station
- in-process calibration of a torque wrench performed by the calibration inspector and verified by the metrology inspector

In addition to observing these activities, the NRC inspection team verified that measuring and test equipment (M&TE) was properly identified, marked, calibrated, and used within its calibrated range.

These regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21



During the course of this inspection, the NRC inspection team implemented Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012; IP 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017; IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017; IP 65001.07, "Inspection of ITAAC-Related Installation of Valves," dated July 29, 2008; and IP 65001.B, "Inspection of the ITAAC-Related Welding Program," dated September 25, 2013.

With the exception of the nonconformances described below, the NRC inspection team concluded that Valcor's QA policies and procedures comply with the applicable requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21, and that Valcor's personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

### Design Control and Commercial-Grade Dedication

The NRC inspection team issued Nonconformance 99900728/I-2017-201-01 in association with Valcor's failure to implement the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-01 cites Valcor for failing to fully verify the adequacy of the design of the solenoid valves voltage controllers. Specifically, as part of the design validation process, Valcor did not perform sufficient testing or analysis to verify that the voltage controller would be capable of providing an acceptable output to the valves, including those valves defined as being in a harsh environment resulting from a design basis accident.

In addition, the NRC inspection team issued Nonconformance 99900728/I-2017-201-02 in association with Valcor's failure to implement the regulatory requirements of Criterion III and Criterion VII, "Control of Purchased Equipment, Materials, and Services," of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-02 cites Valcor for failing to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. In addition, Valcor failed to establish appropriate measures for source evaluation or inspection at the contractor or subcontractors. Specifically, Valcor did not (1) identify an appropriate set of critical characteristics for the voltage controller and the specified production testing was not adequate to fully verify the performance of the controller (the production testing did not verify the pull-in output voltage of the controller under the full range of input voltages, contained an acceptance criteria for the controller output of 180 VDC plus or minus 10 percent without any appropriate justification, and was performed under less than fully loaded conditions), (2) establish the technical basis to verify the suitability of the materials for the selection of the sample population for nondestructive and destructive testing of O-Rings, helical springs, stop springs and other commercial-grade items as part of the commercial-grade dedication process, (3) use correct sample size as to verify the suitability of the material of the O-Rings by a durometer and Fourier-transform infrared spectroscopy (FTIR) analysis, and other commercial-grade items by FTIR analysis as part the commercial-grade dedication process, (4) establish the acceptance criteria for the verification of material hardness properties of the O-rings to ensure that they met the material specification as part of the commercial-grade dedication process (Valcor instead relied on a range value provided in the commercial supplier's Certificate of Conformance without performing a commercial-grade survey or source surveillance to verify their validity), and (5) perform a commercial-grade survey or source surveillance of the commercial suppliers of the helical springs and stop springs, to verify the validity of the Certificates of Conformance

provided by these suppliers for the heat treatment and tensile strength, identified as critical characteristics.

#### Control of Measuring and Test Equipment

The NRC inspection team issued Nonconformance 99900728/I-2017-201-03 in association with Valcor's failure to implement the regulatory requirements of Criterion XII, "Control of Measuring Test and Equipment," of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-03 cites Valcor for failing to assure that measuring and test devices used in activities affecting quality were properly calibrated. Specifically, Valcor calibrated a durometer (serial No 120978/KRW006) using a rubber test block kit (serial No. 120978/WDT004), contrary to the requirements of ASTM D2240, "Standard Test Method for Rubber Property - Durometer Hardness," 2015 Edition.

#### Other Inspection Areas

The NRC inspection team determined that Valcor is implementing its programs 10 CFR Part 21, training and qualification, procurement document control, control of special processes, nonconforming material, parts, or components, corrective action, and internal audits in accordance with the applicable regulatory requirements of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team also determined that Valcor is implementing its policies and procedures associated with these programs. No findings of significance were identified.

## REPORT DETAILS

### 1. Design Control and Commercial-Grade Dedication

#### a. Inspection Scope

The NRC inspection team reviewed Valcor Engineering Corporation's (hereafter referred to as Valcor) policies and implementing procedures that govern the design control program to verify their compliance with the regulatory requirements of Criterion III, "Design Control," of Appendix B, "Quality Assurance 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," and with the applicable requirements of Subsection NCA, "General Requirements for Division 1 and Division 2," Subsection NB, "Class 1 Components," Subsection NC, "Class 2 Components," and Subsection ND, "Class 3 Components," of Section III, "Rules for Construction of Nuclear Facility Components," of the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (B&PV) Code, 1998 Edition, 2000 Addenda, and the Institute of Electrical and Electronic Engineers (IEEE) 323-1974, "Qualifying Class 1E Equipment for Nuclear Power Generating Stations."

The NRC inspection team reviewed the testing and analyses performed by Valcor to demonstrate that the solenoid valves for the Westinghouse Electric Company's (WEC) AP1000 reactor design would be capable of performing their intended safety functions over the wide range of design basis conditions as defined in WEC Specification APP-PV13-Z0-001, Revision 7, dated July 25, 2012. In particular, the NRC inspection team focused on the testing and analysis that was performed to verify that the solenoid valves would be capable of opening and closing under the full range of input voltages and under the stated normal and accident conditions, including the full range of fluid and ambient temperatures. Since the output magnetic force of the coil assemblies is directly proportional to its resistance and applied voltage, any change in applied voltage or temperature (which impacts resistance) could impact the capability of the valve to perform its intended safety function and would need to be fully accounted for in the design verification analysis.

In addition, the NRC inspection team reviewed aspects of the design verification and qualification testing for the associated voltage controller which Valcor had added to the system design to address with the wide range of DC input voltages specified by WEC and the associated heat dissipation issues which would exist at the higher voltage range for normally energized solenoid valves. The voltage controller provides a fixed pull-in voltage which then converts to an adjustable lower hold-in voltage, sufficient to maintain valve position but at a coil voltage that results in much less heat build-up in the valve. The NRC inspection team reviewed the independent laboratory testing as documented in "ASME QME-1 EQ Qualification Report for Solenoid Valve Model V526-5631-36 APP-PV13-Z0D-101," Revision C, dated April 18, 2016, which contained testing to verify whether measured coil self-heating effects were bounded by analytical calculations including those contained in Valcor's "Engineering Actuator Sizing Analysis Report for Solenoid Valve Margins and Uncertainties," Revision D, dated October 7, 2016.

The NRC inspection team also reviewed the thermal aging analysis for the solenoid coils contained in the above ASME QME-1 environmental qualification report. Accelerated thermal aging of the solenoid coils was performed to establish a qualified life for the coils, as required per IEEE 323-1974.

Furthermore, the NRC inspection team reviewed Valcor's program for the dedication of commercial-grade items for use in safety-related applications to verify its compliance with Criterion III and Criterion VII, "Control of Purchased Equipment, Materials, and Services," of Appendix B to 10 CFR Part 50. This review included Valcor's policies and procedures governing the implementation of commercial-grade dedication (CGD) activities, interviews with Valcor's personnel, observation of CGD activities, and review of related documentation. Specifically, the NRC inspection team reviewed a sample of CGD packages to assess the different elements of the CGD program, including the technical evaluation process, design drawings, work package instructions, and inspection reports. The NRC inspection team also evaluated the criteria for the identification of safety functions, credible failure mechanisms/modes, selection of critical characteristics and acceptance criteria, and the identification of verification methods to verify effective implementation of Valcor's CGD process.

The NRC inspection team also discussed the design control and commercial-grade dedication programs with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

The NRC inspection team determined that Valcor had not completed a full design verification of the controller/solenoid valve system. Specifically, Valcor had not verified that the voltage controllers would be capable of providing sufficient voltage to the valves under all design basis conditions. While previous calculations performed by Valcor showed the valve designs contained margin with respect to the required pull-in voltage versus the available voltage, for the most part, these calculations had been performed using a 180 VDC terminal voltage at the coil. In addition, the calculations showed the amount of calculated margin varied significantly depending on the specific valve and its application. Furthermore, the NRC inspection team noted that the initial pull-in voltage to be supplied from the voltage controller will likely be below 180 VDC, as evidenced by testing performed by Valcor which showed that with an input voltage to the controller of 220 VDC nominal, the output voltage was measure at 172 volts. During the inspection, Valcor could not provide information regarding what the expected output of the controller would be with a minimal input line voltage of 180 VDC. The NRC inspection team noted that there will also be additional voltage drops between the controller and the coil due to line losses.

IEEE 323-1974 requires testing or analysis of the valve to be performed at the full range of its performance characteristics. While it appeared that the valves may have sufficient margin to compensate for the lower coil pull-in voltage, this margin had not been specifically quantified as it is unknown what the controller output voltage would be when the input to the controller is at the minimal 180 VDC. A change in applied voltage or temperature could impact the capability of the valve to perform its intended safety function. This issue impacts the domestic AP1000 solenoid valves fabricated by Valcor that are identified in the WEC data sheets APP-PV13-Z0D-101and -111. Additionally, this nonconformance is material to the acceptance criteria of ITAAC 19 for Vogtle Units 3

and 4, because those valves are identified in Table 2.1.2-1 of Appendix C of the Combined License, as being located in a harsh environment. However, Valcor did not perform sufficient testing or analysis to verify that the voltage controller would be capable of providing an acceptable output during environmental conditions under all design basis accidents to ensure the valve would be capable of maintaining its safety function.

The NRC inspection team identified this issue as an example of Nonconformance 99900728/I-2017-201-01 for Valcor's failure to fully verify the adequacy of the design of the solenoid valves voltage controllers. At the time of the inspection, Valcor had not initiated a corrective action report (CAR) to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

In addition to the above concerns regarding the initial design verification of the controllers, the NRC inspection team identified that Valcor had contracted out the design and manufacture of the voltage controller to a commercial facility. The NRC inspection team identified that Valcor had not generated a specific dedication plan for the controller, but instead, was using the normal production testing procedure as a basis for the CGD. The NRC inspection team determined that Valcor had not identified an appropriate set of critical characteristics for the voltage controller and that the specified production testing did not appear to sufficiently verify performance of the controller. Specifically, the production tests did not verify pull-in output of the controller under the full range of input voltages, contained an acceptance criteria for the controller output of 180 VDC plus or minus 10 percent which had not been justified, and was performed under less than fully loaded conditions. As previously discussed, the full range of operation was also not fully verified during testing performed as part of the qualification program for this controller, as discussed in Valcor Environmental and Seismic Qualification Test Report for Voltage Control Boxes Part No. S1140-23-23 (DC) (1E) and Part No. S1140-23-24 (AC) (Non-1E), QR 1140-23-23-1, Revision D, dated July 19, 2015. The NRC inspection team identified this issue as an example of Nonconformance 99900728/I-2017-201-02 for Valcor's failure to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. At the time of the inspection, Valcor had not initiated a CAR to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

With respect to CGD, the NRC Inspection team reviewed Valcor's procedure No. S2002, "Dedication of Commercial Grade Items for Nuclear Safety Related Applications," Revision R, dated September 7, 2017, which provides the process for dedicating commercial-grade items and services for use in safety-related applications, including the development of critical characteristics, and the identification of dedication methods and acceptance criteria. The NRC inspection team witnessed the CGD of O-Rings and requested a sample of CGD packages for O-rings, stop springs, helical springs, back-up springs, plungers, barrier terminal block, coil assembly, switch assembly, tubing sheet, and insulation tubing.

Table 11.2 of Valcor procedure No. S2002 provides guidance on the selection of the sample size for non-destructive and destructive testing inspections. The table states that for a lot of 225 pieces, 5 should be selected for testing. The NRC inspection team

requested Valcor to provide the technical basis for the selection of the sample population as stated in Table 11.2. Upon further discussions, Valcor stated they did not have a technical basis for the selection of the sample population and instead relied on the history of the vendor performance. When performance history is used as a basis for developing the sample population, it should be supported by documented objective evidence that shows the vendor's ability to consistently provide acceptable items. The NRC inspection team identified this issue as another example of Nonconformance 99900728/I-2017-201-02 for Valcor's failure to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. Valcor initiated CAR No. CA-2017-028 to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

During the witnessing of the CGD of O-Rings, the NRC inspection team observed Valcor's Quality Control (QC) inspector select a sample of one O-Ring from a lot of 225 O-Rings to verify the material hardness using a durometer and used the same sample to verify the elastomer material's family using Fourier-transform infrared spectroscopy (FTIR) analysis process by an external laboratory. As previously stated, Table 11.2 of Valcor procedure No. S2002 states that for a lot of 225 pieces, a sample size of 5 should be selected for testing. Upon further discussions, the QC inspector stated that a sample of one O-Ring was chosen consistent with current practice, contrary to the requirements of Valcor's procedure No. S2002. The NRC inspection team identified this issue as another example of Nonconformance 99900728/I-2017-201-02 for Valcor's failure to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. Valcor initiated CAR No. CA-2017-028 to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

In addition, once the QC inspector accepted the results of the material hardness tests for the CGD of the O-Rings, when questioned by the NRC inspection team on the basis for accepting the results, the QC inspector stated that it was using the range specified in the commercial supplier's Certificate of Conformance. Valcor accepted the lot of O-rings based on 100 percent verification of shelf life, cure date and material based on a review of the commercial supplier's Certificate of Conformance and material identification. The NRC inspection team noted that the O-Rings were procured from a distributor, and Valcor had not conducted any commercial-grade survey or source surveillance of the commercial supplier of the O-Rings to determine the validity of the Certificate of Conformance. The NRC inspection team identified this issue as an example of Nonconformance 99900728/I-2017-201-02 for Valcor's failure to establish appropriate measures for source evaluation or inspection at the contractor or subcontractors. Valcor initiated CAR No. CA-2017-028 to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

The NRC inspection team also reviewed CGD packages of helical springs procured from Hurley Manufacturing; and of stop springs procured from Spring Engineering Inc. Each CGD package had QC inspection reports that listed the critical characteristics verified as part of CGD process. Helical spring drawing No. V52615-10-4, Revision B, dated

November 9, 2001, and stop spring drawing No. V52615-5631-36, Revision A, dated July 8, 2009, lists the different critical characteristics such as chemical and physical properties, traceability, heat treatment and tensile strength that should be verified. Upon further discussion, Valcor stated that it used the commercial suppliers' Certificates of Conformance for the heat treatment and tensile strength as a basis to verify these critical characteristics. However, Valcor did not verify the validity of the Certificates of Conformance from these commercial-suppliers through the conduct of a commercial-grade survey, source surveillance or another acceptance method. The NRC inspection team identified this issue as another example of Nonconformance 99900728/I-2017-201-02 for Valcor's failure to establish appropriate measures for source evaluation or inspection at the contractor or subcontractors. Valcor initiated CAR No. CA-2017-028 to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

c. Conclusion

The NRC inspection team issued Nonconformance 99900728/I-2017-201-01 in association with Valcor's failure to implement the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-01 cites Valcor for failing to fully verify the adequacy of the design of the solenoid valves voltage controllers. Specifically, as part of the design validation process, Valcor did not perform sufficient testing or analysis to verify that the voltage controller would be capable of providing an acceptable output to the valves, including those valves defined as being in a harsh environment resulting from a design basis accident.

In addition, the NRC inspection team issued Nonconformance 99900728/I-2017-201-02 in association with Valcor's failure to implement the regulatory requirements of Criterion III and Criterion VII of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-02 cites Valcor for failing to ensure the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the solenoid valves. In addition, Valcor failed to establish appropriate measures for source evaluation or inspection at the contractor or subcontractors. Specifically, Valcor did not (1) identify an appropriate set of critical characteristics for the voltage controller and the specified production testing was not adequate to fully verify the performance of the controller (the production testing did not verify the pull-in output voltage of the controller under the full range of input voltages, contained an acceptance criteria for the controller output of 180 VDC plus or minus 10 percent without any appropriate justification, and was performed under less than fully loaded conditions), (2) establish the technical basis to verify the suitability of the materials for the selection of the sample population for nondestructive and destructive testing of O-Rings, helical springs, stop springs and other commercial-grade items as part of the commercial-grade dedication process, (3) use correct sample size as to verify the suitability of the material of the O-Rings by Durometer and FTIR analysis, and other commercial-grade items by FTIR analysis as part of the commercial-grade dedication process, (4) establish the acceptance criteria for the verification of material hardness properties of the O-rings to ensure that they met the material specification as part of the commercial-grade dedication process (Valcor instead relied on a range value provided in the commercial supplier's Certificate of Conformance without performing a commercial-grade survey or source surveillance to verify their validity), and (5) perform a commercial-grade survey or source surveillance of the commercial suppliers of the

helical springs and top springs, to verify the validity of the Certificates of Conformance provided by these suppliers for the heat treatment and tensile strength, identified as critical characteristics.

## 2. Control of Measuring and Test Equipment

### a. Inspection Scope

The NRC inspection team reviewed Valcor's policies and implementing procedures that govern the M&TE program to verify compliance with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50.

For a sample of M&TE reviewed, the NRC inspection team determined that the M&TE had the appropriate calibration stickers and current calibration dates, including the calibration due date. The NRC inspection team also verified that the M&TE had been calibrated, adjusted, and maintained at prescribed intervals prior to use. In addition, the calibration records reviewed by the NRC inspection team indicated the as-found or as-left conditions, accuracy required, calibration results, calibration dates, and the due date for recalibration. The NRC inspection team also verified that the selected M&TE was calibrated using procedures traceable to known industry standards.

The NRC inspection team observed the calibration of a torque wrench (Serial No. 925359/QTW089) to verify it was adequately labeled and traceable to its records, calibrated before its due date, and appropriately adjusted when found out-of-tolerance in accordance with the applicable Valcor procedures. The NRC inspection team also reviewed the calibration records for the equipment used to calibrate the torque wrench to determine whether records for equipment shipped offsite were properly maintained and indicated calibration information for As-Found and As-Left conditions.

The NRC inspection team reviewed material rejection reports (MRRs) and observed storage of M&TE to verify that Valcor's staff properly segregated, documented, and evaluated when M&TE was found out of calibration, lost, or out of service. The NRC inspection team also reviewed applicable procedures and sections of the QAM to verify provisions were in place that required the vendor to (1) perform evaluations to determine whether previous inspection or test results were affected by M&TE found out of calibration, (2) appropriately notify affected customers, and (3) repair or replace devices consistently found out of calibration.

The NRC inspection team reviewed the use of M&TE during in-process Gas Tungsten Arc Welding (GTAW) of a valve body and nipple assembly for a valve for Wolf Creek Generating Station, Unit 1; material hardness verification as part of the CGD of O-Rings, and receipt inspection of a solenoid valve body to ensure the equipment was calibrated, controlled, and documented in accordance with the applicable requirements. The NRC inspection team also observed a sample of 24 instruments that had calibration stickers identifying the serial number, dates of calibration, and respective due dates. The NRC inspection team reviewed the corresponding calibration history records to verify traceability was maintained, calibration was performed at the required intervals to a nationally recognized standard, and the individual who performed the calibration along with the results were clearly documented.



The NRC inspection team also discussed the M&TE program with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

During an inspection performed as part of the CGD process of O-Rings, the NRC inspection team witnessed the hardness verification of the O-Rings measured by a durometer (serial No. 120978/KRW006). This durometer was calibrated by Valcor at a three month frequency using a rubber test block kit (serial No. 120978/WDT004) supplied by PTC Metrology. The NRC inspection team noted that Certificate of Calibration No. 11000 for the rubber test block kit from PTC Metrology, stated in part, that "Test Blocks are not to be used for durometer calibration per ASTM D2240. Test blocks are intended to monitor changes in durometer performance."

Note 2 in Section 10, "Report," of ASTM D2240, "Standard Test Method for Rubber Property - Durometer Hardness," 2015 Edition, states, in part, that "periodic checking of the operation and state of durometer calibration using commercially available rubber test blocks (refer to 7.8), specifically designed for this purpose, is recommended." Subsection 7.8 of Section 7, "Calibration," of ASTM D2240, states, in part, that "the rubber reference block(s) provided for verifying durometer operation and state of calibration are not to be relied upon as calibration standards."

The NRC inspection team identified this issue as an example of Nonconformance 99900728/I-2017-201-03 for Valcor's failure to adequately calibrate a durometer (serial No. 120978/KRW006). Valcor initiated corrective action report CAR No. CA-2017-032 to address this issue. Valcor should document the results of the extent of condition review for this Nonconformance and determine the effects on any previously delivered safety-related components.

c. Conclusion

The NRC inspection team issued Nonconformance 99900728/I-2017-201-03 in association with Valcor's failure to implement the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Nonconformance 99900728/I-2017-201-03 cites Valcor for failing to assure that measuring and test devices used in activities affecting quality were properly calibrated. Specifically, Valcor calibrated a durometer (serial No. 120978/KRW006) using a rubber test block kit (serial No. 120978/WDT004), contrary to the requirements of ASTM D2240.

3. Supplier Oversight and Internal Audits

a. Inspection Scope

The NRC inspection team reviewed Valcor's policies and implementing procedures that govern the implementation of its supplier oversight and internal audits program to verify compliance with the requirements of Criterion IV, "Procurement Document Control," Criterion VII, and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed Valcor's Approved Vendors List, a sample of purchase orders (POs), external and internal audits, and receipt inspection records to verify compliance with the applicable regulatory and technical requirements.

The NRC inspection team verified that for the sample of POs reviewed, the POs included, as appropriate, the applicable technical and quality requirements. In addition, the NRC inspection team verified that for the sample of receipt inspection records reviewed (e.g., receipt inspection reports, Certificates of Compliance, Certificate of Calibration, and Certified Material Test Reports), these records were (1) reviewed by Valcor for compliance with the requirements of the POs, and (2) the records contained the applicable technical and regulatory information.

For the sample of external and internal audits reviewed, the NRC inspection team verified that the audit reports included an audit plan, any findings identified, adequate documented objective evidence of compliance with the applicable requirements, and a review by Valcor's responsible management. In addition, the NRC inspection team also verified that the external and internal audits were performed by qualified auditors and in the case of the internal audits, that these audits were performed by personnel not having direct responsibilities in the areas being audited. Furthermore, the NRC inspection team reviewed a sample of training and qualification records of Valcor's lead auditors and auditors and confirmed that auditing personnel had completed all the required training and had maintained the applicable qualification and certification in accordance with Valcor's policies and procedures.

The NRC inspection team also discussed the supplier oversight and internal audits programs with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified in this specific area. However, please refer to Nonconformance 99900728/I-2017-201-02 as described in Section 1 above for an issue identified with Valcor's supplier oversight of commercial suppliers as part of its CGD process.

c. Conclusion

The NRC inspection team concluded that Valcor is implementing its supplier oversight and internal audits programs in accordance with the regulatory requirements of Criterion IV, Criterion VII, and criterion XVII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Valcor is implementing its policies and procedures associated with the supplier oversight and internal audits programs. No findings of significance were identified.

4. Manufacturing Control

a. Inspection Scope

The NRC inspection team reviewed Valcor's policies and implementing procedures that govern the control of special processes to verify compliance with the regulatory requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50 and with the requirements of Subsection NCA, Subsection NB, Subsection NC, Subsection ND, of Section III, Section V, "Nondestructive Examination," and Section IX, "Welding and Brazing Qualification," of the ASME B&PV Code, 1998 Edition,

2000 Addenda, and American Society for Nondestructive Testing (ASNT) SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing."

The NRC inspection team reviewed a sample of welding and nondestructive examination (NDE) records associated with the fabrication and inspection of the solenoid valves for the WEC AP1000 reactor design. The NRC inspection team verified that the applicable welding data; such as weld material identification number, welding procedure specifications (WPS), supporting procedure qualification records (PQRs), inspection procedures, and the final inspection results were recorded on the weld travelers.

The NRC inspection team witnessed manual Gas Tungsten Arc Welding (GTAW) of a body and nipple assembly of a valve for Wolf Creek Generating Station, Unit 1. The NRC inspection team verified that the WPS and its associated PQRs were qualified in accordance with the requirements of Section XI of the ASME B&PV Code and the applicable Valcor procedures. The NRC inspection team also reviewed an additional sample of WPSs and PQRs to verify that the documents were in accordance with the requirements of the Section IX of the ASME B&PV Code, and the applicable Valcor procedures.

The NRC inspection team also reviewed Valcor's process for controlling weld filler metal and observed Valcor's weld filler material control storage area. The NRC inspection team witnessed Valcor's process for issuing weld filler metal rod issue to ensure that the weld filler metal was adequately controlled at all times until its consumption, and reviewed records associated with the storage, issuance, and return of weld filler metal. The weld filler metal was kept in containers and the environmental condition of the storage facility was controlled.

The NRC inspection team witnessed penetrant testing (PT) by post emulsification fluorescent process of a body assembly for an ASME B&PV Code, Section III, Class 2 solenoid valve for Wolf Creek Nuclear Generating Station, Unit 1. The NRC inspection team verified that the NDE procedures used by Valcor met the applicable requirements of Section V of the ASME B&PV Code. No relevant indication were identified by the Level II NDE inspector. The NRC inspection team verified that the Level II QC inspector performed the examinations in accordance with the Valcor procedures and the appropriate acceptance criteria using calibrated instruments. The NRC inspection team also reviewed qualification records for the Level II and Level III NDE inspectors and confirmed that they were qualified in accordance with the requirements in ASNT SNT-TC-1A.

The NRC inspection team also discussed the manufacturing control program with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Valcor is implementing its manufacturing control program in accordance with the regulatory requirements of Criterion IX of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Valcor is implementing its policies and procedures associated with the control of special processes program. No findings of significance were identified.

5. Nonconforming Materials, Parts, or Components and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed Valcor's policies and implementing procedures that govern the control of nonconformances to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed a sample of MRRs to verify that Valcor: (1) dispositioned the MRRs in accordance with the applicable procedures, (2) documented an appropriate technical justification for various dispositions, and (3) took adequate corrective action with regard to the nonconforming items. For MRRs that were dispositioned as use as is, the NRC inspection team confirmed that the technical justifications were documented to verify the acceptability of the nonconforming item. The NRC inspection team also verified that Valcor's MRR process provides a link to the 10 CFR Part 21, "Reporting of Defects and Noncompliance," program.

The NRC inspection team also reviewed a sample of CARs to ensure that conditions adverse to quality were promptly identified and corrected. In addition, the NRC inspection team verified that the CARs provided: (1) adequate documentation and description of conditions adverse to quality; (2) an appropriate analysis of the cause of these conditions and the corrective actions taken to prevent recurrence; (3) direction for review and approval by the responsible authority; (4) a description of the current status of the corrective actions; and (5) the follow-up actions taken to verify timely and effective implementation of the corrective actions. In addition, the NRC inspection team verified that Valcor's corrective action process provides a link to the 10 CFR Part 21 program.

The NRC inspection team also discussed the nonconforming materials, parts, or components and corrective action programs with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Valcor is implementing its nonconforming materials, parts, or components and corrective action programs in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to

10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Valcor is implementing its policies and procedures associated with the control of nonconforming materials, parts, or components and corrective action. No findings of significance were identified.

6. 10 CFR Part 21 Program

a. Inspection Scope

The NRC inspection team reviewed Valcor's policies and implementing procedures that govern Valcor's 10 CFR Part 21 program to verify compliance with the regulatory requirements. In addition, the NRC inspection team evaluated the 10 CFR Part 21 postings and a sample of Valcor's POs for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents." The NRC inspection team also verified that Valcor's nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program.

Furthermore, for a sample of 10 CFR Part 21 evaluations performed by Valcor, the NRC inspection team verified that Valcor had effectively implemented the requirements for evaluating deviations and failures to comply. The NRC inspection team verified that the notifications were performed in accordance with the requirements of 10 CFR 21.21, as applicable.

The NRC inspection team also discussed the 10 CFR Part 21 program with Valcor's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Valcor is implementing its 10 CFR Part 21 program in accordance with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Valcor is implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified.

7. Entrance and Exit Meetings

On October 9, 2017, the NRC inspection team discussed the scope of the inspection with Sarah Harris, Vice-President for Operations, and other members of Valcor's management and technical staff. On October 12, 2017, the NRC inspection team presented the inspection results and observations during an exit meeting with John Trezza, Valcor's Chief Executive Officer, and other members of Valcor's management and technical staff. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

## ATTACHMENT

### 1. ENTRANCE/EXIT MEETING ATTENDEES

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
John Trezza	Chief Executive Officer	Valcor Engineering Corporation (Valcor)		X	
Sarah Harris	Vice-President Operations	Valcor	X		
Tom Iervolino	Vice-President Business Development	Valcor	X		X
Fran Lucano	Vice-President Quality Systems	Valcor	X	X	X
Steven Gatcomb	Director of Sales & Marketing	Valcor	X	X	X
A J LaMastra	Sr. Director Engineering and Programs	Valcor	X	X	X
Mike Swirad	Quality Assurance (QA) Manager Nuclear	Valcor	X	X	X
Barry W. Matiez	Engineering Manager	Valcor	X	X	X
Nuno Diaz	Manufacturing Manager	Valcor			X
Hemang Dave	Assistant Chief Engineer	Valcor	X	X	X
Joseph E. Sheridan	Senior Project Engineer	Valcor		X	X
Patrick Chen	Project Engineer	Valcor		X	X
Anthony D'Amato	Project Engineer	Valcor			X
Mafuha Begun	Engineer	Valcor			X
Peter Worst	Engineer	Valcor			X
Robert C. Reitemeyer	Program Manager	Valcor	X		X
Alessi Scott	QA Specialist	Valcor		X	X

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Ashok Idiculla	Quality Control (QC) Manager	Valcor			X
Lidia Martins	QC Inspector	Valcor			X
Antonio Sarmiento	QC Inspector	Valcor			X
Jay Raval	QC Inspector	Valcor			X
Michael Spressler	Level II Nondestructive Examiner (NDE)	Valcor			X
Daniel Enners	Welder	Valcor			X
Lou Augis	Metrologic Inspector	Valcor			X
Adam Spence	Calibration Inspector	Valcor			X
Yamir Diaz-Castillo	Inspection Team Leader	NRC	X	X	
Jeffrey Jacobson	Inspector	NRC	X	X	
Thomas Herrity	Inspector	NRC	X	X	
Raju Patel	Inspector	NRC	X	X	
Katherine McCurry	Inspector	NRC	X	X	

## 2. INSPECTION PROCEDURES USED

Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012

IP 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017

IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017

IP 65001.07, "Inspection of ITAAC-Related Installation of Valves," dated July 29, 2008

IP 65001.B, "Inspection of the ITAAC-Related Welding Program," dated September 25, 2013

IP 65001.F, "Inspection of the ITAAC-Related Design and Fabrication Requirements," dated September 20, 2013

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	ITAAC	Description
99900728/I-2017-201-01	OPENED	NON	19 (VOG3 & VOG4)	Criterion III
99900728/I-2017-201-02	OPENED	NON	None	Criterion III & VII
99900728/I-2017-201-03	OPENED	NON	None	Criterion XII

4. INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC)

The NRC inspection team identified the following ITAAC related to the design and fabrication of solenoid valves by Valcor.

AP1000 Design Control Document (DCD), Revision 19	Appendix C from the Combined License for Vogtle Units 3 and 4, LAR Nos. 84 and 85	
ITAAC	ITAAC	Sequence No.
2.1.02.07a.i	2.1.02.05a.i	19
2.2.05.02a 2.2.05.03a 2.2.05.04a	2.2.05.02a	253

Note: ITAAC Seq. No. 24 was consolidated into 19, and 255 and 257 were consolidated into 253 per license amendment requests Nos. 84 and 85 for Vogtle Electric Generating Plant, Units 4 and 3, respectively.

With respect to ITAAC No. 19, the NRC inspection team reviewed environmental qualification reports to verify that the design of the reactor vessel head vent valves (identified as RCS-PL-V150A, V150B, V150C and V150D) could withstand applicable harsh environments before, during, and following a design basis accident without loss of its safety function. Please refer to Section 1 of the inspection report for more detail. In relation to ITAAC No. 253, the NRC inspection team reviewed fabrication records for pressure boundary welds and materials of valve numbers VES-PL-V005A and V005B (Serial Nos. 5 and 6), associated with Westinghouse Electric Company's (WEC) valve data sheet APP-PV13-Z0D-100, fabricated for installation as main control room air delivery isolation valves at Vogtle Electric Generating Plant, Unit 3.

Specifically, the NRC inspection team reviewed fabrication records for the body, bonnet, bonnet extension, and disc, as well as the fillet weld between the bonnet and bonnet extension, of valve numbers VES-PL-V005A and V005B to verify pressure boundary materials met the applicable requirements of Section III, "Rules for Construction of Nuclear Facility Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, 1998 Edition 2000 Addenda; and the applicable WEC design and fabrication specifications. The NRC inspection team reviewed the following documents:



- final quality data package to verify the records were complete and accurate, reviewed and approved by the responsible organization(s), and provided evidence that the quality and code requirements were satisfied;
- ASME B&PV Code data report and hydrostatic test reports to ensure requirements were met, specified pressures, temperatures, and times were achieved, and the traceability of reports and materials was maintained;
- certified material test reports to verify the materials were properly heat treated, met the specified chemical, mechanical, and nondestructive testing requirements, and that no repairs were made without approval from the purchaser;
- liquid penetrant (PT) examination reports to verify the base material and weld surfaces were examined and found acceptable in accordance with Sections III and V, “Nondestructive Examination,” of the ASME B&PV Code, as well as applicable program procedures and the Quality Assurance Manual;
- welding procedure specification and its supporting procedure qualification records to verify if the procedures had been written and qualified in accordance with the requirements of the ASME B&PV Code; and
- welder and non-destructive qualification test records to verify the welder and Level II PT examiner were traceable to the activities they performed and demonstrated their skills by performing specific qualification tests at appropriate time intervals in accordance with the ASME B&PV Code.

The ITAAC referenced in this section are for future use by the NRC staff during the ITAAC closure process. The identification of these ITAAC does not indicate that they have been met and closed. The NRC inspection team determined that NON 99900728/I-2017-201-01 was material to the acceptance criteria of the ITAAC and corresponding Class 1E equipment listed below. .

ITAAC Number	Applicable Westinghouse AP1000 Valve Data Sheets	Corresponding Valve Numbers
19	APP-PV13-Z0D-101	RCS-PL-V150A and V150B
	APP-PV13-Z0D-111	RCS-PL-V150C and V150D

## 5. DOCUMENTS REVIEWED

### Policies and Procedures

- Valcor Engineering Corporation’s Nuclear Quality Assurance Manual, Revision 23, dated April 20, 2017
- Standard Operating Procedure (SOP) No. 1, “Personnel Training General Aerospace and Nuclear Application,” Revision C, dated April 7, 2017

- SOP No. 12, "Quality Audit Procedure Internal Audit and Supplier Nuclear Application," Revision A, dated July 18, 2014
- Standard S101-TAB/S102-TAB, "O-Ring Standard Size and Compound," Revision FA, dated May 4, 2017
- S101Q, "Commercial-Grade Item Dedication Plan for O-Ring Standard," Revision B, dated September 5, 2017
- S703, "Passivation Procedure for Corrosion Resistant Steels," Revision AD, dated January 8, 2017
- S1120, "Liquid Penetrant Examination Procedure - Nuclear," Revision AF, dated March 5, 2017
- S1122, "Liquid Penetrant Examination Personnel Training & Qualification Written Practice – Nuclear," Revision R, dated June 16, 2016
- S1303, "Engineering Change Order Procedure," Revision L, dated December 6, 1988
- S1503, "Standard Inspection Sampling Plans," Revision G, dated June 6, 2016
- S1511, "Wall Thickness Verification Procedure," Revision E, dated April 13, 2017
- S1519, "Inspection, Test Personnel Qualification Requirement," Revision H, dated April 11, 2017
- S1551, "Identification, Traceability, and Configuration Control Procedure for Nuclear and Aerospace Systems," Revision D, dated July 18, 1974
- S1559, "Audit Personnel Qualification Procedure - Nuclear," Revision J, dated April 11, 2017
- S1564, "Nuclear Return/Repair Procedure," Revision B, dated April 10, 2017
- S1565, "Software Design Control - Nuclear," Revision B, dated February 18, 2015
- S1612, "Procedure, Out of Tolerance Evaluation, Calibration," Revision D, dated February 7, 2017
- S1616, "Age Control For Nuclear Assemblies and Subassemblies Containing Elastomers," Revision C, dated February 7, 1997
- S1618, "Valcor Calibration Procedure Control Requirement," Revision G, dated April 11, 2017
- S1618-C18, "Calibration Procedure - Torque Wrench," Revision C, dated July 29, 2005
- S2002, "Dedication of Commercial Grade Items for Nuclear Safety Related Applications," Revision R, dated April 5, 2017

- S2110, “10CFR21 Defects and Non-Compliance Reporting Procedure,” Revision J, dated February 28, 2013
- Work Instruction (WI) No. 34, “Corrective Action,” dated June 30, 2016
- WI No. A30, “Removal of Non-Conforming Parts,” dated January 8, 2016
- Intertek’s WI No. GRR-PG-IQA-006, “Nuclear Results Testing Procedure,” dated October 9, 2016

#### Design and Commercial-Grade Dedication Records

- Drawing No. 253165204, “Valve, Solenoid, Position Indication, Nuclear Service, Model: V526-5920-11,” Revision C, dated December 19, 2016
- Drawing No. 52683-5920-11, “Bonnet Extension Assembly,” Revision B, dated June 17, 2010
- Drawing No. 208865325, “1/14-inch tube x 0.065-inch wall class 1792 Solenoid valve, Position Indication, Nuclear Service,” Revision B, dated June 17, 2016
- Drawing No. 52600-6040-7, “Valve Solenoid 1-inch A.C. Position Indication, Nuclear Service,” Revision P, March 9, 2010
- Drawing No. 52687-6040-7, “Body Assembly,” Revision D, dated October 9, 1998
- Drawing No. 253165204, “1-inch Schedule 160 Class 1, Valve, Solenoid Position Indication, Nuclear Service Model V526-5920-11,” Revision C9, dated December 1, 2016
- Drawing No. 526-5683-6 for an ASME B&PV Code Section III, 1977 Edition, 1977 Addenda, Class 2, 3/8 inch solenoid glove valve
- Document MR 100-10, “Proprietary Test Report on Activation Energy Values,” Revision C, dated October 2, 2012
- Commercial Grade Dedication Plan No. V52605Q, Revision A, dated March 17, 2017
- Commercial-Grade Dedication (CGD) Package for helical spring P/N V52615-10-4, CN 2740-0134-0 with Quality Control (QC) Inspection Report dated September 18, 2016
- CGD package for a stop spring P/N V52615-5631-36, CN 2740-0459 with QC Inspector Report dated October 13, 2016
- CGD package for 800 pieces of O-Rings P/N S101CB12 C/N 2695-0276 with QC Inspector Report dated November 14, 2016
- CGD package for a lot size 550 pieces of O-Ring P/N S101CB22 C/N 2695-0526 with QC Inspector Report dated January 20, 2009,

- CGD Package for a lot of 18 switch assemblies P/N S1140-6-1, CN 2755-0017 with QC Inspector Report dated October 28, 2016
- CGD Package for 200 pieces of heli coil P/N 3591-3CN0380 (MS21209F1-20) CN 2350-0006 with QC Inspection Report dated February 1, 2008
- Fourier-transform infrared spectroscopy (FTIR) traces contained in Valcor Report No. 101240071GRR-566, dated June 25, 2013
- FTIR traces contained in Valcor Report No. 102002553GRR-661, dated April 12, 2016
- Technical Report No. ER 037, "Engineering Actuator Sizing Analysis Report for Solenoid Valve Margins and Uncertainties," Revision D, dated October 7, 2016
- Valcor Environmental and Seismic Qualification Test Report for Voltage Control Boxes Part No. S1140-23-23 (DC) (1E) and Part No. S1140-23-24 (AC) (Non-1E), QR 1140-23-23-1, Revision D, dated July 19, 2015
- Valcor MR-526-5688-36-12, "Westinghouse AP1000 PV13 Natural Frequency Report for Valve Model V526-5688-36 & Part No. (P/N) 204967204, Revision A, dated June 16, 2017
- QR-17-1817, "Quality Release & Certificate of Conformance," PO Number 450037438 (Item 3), Valve DS APP-PV13-Z0D-100, Serial Nos. 5 and 6, Revision 1, dated August 31, 2017
- Westinghouse Electric Company (WEC) Specification No. APP-PV13-Z0-001, Revision 7, dated July 25, 2012
- WEC Specification No. APP-GW-VP-10, "Equipment Qualification Methodology and Documentation Requirements for AP1000 Safety-Related Valves and Valve Appurtenances," Revision 2
- WEC Specification No. APP-PV13-Z0D-101, "PV13 Datasheet 101," Revision 5, dated July 26, 2012
- WEC Specification No. APP-GW-VLR-002, "Technical Requirements of Stainless Steels, Nickel-Base Alloys, Carbon and Low Alloy Steels, and Welding Materials for the AP1000," Revision 2, dated January 18, 2016
- WEC Specification No. APP-GW-VLR-010, "AP1000 Supplemental Fabrication and Inspection Requirements," Revision 2, dated January 22, 2016
- WEC Specification No. APP-PV13-Z0-001, "Solenoid Valves, ASME Boiler and Pressure Vessel Code, Section III, Class 1, 2, and 3," Revision 9, dated March 6, 2017
- WEC Specification No. APP-PV13-Z0D-100, "PV13 Datasheet 100," Revision 4, dated July 26, 2012

- WEC Engineering & Design Coordination Report (E&DCR) No. APP-RCS-GEF-384, "Pressurizer Venting Flow Path Pressure and Temperature," Revision 0, dated June 1, 2017
- WEC E&DCR No. APP-GW-GEF-1929, "Revision to Appendix B of the Design Specification for Safety-Relief Valves," Revision 0, dated June 14, 2017
- WEC Procurement Advisory Release (PAR) No. 4500374238-068-0, "Deviation Notice for S314 Revision R, Cleaning Verification," approved on August 23, 2013

American Society of Mechanical Engineers (ASME) and Welding Records

- ASME QME-1 EQ Qualification Report for Solenoid Valve Model V526-5631-36 No. APP-PV13-Z0D-101, Revision C, dated April 18, 2016
- AR-526-5920-11, "Nuclear Hardware - Valve, Solenoid," Revision G, dated August 4, 2016
- AR-52660-5920-11, "Nuclear Hardware - Valve Sub Assembly," Revision B, dated November 4, 2009
- AR-52661-5920-11, "Nuclear Hardware - Bonnet Assembly," Revision E, dated August 17, 2012
- Certified Material Test report (CMTR) No. DV27NU, ASME SA 479 316 (Disc), Heat No. 239582, dated December 21, 2006
- CMTR No. EV23NC, ASME SA182 F11 CL.2 (Body), Heat No. U9139, dated May 14, 2010
- CMTR No. FP88NU, ASME SA 479 XM19 (Bonnet Extension), Heat No. G15813, dated April 29, 2013
- CMTR No. FR06NU, ASME SA 479 XM19 (Bonnet), Heat No. G18006, dated May 14, 2013
- CMTR No. K-145N, ASME SFA 5.9 ER308, Lot No. X4579-308, dated March 30, 1981
- Valcor No. 1917, "Form NPV-1 Certificate Holder's Data Report for Nuclear Pumps or Valves\* As Required by the Provisions of the ASME Code, Section III, Division 1," Revision A, dated August 11, 2017
- Procedure Qualification Record (PQR) No. 100, "QW-483 Procedure Qualification Record," Gas Tungsten Arc Welding (GTAW), Revision F, dated December 15, 1976
- PQR No. 106, "QW-483 Procedure Qualification Record," GTAW, Revision A, dated April 15, 1977
- PQR-112, "WPS Hard Surfacing," GTAW, Revision 0, dated October 12, 1978

- PQR No. 131-2, "QW-483 Procedure Qualification Record," GTAW, Revision 2, dated October 6, 1984
- SF-102, "Quality Control Inspection Report," Part No. V52619-5920-11 (Bonnet), dated various
- SF-102, "Quality Control Inspection Report," Part No. V52682-5631-32 (Bonnet Extension), dated various
- SF-102, "Quality Control Inspection Report," Part No. V52683-5920-11 (Bonnet Assembly), dated various
- Shop Order No. 166998, "Operation Routing and Inspection Record," Part No. V52619-5920-11 (Bonnet), Revision A, dated April 15, 2014
- Shop Order No. 167002, "Operation Routing and Inspection Record," Part No. V52682-5631-32 (Bonnet Extension), Revision B, dated September 25, 2013
- Shop Order No. SYS8829, "Operation Routing and Inspection Record," Part No. V52683-5920-11 (Bonnet Assembly), Revision B, dated April 6, 2016
- Welding Procedure Specification (WPS) No. S113, GTAW for welding stainless steel P8-P8 materials qualified, dated January 20, 1977
- WPS No. 112, "Hard Surfacing," GTAW Revision H, dated November 16, 2011
- WPS No. 123, "QW-482 Welding Procedure Specification," GTAW, Revision L, dated September 15, 2015

Calibration, Heat Treatment, Non-Destructive Examination (NDE), Inspection and Test Records

- Certificate of Calibration No. 67110-05 from Industrial Process Measurement Inc. for a Fluke 5500A calibrator, dated March 15, 2017
- Certificate of Calibration No. FN81696 from Carl Zeiss Industrial Metrology for a coordinate measuring machine, dated June 28, 2017
- Certificate of Calibration No. VEC001-17-08-31972 from Laboratory Testing Inc. for a plain ring gage master, dated August 28, 2017
- Certificate of Calibration No. VEA-CAL-030617 from Pyrometer Equipment Company Inc. for temperature instruments, dated March 8, 2017
- "Penetrant Examination Record - Nuclear," for Part No. V52619-5920-11 (Bonnet), dated April 14, 2014
- "Penetrant Examination Record - Nuclear," for Part No. V52682-5631-32 (Bonnet Extension), dated September 19, 2013

- “Penetrant Examination Record - Nuclear,” for Part No. V52683-5920-11 (Bonnet Assembly), dated April, 7, 2016
- Penetrant Examination (PE) Report for a valve body P/N V52610.5920.11
- Test Report (TR) No. 253165204, “Test Report for P/N 253165204,” Valve S/N 5, Body S/N 8, Revision C, dated July 20, 2017
- TR No. 253165204, “Test Report for P/N 253165204,” Valve S/N 6, Body S/N 10, Revision C, dated July 20, 2017
- Calibration Records for Liquid Penetrant Examination Measuring & Test Equipment (M&TE):
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 1, CTB003, Timer Box, dated March 14, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 051008, CTB016, Timer Box, dated December 4, 2016
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N CTB009, Timer Box, dated September 21, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 811115, UAO006, Oven, dated September 28, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N NDE-03, NDE-04, AAA034, Pressure Gages, dated August 9, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 838235, BLM002, Digital Radiometer, dated April 18, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 1092428, ETG006, Temperature Gage, dated July 28, 2017
- Calibration Records for Receipt Inspection M&TE:
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 11315897, VER307, Vernier, dated August 10, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 91224, UXR003, X-Ray Alloy Analyzer, dated October 4, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N TWP205, Thread Plug Gage, dated April 13, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N MIN107, Internal Bore Micrometer, dated June 9, 2017

- “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 41, MIN059, Internal Bore Micrometer, dated June 8, 2017
- “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 2414037, LID032, Intertest, dated July 12, 2017
- “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N MDP144, Depth Micrometer, dated August 10, 2017
- Calibration Records for Welding M&TE:
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N MB390268L, UWM014, Welding Machine, dated February 22, 2017
  - Industrial Process Measurement, Inc. Certificate No. 66765-01, “Certificate of Calibration,” for Serial No. 20910950, XT1003, Infrared Thermometer, dated February 15, 2017
  - Industrial Process Measurement, Inc. Certificate No. 67699-03, “Certificate of Calibration,” for Serial No. 03480852, EMM153, AC/DC Clamp Multi-meter, dated May 17, 2017
- Calibration Records for O-Ring Hardness Verification M&TE:
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 120978, KRW006, Durometer, dated July 25, 2017
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 120978, WDT004, Duro Test Block Kit, dated April 28, 2015
  - PTC Metrology Certification No. 11000, “Rubber Block Calibration Report NIST Traceable,” Serial No. 120978, Rubber Hardness Test Blocks, dated April 28, 2015
- Calibration Records for In-process Observation:
  - “Valcor Engineering Corp. Equipment Control & Calibration Card,” for S/N 925359, QTW089, Torque Wrench, dated October 11, 2017
  - Sturtevant Richmond Certificate No. 10026, “Calibration Certificate” for Order No. SOQ0015969, Model 10050 System 4 A/C, Tester Serial No. 1344, Transducer STT300I-L, Transducer SN 1000235, dated May 19, 2017
  - Sturtevant Richmond Certificate No. 10028, “Calibration Certificate” for Order No. SOQ0015969, Model 10050 System 4 A/C, Tester Serial No. 1344, Transducer STT100I-L, Transducer SN 1000112, dated May 19, 2017
  - Sturtevant Richmond Certificate No. 10029, “Calibration Certificate” for Order No. SOQ0015969, Model 10050 System 4 A/C, Tester Serial No. 1344, Transducer TT-250IO, Transducer SN 1095538, dated May 19, 2017



- Shop Order Operation Routing and Inspection Record for Part No. V526-5683-6
- Verification Report No. 445091216104158 from Instron Calibration Laboratory for a hardness tester, dated September 12, 2016

Purchase Orders, Audit Reports, and Commercial-Grade Dedication

- Valcor Engineering Corporation's Approved Vendor List, dated September 19, 2017
- List of Purchase Order (PO) Clauses
- PO No. 82774S to Laboratory Testing Inc. for testing services, dated September 25, 2017
- PO No. 74105 to Clark Dynamics Test Laboratory, Inc. for testing services, dated August 23, 2016
- PO No. 78601 to Industrial Process Measurement for calibration services, dated March 7, 2017
- PO No. 74243 to Instron Calibration Laboratory for calibration services, dated September 2, 2016
- PO No. 80113 to Carl Zeiss Industrial Metrology for calibration services, dated May 11, 2017
- PO No. 81327 to Laboratory Testing Inc. for calibration services, dated August 21, 2017
- PO No. 78612 to Pyrometer Equipment Company Inc. for calibration services, dated March 8, 2017
- PO No. 82774S to Laboratory Testing Inc. for testing services, dated September 25, 2017
- PO No. 71118C to Intertek for testing services, dated April 29, 2017
- PO No. 82380 to Energy & Process Corporation for forging, dated August 30, 2017
- PO No. 74017 to Weldstar Company for weld material, dated August 19, 2016
- PO No. 54776 to Consolidated Power Supply for forgings, dated October 10, 2013
- PO No. 81446S to BHI Corporation for machining services, dated July 26, 2017
- PO No. 81934S to Nassau Tool Works Inc. for gun drilling and honing services, dated June 1, 2017
- PO No. 81117S to B & M Finishers for coating services, dated July 5, 2017

- PO No. 82625S to New Jersey Precision Technologies Inc. for machining services, dated September 18, 2017
- PO No. 78852 to Spectronics Corporation for calibration services, dated April 4, 2017
- Po No. 01837 to Energy & Process Corporation for stainless steel pipes, dated July 27, 2011
- PO Nos. 75625 and 71548 to Quality Coils Inc. for coil assemblies, dated October 27, 2016 and May 23, 2016, respectively
- PO No. 500610976 from Arizona Public Service to Valcor Engineering Corporation for a ASME B&PV Code Section III, 1977 Edition, 1977 Addenda, Class 2, 3/8-inch solenoid glove valve
- PO No. 4500374238, from WEC to Valcor Engineering Corporation for Vogtle Electric Generating Plant Units 3 & 4 Auxiliary and Balance of Plant Equipment (solenoid operated globe valves) Revision 0, dated May 20, 2011
- Audit report No. 2015-LTI of Laboratory Testing Inc., dated October 20, 2015
- Audit report No. 15-01 of Clark Dynamics Test Laboratory, Inc., dated March 18, 2015
- Audit report No. 2016-EPC of Energy & Process Corporation, dated January 14, 2016
- Audit report No. 16-01 of Weldstar Company, dated February 26, 2016
- Audit report No. 2012-CPS of Consolidated Power Supply, dated November 16, 2012
- Audit report No. 2016-RSC of R.S. Crum Company, dated November 8, 2016
- Audit report No. 2016-BHI of BHI Corporation, dated September 6, 2016
- Audit report No. 2017-NAS of Nassau Tool Works Inc., dated June 1, 2017
- Audit report No. 2016-B&M of B & M Finishers Inc., dated June 22, 2016
- Audit report No. 2017-NJPT of New Jersey Precision Technologies Inc., dated September 24, 2017
- Audit report No. 2016-SPE of Spectronics Corporation, dated November 15, 2016
- 2016 Internal audit reports of Design, Drawing, and Document Control (G3), Purchasing and Verification of Purchased Product (G4), and Inspection, Test, and Status Control (G9)
- 2017 Internal audit reports of Special Processes (G6), Control of Gages and Measuring Equipment (G8), and Nonconformance and Corrective Action (G10)

- Accredited Calibration Supplier Qualification Record Review of Industrial Process Measurement, dated November 29, 2016
- Accredited Calibration Supplier Qualification Record Review of Instron Calibration Laboratory, dated March 31, 2017
- Accredited Calibration Supplier Qualification Record Review of Carl Zeiss Industrial Metrology, dated May 10, 2017
- Accredited Calibration Supplier Qualification Record Review of Laboratory Testing Incorporated, dated August 31, 2017
- Accredited Calibration Supplier Qualification Record Review of Pyrometer Equipment Company, Inc. dated July 22, 2015

#### Nonconformance Reports

694AB, 705AB, 778AA, 884Z, 964Z, 987Z, and 991X

#### Corrective Action Reports

114, 204, 225, 252, 281, and 367

#### Corrective Action Reports Opened During the NRC Inspection

2017-027, 2017-028, 2017-29, 2017-30, 2017-31, and 2017-32

#### Training Records

- Lead auditor training records for Ronald Huddy, Jimmy Shieh, Francis J. Lucano Jr., and Miraslow Swirad
- Inspection/tester qualification records for Lidia Martins and Antonio Sarmiento
- Valcor NDE Certification Record for Michael Spressler (Level II) and Miroslaw Swirad (Level III)
- Welder No. W-34 (File #231), "QW-484A Suggested Format A for Welder Performance Qualifications," dated March 27, 2008
- Welder/Welding Operator Activity Log, Year 2017, dated October 4, 2017
- Welder Performance Qualification Records for Robert Loven, Daniel Enners, and Chuck E. Loller