UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

December 20, 2019

Mr. Robert Simril
Site Vice President
Duke Energy Carolinas, LLC
Catawba Nuclear Station
4800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION – DESIGN BASIS ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT 05000413/2019010 AND 05000414/2019010

Dear Mr. Simril:

On November 21, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Catawba Nuclear Station and discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

Three findings of very low safety significance (Green) are documented in this report. Three of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Catawba Nuclear Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC Resident Inspector at Catawba Nuclear Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the

NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, “Public Inspections, Exemptions, Requests for Withholding.”

Sincerely,

/RA/ Brian R. Bonser for/

James B. Baptist, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos. 05000413 and 05000414
License Nos. NPF-35 and NPF-52

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: CATAWBA NUCLEAR STATION – DESIGN BASIS ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT 05000413/2019010 AND 05000414/2019010 dated December 20, 2019

DISTRIBUTION:
B. Collins, RII
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ADAMS: ☒ Yes ACCESSION NUMBER: **ML19354A856** ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	R-II/DRS/EB3	R-II/DRS/EB1	R-II/DRS/EB1	R-II/DRS/EB1	R-II/DRS/EB1	
NAME	B. Collins	C. Franklin	M. Greenleaf	M. Riley	B. Bonser	
DATE	12/ 18 /2019	12/ 18 /2019	12/ 19 /2019	12/ 18 /2019	12/ 20 /2019	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	

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U.S. NUCLEAR REGULATORY COMMISSION

Inspection Report

Docket Numbers:	05000413 and 05000414
License Numbers:	NPF-35 and NPF-52
Report Numbers:	05000413/2019010 and 05000414/2019010
Enterprise Identifier:	I-2019-010-0029
Licensee:	Duke Energy Carolina, LLC
Facility:	Catawba Nuclear Station
Location:	York, SC
Inspection Dates:	October 28, 2019 to November 21, 2019
Inspectors:	B. Collins, Senior Reactor Inspector C. Franklin, Reactor Inspector M. Greenleaf, Senior Reactor Inspector M. Riley, Reactor Inspector
Approved By:	James B. Baptist, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (programs) inspection at Catawba Nuclear Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Failure to Qualify GEMS Level Transmitters for Submergence			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413,05000414/2019010-01 Open/Closed	None (NPP)	71111.21N
The inspectors identified a Green finding and Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate the GEMS containment sump level transmitter NILT5270 would meet its specified values for one year post-accident during submerged conditions in accordance with Section 6.5.4 of IEEE 323-1974, the standard the licensee chose in order to meet environmental qualification requirements.			

Failure to Demonstrate Qualification of Conduit Sealant Compatibility for Electrical Wires and Cables			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413,05000414/2019010-02 Open/Closed	None (NPP)	71111.21N
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate the qualification of the conduit sealant and cable/wire interfaces utilizing Scotchcast Epoxy 9 in accordance with NUREG-0588 Section 2.2(7).			

Failure to Assess Radiation and Thermal Degradation Effects of Replacement Sealant Equivalency			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413,05000414/2019010-03 Open/Closed	[H.8] - Procedure Adherence	71111.21N
The inspectors identified a Green finding and Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate that the qualification of Scotchcast Epoxy 9 was applicable to Scotchcast Epoxy 9N in accordance with Section 5.5.7 of procedure AD-EG-ALL-1612.			

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.21N - Design Bases Assurance Inspection (Programs)

The inspectors evaluated Environmental Qualification program implementation through the sampling of the following components:

Select Sample Components to Review - Risk Significant/Low Design (Inside/Outside Containment) (IP Section 02.01) (8 Samples)

(1) 1NDPUAMR, 1A Residual Heat Removal Pump Motor (Westinghouse)
(2) Commodity Item, Okozel Low Voltage Power/I&C Cable (Okenite)
(3) Commodity Item, Scotchcast 9 and 9N Epoxies (3M)
(4) Commodity Item, Terminal Blocks (States- and Stanwick-types)
(5) 1TBOX0019, Terminal Block Enclosure (Hoffman)
(6) 2TBOX0656, Terminal Block Enclosure (Hoffman)
(7) 2CFHP0330, Main Feedwater Pneumatic-Hydraulic Isolation Valve (Borg-Warner)
(8) 1YC362/MO, Hot Gas Bypass Valve Actuator (Jamesbury)

Select Sample Components to Review - Primary Containment (Inside Containment) (IP Section 02.01) (2 Samples)

(1) 1NILT5270, Unit 1 Containment Sump Level Transmitter (DeLaval/GEMS)
(2) 2VXPS5110, Pressure Switch (Solon)

INSPECTION RESULTS

<table>
<tr><td colspan="4">Failure to Qualify GEMS Level Transmitters for Submergence</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Mitigating Systems</td><td>Green
NCV 05000413,05000414/2019010-01
Open/Closed</td><td>None (NPP)</td><td>71111.21N</td></tr>
<tr><td colspan="4">The inspectors identified a Green finding and Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate the GEMS containment sump level transmitter NILT5270 would meet its specified values for one year post-accident during submerged conditions in accordance with Section 6.5.4 of IEEE 323-1974, the standard the licensee chose in order to meet environmental qualification requirements.</td></tr>
<tr><td colspan="4">Description: The purpose of GEMS level transmitter 1NILT5270 is to provide post-accident monitoring of Unit 1 containment sump level. EQMM-1393.01-P04-00, “Environmental Qualification Maintenance Manual Equipment Type: Level Transmitter Manufacturer: Delaval, Gems Model/Series: XM54852, XM54853, XM60620, XM60625,” Rev. 0, stated that the post-accident operating time for the transmitter was one year. The transmitters could be submerged in the containment sump solution during the one-year post-accident requirement. During the review of the qualification package for the transmitter, the inspectors identified that the loss of coolant accident (LOCA) testing did not simulate submerged conditions and that the post-LOCA testing only simulated a submerged condition for 30 minutes. The inspectors also identified that the EQMM did not analyze how failing to submerge the transmitter during the LOCA test and for only 30 minutes during Post-LOCA testing proved the transmitters could perform their intended function for up to one year post accident.

Additionally, on August 25, 2016, a 10 CFR Part 21 Notification was supplied to the NRC by NTS Huntsville notifying NRC that the qualification tests for the GEMS transmitters did not simulate the submergence depth of 15-16 ft. to the junction box as stated during the 30 minute submergence test. The Part 21 notification stated that the wire conduit was not sealed to the test chamber, but instead was left unattached to the test chamber accident environment. As a result, the submergence test did not demonstrate the junction box gasket’s ability to prevent moisture intrusion into the internal components of the GEMs transmitter. In response to the Part 21, the licensee completed an evaluation in AR 02149240 which stated that the GEMS transmitter remained qualified due to the silicon oil fluid in the transmitter acting as a general barrier between any potential moisture intrusion into the transmitter junction box and the junction box wiring internals and that the wiring and splices used in the junction box were installed using Raychem splice products which had been qualified as an EQ environmental seal boundary. Due to questions from the inspectors, the licensee reviewed their evaluation of the Part 21 notification and determined that the failure of the unqualified junction box seal could allow sump fluid to displace the oil and submerge subcomponents of the transmitter. The licensee determined that of the subcomponents installed, only the Raychem Spec 44-insulated transmitter lead wires were not demonstrated to be qualified for submergence in post-LOCA sump conditions by other test reports or analysis.

The EQMM stated that the transmitter was qualified in accordance with IEEE 323-1974.</td></tr>
</table>

Section 6.5.4 of IEEE 323 states, “The electric equipment type shall be considered to be qualified by demonstrating that the equipment performance will meet or exceed its specified values for the most severe environment or sequence of environments in the equipment specification during its qualified life.” The inspectors determined that the qualification package for the GEMS 1NILT5270 transmitter did not demonstrate its ability to perform its function under the most severe conditions (e.g., submergence).

Corrective Actions: The licensee entered this issue into their corrective action program and performed an operability evaluation which determined that there was reasonable assurance that the transmitter could perform its intended safety function based on operating experience and the military specification of the wire which demonstrated the insulations ability to withstand different adverse chemicals.

Corrective Action References: AR 02303851

Performance Assessment:

Performance Deficiency: The failure to demonstrate the GEMS level transmitter would meet its specified values for one year post-accident during submerged conditions in accordance with Section 6.5.4 of IEEE 323-1974, the standard the licensee chose in order to meet environmental qualification requirements.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to qualify the transmitter lead wires by testing or analysis for submergence did not ensure the wires could perform their function under wetted conditions for up to a year post accident.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” The inspectors assessed the significance of the finding using Inspection Manual Chapter (IMC) 0609, Att. 4, "Initial Characterization of Findings," issued October 7, 2016, for the Mitigating Systems cornerstone, and IMC 0609, App. A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the qualification of a mitigating structure, system, or component (SSC) and the SSC maintained its operability.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR 50.49(f) required, "Each item of electric equipment important to safety must be qualified by one of the following methods:
(1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(2) Testing a similar item of equipment with a supporting analysis to show that the equipment to be qualified is acceptable.

(3) Experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(4) Analysis in combination with partial type test data that supports the analytical assumptions and conclusions."

Contrary to the above, since the earliest date of record for the EQMM package in 1991, the licensee failed to qualify the GEMS containment sump level transmitter NILT5270 for submergence by test or analysis for post-accident conditions of one year.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Demonstrate Qualification of Conduit Sealant Compatibility for Electrical Wires and Cables			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413,05000414/2019010-02 Open/Closed	None (NPP)	71111.21N

The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate the qualification of the conduit sealant and cable/wire interfaces utilizing Scotchcast Epoxy 9 in accordance with NUREG-0588 Section 2.2(7).

Description: Duke EQ Files EQMM-1391.01-M01-01, Rev. 3 and CNM 1364.00-0007.001, Rev. D3 contained the licensee's basis for environmental qualification (EQ) of conduit seals utilizing Scotchcast Epoxy 9. In the EQ files, the licensee documented a test report that utilized the epoxy as a sealant to prevent moisture intrusion into equipment electrical conduits in accordance with Category II of NRC NUREG-0588. The focus of the testing was to demonstrate the sealing ability of the epoxy around a pair of tefzel-insulated wires in a Swagelock QF quick-connect pipe fitting by testing a mock-up conduit sealing configuration. The testing generally demonstrated the capability of the epoxy to provide a moisture barrier - but due to the use of de-energized wiring - failed to demonstrate that the interface between the epoxy and wires/cables installed in the field were compatible and capable of performing their functions of providing for the necessary transmission of signals or power. By not demonstrating that the sealant was compatible (i.e. did not adversely impact the electrical function of the wire/cable) with the field configurations, the licensee failed to demonstrate that the field configurations were qualified in accordance with 10 CFR 50.49.

For the conduit sealant locations in the station scoped into the licensee's EQ program, the licensee adhered to Category II requirements of NRC NUREG-0588 for qualification and qualification testing to meet 10 CFR 50.49. Section 2.2(7) of the NUREG states that "performance characteristics be verified before, after, and periodically during testing throughout the range of required operability." By testing the sealant's mechanical sealing function without confirming that the epoxy and wire/cable did not adversely impact their electrical function of passing power/signals to/from important to safety equipment, the

licensee failed to demonstrate that the sealant was qualified for the installed configurations in the field.

Corrective Actions: The station entered this into their Corrective Action Program (CAP) as ARs 023011 and 02303697. Although environmental qualification had not been demonstrated and documented, the licensee identified other tests that had been performed on other wire types with Scotchcast Epoxy 9 (e.g. NAMCO limit switch lead wire and Mark WPA 14 gauge hookup wire). The licensee's review of this additional testing provided reasonable assurance that the installed configurations in the plant would be capable of performing their intended safety functions.

Corrective Action References: AR 023011 and 02303697

Performance Assessment:

Performance Deficiency: The failure to verify the Scotchast Epoxy 9 sealant cable/wire interface would meet its electrical performance characteristics before, after, and periodically during testing throughout the range of its required operability in accordance with Section 2.2.7 of NUREG-0588 (Category II) was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to ensure that the cable/wire interface with the sealant would not adversely impact the safety function fails to ensure the availability, reliability, and capability of the electrical equipment important to safety that must send or receive power/signals when challenged with the deleterious effects of aging and harsh environmental conditions.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” The inspectors assessed the significance of the finding using Inspection Manual Chapter (IMC) 0609, Att. 4, "Initial Characterization of Findings," issued October 7, 2016, for the Mitigating Systems cornerstone, and IMC 0609, App. A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the qualification of a mitigating structure, system, or component (SSC) and the SSC maintained its operability.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR 50.49(f) required, "Each item of electric equipment important to safety must be qualified by one of the following methods:
(1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(2) Testing a similar item of equipment with a supporting analysis to show that the equipment

to be qualified is acceptable.
(3) Experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(4) Analysis in combination with partial type test data that supports the analytical assumptions and conclusions."

Contrary to the above, since the qualification file for Scotchcast Epoxy 9 had been performed in 2001, the licensee failed to qualify the epoxy by any of the four methods described above.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Assess Radiation and Thermal Degradation Effects of Replacement Sealant Equivalency

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413,05000414/2019010-03 Open/Closed	[H.8] - Procedure Adherence	71111.21N

The inspectors identified a Green finding and Non-cited Violation (NCV) of 10 CFR 50.49(f) when the licensee failed to demonstrate that the qualification of Scotchcast Epoxy 9 was applicable to Scotchcast Epoxy 9N in accordance with Section 5.5.7 of procedure AD-EG-ALL-1612.

Description: 3M Corporation changed the chemical composition of the Part B of its Scotchcast Epoxy 9 two-part formulation from a nonylphenol component to formulation of cashew, nutshell liq.ccidentale, anacardiaceae, and toluene components. In 2018, the licensee generated an equivalency evaluation in engineering change EC 144757, Rev. 0 to evaluate the differences between the original formulation (Scotchcast Epoxy 9) and the new formulation (i.e. Scotchcast Epoxy 9N). The focus of the evaluation was to determine if the environmental qualification (EQ) performed for the original epoxy was applicable to the new epoxy. The licensee reviewed the material safety data sheets (MSDSs) of the two epoxies, performed durometer testing of representative samples of both epoxies, and performed Fourier Transform Infrared (FTIR) Spectroscopy to determine if the materials were similar enough to warrant the use of the Scotchcast Epoxy 9's qualification file to that of the Scotchcast 9N's. Based on a FTIR high percentage match (>80%) and similar durometer testing, the licensee concluded that the materials were similar enough and qualification of Scotchcast Epoxy 9 was applicable to Scotchcast Epoxy 9N.

The inspectors reviewed the engineering change and noted that FTIR spectroscopy and durometer testing would provide information showing similarity between the chemical constituents and discrepancies in hardness between the two epoxies (respectively), but neither test individually (nor combined) could provide detailed information on how these different epoxies would behave when subjected to the deleterious effects of nuclear radiation and thermal degradation (i.e. aging). Inspectors reviewed the licensee's EQ procedure, AD-EG-ALL-1612, Revs. 3 and 4 and noted that Section 5.5.7(11)(b)(4)(a) stated, in part, that: "materials of construction shall either be the same or equivalent and differences shall be

shown not to adversely affect performance of the safety function." Furthermore, the procedure states that the evaluations should, "evaluate the differences in material properties. Minor chemical differences can cause significant variations in properties (e.g. radiation-withstand capability, dielectric strength, thermal aging, chemical interactions, and changes in material activation energy."

The licensee's technical review of the differences between the two epoxies lacked the necessary level of detail to demonstrate that the Scotchcast Epoxy 9N - which is chemically different - will age and withstand nuclear radiation in the same (or better) manner than the qualified Scotchcast Epoxy 9. As a result of the inspection, the licensee contacted 3M and determined that mechanical and electrical properties were similar between the two epoxies, however, no radiation or thermal degradation comparisons had been made between the materials.

Corrective Actions: The licensee entered this issue into their corrective action program (CAP) as AR 0203601. The licensee determined that the Scotchcast Epoxy 9N had only been used in four recent work orders and based on a review of the material data sheets and on the technical opinion of the licensee's subject matter experts, the licensee concluded that the four seals in question were capable of performing their safety function.

Corrective Action References: AR 0203601

Performance Assessment:

Performance Deficiency: The inspectors determined that the failure to perform an evaluation that appropriately considered the effects of nuclear radiation and thermal aging in accordance with procedure AD-EG-ALL-1612, Section 5.5.7(11)(b)(4)(a) was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to perform the necessary evaluation of Scotchcast 9N's capability to withstand nuclear radiation and thermal aging failed to ensure the reliability and capability of the Scotchcast Epoxy 9N to perform its safety function of protecting equipment important to safety from the deleterious effects of potential steam and moisture intrusion in the four locations where it had been applied to electrical conduits for the span of their designated life.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” The inspectors assessed the significance of the finding using Inspection Manual Chapter (IMC) 0609, Att. 4, "Initial Characterization of Findings," issued October 7, 2016, for the Mitigating Systems cornerstone, and IMC 0609, App. A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the qualification of a mitigating structure, system, or component (SSC) and the SSC maintained its operability.

Cross-Cutting Aspect: H.8 - Procedure Adherence: Individuals follow processes, procedures, and work instructions. This finding is indicative of current performance because the finding

occurred within the last 3 years. This finding was assigned a cross-cutting aspect of H.8 because the licensee's failure to adhere to their EQ procedure AD-EG-ALL-1612, Section 5.5.7(11)(b)(4)(a) was the most significant contributor to the performance deficiency.

Enforcement:

Violation: 10 CFR 50.49(f) required, "Each item of electric equipment important to safety must be qualified by one of the following methods:
(1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(2) Testing a similar item of equipment with a supporting analysis to show that the equipment to be qualified is acceptable.
(3) Experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
(4) Analysis in combination with partial type test data that supports the analytical assumptions and conclusions."

Contrary to the above, since the issuance of EC 144757 in 2018, the licensee failed to qualify the Scotchcast Epoxy 9N by any of the four methods described above.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On November 21, 2019, the inspectors presented the design basis assurance inspection (programs) inspection results to Robert Simril and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N	Calculations	CGD-3007.02-04-0001 Attachment 10	Acton Environmental Testing Corporation Test Report: States Terminal Blocks and Test Switches	Rev. 5
		CNC-1206.03-00-0001	Flood Level for Structures Outside the Reactor Building	Rev. 26
		CNC-1206.03-00-0004	Environmental Effects Due to Pipe Rupture Outside Containment	Rev. 3
		CNC-1381.05-00-0158	FWIV Life Extension	Rev. 3
		CNS-1465.00-00-0020	Design Basis Specification for the Flooding from Internal Sources	Rev. 1
		CNS-1591.CF-00-0001	DESIGN BASIS SPECIFICATION FOR THE FEEDWATER (CF) SYSTEM	Rev. 34
		DPC-1381.05-00-0009	Qualified Life of AGASTAT E7000 Series Timing Relays	Rev. 5
		DPC-1381.05-00-0017	Electrical Enclosure Latching Environmental Qualification Analysis	Rev. 0
		DPC-1381.05-00-0032	Qualified Life Analysis for Brand Rex Flame Retardant Cross-Linked Polyethylene Insulated Instrument Cable	Rev. 2
		DPC-1381.05-00-0050	Environmental Qualification (EQ) Evaluation of Equipment Installed in the Doghouse Buildings	Rev. 1
		DPC-1381.05-00-0077	Environmental Qualification (EQ) Qualified Life Analysis (TLAA) for Trane Chiller Controls Supporting CNS License Renewal	Rev. 0
		DPC-1381.05-00-0082	Environmental Qualification (EQ) Qualified Life Analysis (TLAA) for DeLaval, GEMS Level Transmitters Supporting MNS and CNS License Renewal	Rev. 0
		DPC-1381.05-00-0087	Environmental Qualification (EQ) Qualified Life Analysis (TLAA) for Okonite Flame Retardant Ethylene Propolene (Okonite-FMR) Low Voltage, Control and Instrument Cable	Rev. 1

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Supporting MNS and CNS License Renewal	
		DPC-1381.05-00-0093	Environmental Qualification (EQ) Qualified Life Analysis (TLAA) for Scotch 130C Insulating/Jacketing Tapes Supporting MNS and CNS License Renewal	Rev. 0
		DPC-1381.05-00-0104	Environmental Qualification (EQ) Qualified Life Analysis (TLAA) for Terminal Blocks Supporting MNS and CNS License Renewal	Rev. 000
	Corrective Action Documents	AR01528008	At Risk Procurement of 3M Scotchcast Resin No. 9	11/13/2014
		AR02016420	EQ Rev Tracking	03/31/2016
		AR02096602	2017 NRC EQ Program Inspection - Cable/Splice EQML Question	02/01/2017
		AR02149240-01		
		AR02165587	Fleet License Renewal EQ TLAA Additional Action Tracking	11/14/2017
		AR02172829	Tracking of FLRIT EQ TLAA questions to Fleet EQ	12/18/2017
		AR022242460	PE-003, Environmental Qualification (EQ) Transformation	11/09/2018
		AR02233927	EQ Program Documentation Inefficiencies	09/29/2018
		AR02235165	Assignment 1: Develop and execute an EQMM deficiency recovery plan	10/11/2018
		AR02253701	EQ Equipment in a Non-EQ Zone	01/22/2019
		AR02275149	Evaluation of WL Sump Pumps Support of CA Operability	05/30/2019
		AR02275671	Complete all prep activities associated with CNS EQ NRC DBAI	06/04/2019
		AR02275676	EQ DBAI Self-Assessment - EQML Deficiency	06/04/2019
		AR02275676	EQ DBAI Self-Assessment - EQML Deficiency	06/04/2019
		AR02275785	2019 CNS EQ DBAI Self-Assessment - EQ Master List Data Gaps	06/05/2019
		AR02276144	EDB discrepancy found during EQ program self-assessment	06/06/2019
		AR02280114	2019 CNS EQ DBAI Focused Self-Assessment AFI#1	07/02/2019
		AR02280116	2019 CNS EQ DBAI Focused Self-Assessment AFI#2	07/02/2019
		AR02280118	2019 CNS EQ DBAI Focused Self-Assessment AFI#3	07/02/2019
		AR02280121	2019 CNS EQ DBAI Focused Self-Assessment AFI#4	07/02/2019

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AR02280125	2019 CNS EQ DBAI Focused Self-Assessment AFI#5	07/02/2019
		AR02283803	2019 CNS EQ DBAI Focused Self-Assessment AFI#8	07/25/2019
		AR02284923	2019 CNS EQ DBAI Focused Self-Assessment AFI#6	08/01/2019
	Corrective Action Documents Resulting from Inspection	AR02294978	2019 DBAI EQ Mechanical Components Incorrectly Labeled EQ=H	10/02/2019
		AR02295176	2019 DBAI EQ Housekeeping and Material Condition in U2 DH	10/02/2019
		AR02296270	Update EQMMs to Incorporate EQ Document Package	10/09/2019
		AR02296584	Items Listed in EQMM not in EDB	10/10/2019
		AR02298945	1CFHP0660, Armored Cable Pulled out of Junction Box	10/24/2019
		AR02298957	2CA-66B; Armored Cable Pulled from Junction Box	10/24/2019
		AR02298964	2BB-148B, Connector Pulled back from Elbolet	10/24/2019
		AR02298990	2CF SV 0901; Missing Screw on Junction Box Cover Panel	10/24/2019
		AR02299853	2019 NRC DBAI EQ - DPC-1381.05-00-0104 Documentation Error	10/29/2019
		AR02299853	2019 NRC DBAI EQ – DPC-1381.05-00-0104 Documentation Error	10/29/2019
		AR02299853	2019 NRC DBAI EQ – DBC-1381-05-00-0104 Documentation Error	10/29/2019
		AR02300081	2019 NRC DBAI EQ - NCR 02233927 Screened Incorrectly	10/30/2019
		AR02300307	2019 NRC DBAI EQ - EQ procedure Issues with Sealant Use	10/31/2019
		AR02300311	2019 NRC DBAI EQ Scotchcast 9 Resin Testing Issues	10/31/2019
		AR02300347	2019 NRC DBAI EQ: Lack of EQMM for TBOX enclosures	10/31/2019
		AR02300347	CNS 2019 NRC DBAI EQ – EQ Documentation for Electrical Enclosure Latches Missing Information	10/31/2019
		AR02300415	2019 NRC DBAI EQ: EQMM clarification report for submergence	11/01/2019
		AR02300438	2019 NRC DBAI EQ, DPC 1381.05-00-0104 has error in table	11/01/2019
		AR02300438	2019 NRC DBAI EQ – DPC 1381.05-00-0104 Error in Tabled Data	11/01/2019

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AR0230081	2019 NRC DBAI EQ - NCR 02233927 Screened Incorrectly	10/30/2019
		AR02303599	2019 NRC DBAI EQ - EQMM-1393.01-P04-00, DeLaval, Gems	11/20/2019
		AR02303601	2019 NRC DBAI EQ Scotchcast 9N Equivalency	11/20/2019
		AR02303602	2019 NRC DBAI EQ - EQMM-1393.01-G04-00, Westinghouse Motors	11/20/2019
		AR02303697	2019 NRC DBAI EQ Electrical Continuity Testing Not Performed	11/20/2019
		AR02303697	2019 NRC DBAI EQ Electrical Continuity Testing Not Performed	11/20/2019
		AR02303851	2019 NRC DBAI EQ: Raychem Spec 44 Wire No Submergence Qualification	11/21/2019
		AR02306022	2019 NRC DBAI EQ - Scotchcast 9/9N EQ File	12/05/2019
		AR02306022	2019 NRC DBAI EQ - Scotchcast 9/9N EQ File	12/05/2019
	Drawings	CN-1499-CF.12-00	SG Feedwater Isolation Instrument Detail	Rev. 9
		CN-1702-02.01	One-Line Diagram 4160V Essential Auxiliary Power System (EPC) 4160V Switchgear No. 1ETA	Rev. 18
		CN-1721-21.09	Catawba Nuclear Station Panel Cutout Sheet, Stanwick-Type DG Sliding Link Terminal Blocks	Rev. 7
		CN-1721-21.21	Catawba Nuclear Station Panel Cutout Sheet, States Co. Type-ZWM-Sliding Link Terminal Block	Rev. 1
		CN-1734-01.04	Connection Diagram Safety Injection System (NI) B-Train Motor Operated Valves 1NI010B, 1NI005B, 1NI178B, 1NI183B & 1TBOX0019	Rev. 15
		CN-2747-01.02-16	Connection Diagram Feedwater System (CF) Doghouse Level Switches	Rev. 001
		CNEE-0151-01.03	Elementary Diagram Safety Injection System (NI) B.I.T. Discharge Isolation Valve 1NI010B	Rev. 10
		CNEE-0151-01.45	Elementary Diagram Safety Injection System (NI) ND HDR to N.C. Cold Legs A and B Valve 1NI178B	Rev. 13
		CNEE-0151-01.46	Elementary Diagram Safety Injection System (NI) NS HDR to N.C. Hot Leg Isolation Valve 1NI183B	Rev. 12

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CNEE-0245-01.05-02	Elementary Diagram Main Feedwater Sys. (CF) Doghouse Safety Level Switches Train A	Rev. 9
		CNM 1210.04-0434 001	323 Transmitter Bottoming/Transfer Type, Bracket MTD., J/Box Output	12/16/1993
		CNM 1210.04-0438 001	Installation Specifications Transmitter Wiring and Mounting	7/27/1995
		CNM-1205.12-0050.002	Operator Pneumatic Hydraulic	Rev. 6
		CNM-1205.12-0050.003	Operator Pneumatic Hydraulic Unit 1&2 Valves 1(2)CF33,42,51,60	Rev. 9
		CNM-1205.12-0050.004	Cylinder Assembly Hydraulic Operator	Rev. 3
		CNM-1205.12-0050.005	Reservoir Assembly Hydraulic Operator	Rev. 7
		MCM 1210.04-0215 001	Splicing & Sealing Procedure	Rev. DC
	Engineering Changes	EC0000094280	CD201315 - CMP - Revise FWST Level Set-Points and Annunciators	Rev. 3
		EC0000408141	Revise EQMM to Include New Sections for EQ Cables & Splices	Rev. 0
		EC0000408781000	CN/MC/ON, CGI, PQL2, various Type ZWM Terminal Blocks, States, MIR/RWF	Rev. 0
		EC0000411757	CN/M/O. EE. PQL2, 9230027814, Electrical Resin, 3M, WB/DT	Rev. 0
		EC400046	C, CGI, Q2, Various, Enclosures, Hoffman, LFC/KCM Hoffman Enclosures	Rev. 0
	Engineering Evaluations	CGD-3007.02-00-0004	Stanwick Electrical Products, Terminal Block Pole	Rev. 0
		CGD-3010.02-06-0001	3M Company Scotchcast Electrical Resin No. 9	Rev. 19
		CGD-3010.02-13-0001	Attachment 7: Environmental Qualification Parameter Summaries for the various Dow Corning products	Rev. 1

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CGD-3015.01-01-0001	Technical Evaluation: Commercial Grade Evaluation – Enclosures	Rev. 2
	Miscellaneous	ADAMS Accession No. ML16155A354	Potential Part 21 on Wyle Laboratories Test Report Nos. 45700-1 Rev. A dated November 21, 1988, and 45700-2 Rev. A dated November 21, 1988, Submergence Test of Gems Liquid Level Transmitter	04/25/2016
		CNLT-1780-03.02	Response to NUREG-0588	Rev. 8
		CNLT-1780-03.03	Environmental Qualification Criteria Manual (EQCM)	Rev. 35
		CNM 1210.04-0433.001	Wyle Labs Test Report 45700-2	Rev. 2
		CNM 1211.00-2492.037	Qualification Report for Traine CH531 Chiller Controls	Rev. 3
		CNM 1318.00-0004.001	Motor Qualification Report, WCAP 8754	Rev. 4
		CNM 1354.00-0070.001	Qualification Test of Instrument Cable in a Simulated SLB & LOCA Environment	Rev. 2
		CNM 1362.00-0004, TR-028	Test Report on the Environmental Evaluation of Terminal Blocks for McGuire Nuclear Station	Rev. 02
		CNM 1364.00-0005.001	Environmental Qualification of Electrical Insulating Tape for McGuire and Catawba Nuclear Stations	Rev. 1
		CNM 1364.00-0007.001	EQR of “Quick-Connect” Fittings Used as Cable Entrance Seals	Rev. D3
		CNM-1205.12-0013.001	Feedwater Isolation Valve Pneumatic-Hydraulic Operator O&M Manual	Rev. 26
		CNM-1205.12-0026.001	Environmental Qualification Report for BWFC FWIV Actuators	Rev. 7
		CNM-1354.00-0026	Engineering Report No. 344 - Main Steam Line Break Qualification Test on Okozel Insulation	Rev. 1
		CNM-1399.05-0366.001	3m Scotchcast Electrical Resin 9N Data Sheet	Rev. 0
		CNS-1205.12.00.0002	Elector-Hydraulic-Pneumatic Actuator and Spare Parts for Feedwater Isolation Valves	Rev. 2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CNS-1354.04-00-0006	Specification: Shielded and Unshielded 600 Volt Switchboard and Hook up Wire	Rev. 0
		DPM-1393.01-0001	Environmental Qualification Package For Raychem Corporation WCSF-U Heat Shrink Tubing	Rev. D04
		DPM-1393.01-0040.001	EQ Test Summary for Solon Pressure Switches	Rev. 000
		DPM1393.01-0019.001	Duke Power Test Summary For: Equipment Type: EGS Tape Splices Manufacturer: SAIC/EGS Division Model/Series No: SCOTCH 130C Insulating/Jacketing Tapes Report #EGS-TR-399.16-16	Rev. 1
		EGS-TR-880707-03	Test Report for Submergence Qualification of Raychem WCSF-N Nuclear Line Cable Splice Assemblies for Shearon Harris Nuclear Plant	10/05/1990
		EQMM-1393.01-A04-00	ENVIRONMENTAL QUALIFICATION MAINTENANCE MANUAL EQUIPMENT TYPE: FWIV ELECTRO-HYDRAULIC-PNEUMATIC-ACTUATOR: MANUFACTURER: BORG-WARNER MODEL/SERIES: PART NO. 37981	Rev. 10
		EQMM-1393.01-C03-00	Environmental Qualification Maintenance Manual - Low Voltage Power, Control and Instrumentation Cable / Okenite / Okozel Tefzel (280) Extruded Insulation System	Rev. 0
		EQMM-1393.01-M01-00	Environmental Qualification Maintenance Manual Equipment Type: Commercial Grade/Approved Vendor Items	Rev. 3
		EQMM-1393.01-M01-01	Environmental Qualification Maintenance Manual Equipment Type: Connector Manufacturer: Swagelok Model Series: QF Series Quick-Connect	Rev. 3
		EQMM-1393.01-M01-04	Environmental Qualification Maintenance Manual Equipment Type: Electrical Enclosure Latches – Manufacturer: Hoffman – Model/Series: A-L31, A-FC412SS, A-FT44XSS	Rev. 2
		EQMM-1393.01-	Environmental Qualification Maintenance Manual	Rev. 8

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		N04-00	Equipment Type: Differential Pressure Switch Inside Containment; Manufacturer: Solon; Model/Series: 7PS1ADW / 7PS11DW / 7PSW11D2 / 7PSW1AD2	
		EQMM-1393.01-P04-00	Devals, GEMS Level Transmitter Environmental Qualification Maintenance Manual	Rev. 10
		EQMM-1393.01-R02-00	ENVIRONMENTAL QUALIFICATION MAINTENANCE MANUAL - EQUIPMENT TYPE: CHILLER CONTROLS - MANUFACTURER: TRANE (SUPPLIED BY: NUCLEAR LOGISTICS, INC. (NLI)) - MODEL / SERIES: CH531 & ASSOCIATED COMPONENTS	Rev. 2
		MCM 1211.00-1505-001	Nuclear Environmental Qualification Report: Solon Differential Pressure Switches for McGuire Nuclear Power Station, Units 1 & 2	Rev. 0
		MCM 1211.00-1505-002	Addendum 1 to CCL Report on Envir. Qual. of Solon DP Switch	Rev. 002
		MCM 1393.02-0007, TR-047	Test Report on the Effects of Radiation Exposure on Some Class 1E Electrical Components for the McGuire Nuclear Station	Rev. 00
	Procedures	AD-EG-ALL-1103	Procurement Engineering Products	Rev. 4
		AD-EG-ALL-1612	Environmental Qualification (EQ) Program	Rev. 4
		AD-EG-ALL-1612	Environmental Qualification (EQ) Program	Rev. 3
		AD-PI-ALL-0100	Corrective Action Program	Rev. 21
		IP-0-A-3010-021	Nitrogen System Charging for Main Feedwater (CF) Isolation Valve Operators	Rev. 23
		IP-0-A-3010-022	Removal and Installation of Main Feedwater (CF) Isolation Valve Operators	Rev. 9
		IP-0-A-3190-004	Maintenance Procedure for YC System Hot Gas Bypass Valve Actuator	Rev. 5
		IP-2-A-3010-020	Unit 2 Main Feedwater (CF) System Calibration of Feedwater Isolation Valves Pneumatic-Hydraulic Operators	Rev. 10
		IP/0/A/0200/029 A	Sealing Cable Entrance Fittings on Class 1E Devices	Rev. 35
		IP/0/A/3820/020 Q	Namco Limit Switch Replacement for Utilizing Quick	Rev. 13

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Connectors	
		IP/0/A/3850/013 A	Procedure for Cable Termination Sealing	Rev. 64
		IP/0/A/3850/013 B	Procedure for Sealing Rigid Steel Field Run Conduit	Rev. 13
		MP-0-A-7200-008	Feedwater Isolation Valve Corrective Maintenance	Rev. 22
		MP-0-A-7450-024	YC CHILLER HOT GAS BYPASS VALVE REMOVAL AND REPLACEMENT	Rev. 11
		OP.0.A.6450.011	Control Room Ventilation/Chilled Water System	Rev. 146
		PT-2-A-4200-009	Engineered Safety Features Actuation Periodic Test	Rev. 170
		PT-2-A-4200-018B	CF Valve Inservice Test (CS)	Rev. 21
	Self-Assessments	02276400	Focused SAST: CNS EQ Program DBAI NRC inspection	06/06/2019
	Work Orders	01713620		
		01810701		
		02073010		
		02079985		
		20033963		