



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

August 14, 2018

Mr. Thomas D. Ray
Site Vice President
Duke Energy Carolinas, LLC
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078

**SUBJECT: MCGUIRE NUCLEAR STATION – NRC PROBLEM IDENTIFICATION AND
RESOLUTION INSPECTION REPORT 05000369/2018012 AND
05000370/2018012**

Dear Mr. Ray:

On July 26, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed a problem identification and resolution inspection at your McGuire Nuclear Station Units 1 and 2. On that date, the NRC inspectors discussed the results of this inspection with Mr. Snider and other members of your staff. The results of this inspection are documented in the enclosed inspection report.

The NRC inspection team reviewed the station's corrective action program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for corrective action programs. Based on the samples reviewed, the team identified a finding in the problem identification area.

The team also evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments. Based on the samples reviewed, the team determined that your staff's performance in each of these areas adequately supported nuclear safety.

Finally, the team reviewed the station's programs to establish and maintain a safety-conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs. Based on the team's observations and the results of these interviews the team found no evidence of challenges to your organization's safety-conscious work environment. Your employees appeared willing to raise nuclear safety concerns through at least one of the several means available.

NRC inspectors documented a finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

T. Ray

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If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis of 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 the McGuire 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 of 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 the McGuire 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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Frank Ehrhardt, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos.: 50-369, 50-370
License Nos.: NPF-9, NPF-17

Enclosure:
IR 05000369/2018012 and 05000370/2018012

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Numbers: 50-369, 50-370

License Numbers: NPF-9, NPF-17

Report Numbers: 05000369/2018012 and 05000370/2018012

Enterprise Identifier: I-2018-002-0037

Licensee: Duke Energy Carolinas, LLC

Facility: McGuire Nuclear Station, Units 1 and 2

Location: Huntersville, NC

Inspection Dates: July 9, 2018 to July 26, 2018

Inspectors: J. Worosilo, Senior Project Engineer, Team Lead
R. Cureton, Resident Inspector
M. Riley, Reactor Inspector
M. Toth, Project Engineer

Approved By: F. Ehrhardt, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a Problem Identification and Resolution Inspection at McGuire Nuclear Station Units 1 and 2 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. NRC and self-revealed findings, violations, or additional items are summarized in the table below.

List of Findings and Violations

Failure to Translate Seismic Mounting Requirements for 125 VDC Vital Batteries into Installation and Replacement Procedure			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000369, 05000370/2018012-01 Closed	[H.6] – Design Margins	71152 – Problem Identification and Resolution
<p>The inspectors identified a Green finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," when the licensee failed to translate the mounting requirements for seismic qualification contained in NLI technical calculation C-017-074-2, "Vital Instrumentation & Control Batteries & Racks Equipment Qualification Calculation," Rev. 0, into their battery replacement and installation procedure IP/0/A/3061/003, "125 Volt Vital Battery Maintenance and Repair," Rev. 23.</p>			

Identification and Resolution of Problems

The inspectors concluded that, in general, problems were properly identified, evaluated, prioritized and corrected. The licensee effectively identified problems and entered them into the corrective action program for resolution. Generally, prioritization and evaluation of issues were adequate, cause evaluations were adequate, and corrective actions specified for problems were acceptable. Corrective actions developed and implemented for issues were generally effective and implemented in a timely manner.

The inspectors determined that audits and self-assessments were adequate in identifying deficiencies and areas for improvement in the corrective action program, and appropriate corrective actions were developed to address the issues identified. The licensee appropriately evaluated industry operating experience for relevance to the facility and entered applicable items in the corrective action program. The licensee appropriately incorporated industry and internal operating experience in its cause evaluations.

Based on discussions and interviews conducted with plant employees from various departments, the team determined that personnel at the site felt free to raise safety concerns to management and use the corrective action program to resolve those concerns.

INSPECTION SCOPE

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

71152 – Problem Identification and Resolution

Biennial Team Inspection (1 Sample)

The inspectors performed a biennial assessment of the licensee's corrective action program, use of operating experience, self-assessments and audits, and safety conscious work environment. The assessment is documented below.

- (1) Corrective Action Program Effectiveness: Problem Identification, Problem Prioritization and Evaluation, and Corrective Actions – The inspection team reviewed the station's corrective action program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for corrective action programs.
- (2) Operating Experience and Self-Assessments and Audits – The team evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments.
- (3) Safety Conscious Work Environment - The team reviewed the station's programs to establish and maintain a safety-conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs.

INSPECTION RESULTS

Corrective Action Program Effectiveness Assessment	71152—Problem Identification and Resolution
<p>Based on the samples reviewed, the team determined that the licensee's corrective action program complied with regulatory requirements and self-imposed standards. The licensee's implementation of the corrective action program adequately supported nuclear safety.</p> <p><u>Problem Identification:</u> The inspectors determined that the licensee was effective in identifying problems and entering them into the corrective action program and there was a low threshold for entering issues into the corrective action program. This conclusion was based on a review of the requirements for initiating condition reports as described in licensee</p>	

procedure AD-PI-ALL-0100, "Corrective Action Program," and management's expectation that employees were encouraged to initiate condition reports for any reason. Additionally, site management was actively involved in the corrective action program and focused appropriate attention on significant plant issues.

The inspection team identified one finding regarding the licensee's failure to translate the mounting requirements for seismic qualification contained in NLI technical calculation C-017-074-2, "Vital Instrumentation & Control Batteries & Racks Equipment Qualification Calculation," Rev. 0, into their battery replacement and installation procedure IP/0/A/3061/003, "125 Volt Vital Battery Maintenance and Repair," Rev. 23. This issue was entered into the licensee's corrective action program as Nuclear Condition Report (NCR) 02217854 and is documented as a finding and violation in the table below.

Problem Prioritization and Evaluation: Based on the review of condition reports, the inspectors concluded that problems were prioritized and evaluated in accordance with the condition report significance determination guidance in procedure AD-PI-ALL-0100. The inspectors determined that adequate consideration was given to system or component operability and associated plant risk.

The inspectors determined that plant personnel had conducted cause evaluations in compliance with the licensee's corrective action program procedures and cause determinations were appropriate, and considered the significance of the issues being evaluated.

The team observed, from multiple examples, that the screening for conditions adverse to quality (CAQ) and non-conditions adverse to quality (NCAQ) was not consistent with the definition in AD-PI-ALL-0100. Inspectors also noted that the examples given for determining a CAQ could lead a reviewer to only classify conditions that could affect operability/functionality as CAQs. The instances observed were deficiencies on safety-related and important to safety structures, systems, and components (SSCs) that were labeled as NCAQ and should have been classified as CAQs in accordance with the CAQ definition. The licensee's interpretation of the definition, i.e. a deficiency must challenge operability/functionality to be classified as a CAQ, could lead to corrective actions on risk-significant equipment being delayed, depending on how the issue is treated in the corrective action program and work management systems.

Corrective Actions: Based on a review of corrective action documents, interviews with licensee staff, and verification of completed corrective actions, the inspectors determined that corrective actions were timely, commensurate with the safety significance of the issues, and effective, in that conditions adverse to quality were corrected. For significant conditions adverse to quality, the corrective actions directly addressed the cause and effectively prevented recurrence. The team reviewed condition reports and effectiveness reviews to verify that the significant conditions adverse to quality had not recurred. Effectiveness reviews for corrective actions to prevent recurrence (CAPRs) were sufficient to ensure corrective actions were properly implemented and were effective.

Failure to Translate Seismic Mounting Requirements for 125 VDC Vital Batteries into Installation and Replacement Procedure			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000369, 370/2018012-01 Closed	[H.6] – Design Margins	71152 – Problem Identification and Resolution
<p>The inspectors identified a Green finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” when the licensee failed to translate the mounting requirements for seismic qualification contained in NLI technical calculation C-017-074-2, “Vital Instrumentation & Control Batteries & Racks Equipment Qualification Calculation,” Rev. 0, into their battery replacement and installation procedure IP/0/A/3061/003, “125 Volt Vital Battery Maintenance and Repair,” Rev. 23.</p>			
<p><u>Description:</u></p> <p>UFSAR Section 8.3.2.1.4 states that the 125VDC system at McGuire Nuclear Station consists of five battery chargers, four 125 volt DC batteries, four distribution centers, and eight panelboards. Each battery is sized to carry the accident loads of one unit plus the safe shutdown loads of the other unit for one complete train, assuming a loss of offsite power. The UFSAR states that the 125 VDC system is designed to seismic category I requirements and UFSAR Section 3.10.1.3 states that the 125VDC batteries were seismically qualified in accordance with IEEE 344-1971. Section 3.2.2 of IEEE 344-1971 states that the device being tested should be mounted in a manner that simulates the intended service mounting and that the device being tested should demonstrate its ability to perform its intended function.</p> <p>Licensee document MCM 1356.01-0048.001 contained NLI technical calculation C-017-074-2, “Vital Instrumentation & Control Batteries & Racks Equipment Qualification Calculation,” Rev. 0. The purpose of the calculation was to demonstrate that the vital batteries supplied to McGuire Nuclear Station were qualified for the mild environment in the auxiliary building and to demonstrate that the batteries were seismically qualified for the site’s design basis safe shutdown earthquake. The seismic qualification testing was completed on different batteries than those installed and a comparison was made to justify and evaluate the differences. Section 5.3 of the NLI technical calculation compared the tested configuration against the installed configuration. The evaluation stated that NLI specified the batteries be snug between the rails with a maximum 1/8 inch gap since that was the tested configuration. During a walk-down on July 10, 2018, the team identified gaps between the batteries and the end rails and questioned if the gaps exceeded those specified in the seismic qualification of the vital batteries. Upon review of the team’s question, the licensee determined that all four of the vital 125 VDC batteries exceeded the 1/8 inch gap specified in the calculation, with the maximum gap at battery EVCA of 1 ½ inches. The inspectors also identified that procedure IP/0/A/3061/003, “125 Volt Vital Battery Maintenance and Repair,” Rev. 23, which was used to replace vital battery EVCA in 2016, did not contain steps to ensure the gap between the battery and end rails was less than an 1/8 inch to maintain the vital battery within its seismic qualification. The failure to maintain the installed configuration of the vital batteries within seismic qualification could result in displacement of the battery greater than 1/8 inch during a seismic event and challenge the structural and electrical capability of the battery, in particular the battery posts.</p>			

Corrective Actions: The licensee performed an immediate determination of operability to verify there was reasonable assurance that the batteries could perform their intended safety function during a seismic event. The licensee also installed spacers between the batteries and end rails to reduce the gaps to less than 1/8 inch as specified in the seismic qualification.

Corrective Action Reference: The licensee entered this issue into their corrective action program as NCR 02217854.

Performance Assessment:

Performance Deficiency: The failure to translate the mounting requirements for seismic qualification contained in NLI technical calculation C-017-074-2 into battery replacement and installation procedure IP/0/A/3061/003 was a violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and a performance deficiency (PD).

Screening: The PD was determined to be more than minor because it was associated with the design control attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the as-found configuration did not ensure that the seismic forces would not displace the battery by greater than 1/8 inch. Displacement of the battery greater than 1/8 inch could challenge the structural and electrical capability and reliability of the battery, in particular the battery posts.

Significance: The team used IMC 0609, Attachment 4, "Initial Characterization of Findings," issued October 7, 2016, for mitigating systems, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding to be of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating SSC, and the SSC maintained its operability.

Cross-cutting Aspect: Since the latest opportunity to identify the issue occurred in 2016 with the replacement of vital battery EVCA, the team determined the finding was indicative of present licensee performance and was associated with the cross cutting aspect of design margins in the area of human performance because the licensee failed to ensure their battery installation procedures guarded the margins contained in their seismic qualification [H.6].

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires in part that "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions."

Contrary to the above, since at least 2016, the licensee failed to translate the mounting requirements for seismic qualification contained in NLI technical calculation C-017-074-2 into battery replacement and installation procedure IP/0/A/3061/003.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Operating Experience, Self-Assessments, and Audits Assessment	71152—Problem Identification and Resolution
<p>The team determined that station's processes for the use of industry and NRC operating experience information and for the performance of audits and self-assessments were effective and complied with all regulatory requirements and licensee standards. The implementation of these programs adequately supported nuclear safety. The team concluded that operating experience was adequately evaluated for applicability and that appropriate actions were implemented to address lessons learned as needed. The inspectors determined that the licensee was effective at performing self-assessments and audits to identify issues at a low level, properly evaluated those issues, and resolved them commensurate with their safety significance.</p>	
Safety Conscious Work Environment Assessment	71152—Problem Identification and Resolution
<p>Based on interviews with plant staff and reviews of the latest safety culture survey results to assess the safety conscious work environment on site, the team found no evidence of challenges to safety-conscious work environment. Employees appeared willing to raise nuclear safety concerns through at least one of the several means available.</p>	

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure. No proprietary information was documented in this report.

- On July 26, 2018, the inspectors presented the problem identification and resolution inspection results to Mr. Steve Snider and other members of the licensee staff.

DOCUMENTS REVIEWED

Procedures

AD-EG-ALL-1202, "Preventive Maintenance and Surveillance Testing Administration"
 AD-EG-ALL-1208, Life Cycle Management Planning
 AD-EG-ALL-1209, "System Health Reports and Notebooks," Rev. 5-8
 AD-EG-ALL-1210, Maintenance Rule Program
 AD-EG-ALL-1650, License Renewal Aging Management Activities
 AD-PI-ALL-0100, "Corrective Action Program"
 AD-PI-ALL-0101, Root Cause Evaluation, Rev. 5
 AD-PI-ALL-0102, "Apparent Cause Evaluation"
 AD-PI-ALL-0103, "Quick Cause Evaluation"
 AD-PI-ALL-0106, "Cause Investigation Checklists"
 AD-PI-ALL-0300, "Self-Assessment and Benchmark Programs"
 AD-PI-ALL-0400, "Operating Experience Program"
 AD-PI-ALL-0401, "Significant Operating Experience Program"
 AD-MN-ALL-1000, "Conduct Of Maintenance"
 AD-NO-ALL-0202, "Employee Concerns Program"
 AD-OP-ALL-0105, "Operability Determinations and Functionality Assessments"
 AD-OP-ALL-0202, Aggregate Operator Impact Assessment, Rev. 2
 PT/0/A/4601/008 A, "SSPS Train A Periodic Test With NC System Pressure Greater Than 1955 PSIG"
 PT/0/A/4601/008 B, "SSPS Train B Periodic Test With NC System Pressure Greater Than 1955 PSIG"
 Chemistry Manual MCM 3.6, Attachments 8.1, 8.2, 8.3, and 8.4
 LTAM MC-15-0164, Low Structural Margin on 1/2 KC-57A and 1/2 KC-82B
 IP/0/A/3190/012, NAMCO Limit Switch Preventative and Corrective Maintenance, Rev. 3
 OP//A/6400/006, Nuclear Service Water System, Rev. 252

Condition Reports

220096, 2020700, 2023639, 2026503, 2033319, 2053946, 2082816, 2083284, 2085366, 2094502, 2128625, 2180503, 2181708, 2188436, 2194299, 2195227, 2195237, 2200404, 2201462, 2203019, 2203246, 2192946, 2185359, 1962235, 2124540, 2142074, 2125164, 2125489, 2016951, 2054145, 2054155, 2107895, 2112637, 2152611, 2181923, 2187250, 2189099, 2191029, 2193237, 2193515, 2194857, 2199066, 2200342, 2204580, 2205631, 2053399, 2103908, 2142200, 2142735, 2172626, 2178439, 2181655, 2184503, 2184505, 2184867, 2184883, 2186769, 2187191, 2188290, 2192535, 2195944, 2199099, 2078579, 2016962, 2102868, 2197892, AR 1638718, AR 1695266, AR 2018317, AR 2182978, AR 2157616, AR 2203264, PRR 2187761, PRR 2179966, PRR 2196116, NTM 2186004, NTM 2186015, 1943414, 2019477, 2020345, 2021396, 2022635, 2023787, 2025517, 2035015, 2035574, 2039739, 2039741, 2042563, 2054318, 2058969, 2063354, 2063800, 2064590, 2074269, 2074327, 2074969, 2080411, 2088359, 2089536, 2095333, 2095333, 2115282, 2146488, 2162824, 2168711, 2179614, 2211485, 02018605, 02018701, 02185409, 02208159, 02072797, 02199390, 2217854, 2205392, 2197578, 2199686, 2195818, 2125953, 2121955, 2115334, 2196028, 2148187, 2156494, 2203047, 2161684, 021138898, 02021742, 02049571, 02048738, 02038505, 02184882, 02128108, 02208731, 02149151, 02130264, 02194962, 02189785, 02189817, 02175451, 02191439, 02191210, 02205233, 02131711, 02179288, 02022090, 02038379, 02030208, 02048943, 02122920, 02038624, 02187719, 02122164, 02184835, 02170684, 02196565, 02189648, 02046323, 02120499, 02127541, 02157073, 02155066, 02200750, 02178723, 02181995

Self-Assessments, Audits, and Trend Reports

ST1613 Control Room Deficiency Audit Report, dated 7/12/20018

2016-FLEET-CAP-01, Fleet Corrective Action Program

Nuclear Safety Culture Assessment – Executive Summary – June 2016

2018-FLEET-CAP-01, 2018 Fleet Corrective Action Program

Work Orders

WP 00405712-01, 20073297, 20173341, 20027431, 20123508, 20263858, 20034448, 02183098, 20243981, 20102332, 20152798, 20123511, 20042523, 20100321, 1914347, 20078344, 20096975, 20122454, 20139485, 20147245, 20149194, 20149287, 20160252, 20202500, 20247371

Other

LER 369-2018-01 Rev1

TS Action Register A-1-16-00912

Engineering Change (EC) 408757

EC 410387

EC 408547

MCC-1223.24-00-0059, RN Train A Return Header Continuous Vent Volumetric Flow Rates, Rev. 2

MCC-1223.24-00-0060, RN/SSS Supply to Unit 1 CA Turbine-Driven Pump Suction Continuous Vent Volumetric Flow Rate, Rev. 2

MCM 1356.01-0048.001, Equipment Qualification for GNB NCN-27 Battery Cells, Rev. 0

MCS-1574.RN-00-0001, Design Bases Specification for the RN System, Rev. 57

MCSF-1574.RN-01

EQMM-1393.01-N03-00, NAMCO Limit Switch Red-line Mark-up

Wyle Test Report 44681-2, Intercell Connector GNB P/N L03-086515, dated 10/27/81

Maintenance Rule Periodic Assessment for McGuire Maintenance Rule Implementation, January 1, 2017 – June 30, 2017

Self-Assessment, Maintenance Rule Unavailability

KC System Health Report, Q4

MNS IWE MC-1SIC3-1042-0001 Plan, Third Interval Containment In-service Inspection Plan, Rev. 5