



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

August 17, 2017

Mr. Bryan C. Hanson
Senior Vice President, Exelon
Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 – NRC DESIGN
BASES ASSURANCE INSPECTION (PROGRAMS); INSPECTION
REPORT 05000373/2017008; 05000374/2017008**

Dear Mr. Hanson:

On July 14, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial baseline Design Bases Assurance Inspection (Programs) at your LaSalle County Station. The inspection reviewed the implementation of the Environmental Qualification Program for electrical equipment. The enclosed report documents the results of this inspection, which were discussed on July 14, 2017, with Mr. Harold Vinyard and other members of your staff.

Based on the results of this inspection, two NRC-identified findings of very low safety significance were identified. The findings involved violations of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as Non-Cited Violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the subject or severity of the NCVs, 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 a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission–Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532–4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; and the Resident Inspector Office at the LaSalle County Station, Units 1 and 2. In addition, if you disagree with the cross-cutting aspect assigned to any finding 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 Regional Administrator, Region III, and the NRC Resident Inspector at the LaSalle County Station.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Mark T. Jeffers, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-373; 50-374
License Nos. NPF-11; NPF-18

Enclosure:
Inspection Report 05000373/2017008;
05000374/2017008

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Letter to Bryan Hanson from Mark Jeffers dated August 17, 2017

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REGION III

Docket No: 50-373; 50-374
License No: NPF-11; NPF-18

Report No: 05000373/2017008; 05000374/2017008

Licensee: Exelon Generation Company, LLC

Facility: LaSalle County Station, Units 1 and 2

Location: Marseilles, IL

Dates: June 26, 2017 – July 14, 2017

Inspectors: George M. Hausman, Senior Reactor Inspector, Lead
Alan K. Dahbur, Senior Reactor Inspector
Jasmine A. Gilliam, Reactor Inspector

Approved by: Mark T. Jeffers, Chief
Engineering Branch 2
Division of Reactor Safety

Enclosure

SUMMARY

Inspection Report 05000373/2017008; 05000374/2017008; 06/26/2017 – 07/14/2017; LaSalle County Station, Units 1 and 2; Design Bases Assurance Inspection (Programs).

This report covers a 2-week announced baseline inspection on implementation of the Environmental Qualification Program. The inspection was conducted by three regional engineering inspectors. Two Green finding(s) were identified by the inspectors. The findings were considered Non-Cited Violations (NCVs) of U.S. Nuclear Regulatory Commission (NRC) regulations. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6, dated July 2016.

NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

Green. The inspectors identified a finding of very-low safety significance and an associated NCV of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.49, Paragraph (f)(4), for the licensee's failure to provide adequate analysis in combination with partial type test data to qualify an Environmental Qualification (EQ) component. Specifically, EQ-LS068 failed to provide adequate analysis to justify the Post-Accident Operability Qualification for the Reliance Electric motor utilized for 1(2)VY03C. The EQ Binder incorrectly relied on test values that was strictly performed for thermal aging (for normal plant conditions) to justify a Post-Accident Qualification. The licensee captured the inspectors' concern into their Corrective Action Program (CAP) as Action Request (AR) 04030532.

The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. The finding screened as of very-low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, as an immediate corrective action, the licensee performed a preliminary assessments and concluded that the motors could be EQ qualified for the environmental conditions for which they could be exposed. The finding was associated with a cross-cutting aspect in the area of Human Performance, Design Margin. [H.6] (Section 1R21.3.b(1))

Green. The inspectors identified a finding of very-low safety significance and an associated NCV of 10 CFR Part 50.49, Paragraph (j), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," for the licensee's failure to have adequate justification for extending the service-life for grease used in the bearing for EQ motors installed in harsh environment. Specifically, the licensee extended the bearing grease qualified service life for several EQ motors installed in Zone H4A, H6 and H5A from 31.5, 20.5 and 19.5 years respectively to 60 years based on incorrect assumptions. The justification for 60 years extension incorrectly assumed

that the calculated service-life was based on continuous operation of the motor. The licensee captured the inspectors' concern into their CAP as AR 04030538.

The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. The finding screened as of very-low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, as an immediate corrective action, the licensee performed a preliminary evaluation that concluded that the grease remained qualified based on test data which showed that the grease consistency remained within acceptable range during the thermal age test. The finding did not have a cross-cutting aspect associated with it because it was not representative of current performance. (Section 1R21.3.b(2))

Licensee-Identified Violations

No violations were identified.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Mitigating Systems and Barrier Integrity

1R21 Design Bases Assurance Inspection (Programs) (71111.21N)

.1 Introduction

This is a baseline inspection of a licensee program conducted per U.S. Nuclear Regulatory Commission (NRC) Inspection Procedure (IP) 71111.21N, Attachment 1. The objective of the Design Bases Assurance (DBA) Inspection is to gain reasonable assurance that structures, systems, and components (SSCs) can adequately perform their design basis function. This includes reasonable assurance that electrical equipment important-to-safety for which a qualified life has been established can perform its safety functions without experiencing common cause failures before, during, and after applicable design basis events. This inspection will review the licensee's implementation of the electrical equipment Environmental Qualification (EQ) Program, as required by their license, for maintaining the qualified status of equipment during the life of the plant. The inspection is intended to assess the program's effectiveness by sampling a limited number of components. This inspectable area verifies aspects of the Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

The inspectors assessed the implementation of the EQ Program, established to meet the requirements of Title 10, *Code of Federal Regulations* (10 CFR), Part 50, Section 49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants." The scope of this rule included safety-related equipment relied upon to remain functional during and following design basis events, non-safety related equipment whose failure under postulated environmental conditions could prevent safety-related equipment from performing design functions, and certain post-accident monitoring equipment. The NRC originally verified plant's EQ Program implementation through a series of onsite inspections from 1984 – 1989. The EQ Program at that time established measures to ensure components met the EQ rule through the 40-year operating license period. LaSalle County Station (LSCS) began commercial operation in January 1984 (Unit 1) and October 1984 (Unit 2). The current operating licenses for LSCS, Units 1 and 2, expire on April 17, 2022, and December 16, 2023, respectively. The NRC has determined that the standards for the issuance of renewed operating licenses for LSCS for Units 1 and 2 have been met (i.e., Date of Issuance: October 19, 2016). The renewed facility operating license No. NPF-11 for Unit 1 expires at midnight on April 17, 2042, and the renewed facility operating license No. NPF-18 for Unit 2 expires at midnight on December 16, 2043, ([ML16202A075](#)).

Specific documents reviewed during the inspection are listed in the Attachment to the report.

.2 Inspection Sample Selection Process

The inspectors selected components for review using information provided by the licensee. This included risk informing the selection based on the LSCS probabilistic risk assessment by generally selecting components that had a high Fussell Vesely

Importance factor. Additional selection criteria included discussions with plant staff, reviewing procurement, maintenance, and design records, and walking down plant areas susceptible to high energy line breaks. Based on these reviews, the inspectors focused the inspection on EQ Program elements and components repaired, modified, or replaced. Components from each unit were selected and included pump motors, motor-operated valves, air operated valves, electrical containment penetrations, and transmitters (pressure, flow, and level) located both inside and outside of containment. For each component selected, the inspectors evaluated the environmental qualifications of supporting sub-components including seals, lubricants, connectors, control and power cables, solenoids, transducers, limit switches, and terminal blocks.

This inspection constituted eight samples as defined in IP 71111.21N, Attachment 1, Section 02.01.

.3 Component Design

a. Inspection Scope

The inspectors assessed the licensee's implementation of the EQ Program as required by 10 CFR 50.49. The inspectors evaluated whether the licensee staff properly maintained the EQ of electrical equipment important to safety through plant life (repair, replacement, modification, and plant life extension), established and maintained required EQ documentation records, and implemented an effective Corrective Action Program (CAP) to identify and correct EQ-related deficiencies and evaluate EQ-related industry operating experience.

This inspection effort included a review of EQ Program-related procedures, component EQ files, EQ test records, equipment maintenance and operating history, maintenance and operating procedures, vendor documents, design documents, and calculations. The inspectors interviewed operators, engineers, maintenance staff, and procurement staff. Additionally, the inspectors performed in-plant walkdowns of accessible components to verify installed equipment was the same as described in the EQ component documentation files, verify components were installed in their tested configuration, determine whether equipment surrounding the EQ component may fail in a manner that could prevent the EQ component from performing its safety function, and verify that components located in areas susceptible to a high energy line break were properly evaluated for operation in a harsh environment. Components removed from the EQ Program were reviewed to ensure an adequate basis existed to no longer require the components to meet EQ requirements. Documents reviewed for this inspection are listed in the Attachment. The following eight EQ components (samples) were reviewed:

- Residual Heat Removal Pump B and C Room Cooling Fan Motor (2VY03C-M10); Reactor Building (694' Elevation, Zone: LH5E);
- Residual Heat Removal Primary Containment Cooling Heat Exchanger Discharge Valve Actuator (2E12-F068B-L05); Reactor Building (687' Elevation, Zone: LH6);
- Reactor Vessel Water Level 1 Transmitter (2B21-N407C-LT); Reactor Building (761' Elevation, Zone: LH4E);
- Primary Containment Pressure Switch (2C71-N002A-PS); Reactor Building (761' Elevation, Zone: LH4E);

- Outboard Main Steam Isolation Valve Solenoid (1B21-F028D-P2-V27); Reactor Building (742' Elevation, Zone: LH5C);
- Division II Inboard Hydraulic Power Unit Isolation Valve, Conductor Seal Assembly (2B33-F338B-C09); Drywell (759' Elevation, Zone: LH2A);
- Control Rod Drive Charging Water Header Pressure Transmitter (1C11-N016C-PT); Reactor Building (761' Elevation, Zone: LH4E); and
- Stand-By Gas Treatment System Cooling Fan Motor (2VG02C-M10); Reactor Building (820' Elevation, Zone: LH4E).

b. Findings

(1) Failure to Correctly Evaluate/Justify the RHR Pump B and C Room Cooling Fan Reliance Motor 2VY03C-M10 for Post-Accident Operability Qualification

Introduction: The inspectors identified a finding of very-low safety significance (Green) and an associated Non-Cited Violation (NCV) of 10 CFR Part 50.49, Paragraph (f)(4), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," for the licensee's failure to provide adequate analysis in combination with partial type test data to qualify an EQ component. Specifically, EQ-LS068 failed to provide adequate analysis to justify the Post-Accident Operability Qualification for the Reliance Electric motor utilized for 1(2)VY03C "Residual Heat Removal (RHR) Pumps B and C Room Cooling Fan." Since the type test accident qualification profile did not bound the required plant profile plus the margin recommended by Institute of Electrical and Electronics Engineers (IEEE) Standard 323-1974, the EQ Binder analysis incorrectly credited values from a test that was strictly performed for thermal aging (for normal plant conditions) to justify a Post-Accident Operability Qualification.

Description: Electrical Environmental Qualification Binder Analysis EQ-LS068 documented the qualification for the Reliance Electric Company Fan Motors Frame 284 TCZ (1/2VY03C) installed in post-accident harsh environment Zone H5E to ensure they will perform their intended safety functions during the normal plant operation, plus accident and 100 days post-accident conditions. The purpose of the analysis was to demonstrate that these motors meet the qualification level of NUREG-0588 Category I in accordance with the requirement of 10 CFR 50.49.

Section 17.2, Accident/Post-Accident Temperature Qualification, of EQ-LS068 indicated that the required Zone H5E bounding accident conditions High Energy Line Break (HELB) was 212°F for 6 hours followed by 150°F for 99.75 days, and during a Loss of Coolant Accident (LOCA) condition, these motors will be exposed to 150°F for 100 days. These motors will be continuously energized during the 100-day postulated accident. The analysis credited testing performed by Limitorque which utilized a Reliance Class RH insulated motor similar to the insulation system used in motors for 1(2)VY03C. The type test specimen was subjected to accident condition consisted of a 30-day profile with a double peaks temperature of 340°F for 3 hours and 320°F for another 3 hours, followed by 251°F for 3-day and 18 hours, followed by 200°F for 26 days. The motor was not continuously energized during the test, and therefore the specimen motor did not experience the temperature rise that it would experience during the accident conditions. For thermal aging during normal plant operation conditions, the analysis credited a Reliance Electric test which heated aged the motor stator for 100 hours at 180°C.

The analysis incorrectly considered the LOCA temperature and duration degradation aging affect as part of the normal environment aging due to there was no condensing humidity associated with the LOCA environment. For a continuously operated motor, the operating temperature was assumed 150°F plus 171°F (heat rise), a total of 321°F for 100 days. Using the Arrhenius equation, the analysis considered 100 days at 321°F to be equivalent to 31.34 days at 180°C. The calculated thermal life of the motor insulation system based on regression line equation at 180°C was 29.44 years. Therefore, the analysis concluded that the degradation due to accident temperature and duration was negligible compared to the thermal capability of the insulation system.

The analysis also indicated that the post-accident requirement after 3 hours into the HELB was 338°F for 3 hours followed by 276°F for 99.875 days. The analysis acknowledged that the test profile did not envelope the temperature and duration requirement. Similarly, for Post-Accident Operability Qualification for HELB environment, the analysis justified/addressed it, as an extension of normal plant operation for the purpose of thermal degradation evaluation, justified as follows: Using Arrhenius equation, the required HELB profile (338°F for 3 hours followed by 276°F for 99.875 days) was equivalent to 0.1613 years at 180°C. Adding the HELB equivalent duration (0.01613) to the aging requirement for 60 years (2.37 years), the total aging requirement was calculated as 2.396 years at 180°C. Therefore, the analysis concluded that the degradation due to combined normal service and accident environment was negligible compared to the thermal capability of the motor calculated insulation system life (29.44 years).

The inspectors were concerned that the licensee failed to provide adequate justification/analysis to show that the Reliance motors used for the ventilation room coolers were qualified for post-accident in a harsh environment. Specifically, the licensee failed to demonstrate that the motors would perform their safety function and continue to operate for 100 days in 150°F after being subjected to the harsh environment, steam and high radiation conditions, instead, the licensee incorrectly considered the degradation for post-accident condition as an extension of normal plant operation for the purpose of thermal degradation evaluation.

The licensee captured both of the inspectors' concerns into their CAP as Action Request (AR) 04030532. As an immediate corrective action, the licensee performed a preliminary assessments that concluded that based on a Reliance Electric Supplemented Report to NUC-9 and testing performed under 255°C for 88 days followed by radiation testing, the motor could be qualified for post-accident condition in Zone H5E. Hence, the EQ equipment safety function could be shown to be not impacted.

Analysis: The inspectors determined that the failure to provide adequate analysis in combination with partial type test data to qualify an EQ component was contrary to 10 CFR Part 50.49, Paragraph (f)(4), and was a performance deficiency. Specifically, the licensee failed to provide adequate justification/analysis in combination with a partial type test when the post-accident test profile did not envelop the temperature and duration plant requirement. The licensee incorrectly addressed the post-accident conditions as an extension of normal plant operation for purpose of thermal degradation evaluation.

The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. Specifically, the failure to correctly evaluate the post-accident operability qualification for EQ motor utilized for 1(2)VY03C did not ensure the reliability of the room cooling fan to perform their mitigating functions post-accident.

The inspectors determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with Inspection Manual Chapter (IMC) 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings," issued on June 19, 2012. Because the finding impacted the Mitigating Systems cornerstone, the team screened the finding through IMC 0609, Appendix A, "The SDP for Findings At-Power," issued on June 19, 2012, using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very-low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the inspectors questioned operability of the motor in a harsh environment and the licensee performed a preliminary assessment and concluded that these motors could be qualified for the environmental conditions for which they could be exposed.

The inspectors determined that the associated finding had a cross-cutting aspect in the area of Human Performance, Design Margin area because the licensee did not maintain equipment within design margins. [H.6].

Enforcement: Title 10 CFR Part 50.49, Paragraph (f)(4), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," requires, in part, that each item of electric equipment important to safety must be qualified by one of the following methods. Item 4, requires analysis in combination with partial type test data that supports the analytical and conclusions.

Contrary to the above, as of July 14, 2017, the licensee failed to correctly show that an EQ component was qualified using adequate analysis in combination with partial type test data. Specifically, the licensee failed to correctly show that Reliance Electric motors utilized in 1(2)VY03C were EQ qualified by analysis and partial type test when the accident test profile did not bound the required plant accident profile. The licensee inappropriately used data from a strictly thermal aging test to justify post-accident qualification.

At the time of this inspection, the licensee was still evaluating its planned corrective actions. However, the inspectors determined that the continued noncompliance did not present an immediate safety concern because the licensee determined that the affected SSCs remained operable, as discussed in the Description section above.

Because this violation was of very-low safety significance and was entered into the licensee's CAP as AR, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000373/2017008-01; 05000374/2017008-01, Failure to Correctly Evaluate/Justify Post-Accident Operability Qualification for the Reliance Motor 1(2)VY03C RHR Pumps Room Cooling Fan)**

(2) Failure to have Adequate Justification for Extending the life of Lubricant used in EQ Motor Bearings

Introduction: The inspectors identified a finding of very-low safety significance (Green) and an associated NCV of 10 CFR Part 50.49, Paragraph (j), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," for the licensee's failure to have adequate justification for extending the service-life for grease used in bearing for EQ motors installed in harsh environment. Specifically, the licensee extended the bearing grease qualified service life for several EQ motors installed in Zone H4A, H6 and H5A from 31.5, 20.5 and 19.5 years respectively to 60 years based on incorrect assumptions. The justification for 60 years extension incorrectly assumed that the calculated service-life was based on continuous operation of the motor.

Description: Electrical Environmental Qualification Analysis EQ-LS057 documented the qualification analysis for the Westinghouse Standby Gas Treatment System Cooling Fan 1(2)VG02C Motor Model TBFC installed in post-accident harsh environment Zone H4E to ensure they will perform their intended safety functions during the normal plant operation, plus accident and 100 days post-accident conditions. The purpose of the analysis was to demonstrate that these motors meet the qualification level of NUREG-0588, Category 1 in accordance with the requirement of 10 CFR 50.49. Similar analysis were completed for all EQ motors in Zone H4E (i.e. 1(2)CM03PA, 1(2)CM03PB, 1(2)HG01A and 1(2)VG01C).

The motors had front and rear bearings, both of which were anti-friction radial ball double shielded bearings, which contained Chevron SRI-2 grease. Contamination of the bearing grease or exposure to extended elevated temperatures could lead to a failure of the lubricant. High temperatures could result in oxidation causing the grease to harden and increasing friction that could lead to excessive bearing heating.

The EQ analysis evaluated the thermal qualified life for each motor type including the lubricant. The analyses credited LaSalle Station Calculation Number L-000904 "Qualified Service Life of Chevron SRI-2 Grease in EQ Motors," which calculated the qualified life of Chevron SRI-2 and Chevron SRI mixed with Mobile grease SHC-28 or SHC-32 when used in double shielded and/or sealed bearings of EQ motors installed at LaSalle Station. Based on the type test data and the zone temperature during plant operation, using the 10°C Rule, the calculation determined that the calculated qualified life of the grease used in the bearing for EQ motors installed in Zone H4E, H5A and H6 were 31.5, 19.5 and 20.5 years respectively. The EQ Binder analyses for these motors incorrectly indicated that because the service-life of the lubricant in the motor bearings were calculated assuming continuous operation of the motors and these motors had very low run time, less than one hour per month, therefore, degradation due to temperature was not expected. The evaluation indicated that since the total run time was less than 3% of the calculated service life and the bearing were qualified for 60 years, the grease was considered qualified for the 60-year normal plant condition. In addition, Section 4.2 of Tab D of the EQ analysis also concluded that the motor bearing grease was qualified for the 60-year normal operating condition and no bearing/grease replacement was required every 31.5 years. It also credited the motors monthly operation surveillance to monitor and trend any bearing degradation for potential need for bearing/lubricant replacement.

The inspectors reviewed Calculation L-000904, and noted that the type test, which was credited, for calculating the thermal aging and service life was performed on the Chevron grease alone without the motor, using cone penetration testing. The grease sample was thermally aged at 212 °F for 128 days and then was irradiated to 2.0E08 rads (air equivalent gamma). The sample set was subject to design basis event DBA accident exposure, 355 °F for 3 hours, followed by 335°F for 3 hours, 265 °F for 18 hours and 200°F for 109 days. Based on Calculation L-000904 and test data, the inspectors concluded that the calculated service life of the grease was solely based on type test data for the grease alone and not based on continuous operation of the motor and therefore, the justification for extending the service life of the grease used in the bearing for several EQ motors, from 31.5-year to 60-year using the lessor motor run time was incorrect. Specifically, the type test was completed to determine the thermal and radiation degradation effect on the grease alone regardless if the motor was continuously running or not.

During the inspectors walkdown for 2VG02C, the inspectors notice that the motor was equipped with grease fitting for the front and rear bearings. The inspectors questioned if the motor have been periodically greased. The license indicated that the motor was last greased in 2010 per an 8-year frequency preventive maintenance (PM). Further review of applicable PM for all motors covered by Calculation L-000904, the licensee indicated except for 1(2)HG01A "Hydrogen Recombiner Motor," all other motors have active PMs. The PMs for 1(2)HG01A were retired based on their latest revision of the EQ binder which extended the service life of the grease to 60-year which then concluded no PM to grease the motors were required for EQ qualification. None of the EQ binders showed a required PM to maintain the grease qualified service life. The identified periodic PMs for greasing the bearing for the remaining EQ motors in these zones were required to satisfy other requirement for a different reasons.

The inspectors were concerned that the licensee have not determined that these PMs were effective and can be credited to meet the EQ requirement. In addition, the inspectors were concerned that there were no other PM or method to ensure that the grease used in the bearing for the EQ motors 1(2) HG01A would be replaced prior to its service life expire to maintain its EQ qualification.

The licensee captured the inspectors' concern into their CAP as AR 04030538. As an immediate corrective action, the licensee performed a preliminary evaluation that concluded that the calculated service-life for each zone was conservative based on there were sufficient test data which showed that the grease consistency remained within acceptable range during the thermal age testing. Hence, the EQ equipment safety function was not impacted.

Analysis: The inspectors determined that the failure to provide adequate justification and bases for extending the service-life for lubricant used in bearing for EQ motors beyond its calculated service life in each zone was contrary to 10 CFR Part 50.49, Paragraph (j) and was a performance deficiency. The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. Specifically, the failure to correctly justify the service-life for the motor bearing grease beyond its calculated service life did not ensure the reliability of the EQ motors to fulfill its post-accident

mission time in a harsh environment. In addition, the retiring of the grease PM for 1(2) HG01A did not ensure the qualification of these EQ motors will be maintained passed 2025 and 2030.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "SDP," Attachment 0609.04, "Initial Characterization of Findings," issued on June 19, 2012. Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609 Appendix A, "The Significance Determination Process for Findings At-Power," issued on June 19, 2012, using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very-low safety significance (Green) because it did not result in the loss of operability or functionality of mitigating systems. Specifically, the licensee performed a preliminary evaluation and determined that the 31.5 years calculated service-life was conservative based on there were sufficient test data which showed that the grease consistency remained within acceptable range during the thermal age test.

The inspectors did not identify a cross-cutting aspect associated with this finding because it was not confirmed to reflect current performance due to the age of the performance deficiency. Specifically, the initial justification for the extension of the motor bearing grease service-life beyond the calculated service life was completed prior to the latest revision that extended it to 60-year, more than 3 years ago.

Enforcement: Title 10 CFR Part 50.49, Paragraph (j), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," requires, in part, that a record of qualification must be maintained in an auditable form to permit verification that each item of the electrical equipment important to safety:

- (1) Is qualified for the application; and
- (2) Meets its specified performance requirements when it is subject to the conditions predicted to be present when it must perform its safety function up to the end of its qualified life.

Contrary to the above, as of July 14, 2017, the licensee failed to have record of qualification that adequately justified the service-life qualification for 1/2VG02C motor bearing grease. Specifically, the licensee failed to provide adequate bases for extending the qualified service-life for lubricant used EQ motors bearing installed in Zone H4A, H6 and H5A beyond the calculated service life value of 31.5, 20.5 and 19.5 years respectively to 60-year.

At the time of this inspection, the licensee was still evaluating its planned corrective actions. However, the inspectors determined that the continued noncompliance did not present an immediate safety concern because the licensee were able to show that the calculated qualified service-life was conservative, as discussed in the Description section above.

Because this violation was of very-low safety significance and was entered into the licensee's CAP as AR 04030538, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000373/2017008-02; 05000374/2017008-02, Failure to have Adequate Justification for Extending the life of Lubricant used in EQ Motor Bearings)**

.4 Operating Experience

a. Inspection Scope

The inspectors reviewed one EQ-related operating experience issue(s) associated with the selected components to ensure that associated generic concerns had been adequately evaluated and addressed by the licensee. The operating experience issue(s) listed below was/were reviewed as part of this inspection:

- Event Notification 47693, "Rosemount Pressure Transmitters with Nonzero Based Calibrations," dated February 23, 2012 and April 2, 2012.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

.1 Review of Items Entered Into the Corrective Action Program

a. Inspection Scope

The inspectors reviewed a sample of the selected component problems identified by the licensee and entered into the CAP. The inspectors reviewed these issues to assess the licensee's threshold for identifying issues and the effectiveness of corrective actions related to design issues. In addition, corrective action documents written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the CAP. The specific corrective action documents sampled and reviewed by the inspectors are listed in the attachment to this report.

b. Findings

No findings were identified.

4OA6 Management Meeting

.1 Exit Meeting Summary

On July 14, 2017, the inspectors presented the inspection results to Mr. Harold Vinyard, Plant Manager, and other members of the licensee staff. The licensee personnel acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. The inspectors were informed that none of the materials received were considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

E. Ballou, Engineer
A. Behera, KCI Consultant
K. Berta, Senior Engineer
J. Bieronski, KCI Consultant
S. Desai, Engineer
G. Ford, Regulatory Assurance
E. Harcharik, Engineer
A. Illyas, Engineer
J. Kowalski, Maintenance Director
T. Lanc, Regulatory Assurance
S. Makayee, EQ Engineer
D. Murray, Regulatory Assurance
T. Riddle, Engineering Design Manager
V. Shah, Engineering Director Deputy
J. Stovau, Operations Director
H. Vinyard, Plant Manager
E. Zacharias, KCI Consultant

U.S. Nuclear Regulatory Commission

C. Phillips, Senior Resident Inspector (Acting)

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000373/2017008-01; 05000374/2017008-01	NCV	Failure to Correctly Evaluate/Justify Post-Accident Operability Qualification for the Reliance Motor 1(2)VY03C RHR Pumps Room Cooling Fan (Section 1R21.3.b(1))
05000373/2017008-02; 05000374/2017008-02	NCV	Failure to have Adequate Justification for Extending the life of Lubricant used in EQ Motor Bearings (<u>Section 1R21.3.b(2)</u>)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

CALCULATIONS

<u>Number</u>	<u>Description or Title</u>	<u>Revision</u>
L-002884	Measurement and Test Equipment (M&TE) Acceptability Evaluation	0
NED-I-EIC-0199	Reactor Vessel Low Water Level 1 Emergency Core Cooling System (ECCS) Initiation and Low Water Level 2 Reactor Core Isolation Cooling (RCIC) Initiation Setpoint Error Calculation	0
L-000904	Qualified Service Life of Chevron SRI-2 Grease in EQ Motors	11/22/96

CORRECTIVE ACTION DOCUMENTS GENERATED DUE TO THE INSPECTION

<u>Number</u>	<u>Description or Title</u>	<u>Date</u>
AR04014301	NRC ID. Passport Incorrectly Shows Equipment Records As EQ	05/24/17
AR04025423	NRC ID: EQ-LS037 HMCP BKR Post-Accident Duration Is Wrong	06/25/17
AR04027178	NRC ID: EQ-LS102, Tab E, SEC. 2, Has Incorrect Information	06/29/17
AR04027205	NRC ID: Extraneous Information Found In EQ-LS039	06/29/17
AR04030322	NRC ID: Incorrect Reference for the Torque Value in EQ-LS095	07/10/17
AR04030532	NRC ID: EQ-LS068 Justification of Acc. Qual. Not Adequate	07/11/17
AR04030538	NRC ID: EQ-LS057 Motor Bearing Grease Qualification Issue	07/11/17

CORRECTIVE ACTION DOCUMENTS REVIEWED DURING THE INSPECTION

<u>Number</u>	<u>Description or Title</u>	<u>Date</u>
AR 01337255	Technical Requirements Manual Appendix G, Table 2 Enhancements Needed	03/06/12
AR 01482305	Minor Packing Leakage Opn 2B21-N407C-LSV during LOS-NB-R2	03/02/13
AR 02658563	Missing Label on Valve 1C11-N016C-XX	04/20/16
AR 03961276	2017 NRC DBA EQ Program Inspection Preparation	05/9/17
AR 01449485	Review VY Cooler Fan Motor Bearing Replacement PM	12/07/12
AR 01488249	IEEMA Question on VY Fan PM and Equipment Monitoring Changes	03/15/13

EQ FILES

<u>Number</u>	<u>Description or Title</u>	<u>Date</u>
EQ-GEN017	Environmental Qualification of EGS (Patel) Quick Disconnect Electrical Connectors, Revision 13A	07/07/16

EQ FILES

<u>Number</u>	<u>Description or Title</u>	<u>Date</u>
EQ-LS027	Environmental Qualification of Rosemount Pressure Transmitters Model 1153 Series B, Revision 24	06/22/15
EQ-LS039	Environmental Qualification of SOR® Pressure and Vacuum Switches Models 5N6, 6N6, 9N6, 12N6, & 54N6, Revision 20	04/22/15
EQ-LS057	Environmental Qualification of Westinghouse Standby Gas Treatment Cooling Fan Motor Model TBFC, Revision 12	07/14/15
EQ-LS068	Environmental Qualification of Reliance Electric Company Ventilation Fan Motors Frame 284 TCZ, Revision 15	07/14/15
EQ-LS079	Environmental Qualification of Limitorque Valve Actuators Model SMB/SB, Revision 20A	08/04/16
EQ-LS095	Environmental Qualification of Rosemount Pressure Transmitters Model 1154 Series H, Revision 09	06/15/15
EQ-LS102	Environmental Qualification of Valcor Solenoid Valves-PIN V70900-87-8 Revision 03A	07/07/16

MISCELLANEOUS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
EN 47693	Part 21 Report - Rosemount Pressure Transmitters with Nonzero Based Calibrations (ML12058A141 & ML12094A371)	02/23/12 & 04/02/12
IEEE STD 323	IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations	1974
ML16202A075	Issuance of Renewed Facility Operating Licenses for LaSalle County Station, Units 1 and 2 (TAC Nos. MF5347 & MF5346)	10/19/16
NUREG-0588	Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment	1
EC 372926	EQ Service Life Extension Evaluation of MSIV Components	2
NUC-22	Reliance Electric Company Qualification Report – Nuclear Power Motor Systems End of Life Type Test, Random Wound Motors	02/10/84
NUC-9	Reliance Electric Company Qualification Report – Nuclear Power Motor Systems End of Life Type Test, Random Wound Motors	01/18/00
M-900, Sht. 1	Main Steam Piping	T
WR980122065 01	HELB Add Weep Holes to Panels 2H22-P002, P004, P010 & P026	01/14/99

PROCEDURES

<u>Number</u>	<u>Description or Title</u>	<u>Revision</u>
CC-AA-102	Design Input and Configuration Change Impact Screening	29
CC-AA-103	Configuration Change Control for Permanent Physical Plant Changes	29
CC-AA-203	Environmental Qualification Program	12

PROCEDURES

<u>Number</u>	<u>Description or Title</u>	<u>Revision</u>
CC-AA-203-1001	Environmental Qualification Program Performance Indicators	4
ER-AA-1100	Implementing and Managing Engineering Programs	17
LIP-GM-941	Replacement Procedure for Environmentally Qualified Rosemount 1153 Series B Transmitters	12
LIP-GM-943	Installation of Environmentally Qualified Static "0" Ring (S-O-R) Pressure Switches	11
LIP-GM-966	Replacement Procedure for Environmentally Qualified Rosemount 1154 Series H Transmitters	6
LIS-PC-201	Unit 2 High Drywell Pressure SCRAM, Primary Containment Isolation, and Secondary Containment Isolation Calibration	13
LIS-RD-104	Procedure for Environmentally Qualified Rosemount 1153 Series B Transmitters	18
NES-EIC-30.00	Environmental Qualification Engineering	2
PES-S-002	Shelf Life	8
PES-S-003	In-Storage Maintenance of Nuclear Material	9
SM-AA-102	Warehouse Operations	22
SM-AA-300	Procurement Engineering Support Activities	7
SM-AA-300-1001	Procurement Engineering Process and Responsibilities	21
MA-AA-723-301	Periodic Inspection of Limitorque Model SMB/SB/SBD-000 Through 5 Motor Operated Valves	12
MA-AA-723-300	Diagnostic of Motor Operated Valves	1

SURVEILLANCES (COMPLETED)

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
LIS-NB-204A	Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Refuel Calibration, Revision 0	04/27/90
LIS-NB-204A	Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Refuel Calibration, Revision 2	10/17/91
LIS-NB-204A	Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Refuel Calibration, Revision 3	02/29/92
LIS-NB-204A	Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Refuel Calibration, Revision 3	04/29/93
WR 940062839 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 4	01/11/95
WR 950035941 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 6	06/17/96

SURVEILLANCES (COMPLETED)

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
WR 960061469 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 8	03/22/99
WR 990030108 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 11	09/25/00
WO 99213096 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 13	09/30/02
WO 00563926 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 14	01/25/05
WO 00835432 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 15	07/22/07
WO 01066912 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 15	03/27/09
WO 01273782 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 15	08/16/11
WO 01466790 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 16	08/19/13
WO 01668868 01	LIS-NB-204A, Unit 2 Reactor Vessel Low Water Level 1 ECCS Division 1 Initiation and Level 2 RCIC Initiation Instrument Channels A & C Calibration, Revision 16	11/17/15

VENDOR MANUALS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
Binder#: J-0223, Tab: 005, Doc No: R369-0299	Fisher-Rosemount - Product Manual for Model 1153 Series B Alphaline® Nuclear Pressure Transmitter, Pub 0080901004302, Revision AB, 05/01/99	007
Binder#: J-0223, Tab: 005, Doc No: R369-0330	Rosemount - Rosemount Reference Manual for Model 1153 Series B Alphaline® Nuclear Pressure Transmitter, Pub 0080901004302, Revision BA, 01/01/08	007
Binder#: J-0223, Tab: 009, Doc No: R369-0304	Fisher-Rosemount - Product Manual for Model 1154 Series H Alphaline® Nuclear Pressure Transmitter, Pub 0080901004631, Revision AA, 06/01/99	007

VENDOR MANUALS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
Binder#: J-0223, Tab: 009, Doc No: R369-0320	Rosemount - Rosemount Reference Manual for Model 1154 Series H Alphaline® Nuclear Pressure Transmitter, Pub 0080901004631, Revision BA, 04/01/07	007
Binder#: J-0983, Tab: 002, Doc No: S382-0046	Static O-Ring SOR® Inc. - Differential Pressure Switches for the Nuclear Power Industry, Pub: FORM651, 05/01/07	001
	Valcor- Operation/ Maintenance Manual 3-Way Solenoid Valve, Valcor P/N V70900-87	C
Binder#: J-0687, Tab: 001	Limitorque Corp. - Installation & Maintenance Manual for Type SMB Valve Operators	012

WORK DOCUMENTS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
WO 91046765	Small Leaks Found at High Side of 1B21-N409B Reactor Water Level 8 High Pressure Core Spray Trip, Rosemount Model 1154, Series H Transmitter	09/03/91
WO 01600344	Replace Connector O- Ring, DIV II Inboard HPU Isolation Valve, Conductor Seal Assembly	02/08/2015
WO 01396036-01	Periodic Inspection of 2E12-F068B	04/17/13

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
AR	Action Request
CAP	Corrective Action Program
CFR	<i>Code of Federal Regulations</i>
DBA	Design Bases Assurance
ECCS	Emergency Core Cooling System
EQ	Equipment Qualifications
HELB	High Energy Line Break
IEEE	Institute of Electrical and Electronics Engineers
IMC	Inspection Manual Chapter
IP	Inspection Procedure
LOCA	Loss of Coolant Accident
LSCS	LaSalle County Station
LLC	Limited Liability Corporation
NCV	Non-Cited Violation
NPF	Nuclear Power Facility
NRC	U.S. Nuclear Regulatory Commission
NUREG	U.S. Nuclear Regulatory Commission Technical Report Designation
PM	Preventive Maintenance
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
SDP	Significance Determination Process
SSC	Systems, Structures, and Components
WO	Work Order