UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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July 20, 2017

Mr. Paul Fessler, Senior VP
and Chief Nuclear Officer
DTE Energy Company
Fermi 2 - 210 NOC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI POWER PLANT, UNIT 2—NRC DESIGN BASES ASSURANCE INSPECTION (PROGRAMS): INSPECTION REPORT 05000341/2017010

Dear Mr. Fessler:

On June 15, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial baseline Design Bases Assurance Inspection (Programs) at your Fermi Power Plant, Unit 2 (Fermi 2). 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 June 15, 2017, and on May 26, 2017, with Mr. Caragher and other members of your staff.

Based on the results of this inspection, three NRC-identified findings of very-low safety significance were identified. The findings involved violations of NRC requirements. In addition, one licensee-identified violation was documented in this report. 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 in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the violations or significance of these Non-Cited Violations, 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 III; the Director, Office of Enforcement; and the NRC resident inspector at the Fermi 2 Power Plant.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement 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 III; and the NRC resident inspector at the Fermi 2 Power Plant.

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/

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

Docket No. 50–341
License No. NPF–43

Enclosure:
IR 05000341/2017010

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Letter to Paul Fessler from Mark T. Jeffers dated July 20, 2017

SUBJECT: FERMI POWER PLANT, UNIT 2—NRC DESIGN BASES ASSURANCE INSPECTION (PROGRAMS): INSPECTION REPORT 05000341/2017010

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REGION III

Docket No:	50–341
License No:	NPF–43
Report No:	05000341/2017010
Licensee:	DTE Energy Company
Facility:	Fermi Power Plant, Unit 2
Location:	Newport, MI
Dates:	May 8, 2017, through June 15, 2017
Inspectors:	A. Dahbur, Senior Reactor Inspector, Lead I. Khan, Reactor Inspector J. Robbins, Reactor Inspector
Observers:	M. Greenleaf, RII Reactor Inspector
Approved by:	M. Jeffers, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY

Inspection Report 05000341/2017010; 05/08/2017 – 06/15/2017; Fermi Power Plant, Unit 2; Design Bases Assurance Inspection (Programs).

The inspection was a 2-week onsite baseline inspection that focused on the implementation of the Environmental Qualification Program. The inspection was conducted by three regional engineering inspectors. Three Green findings were identified by the inspectors. The findings were considered a Non-Cited Violation (NCV) 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 0609, "Significance Determination Process," dated October 8, 2015. Cross-cutting aspects are determined using Inspection Manual Chapter 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," dated July 2016.

NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

Green. The inspectors identified a finding of very-low safety significance (Green) and an associated NCV of Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to ensure that the protective devices installed in Motor Control Centers (MCCs) would not spuriously trip during design basis events. Specifically, the licensee did not account for 18 degrees Fahrenheit (F) heat rise inside the MCCs. Protective devices inside MCCs located in harsh environment were evaluated and sized for a maximum elevated temperature up to 156 degrees F instead of 174 degrees F. The licensee captured the inspectors' concern into their Corrective Action Program (CAP) as CARD 17-24412.

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 reasonably concluded the overcurrent protection devices within the scope of DC-6475 would not spuriously trip. The finding did not have a cross-cutting aspect associated with it because it was not representative of current performance. (Section 1R21.3.b(1))

Green. The inspectors identified a finding of very-low safety significance (Green) and an associated NCV of 10 CFR 50.49, Paragraph (e) (1), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," for the licensee's failure to include the correct time-dependent temperature for EQ components in their EQ Program. Specifically, the inspectors identified two examples where the licensee's EQ files failed or incorrectly calculated the Loss of Coolant Accident Post Accident Operating Time for EQ components. The licensee captured the inspectors' concern into their CAP as CARD 17-24760 and 17-24619.

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 assessment and calculated the Loss of Coolant Accident Post Accident Operating Time for these two EQ components and determined that the equipment remained qualified for the environmental conditions. 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))

Green. The inspectors identified a finding of very-low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to translate Environmental Qualification Requirements into Maintenance Procedures. Specifically, the licensee failed to ensure that the Environmental Qualification requirement to replace the top cover gasket on NAMCO EA740 Series Limit Switches was translated to the associated maintenance procedure. In addition, the licensee also failed to ensure that the Environmental Qualification requirement to inspect MCC gaskets was translated to the associated maintenance procedure. The licensee captured the inspectors' concern into their CAP as CARD 17-24629 and 17-24444.

The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of procedure 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 any structure, system, or component. The finding did not have a cross-cutting aspect associated with it because it was not representative of current performance. (Section 1R21.3.b(3))

Licensee-Identified Violations

A violation of very-low safety significance that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's CAP. The violation and corrective action tracking numbers are listed in Section 4OA7 of this report.

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 71111.21N, Attachment 1. The objective of the Design Bases Assurance 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 of the *Code of Federal Regulations* (CFR), Part 50.49, "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, nonsafety-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.

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. The Fermi Power Plant, Unit 2, Probabilistic Risk Assessment was reviewed and used for selecting components, generally 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 break (HELB). Based on these reviews, the inspectors focused the inspection on EQ Program elements and components repaired, modified, or replaced. Components 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 equipment qualifications of supporting sub-components including seals, lubricants, connectors, control and power cables, solenoids, transducers, limit switches, and terminal blocks.

This inspection constituted seven samples (four components of which were located in primary containment) as defined in Inspection Procedure 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 HELB 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. The inspectors reviewed procurement records and inspected a sample of replacement parts stored in the warehouse to verify EQ parts approved for installation in the plant were properly identified and controlled; and that storage time and environmental conditions did not adversely affect the components' qualified life or service life. Documents reviewed for this inspection are listed in the Attachment. The following seven EQ components (samples) were reviewed:

- NB DIV1 Safety Relief Valve (B21F013A), EQ Zone 22, Raychem Splice (WCSF-N), Electrical Connector (880701-04);
- NB DIV1 Safety Relief Valve Tail Pipe Pressure Switch (B21N410A), EQ Zone 22;
- Standby Gas Treatment System Refueling Area Inlet Valve (T46F415), EQ Zone 4;
- RWCU Steam Leak Detector Pump "A" Room T/C (G33N016A), EQ Zone 19K;
- 480 MCC 72-F (R1600S003D), EQ Zone 18;
- Drywell Primary Electrical Penetration (T2301X102A), EQ one 22/24; and
- NB RPV Steam Line "A" Isolation Valve position Switch (B21N522A), EQ Zone 22.

b. Findings

(1) Failure to Account for Internal Heat Rise for Protective Devices Settings

Introduction: The inspectors identified a finding of very-low safety significance (Green) and an associated Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to ensure that the protective devices installed in the Motor Control Centers (MCC) would not spuriously trip during design basis events. Specifically, the licensee did not account for an 18 degrees Fahrenheit (F) heat rise inside the MCCs. Protective devices inside the MCCs located in a harsh environment were evaluated and sized for a maximum elevated temperature of up to 156 degrees F instead of 174 degrees F.

Description: The setpoint and coordination for 13.2KV, 4.16KV and 480V protective devices Calculation DC-6475 evaluated the functionality of the overcurrent protection devices using the maximum ambient temperature. For MCCs located in EQ zones, the protective devices were evaluated for a maximum ambient temperature of up to 156 degrees F which was obtained from EQO-EF2-018, "Summary of Environmental Parameters for use in the Fermi 2 EQ Program."

However, the inspectors noted that the Electrical EQ File EQ1-EF2-143, "Motor Control Center and Hydrogen Recombiner Components," referenced a thermal imaging study (Work Request 000Z053343) and a Qualification and Test Summary Report (CC-75-195, Revision 1), which stated that ITE Gould Series 5600 MCC units experienced an internal heat rise of 10 degrees C (18 degrees F) greater than the ambient temperature.

The inspectors were concerned that the heat rise of 18 degrees F was not included nor justified in Calculation DC-6475 for sizing the overcurrent protection devices such as fuses, breakers, and overloads. The inspectors determined that EQ MCCs internal protection devices should be designed and evaluated for 174 degrees F (156 degrees F plus the internal heat rise of 18 degrees F) instead of 156 degrees F to ensure that these devices would not spuriously trip.

In addition, Specification 3071-128-EZ-01, the Electrical Design Instructions for Power and Control Fuse Sizing, did not include the requirement to consider the MCC internal temperature heat rise. It only included the requirement for considering the ambient EQ temperature. Based on the inspectors' questions, the licensee determined that this specification need to be updated to include the MCC internal heat rise.

The licensee captured the inspectors' concern into their CAP as CARD 17-24412. As an immediate corrective action, the licensee performed a preliminary evaluation that reasonably concluded the overcurrent protection devices within the scope of DC-6475 would not spuriously trip. There was design margin between the trip curve and the load current. Hence, the EQ equipment safety function was not impacted.

Analysis: The inspectors determined that the failure to ensure that the protective devices installed in MCCs would not spuriously trip during design basis events was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," 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 evaluate/size the protective devices for the maximum elevated ambient temperature of 174 degrees F did not ensure that these devices would not spuriously trip and would be available to perform their mitigating functions.

The inspectors determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," 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 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 reasonably determined that protective devices would not spuriously actuate because they were able to show there was still a reasonable design margin between the trip curve and the full load current associated with these devices.

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 associated evaluations were performed more than 3 years ago.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures shall be established for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, as of May 11, 2017, the licensee failed to verify the adequacy of design associated with the safety-related protective devices located inside MCCs. Specifically, the licensee did not verify that the protective devices would not spuriously trip for a maximum elevated ambient temperature of 174 degrees F during design basis events, which would render the affected loads nonfunctional.

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 reasonably determined 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 CR 17-24412, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. (**NCV 05000341/2017010-01, Failure to Account for Internal Heat Rise for Protective Devices Settings**)

(2) Failure to Correctly Calculate the Post Accident Operating Time

Introduction: The inspectors identified a finding of very-low safety significance (Green) and an associated NCV of 10 CFR 50.49, Paragraph (e) (1), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," for the licensee's failure to include the correct time-dependent temperature for EQ

components in their EQ Program. Specifically, the inspectors identified two examples where the licensee's EQ files failed or incorrectly calculated the Loss of Coolant Accident (LOCA) Post Accident Operating Time (PAOT) for EQ components.

Description: Institute of Electrical and Electronics Engineers Standard 121205-2000, "Guide for Assessing, Monitoring and Mitigating Aging Effects on Electrical Equipment used in Nuclear Power Generating Station and other Nuclear Facilities," described a simple method to model a discrete set of "time at temperature" intervals to derive an equivalent Arrhenius weighted average temperature for the entire modeled period. The licensee used this method to establish PAOTs for various components. The PAOT was justified by comparing the accident test time/temperature profile to the required plant accident time/temperature profile. This comparison was made by calculating the equivalent duration of the tested and required profile at one base temperature applying the Arrhenius equation. During the inspectors' review of the EQ files, the inspectors identified two examples of a performance deficiency for the licensee failure to correctly calculate the PAOT as discussed below.

Example 1

Electrical EQ File EQ1-EF2-143, "Motor Control Center and Hydrogen Recombiner Components," Section 1.0, determined that the worst-case required PAOT for MCCs installed in EQ application was 100-day for LOCA and 2-day for HELB.

Section 5.0 of EQ1-EF2-143 established the requirements for calculating the PAOT for the EQ MCCs. The EQ file considered the MCCs were in a harsh environment for radiation only during a LOCA event and harsh for radiation plus temperature during HELB event. The LOCA qualification for the 100-day temperature profile was not evaluated because it did not meet the Fermi harsh environment criteria. The 100-day LOCA temperature profile peak was 136 degrees F for EQ Zones in which the MCCs EQ components were installed. This temperature peak value did not exceed the Fermi temperature threshold criteria for harsh environment of 140 degrees F.

Reference 20.1 in the EQ file, indicated that the MCC components experienced a 10 degrees C (18 degrees F) internal heat rise due to the MCC enclosure. Therefore, the inspectors were concerned that the evaluation failed to consider the heat rise inside the MCCs for post LOCA conditions. The MCCs' internal devices would experience an ambient temperature peak value greater than the threshold temperature for harsh environment of 140 degrees F. The inspectors determined that the EQ file failed to consider the MCCs were located in a harsh environment due to temperature for post LOCA conditions.

Example 2

Acton Environmental Testing Corporation Report 16436-82N initially tested multiple Pyco temperature sensor specimen to a 30-day LOCA profile. Some of the specimen failed due to moisture intrusion. Test specimen Number 21 and 28 represented the Pyco temperature element equipment model number installed at Fermi 2. One element of the dual element test specimen Number 28 failed within the first hour of the Design Basis Event simulation, but the second element of the specimen functioned throughout the initial 30-day LOCA test. The failed sample Number 28 subsequently had thread sealant/lubricant applied to the terminal head cover threads to aid in properly torqueing

the terminal head cover to 50 foot-pounds. The properly torqued samples were submitted to a second 15-day LOCA test and passed. The test report indicated that the second LOCA test was less severe than the first LOCA test.

The inspectors noted that the licensee incorrectly used the 30-day LOCA profile for which the test specimen failed to calculate/evaluate the LOCA PAOT for the temperature elements installed at Fermi 2.

The licensee captured both of the inspectors' concerns into their CAP as CARD 17-24760 and 17-24619. As an immediate corrective action, the licensee performed preliminary assessments that reasonably concluded that the revised LOCA PAOT for both issues were acceptable and exceeded the 100-day LOCA required profile. Hence, the EQ equipment safety function was not impacted.

Analysis: The inspectors determined that the failure to correctly calculate the LOCA PAOT for two EQ components was contrary to 10 CFR 50.49, Paragraph (e) (1), 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 calculate the LOCA PAOT for these two EQ components did not ensure the reliability of these components to perform their mitigating functions post-accident.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," 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 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 preliminary assessments and calculated the LOCA PAOT for these two EQ components and determined that the equipment remained qualified for the environmental conditions for which they could be exposed.

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 associated EQ files were established more than 3 years ago.

Enforcement: Title 10 CFR 50.49, Paragraph (e) (1), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," states, in part, that the electrical Equipment Qualification Program must include and be based on a list of 8 items. Item (1) stated, "The time-dependent temperature and pressure at the location of the electrical equipment important to safety must be established for the most severe design basis accident during or following which this equipment is required to remain functional."

Contrary to the above, as of May 27, 2017, the licensee failed to correctly establish the time-dependent temperature and pressure for two EQ components. Specifically, the licensee failed to correctly calculate the LOCA PAOT for Pyco temperature element and

ITE Gould MCCs located in harsh environment to ensure that equipment were qualified for the environment. In the case of Pyco temperature element, the licensee incorrectly used the 30-day LOCA profile for the failed specimen instead of the 15-day LOCA profile for the successfully tested specimen. In the case for the MCCs, the licensee failed to account for the heat rise inside the MCCs and hence failed to evaluate the MCCs for harsh environment for post-LOCA temperature.

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 reasonably 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 CARD 17-24619 and 17-24760, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.
(**NCV 05000341/2017010-02, Failure to correctly calculate the Post Accident Operating Time**)

(3) Failure to Translate Environmental Qualification Requirements into Maintenance Procedures

Introduction: The inspectors identified a finding of very-low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to translate EQ Requirements into Maintenance Procedures. Specifically, the licensee failed to ensure that the EQ requirement to replace the top cover gasket on NAMCO EA740 Series Limit Switches was translated to the associated maintenance procedure. In addition, the licensee also failed to ensure that the EQ requirement to inspect Motor Control Center gaskets was translated to the associated maintenance procedure.

Description: The inspectors reviewed EQ File NE-6.6-EQMS.169, Maintenance and Surveillance Requirement for EQ1-EF2-327, and noted that the top cover gasket and screw assemblies for Environmentally Qualified NAMCO EA740 Series Limit Switches must be replaced each time the top cover gasket is removed per Section III.D of the EQ file. The inspectors also reviewed Maintenance Procedure 46.000.032 Revision 26, Calibration of Environmentally Qualified Limit Switches, and noted that Step 6.4.4 stated, "Replace top cover gasket if damaged." The inspectors determined that the guidance in the Procedure 46.000.032 was contrary to the qualification requirements as stated in the referenced EQ File. Specifically, the maintenance procedure did not ensure replacement of the top cover gasket and screw assemblies when the top cover is removed as required per the EQ file documentation. The inspectors were concerned that the instruction in Procedure 46.000.032 allows reinstallation of a gasket that would invalidate the EQ of the limit switch. The licensee entered this issue into the CAP as CARD 17-24629, NAMCO limit switch calibration Procedure 46.000.032 does not meet EQ requirements. The licensee's immediate corrective action included revising Procedure 46.000.032 to include guidance to replace the top cover gasket whenever the top cover is removed.

The inspectors completed a walkdown of MCC 73C-F and noted that Cubicle 1A did not have a gasket seal installed on the door. The inspectors also reviewed Qualification Summary Report CC-74-196, Revision 1, and noted that it stated that the MCC gaskets should be monitored for deterioration and emphasized that the gasket should be

inspected for improper sealing. In addition, the inspectors noted that the MCC was aged and tested with the gasket seal installed. The inspectors reviewed Maintenance Procedure 35.306.018, Spectrum Technology Load Compartment, and noted that the procedure did not contain any instructions to inspect the gasket seal. The inspectors were concerned that the failure to include instructions in procedure 35.306.018 invalidates the EQ of the MCC by failing to perform maintenance required to maintain EQ. The licensee entered this issue into the CAP as CARD 17-24444, Revision to Procedure 35.306.018. The licensee's immediate corrective action included revising Procedure 35.306.018 to include guidance to inspect the MCC gasket.

Analysis: The inspectors determined that the licensee's failure to translate the EQ Requirements into Maintenance Procedures 46.000.032 and 35.306.018 was contrary to the requirements of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and a Performance Deficiency.

The performance deficiency was determined to be more-than-minor because it was associated with the Mitigating Systems cornerstone attribute of procedure 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 instructions in the maintenance procedures allowed the re-installation of an existing gasket for the limit switch and did not ensure gasket inspections were completed on the MCC, both of which invalidate the EQ for the these components.

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," Table 2 the inspectors determined the finding affected the Mitigating Systems cornerstone. As a result, the inspectors determined the finding could be evaluated using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2 for the Mitigating Systems cornerstone. The finding screened as very-low safety significance (i.e., Green) because it did not result in the loss of operability or functionality of any SSC. Specifically, the inspectors did not find any examples of Environmentally Qualified NAMCO EA740 Series limit switches where the top cover gasket was re-used. In addition, the licensee determined that MCC 73C-F maintained operability absent the gasket seal because the missing seal was on a spare compartment and the environment which the MCC was located was less severe than the testing environment.

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 associated maintenance procedures were established more than 3 years ago.

Enforcement: 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 are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, prior to May 12, 2017, the licensee failed to assure that the design basis (i.e., EQ Requirements) was translated into Procedures 46.000.032 and 35.306.018. Specifically, the licensee did not incorporate the EQ Requirement to replace the top cover gasket for NAMCO EA740 Series Limit Switches whenever the top cover is removed into Procedure 46.000.032. In addition, the licensee did not incorporate the EQ Requirement to inspect MCC Gaskets into Procedure 35.306.018.

This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very-low safety significance and was entered into the licensee's CAP as CARD 17-24629 and 17-24444. The licensee's immediate corrective action included revising the procedures to include guidance to implement the appropriate EQ Requirements. (**NCV 05000341/2017010-03, Failure to Translate Environmental Qualification Requirements into Maintenance Procedures**)

.4 Operating Experience

a. Inspection Scope

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

- IN 84-57, "Operating Experience Related to Moisture Intrusion in Safety-Related Electrical Equipment at Commercial Power Plants;"
- IN 86-53, "Improper Installation of Heat Shrinkable Tubing;" and
- IN 83-72, "Environmental Qualification Testing Experience."

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(s)

.1 Exit Meeting Summary

The inspectors presented the inspection results to Mr. Caragher, and other members of the licensee staff on May 26, 2017, and June 15, 2017. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary.

4OA7 Licensee-Identified Violations

The following violation of very-low significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a NCV.

- Title 10 CFR 50.49, Paragraph (k), stated, in part, that licenses are not required to requalify electric equipment important to safety in accordance with the provisions of this section if the Commission has previously required qualification of that equipment in accordance with, "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979 (DOR Guidelines), or NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment." Paragraph (k)(1), stated, in part, that replacement equipment must be qualified in accordance with the provisions of this section unless there are sound reasons to the contrary. Contrary to these requirements, as of May 22, 2017, the licensee failed to replace Category II equipment with Category I qualified equipment. Specifically, General Electric vertical pump Residual Heat Removal motors were qualified to NUREG 0588 Category II originally. When they were refurbished by Westinghouse in 1990's, a mixed qualification was developed via analysis only instead of testing of specimens as required for Category I qualified equipment. This violation was identified by the licensee during self-assessment and was entered into the licensee's CAP as CARD 16-25611. The licensee plan to replace the pump motors with new motors that meet NUREG-0588 Category I requirement.

  The inspectors determined that the performance deficiency was of 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 licensee's failure to replace the Residual Heat Removal pump motor with qualified Category I motors did not ensure the reliability of the replacement motors.

  The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," 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 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

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

L. Bennett, Director, Nuclear Operations
M. Caragher, Executive Director, Nuclear Production
J. Haas, Supervisor, Licensing
H. Heidarisafa, Engineer, Plant System Engineering
K. Hullum-Lawson, Manager, Plant Support Engineering
E. Kokosky, Director, Organization Effectiveness
J. Louwers, Manager, Nuclear Quality Assurance
S. Maglio, Manager, Licensing
K. Mann, Supervisor, Regulatory Compliance
R. Matuszak, Manager, Plant Systems Engineering
B. Mayer, Engineer, Plant Support Engineering
D. Noetzel, Director, Nuclear Engineering
W. Raymer, Director, Nuclear Maintenance
R. Sloan, Engineer, Plant Support Engineering
P. Summers, Nuclear Support

U.S. Nuclear Regulatory Commission

B. Kemker, Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000341/2017010-01	NCV	Failure to Account for Internal Heat Rise for Protective Devices Settings (Section 1R21.3.b(1))
05000341/2017010-02	NCV	Failure to Correctly Calculate the Post Accident Operating Time (Section 1R21.3.b(2))
05000341/2017010-03	NCV	Failure to Translate Environmental Qualification Requirements into Maintenance Procedures (Section 1R21.3.b(3))

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 of 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

Number	Description or Title	Date or Revision
NEDC-31336P-A	General Electric Instrument Setpoint Methodology	09/1996
DC-3219	Vol. 1 Class 1E Equipment Qualification Review Nuclear - Boiler System	E
DC-3233	Vol. 1 Class 1E Equipment Qualification Review; Wire, Cable, Conduit Seals and Miscellaneous Electrical Interface Components	G
DC-3236	Vol.1 Class 1E Equipment Qualification Review Standby Gas Treatment System	B
DC-4564	Vol. 1 SRV Tailpipe Pressure Switch Surveillance Calibration	C

CORRECTIVE ACTION DOCUMENTS GENERATED DUE TO THE INSPECTION

Number	Description or Title	Date or Revision
17-24325	2017 CDBI EQ - Minor Grease Leak on E4150F001	05/09/17
17-24332	Housekeeping Items Identified during Plant Tour	05/09/17
17-24372	Create Work Order to Install Gasket on MCC 72C-F	05/10/17
17-24376	Enhancement of EQ File EQ1-EF2-036	05/10/17
17-24412	MCC Internal Heat Rise Impact to MCC Overcurrent Protection	05/11/17
17-24614	Enhancement of EQ File EQ1-EF2-0143	
17-24619	Enhancement of EQ File EQ1-EF2-036	
17-24417	(Discrepancy in EQ documentation for Conax Electrical Penetrations)	05/12/17
17-24444	EQ Revision to 35.306.018	
17-24435	Enhancement of EQ file EQ1-EF2-001	05/12/17
17-24438	Enhancement of EQ File EQ1-EF2-029	05/12/17
17-24556	Enhancement of EQ File EQ1-EF2-081	05/17/17
17-24592	WO 44244695 lacks specific work steps for EQ requirements	05/18/17
17-24612	Inappropriate removal of cables from EQ program	05/19/17
17-24629	NAMCO Limit switch calibration procedure 46.000.032 does not meet EQ requirements	05/20/17
17-24647	WO B961100100 was released to work with incorrect installation instructions (EQ requirements)	05/21/17

CORRECTIVE ACTION DOCUMENTS REVIEWED DURING THE INSPECTION

Number	Description or Title	Date or Revision
14-26019	SRV 'A' Tailpipe Temperature Recorder showed a step change from 186 degrees to 213 degrees over a 4-hour period on 7/18/2014	07/24/14
14-27874	SRV A Tailpipe Temperature Indicates Valve Has Slight Leakage	10/07/14
15-28500	Division 2 SRV Cables ,Replacement	10/31/15
17-22272	2017 EQ Program QHSA Deficiency, TMPE 17-0055: DSN: EQ1-EF2-001 (Pressure Switch)	03/21/17
17-21471	Replace broken label	02/21/17
16-25611	EQ Files Lack Formal Documentation for the use of Sound Reason to the Contrary	07/14/16

DRAWINGS

Number	Description or Title	Date or Revision
7087-10000	Composite Section Electrical Penetration Assemblies – Installation	B

EQ FILES

Number	Description or Title	Date or Revision
EQ1-EF2-143	MCC and Hydrogen Recombiner Components	06/18/07
EQ1-EF2-143A	Retrofit Buckets for ITE Gould MCC and Bussmann Fuses	01/30/12
EQ1-EF2-029	Nuclear Cable Sleeves	D
EQ1-EF2-031	Transition Splice Kit	E
EQ1-EF2-099	Small Conductor "V" Stub Connection Kit, Nuclear End Sealing Kit, and Nuclear Cable Breakout Kit	F
EQ1-EF2-327	Limit Switches and Receptacle Assemblies & Connector/Cable Assemblies	0
EQ1-EF2-081	Medium Voltage Power (MVP), Low Voltage Power/Control (LVP/C), and Low Voltage Instrumentation (LVI) Electrical Penetrations	D
EQ1-EF2-317	Quick Disconnect w/pin half integral to ½ SMS-S-02-1 SRV Solenoid	A
EQ1-EF2-155	3-Way Solenoid Valve and Manifold Assembly	D
EQ1-EF2-029	Raychem Nuclear Cable Sleeves	D
EQ1-EF2-052A	Series NP8316, NP8320, and NP8321 (K and L Variants and Suffix E and V) Solenoid Valves	F
EQ1-EF2-001	Qualification Evaluation Report for Pressure Switch A17-1P	A
EQ0-EF2-018	Summary of Environmental Parameters for use in the Fermi 2 EQ Program	M
NE-6.6-EQMS.018	EQ Maintenance and Surveillance Requirement for EQ1-EF2-029	2
NE-6.6 EQMS.071	EQ Maintenance and Surveillance Requirement for EQ1-EF2-155	9

EQ FILES

Number	Description or Title	Date or Revision
NE-6.6-EQMS.031	EQ Maintenance and Surveillance Requirement for EQ1-EF2-052A	16
NE-6.6-EQMS.002	EQ Maintenance and Surveillance Requirement for EQ1-EF2-001	2
24A1206CA	GE Pressure Switch Environmental Qualification Report	4

MISCELLANEOUS

Number	Description or Title	Date or Revision
IN 83-72	Environmental Qualification Testing Experience	
VMC1-206	GE Vendor Manual for Pressure Switch Type A17-1P Model 219B4684	0
AQR67368	Test Report for ASCO NP-1 Solenoid Valves	1
3071-128-EG	Design Specification for pull boxes, NEMA enclosures, terminal boxes and splice enclosures	AL
Rockbestos QR 6802	Report on Qualification Test for ROCKBESTOS Adverse Service Coaxial, Twinaxial, and Triaxial Cable Genric Nuclear Incident for Class 1E Service in Nuclear Generating Stations	07/02/87
VME5-7.1	Vendor Manual - ITE 5600 Series MCC	E
CC-74-195	Class 1E Motor Control Center	1

MODIFICATIONS

Number	Description or Title	Date or Revision
TSR-37275	Revise NE-1.1.16.9-EQE: Table 3-5, EQ0-EF2-018: Table 5, Remove Rockbestos RSS-6-105 Firewall III – First Generation Coaxial Cable from EQ Harsh Program and Cancel five AFC sections of the file EQ-EF2-087	0
TSR-27994	Revise QA Level of Reactor Recirculation Pump Motors from QA Level-IM to QA Level-1.	A
ABN-26702-1	Revise the CECO Database, P44 System Design Basis Document P44-00 and EQR Design Calc. DC- 3766 (as appropriate) to: downgrade the Limitorque actuators for MOVs P4400F608 and P4400F614 from EQ (NUREG 0588 Appendix E Safety Category 2A) to non-EQ (NUREG 0588 Appendix E Safety Category 2C) and revise the valve classification from NUREG 0588 Appendix E Safety Category 2A to 2B.	0

MODIFICATIONS

Number	Description or Title	Date or Revision
TSR-37821	CARD 16-25611 (EQI1-EF2-020 and -058 lack formal documentation for the use of "Sound Reasons), CARD 17-22277 (EQ1-EF2-038 Okonite Okoprene Cable), 17-22290 (EQ l-EF2-220 MSIV PNEUMATIC MANIFOLD), 17-22327 (EQ 1-EF2-029, Raychem Shrink Tubing), CARD 06-22179, "Additional penetrations identified that require post LOCA radiation shine evaluation" (EQO-EF2-018), and CARD (17-22274) Corrections of the typographical errors in DC-6530.	0

PROCEDURES

Number	Description or Title	Date or Revision
NE-6.6-EQMS.018	Environmental Qualification (EQ) Maintenance and Surveillance Requirements for EQ1-EF2-029	2
NE-6.6-EQMS.019	Environmental Qualification (EQ) Maintenance and Surveillance Requirements for EQ1-EF2-031	2
NE-6.6-EQMS.062	Environmental Qualification (EQ) Maintenance and Surveillance Requirements for EQ1-EF2-099	2
NE-6.6-EQMS.169	Environmental Qualification (EQ) Maintenance and Surveillance Requirements for EQ1-EF2-327	0
NE-6.6-EQMS.052	Environmental Qualification (EQ) Maintenance and Surveillance Requirements for EQ1-EF2-081	3
MES51	Preventive Maintenance Program	17

WORK DOCUMENTS

Number	Description or Title	Date or Revision
B961100100	Replace Inboard MSIV ‘A’ Position Switches per NES-6.6-EQMS.169	10/04/15
44244695	Troubleshoot Indication light T5000F420B	11/04/15
42706541	Replace Multi-Pin Connector Assembly PER NE-6.6-EQMS.141 DIV 2	11/20/15
1412090100	Replace Multi-Pin Connector Assembly PER NE-6.6-EQMS.141	11/07/15
47169785	Replace/Extend Cabling to Support Solenoid Valve Replacement	03/30/17
D996060100	Replace Solenoid Valve Assembly B31FO14A Required by NE-6.6-EQMS.031.	04/08/17

LIST OF ACRONYMS USED

°F	Fahrenheit Degrees
CAP	Corrective Action Program
CFR	*Code of Federal Regulations*
EQ	Equipment Qualifications
HELB	High Energy Line Break
IMC	Inspection Manual Chapter
LOCA	Loss of Coolant Accident
MCC	Motor Control Center
NCV	Non-Cited Violation
NRC	U.S. Nuclear Regulatory Commission
PAOT	Post Accident Operating Time
SDP	Significance Determination Process
SSC	Systems, Structures, and Components