U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/89026(DRS)

Docket No. 50-341 License No. NPF-43

Licensee: The Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

Facility Name: Fermi 2 Nuclear Power Station

Inspection At: Fermi 2 Site

Inspection Conducted: September 19 through October 2, 1989

Inspector: M. J. Kopp — Date: 10/19/89

Also participating in the inspection
and contributing to the report:
Quin Decker, INEL

Approved By: R. N. Gardner, Chief
Plant Systems Section — Date: 10/19/89

Inspection Summary

Inspection on September 19 through October 2, 1989 (Report No. 50-341/89026(DRS))
Areas Inspected: Special announced safety inspection of licensee actions regarding previously identified Environmental Qualification (EQ) inspection findings, and concerns regarding water/moisture intrusion into EQ equipment.
Results: Of the two areas inspected, one Severity Level IV violation (Paragraph 3) of 10 CFR 50.49, Paragraphs (f) and (g), was identified. The violation pertains to the licensee's failure to ensure qualification of installed Raychem splices and for failure to have an EQ test on file that demonstrated the qualification of T&B nylon wire caps. The violation concerns deficiencies identified as a result of the NRC EQ team inspection conducted in 1987. This current inspection revealed that the licensee has resolved previously identified NRC EQ inspection findings as well as water/moisture intrusion concerns.

DETAILS

1. Persons Contacted

a. Detroit Edison Company (DECo)

+S. Catola, Vice President, Nuclear Engineering
+G. Cranston, General Director, Nuclear Engineering
+R. Stafford, General Director, Quality Assurance
+D. Gipson, Plant Manager
+L. Schuerman, General Supervisor, Nuclear Engineering
+J. Walker, General Supervisor, Plant Engineering
+R. Matthews, Acting Superintendent, Maintenance
L. Goodman, Director, Licensing and Compliance
*+Q. Duong, Supervisor, Nuclear Engineering
+T. Riley, Supervisor, Licensing and Compliance
+J. Green, Supervisor, Plant Engineering
D. Drotar, Supervisor, Nuclear Training
+L. Collins, Acting Supervisor, Plant Engineering
*+L. Raisanen, Lead Engineer, Environmental Qualification
R. Haupt, Lead Engineer, Instrumentation and Control
*+K. Bandyopadhyay, Senior Engineer
+J. Pendergast, Licensing Engineer
+J. Kilpatrick, Engineer, Environmental Qualification
+B. Stone, Maintenance Coordinator
P. McLanish, Maintenance
+M. Baxi, Engineer, Environmental Qualification

b. Sargent and Lundy Engineers (S&L)

*+M. Spisak, Senior Project Engineer
B. Pikelny, Project Engineer
+A. Behera, Consultant

+Denotes those participating at the interim site exit on September 22, 1989.

*Denotes those participating in the final exit on October 2, 1989.

2. Licensee Actions on Previously Identified NRC Findings

a. (Closed) Open Item (50-341/87039-001(DRS)):

This item addressed the licensee's EQ maintenance and surveillance program. The inspector observed that certain EQ requirements had not been incorporated into the licensee's maintenance and surveillance programs, and that several EQ maintenance requirements had not been implemented in the field. The licensee stated that the Fermi 2 SER, Supplement No. 5, Section 3.11.5, allowed Fermi 2 to not fully implement their EQ maintenance program until the plant reached full power operation. In response to the inspector concerns, the licensee

agreed to incorporate all EQ maintenance and surveillance requirements into their EQ program, review past maintenance and surveillance records to verify if any EQ equipment had been compromised, and implement all EQ maintenance and surveillance requirements prior to full power operation.

During this inspection, the inspector performed a selected review of the licensee's EQ maintenance and surveillance program. The inspector determined that the licensee incorporated EQ maintenance and surveillance requirements into the EQ program, reviewed past maintenance records to ensure maintenance was performed, and implemented all EQ maintenance requirements prior to full power operation.

No further NRC concerns were identified.

b. (Closed) Open Item (50-341/87039-02(DRS)):

This item addressed a generic industry concern regarding BWR containment temperatures exceeding the temperatures considered in the aging calculations of 10 CFR 50.49 designated equipment. The licensee stated that in order to address this NRC concern, the Fermi 2 Nuclear Station initiated a program for monitoring drywell area temperatures during power ascension. Input from this program was used to validate analytical values used to determine the qualified life of Fermi 2 EQ equipment.

During this inspection, the inspector reviewed the licensee's program to verify and recalculate the qualified life of affected EQ equipment. The original temperature used to calculate qualified life of EQ equipment in the drywell was 135°F. The program to monitor drywell temperatures was completed in 1988, and the results outlined in a DECo letter, NE-88-0117 dated November 7, 1988, from Nuclear Engineering to Licensing. As a result, the drywell was divided into 6 zones and the highest temperature recorded in the particular zone was used as the temperature for recalculating qualified life for the EQ equipment in the zone.

No further NRC concerns were identified.

c. (Closed) Unresolved Item (50-341/87039-003(DRS)):

This item addressed deficiencies in the installation of Raychem splices used in 10 CFR 50.49 circuits. Most deficiencies appeared to be qualifiable; however, some deficiencies were not demonstrated to be qualifiable.

During this inspection, the inspector reviewed the licensee's corrective actions regarding deficient Raychem splices in EQ circuits. The licensee's failure to demonstrate qualification of Raychem splices prior to the EQ deadline of November 30, 1985, is considered a violation of NRC requirements. This unresolved item is considered closed; however, further discussion of this item is contained in Paragraph 3.a of this report.

d. (Closed) Unresolved Item (50-341/87039-004(DRS)):

This item addressed the installation of Thomas and Betts (T&B) nylon wire caps in over 58 EQ Limitorque operators. Qualification of the nylon wire caps was not demonstrated by the Limitorque test report. The licensee reworked five of the actuators and installed Raychem splices, and determined that the remaining operators would either not see condensing steam or would not be affected by steam conditions.

During this inspection, the inspector reviewed the licensee's corrective actions regarding the use of T&B nylon wire caps in EQ Limitorque operators. The licensee's failure to demonstrate qualification of T&B nylon wire caps prior to the EQ deadline of November 30, 1985, is considered a violation of NRC requirements. This unresolved item is considered closed; however, further discussion of this item is contained in Paragraph 3. of this report.

e. (Closed) Violation (50-341/87039-006(DRS)):

This item addressed the qualification of Weidmuller SAK terminal blocks for use inside the drywell in 120 VAC control, 460 VAC power, and thermocouple instrumentation circuits. The inspector noted that the test data did not conclusively demonstrate operability of the terminal blocks at 460 VAC, in that, whenever cold sprays were initiated during the test, the one ampere circuit breakers would fail. Failure of the one ampere circuit breakers did not occur when the 600 VAC applied voltage was reduced to approximately 150 VAC. Therefore, operability at 460 VAC was not demonstrated. Subsequent to this finding, the licensee provided additional documentation to demonstrate that the terminal blocks were qualifiable.

During this inspection, the inspector reviewed the licensee's EQ file, EQ-1-EF2-101, dated January 13, 1988, concerning the analysis of Weidmuller type SAK terminal blocks used in 460 VAC applications. The licensee's response to the violation committed to revision of the EQ file to incorporate the additional data. The file was revised and contained additional test data and analysis to support qualification of the terminal blocks.

No further NRC concerns were identified.

f. (Closed) Violation (50-341/87039-007(DRS)):

This item addressed qualification of AVCO solenoid valve assemblies for use inside the drywell and steam tunnel on the MSIVs. The assembly failed the functional EQ test by sticking in an intermediate position. The valve was disassembled and the failure researched. The failure was determined to have been caused by the hardening of the Parker Super-O-Lube lubricant. The lubricant was removed and the assembly was lubricated with a Houghton 620. A functional test

was satisfactorily performed after reassembly. LOCA testing was then performed. The assembly was functionally tested and again stuck in the intermediate position. This failure was determined to be the result of lubrication failure at high radiation. The inspectors were concerned that based on inadequate test documentation, operability under accident conditions had not been addressed. The licensee provided additional documentation in their files to support the Parker Super-O-Lube qualification for radiation; however, the inspectors concluded that the file did not demonstrate the qualification of the AVCO when operated in conjunction with the lubricant under radiation conditions. Subsequent to this finding, the licensee provided additional documentation to demonstrate that these valves were qualifiable.

During this inspection, the inspector reviewed the licensee's EQ file, EQ1-EF2-220, dated January 14, 1988, concerning AVCO solenoid valve assemblies used in EQ applications. The licensee's response to the violation committed to revising the EQ file to incorporate the additional data. The file was revised and contained additional test data and analysis to support qualification of the AVCO solenoid valves.

No further NRC concerns were identified.

g. (Closed) Open Item (50-341/87039-008(DRS)):

This item addressed instrument loop accuracy calculations to justify the performance of EQ instruments and their interfaces during harsh accident conditions. Fermi 2 SSER 5, Section 3.11.5.1, stated that the Technical Specifications for instrument channel setpoint allowable values issued for General Electric BWR plants were sufficiently conservative to permit licensing of the Fermi plant. The SER, however, required the licensee to perform a confirmatory review of plant specific loop accuracy to verify that all EQ instruments would perform satisfactorily under harsh conditions. The inspectors reviewed six instrument loops and concluded that the loop accuracy was consistent with the plant Technical Specifications. Based on NRR's SER comments as well as a Region III discussion with NRR on this subject, the inspectors identified no immediate safety concerns regarding the operability of the plant. The licensee stated that they had completed their confirmatory review for about 30% of the plant instrument loops but did not expect to complete this review by full power operation. The licensee was informed by the inspectors that even though this issue would be further reviewed with NRR, Region III expected the licensee to have completed their confirmatory review for the accuracy of all affected instrument loops prior to full power operation. In response to the inspector's concerns, the licensee agreed to complete the confirmation/review. Completion of the review was documented in a letter, NRC-88-0186, dated July 22, 1988, from DECo to the NRC.

During this inspection, the inspector reviewed the licensee's EQ file, EQO-EF2-021, dated September 19, 1989, "Harsh Environment Effects on Instrument Accuracy." This document provided evidence that the licensee has completed the design calculations which address the effects of harsh environments on EQ instrument accuracy. The data obtained from the design calculations were factored into the licensee's instrument loop setpoint calculations. Based upon the completion of the licensee's review of the effects of harsh environments on EQ instrument accuracy, this item is considered closed.

No further NRC concerns were identified.

3. Raychem Splices and Limitorque Nylon Wire Caps

a. During this inspection, the inspector reviewed the licensee's corrective actions regarding Raychem splices in EQ circuits. The licensee identified 26 Raychem splices that were not in compliance with EQ requirements. Nineteen of these splices were qualified using Commonwealth Edison Company's (CECo) Qualification Test Report No. 17859-02b, dated March 11, 1987. The other 7 splices could not be qualified using this report. Review of the operability requirements and analysis of the environment and location of these splices determined that 6 of the 7 were qualifiable by analysis. The final splice, located in motor operator E41-F003, could not be qualified by analysis or further testing.

The licensee took corrective actions and upgraded the EQ files, replaced or repaired deficient splices, revised the Raychem training program and procedures to reflect the vendor's latest instructions, and provided certification, by Raychem, of Fermi 2 instructors. Licensee Event Report (LER) 87-046, dated September 20, 1987, was written by the licensee and addressed the deficiencies and corrective actions taken.

In addition, the inspectors reviewed the licensee's corrective actions regarding T&B nylon wire caps. Based upon Wyle Test Report 17955-1, dated January 29, 1988, the licensee determined that the nylon wire caps were qualified for approximately 4.5 years, until February 1990. The licensee committed to replace all wire caps installed in EQ equipment with qualified Raychem splices by the end of 1989. The licensee stated that 11 EQ operators remained in the plant with nylon wire caps installed. The licensee committed to replace the nylon wire caps in 8 of the operators during the current outage and the remaining 3 in December 1989.

10 CFR 50.49, Paragraphs (f) and (g), require electrical equipment important to safety to be qualified by test and/or analysis. The licensee's failure to demonstrate qualification of Raychem splices and T&B nylon wire caps used in EQ circuits prior to the November 30, 1985, EQ deadline is considered a violation of 10 CFR 50.49 (50-341/89026-01a. and b.(DRS)).

4. Water/Moisture Intrusion into 10 CFR 50.49 Equipment/Components

During this inspection, the inspector reviewed the licensee's EQ file, EQO-EF2-019, dated September 21, 1989. This file documented actions taken by the licensee regarding moisture/water intrusion into EQ equipment located in 100% relative humidity areas. The licensee performed engineering evaluations and walkdowns of affected EQ equipment. The licensee provided justification of the as-installed configuration of equipment without weep holes or conduit seals, and walkdown documentation for the installed configuration. In addition, the licensee prepared work requests to install weep holes and/or conduit seals during the current outage, if required, and upgraded the EQ files to reflect the evaluation and walkdown results. The licensee also provided data concerning the submergence qualification of cables located in pull boxes above flood level.

Also, during this inspection, the NRC inspector performed a walkdown of selected EQ equipment located in LOCA/HELB areas. The equipment was inspected for signs of degradation due to moisture intrusion and to determine the acceptability of the installed configuration relative to the drainage of accumulated moisture.

No NRC concerns were identified.

5. Exit Interview

The Region III inspector met with the licensee's representatives (denoted under Paragraph 1) during an interim exit on September 22, 1989, and discussed the findings by telephone at the conclusion of the inspection on October 2, 1989. The inspector summarized the purpose and findings of the inspection and the licensee acknowledged this information. The licensee did not identify any documents/processes reviewed during the inspection as proprietary.