

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-282/86003(DRS); 50-306/86003(DRS)

Docket Nos. 50-282; 50-306

Licenses No. DPR-42; DPR-60

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Prairie Island Nuclear Generating Plants, Unit 1 and 2

Inspection At: Red Wing, MN

Inspection Conducted: February 6 and 7, 1986

Inspectors: A. S. Gautam

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3/5/86

Date

R. J. Smeenge

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Approved By: James W. Muffett, Chief
Plant Systems Section

James W. Muffett

3/5/86

Date

Inspection Summary

Inspection on February 6 and 7, 1986 (Reports No. 50-282/86003(DRS);
No. 50-306/86003(DRS))

Areas Inspected: Reactive, announced inspection relative to use of non-qualified wires in 10 CFR 50.49 designated environmentally qualified (EQ) limitorque valve operators identified in IE Information Notice No. 86-03. The inspection involved total of 18 inspector-hours onsite by two NRC inspectors.

Results: No violations or deviations were identified, however, two unresolved items and one open item require further evaluation by the NRC.

DETAILS

1. Persons Contacted

Northern States Power Company (NSP)

- *E. Watzl, Plant Manager
- *J. Goldsmith, Superintendent Nuclear Technical Services, (MTS)
- *J. Hoffman, Superintendent Technical Engineering
- *K. M. Beadell, Superintendent Quality Engineering
- *P. F. Sureski, Superintendent Nuclear Projects QA
- *D. Mendele, Superintendent Engineering and Rad Protection
- *G. C. Sundsberg, Lead Engineer, NTS
- *R. H. Hansen, Quality Control Engineer
- *B. Amick, P.S. Quality Assurance
- *T. Silverberg, Technical Engineer
- *J. Ruether, Technical Engineer

IMPELL Cooperation

- *Mike Lawrence, EQ Engineer
- *Terry Maxey, EQ Engineer

*Denotes those present during the exit interview on February 7, 1986.

2. Inspection Results

The NRC inspectors reviewed four limitorque valve motor operators in the Unit 1 Auxiliary Building to verify the qualification of jumper wires on the limit switch and the torque switch mounted in each valve's motor operator. This NRC review was a follow up to IE Information Notice 86-03, which had notified licensees of the potential for unqualified wires in 10 CFR 50.49 designated limitorque valves. During this review the NRC inspectors identified Rockbestos SIS and PVC wires as not having adequate similarity or traceability to qualification documents, and reviewed the impact of postulated insulation failures of these unqualified wires on the safe shutdown of the plant, and the impact of these unqualified wires on the licensee's compliance to 10 CFR 50.49:

a. Review of Impact of Unqualified Wires on the Safe Shutdown of the Plant

The inspectors reviewed schematic diagrams, including schematic drawing NE 40008 Sheet 40, Revision BM, Motor Operated Valve MV-32084 (RWST to 11 RHR Pump), for postulated failures due to degradation of wire insulation in a harsh environment. It was evident from the schematics reviewed that short circuits due to wire insulation degradation could cause a 0.8A fuse in the control circuit to fail, thereby causing the valve to fail in its current position.

The licensee informed the inspectors that the limitorque valves required to stroke during an accident would perform their safety functions despite the currently installed unqualified jumper wires, by stroking prior to the onset of harsh environment. The inspectors reviewed licensee's analysis for the operability of (42) Unit 1 Limitorque Motor Operated Valves designated by the licensee as falling within the scope of 10 CFR 50.49. Twenty one of these valves were inside the containment. The licensee reported the following:

- Four of the (42) Unit 1 valves were of late vintage (Post 1978) and had no unqualified wires.
- Fourteen of the valves were exposed to radiation only when recirculation was in progress during and after the accident. All (14) of these valves located outside the containment were stroked prior to the onset of a harsh environment caused by the coolant in the line. These valves received an exposure of less than 1 Rem/hr, prior to stroking. No post accident realignment of these valves was required.
- Eight valves were located inside the containment. These valves maintained a normally open position during an accident and were not required to stroke during the accident.
- Ten valves receive an immediate Safety Injection Actuation Signal during an accident and consequently stroke prior to the onset of a harsh environment. Four of these valves are inside the containment, however, (3) have redundant backup valves in the Auxiliary Building and were reported to stroke simultaneously with their redundant valves.

The total integrated dose during a Design Basis Event (DBE) accident inside the containment was reported by the licensee to be 4.8×10^7 Rads Gamma, with a 40 year background exposure of 100 mrem/hour. Since the wires are in metal enclosures, Beta exposures and chemical sprays were not considered significant. The licensee took credit for PVC wires withstanding early radiation doses based on - IEEE Transactions on Power Apparatus and Systems, VOL. PAS-88, No. 5, "Insulation and Jackets for Control and Power Cables in Thermal Reactor Nuclear Generating Stations," Blodgett and Fisher, May 1969. This document referenced testing of a typical PVC cable to irradiation of 5×10^6 Rads at 70°C for 115 years and indicated that higher doses would cause significant degradation. The licensee extrapolated that a typical PVC specimen would survive a 5.0×10^7 Rads Gamma dose at 80 Volts/Mil, for a period of one week.

- Four valves in the containment for Post-LOCA Hydrogen Control Vent Isolation were normally closed. The licensee reported that during their TMI modifications review, Westinghouse Hydrogen Recombiners had been established to provide Post-LOCA Hydrogen vent capability, and that the above four valves were no longer

stroked during an accident. The licensee's emergency procedures (2FR-Z.1, Revision 0, Paragraph 4) also indicated use of the Hydrogen Recombiners for mitigation of H² during a DBE, further indicating to the inspectors that these four valves were not critical for safe shutdown.

- The two remaining isolation valves MV32067 and MV32069 employed in the containment safety injection system to the reactor vessel, are required to stroke 30 minutes into the accident. These valves were normally closed, but are required to stroke to provide Upper Plenum Injection to mitigate boron precipitation above the core. The NRC inspectors identified these valves as most likely to fail to stroke due to degradation of unqualified wires, late into the accident. The licensee reported that their qualification reports for PVC and Rockbestos SIS provided adequate justification for these wires withstanding radiation doses prior to the stroking of these valves, and that Upper Plenum Injection was not considered by them to be critical for safe shutdown. The licensee also felt that if necessary during an accident a member of their Emergency Response Organization could manually stroke these valves from their appropriate Motor Control Centers.

Based on the above preliminary review of (42) valves in Unit 1 the inspectors did not identify any immediate concern regarding the operability of these valves during a DBE. Pending further review of a detailed analysis by NRR, this an unresolved item (282/86003-01; 306/86003-01).

b. Review of Impact of Unqualified Wires on Licensee Compliance to 10 CFR 50.49 Program

10 CFR 50.49, Paragraph (g), requires that a record of the qualification of equipment falling within the scope of Paragraph (b) of the 50.49 rule, including documentation on performance specifications, electrical characteristics and environmental conditions during an accident, must be maintained in an auditable form by a licensee for the entire life of the equipment. The purpose of this documentation is to permit verification that the electric equipment important to safety is qualified for its application. Additionally, Generic Letter No. 85-15, addressed to all licensees of operating reactors, defines unqualified equipment as that for which there is not adequate documentation to establish that the equipment would perform its intended functions in the relevant environment.

During this review the licensee failed to provide sufficient documentation in terms of traceability and similarity of installed cables to those tested in qualification reports for the following wires:

Rockbestos SIS, 600V, UL. Reported to be same as Firewall III.

PVC Type TW, 600V, 60°C

PVC Type TFF, E13463, 600V, UL

Heater wire with no markings. Reported by licensee to be PVC.

(1) Rockbestos SIS, 600V, UL

The licensee reported that Mr. George Littlehales, QA Manager Rockbestos, had confirmed the Rockbestos Type SIS to have the same insulation as Rockbestos Firewall III. The licensee provided a similarity analysis for Rockbestos cables manufactured prior to 1979 and Post-1979, Insulation Types KXL 760-5 and KXL 760-D chemically cross linked polyethylene. This similarity analysis was based on Rockbestos Report No. 5804 "Report on Qualification Tests for Firewall III Chemically Cross Linked Polyethylene," which is currently under review by Sandia Labs for the NRC, and has not yet been accepted.

(2) PVC Type TW, 600V, 60°C; PVC Type TFF, E13463, 600V, UL

The licensee provided qualification reports and analysis for typical PVC cable. The inspectors could not determine if the chemical constituents of the PVC cables installed were identical or similar to those analysed in the qualification reports.

(3) Heater Wire

Unidentified blue wires with no markings were identified by the inspectors in two of the four valves reviewed in the field. These wires were determined to be the leads for a space heater in each motor operator. The wires were undamaged and flexible. The licensee reported these to be PVC wires, planned to be removed during the next outage; however, no traceability to qualification reports was provided.

The NRC inspectors informed the licensee that further discussions would be held within the NRC to determine the extent of any violations by the licensee to the requirements of 10 CFR 50.49, Paragraph (j). Pending completion of this review this an unresolved item (282/86003-02; 306/86003-02).

c. Visual Inspection of Limitorque Motor Operators

(1) Plant Walkdown

The following Limitorque motor valve operators were visually examined during this inspection in the Unit 1 Auxiliary Building:

MV-32096, No. 11CS Pump Suction from RHR heat exchanger

MV-32097, No. 12CS Pump Suction from RHR heat exchanger

MV-32206, No. 11 RHR to 11 Safety Injection Pump

MV-32207, No. 12 RHR to 12 Safety Injection Pump

The following seven different types of wire were identified in the above valves:

GE, Vulkene XHHW-SI S8053L

GE, Vulkene SIS, UL, INS

Rockbestos SIS, 600V, UL

TW, 600V, 3939, 60°C

Raychem Flametrol

Red insulated wire, TFF, 600V, E13463, (UL)

Unmarked blue insulated wire to box heaters

The licensee notified the NRC by a February 11, 1986 transmittal, that they plan to inspect and replace all PVC insulated jumpers wiring in the motor operators. This inspection and replacement will take place during the 1986 refueling outages now scheduled to begin on March 5, 1986, for Unit 1, and October 22, 1986, for Unit No. 2. Pending an NRC review of the replacement of all unqualified wires, this is an open item (282/86003-03; 306/86003-03).

(2) Review of New Limatorque Motor Operators

The inspectors reviewed new Limatorque valve motor operators procured under Purchase Order No. D48808MQ of August 1984, to be used in the piping modification of a sampling system. The purchase order specified that the operators were to be environmentally qualified in accordance with IEEE 323 (1974), IEEE 382 (1972), and Limatorque Report No. 600456, PWR Nuclear Containment. The purchase order also required certification to a quality assurance program in accordance with 10 CFR 50, Appendix B, and ANSI N45.2.

The inspector reviewed the Receipt Inspection records for these valves and found them to be satisfactory. Three operators were visually examined in the warehouse. Plant tags identified the operators to be 50.49 designated Environmentally Qualified equipment and indicated that these valves had been accepted by receipt inspection. The internal wires were all identified by the inspector as 14 gauge, 600 Volt Rockbestos Firewall SIS Nuclear Grade and found to be qualified.

3. Open Items

Open items, are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involves some action on the part of the NRC or licensee or both. An open item disclosed during this inspection is discussed in Paragraph 2. c.

4. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. Unresolved items disclosed during this inspection are discussed in Paragraphs 2. a. and 2. b.

5. Exit Interview

The Region III inspectors met with the licensee representatives (denoted under Paragraph 1) at the conclusion of the inspection on February 7, 1986. The inspectors summarized the purpose and findings of the inspection. The licensee acknowledged this information. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents/processes as proprietary.