

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-220/89-17

Docket No. 50-220

License No. DPR-63

Priority -

Category C

Licensee: Niagara Mohawk Power Corporation
301 Plainfield Road
Syracuse, New York 13212

Facility Name: Nine Mile Point Unit 1

Inspection At: Salina Meadows Corporate Office

Inspection Conducted: June 12-16, 1989

Inspector:

R. J. Paolino
R. J. Paolino, Senior Reactor Engineer,
PSS/EB

8-15-89
date

Approved by:

C. J. Anderson
C. J. Anderson, Chief, Plant Systems
Section, EB/DRS

8/15/89
date

Inspection Summary: Inspection of June 12-16, 1989 (Inspection Report
No. 50-220/89-17)

Areas Inspected: Special announced inspection by regional personnel of licensee activities in response to Information Notice 86-53 regarding Raychem Heat Shrinkable Tubing. Review and closeout of previously identified open items.

Results: Two potential violations were identified regarding equipment qualification of splice assemblies. Three previously identified open items were closed. One unresolved item was identified involving the qualification of Raychem splice materials used with Endevco accelerometers.

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Details

1.0 Persons Contacted

1.1 Niagara Mohawk Power Corporation

- G. Brownell, Regulatory Compliance Engineer
- W. D'Angelo, Manager
- M. Dooley, Regulatory Compliance Engineer
- C. Fischer, Electrical Maintenance
- J. Janas, Lead, QAE Electrical
- J. Jirousek, Manager - EQ Programs
- K. Johnson, Generation Engineer
- M. Mosier, Lead Engineer - Safety Analysis
- * G. Sanford, Regulatory Compliance Engineer
- K. Sweet, Maintenance Superintendent
- J. Willis, General Superintendent

1.2 Consultants

- G. Eldridge, EQ Engineer - Gasser Associates
- L. Price, EQ Engineer - Gasser Associates
- E. Schum, Senior Engineer - Wyle Test Laboratory
- * W. Shaffer, Utility Regulatory Support Associates

1.3 U. S. Nuclear Regulatory Commission

W. Cook, Senior Resident Inspector

- * Denotes personnel not present at exit meeting of June 16, 1989.

2.0 Purpose

The purpose of this inspection was to: 1) review and evaluate licensee activities in addressing NRC information notice 86-53 regarding "improper Installation of Heat Shrinkable Tubing" and, 2) review status of - previously identified open items and close out those items which have been corrected.

3.0 Background

Several licensees discovered in 1986 that a substantial amount of Raychem cable splices installed previously at their facilities did not conform to vendor's installation requirements in one or more of the following ways;

- Improper sizing of splice diameters.
- Improper overlap seal length on wire insulation.



- Use of Heat Shrink tubing directly over fabric braiding or wire.
- Improper bending of heat shrink tubing placed in junction boxes and motor lead enclosures.

On June 26, 1986 Information Notice 86-53 was issued to alert licensees to this potential generic safety problem and to inform them to consider appropriate actions, if applicable, to prevent similar problems at their facilities.

4.0 Licensee Action

In response to the NRC Information Notice 86-53, the licensee issued a memo (file code 1070W) dated April 1, 1988 documenting the NMPC EQ response to the issues raised by the IE Notice 86-53.

For Unit 1, a training seminar was conducted by Raychem to demonstrate the techniques involved in correctly applying the various types of Raychem Heat Shrink Tubing. Instrumentation and Control and Electrical maintenance personnel performed several trial runs installing Raychem splices.

Subsequent to the installation of any Raychem at NMP-1, in an EQ application, plant procedures N1-EMP-44.2, N1-EMP-44.22 and N1-IMP-OICS were revised to provide installation instructions for field installation of Raychem splices.

The licensee concluded that the site procedures S-EMP-GEN-003 and the action taken to date, address the concerns of Information Notice 86-53.

5.0 Physical Walkdown

The NRC inspector performed a walkdown and visual inspection of select EQ equipment splices. Specific equipment examined included:

- Core Spray Pump Motor No. PB-102, Equipment No. M81-51
- Rosemount transmitter Nos. FT-201.8-68 and FT-201.8-69
- Asco Valve No. 201.7-11
- Electrical Penetration Nos. X-E198B, X-E199 (all), X-E200U, E-E201J and X-E202G,H.
- Endevco Accelerometer Nos. FT-66-19 thru FT-66-24.

In examining the Rosemount transmitter and Asco Valve electrical splices, the inspector noted that the splice configuration was not per the instructions (N1-EMP-44.2) in effect at the time of installation. The N1-EMP-44.2 procedure specifies an in-line splice with two half-lapped layers of T-95 tape covered with one half-lapped layer of T-35 tape. The installed configuration consisted of three parallel wires bolted (terminated) at one with T-95 tape randomly wrapped around all three wires. Standard PVC electrical tape was added as a protective cover. No attempt was made to seal the area between the three parallel wire leads.



The test Report (Wyle Laboratory Test Report 17722-1) on which qualification of the Rosemount Transmitter and Asco Valve electrical splice is based does not address the installed configuration. In addition, it differs from the engineering approved instructions specified in N1-EMP-44.2 for electrical in-line splices. The Wyle Test Report states that the applicable test specimens (Items 3-1 and 3-2) have two half-lapped layers of T-95 tape and one half-lapped layer of the T-35 tape. A 2nd layer of the jacketing tape was used in the test to cover the spliced area and approximately one inch over the cable jacket. The procedure N1-EMP-44.2 does not require the 2nd layer of the jacketing tape. A review of the quality control (QC) inspection records indicate the splices were completed in November 6, 1984 against Work Request No. 29688. The QC Report No. 84-1315, step 7.3 which specifies compliance with Procedure N1-EMP-44.2 configuration contained QC approval of the installed splice.

Discussions with licensee craft and supervisory personnel involved in the splice installation at the time indicate approximately 90% of splices were done in this manner.

Prior to the end of this inspection, the licensee was able to procure a proprietary test report that qualified a test specimens similar to the NMP-1 installed configuration. Preliminary review of the test report (Wyle Laboratory Test Report 17947-01) indicates qualifiability of test specimens having two parallel wires bolted (terminated) at one end with T-95 tape applied in half-lapped layers. The NMP-1 configuration uses three parallel wires bolted at one end. In addition, test photographs in the report indicate splices were held in a vertical position (open end down) so that moisture would not accumulate in the area of the bolted termination. During a licensee telephone conversation with NRC personnel on August 7, 1989, the licensee indicated that they had additional information to support qualifiability of the subject splices. The licensee agreed to send this information to the NRC for review. Furthermore, the licensee agreed that before restart they planned to upgrade the deficient splices. This item is a potential violation of 10 CFR 50.49 which requires the qualification of electrical equipment subject to a harsh environment (50-220/89-17-01).

An inspection of electrical penetrations Nos. X-E198, X-E199, X-E200, X-E201 and X-E202 (elevation 252'0") revealed several deficiencies involving the D. G. O'Brien cable/connector assemblies. The D. G. O'Brien cable/connector assembly uses a polyurethane filler to fill all voids between the cable and the connector and a Raychem preformed boot shrunk over the assembly to complete the moisture seal. During this inspection, and in the company of licensee representatives, the inspector observed D. G. O'Brien cable/connector assemblies without the preformed boot, assemblies covered with Raychem In-line heat shrink tubing instead of the preformed boot, preformed boots that appeared to be slipping off the cable/connector assembly and preformed boots sized for single cable/connector applications being used with 3 and 6 cables per connector.



Qualification of the Raychem preformed boot used over metal surfaces was not established. Documents reviewed by the inspector consisted of analysis performed by Wyle Laboratories of existing Raychem reports on Heat Shrink tubing, none of which address the use of Heat Shrink tubing over metal surfaces in a harsh environment.

At the time of the inspection, it was not determined how many of the deficiencies applied to EQ related circuits, however, the licensee had agreed to inspect all electrical penetrations prior to start-up to determine the extent of the deficiencies and applicability to EQ related circuits.

Test Reports reviewed for this determination include:

- Wyle Test Report No. 17655-1, revision C dated January 23, 1986
- Wyle Test Report No. 17655-1.1, revision D dated January 23, 1986
- Wyle Test Report No. 17655-1.2, revision B dated January 24, 1986
- Patel Engineering Report No. PEI-TR-82-12-101 dated September 28, 1982
- D. G. O'Brien Report No. ER-268, revision A dated May 24, 1979
- D. G. O'Brien Report No. ER-330 revision N/C dated November 17, 1983

The D. G. O'Brien Report No. ER-330 was an assessment of Raychem Test Report Nos. EDR-5008 (adhesive coated Heat Shrunk Tubing), EDR-5011 (Splice on Hypolon wire) and EDR-5021 (Nuclear Grade Adhesive-S1119). None of the above reports address the use of Raychem Heat Shrinkable tubing/materials over metal surfaces located in harsh environments.

During a licensee telephone call with NRC personnel on August 7, 1989, the licensee provided the results of their follow up inspection of all D. G. O'Brien cable/connector assemblies used at Nine Mile 1 in areas requiring equipment qualification for harsh environments. Sixty-three assemblies are installed at Unit 1. Seventeen of these assemblies contain a total of forty plugs requiring equipment qualification. Deficiencies were observed in only one of these plugs. The deficiency consisted of incomplete installation including failure to shrink the sleeve and failure to install the potting compound inside the heat shrink. The licensee has contacted the manufacturer to initiate repair of the assembly before restart of the Unit on August 22, 1989. The licensee committed to complete the repair before Unit 1 startup.

The licensee specified that a Wyle report was obtained that demonstrates that the assembly would have performed its function despite the presence of the installation deficiencies. The licensee has also obtained information to support the qualification of Raychem HST splice seals for metal surfaces. The licensee agreed to send this information to the NRC



for review. This item is a potential violation of 10 CFR 50.49 which requires the qualification of electrical equipment subject to a harsh environment (50-220/89-17-02).

During the walkdown in the drywell, the inspector observed several installations of the Endevco Accelerometer (FT-66-19 thru FT-66-24). An in-line Raychem WCSF-N splice was used to seal the accelerometer connector assembly against moisture intrusion. The Raychem WCSF-N Heat Shrinkable tubing was applied directly over metal surfaces. Data which clearly establishes use of Raychem WCSF-N Heat Shrinkable Tubing (HST) over metal as a method for obtaining a qualified moisture seal in a harsh environment was not available.

The Wyle Assessment Report (17655-CON-1) for qualifying hardline cable to hardline cable contained a number of discrepancies as follows:

- The qualification test data did not demonstrate that the equipment being tested satisfied the acceptance criteria through all phases of testing.
- The thermal aging analysis was used on temperatures less than for NMP-1 normal service temperatures.
- The Units, which are installed without enclosures, were subjected to a simulated LOCA in a Hoffman enclosure.

This item is unresolved pending NRC review of licensee evaluation and analysis to support use of Raychem HST splice materials as moisture seals for metal surfaces. (50-220/89-17-03)

6.0 Status of Previously Identified Open Items

- (Closed) Open Item 220/85-13-08 pertaining to long term EQ program to update NMP-1 equipment qualification required maintenance requirements for instrument and control procedures. Nine Mile Point Unit 1 has completed this effort to include EQ maintenance requirements in I&C and Electrical procedures. Licensee memo of May 15, 1986 (file code 16982) documents the procedures that have been revised to incorporate the EQ maintenance requirement. Licensee memo of January 2, 1987 (file code NMP 21700) documents the verification of the completion of the commitment to the NRC, made in C. V. Mangan's March 3, 1986 letter to the NRC concerning this subject and its completion by December 31, 1986.

This item is closed.



- (Open) Open item 220/85-13-09 pertaining to closed loop cooling motor oil spillage. The licensee had proposed two steps to provide corrective action to prevent recurrence of the oil overflow spillage, 1) instruct maintenance personnel not to overfill during the lubricating maintenance, 2) adjust lube oil filler level such that any overfilled oil will be drained to the filler pan. The licensee has completed action on item one above. Item 2 has not been addressed. During a walkdown inspection of the motors the NRC inspector noted that one of three motors had been replaced. The other two motors still showed evidence of oil spillage. The licensee has not determined the cause of oil spill. A work request (WR-153280 and 153281) dated June 15, 1989 has been issued to investigate and repair the leak.

This item remains open.

- (Closed) Unresolved item 220/86-05-01 pertaining to qualification status of Limitorque jumper wires. The licensee inspected all EQ MOV's and removed all jumpers that were not identifiable as Raychem Flamtrol or Rockbestos Firewall III. All jumpers that were removed were replaced with qualified wiring. The unknown jumpers were sent to Wyle Laboratories for evaluation and reported to NMPC in Report No. 17655-JMP-1. Chemical composition analysis was performed to establish qualification of the unknown material.

This item is closed.

- (Closed) Violation 220/86-05-02 pertaining to the field identified Kerite cable for which an EQ file was not established and that were not listed on the EQ master list. The licensee has established an EQ file from existing documentation which identifies and qualifies the Kerite Model HTK and the model FR FRII cables. Both cables have been added to the master list. Compliance was completed April 18, 1986.

This item is closed.

7.0 Unresolved Items

Unresolved items are matters about which more information is needed to ascertain whether the item is acceptable or a violation. Unresolved items are discussed in Details, paragraph 4.0.



8.0 Exit Meeting

The inspector met with licensee representatives on May 26, 1989. The scope of the inspection and the inspection findings were discussed at this meeting. The licensee did not identify as proprietary any of the material provided to or for review by the inspector during this inspection.

At no time during this inspection was written material given to the licensee or his representatives.

