

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-298/89-13 Operating License: DPR-46

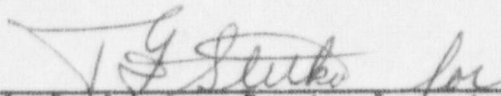
Docket: 50-298

Licensee: Nebraska Public Power District (NPPD)
P.O. Box 499
Columbus, NE 68601

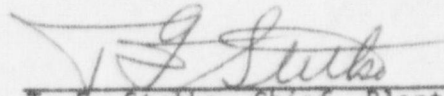
Facility Name: Cooper Nuclear Station (CNS)

Inspection At: CNS, Brownsville, Nebraska and
NPPD Corporate Office, Columbus, Nebraska

Inspection Conducted: March 27 and 30, 1989 (CNS)
March 28-30, 1989 (NPPD Corporate Office)

Inspector: 
A. R. Johnson, Reactor Inspector, Plant Systems Date 4/12/89
Section, Division of Reactor Safety

Consultant: M. Jacobus, Consultant Engineer, Sandia National Laboratory (SNL)

Approved: 
T. F. Stetka, Chief, Plant Systems Section Date 4/12/89
Division of Reactor Safety

Inspection Summary

Inspection Conducted March 27-30, 1989 (Report 50-298/89-13)

Areas Inspected: Routine, unannounced inspection of the licensee's actions resulting from NRC Information Notice (IN) 86-53 with regards to improper installation of heat shrinkable tubing (HST) at nuclear plants. In addition, the licensee's actions on previously identified items regarding equipment qualification (EQ) as documented in NRC Inspection Reports 50-298/86-28, April 1, 1987, and 50-298/88-26, October 19, 1988, and the Notice of Violation dated October 25, 1988, were reviewed.

Results: Within the areas inspected, no violations or deviations were identified. HST in bulk form and engineered kits for specific applications are installed in accordance with qualification procedures and test criteria at CNS. Seven violations and one open item pertaining to EQ items have been closed.

DETAILS

1. Persons Contacted

NPPD/CNS

- *G. Horn, Division Manager of Nuclear Operations
- *E. Mace, Engineering Manager
- H. Hitch, Jr., Plant Services Manager
- R. Gardner, Maintenance Manager
- *G. Smith, Licensing Supervisor
- D. Robinson, Operations Quality Assurance Supervisor
- L. Bray, Licensing Specialist
- S. Ernest, EQ Coordinator

NPPD/Corporate Office

- *S. McClure, Engineering Manager
- *W. Fischer, Electrical Engineering Supervisor
- *D. Buman, Electrical Engineer
- *M. Bennett, Nuclear Licensing and Safety Engineer
- *T. Arlt, Licensing Specialist
- *R. Minadeo, EQ Consultant to NPPD, Patel Engineers

NRC

- R. Bennett, Senior Resident Inspector
- *G. Pick, Resident Inspector
- *T. Stetka, Chief, Plant Systems Section, Region IV

Sandia National Laboratory

- *M. Jacobus, Consultant Engineer to NRC

*Denotes attendance or teleconference participant at the exit meeting held at the NPPD corporate office on March 30, 1989.

2. Licensee Actions on Previously Identified Items

- 2.1 (Closed) Violation Part I.A (EA 88-159) (298/8628-03): During the November 1986 NRC EQ inspection, the licensee's EQ data package (EQDP) No. 5 for Kerite 600 volt cable, type HTK/FR, did not adequately support qualification in that the documented test results did not meet the acceptance criteria for adequate insulation resistance (IR) during accident testing. NPPD has now analyzed the IR values and considered applications of these values to the Kerite cable used in the plant. New type testing has been documented and this testing confirmed qualification of the Kerite cable for outside drywell applications. Restricted use of Kerite cable for outside drywell applications has been imposed. Kerite cable originally used inside the drywell has been replaced using a qualified Rockbestos Firewell III, Type SIS cable. NPPD

has implemented a computerized cable tracking program which identifies all cable used in EQ applications at CNS. The EQDP No. 5 documentation file has been updated and is current to demonstrate qualification of Kerite cable used at CNS.

This violation is closed.

- 2.2 (Closed) Violation Part I.B (EA 88-159) (298/8628-07): During the November 1986 NRC EQ inspection, the licensee's EQDP Nos. 220 and 220A for Fenwal/Patel temperature switches, Model 01-170230-090, did not adequately establish qualification because of failure to base the qualification of the interfacing Thomas & Betts (T&B) STA-KON friction crimped cable splices on full accident conditions. NPPD has added a new EQDP No. 235 to the documentation file. EQDP No. 235 now contains test results that include postulated accident radiation levels and service life radiation, temperature, and aging effects for the T&B STA-KON connector splices. NPPD reviewed their plant equipment for other applications where T&B STA-KON splices are used; however, none were found in use in EQ applications.

This violation is closed.

- 2.3 (Closed) Violation Part I.C (EA 88-159): During the November 1986 NRC EQ inspection, the licensee's EQDP No. 40 for Scotch 130/70/17 tape cable splices used to splice motor lead power connections in Limitorque motor operators, did not adequately establish qualification in that the documentation in the file could not demonstrate qualification for Scotch splices over fiberglass braided jacket motor leads. NPPD has fully evaluated and documented the qualification of Scotch 130/70/17 splice methodology to EQ cables including over fiberglass braided cable. Documentation for one qualified application, involving a successfully tested Scotch splice to silicone rubber insulation, was retrieved from the NPPD archives and placed in the file. However, all Scotch tape cable splices used in EQ applications at CNS have been replaced using qualified Okonite T95/35 tape splices which have been fully documented in EQDP No. 224.

This violation is closed.

- 2.4 (Closed) Violation Part II.A (EA 88-159) (298/8628-01): During the November 1986 NRC EQ inspection, the licensee's EQDP No. 6 for Boston Insulated Wire (BIW) Bostrad 7E, did not adequately demonstrate qualification because of failure to analyze the effects of cable performance when used with penetrations, splices, and longer than type test lengths, as applicable to CNS. NPPD has now performed further analyses to address the accuracy aspects related to instrumentation and control circuits at CNS. The analyses were reviewed by the NRC and the IR values were determined to be adequate to demonstrate cable qualification for the CNS circuit configurations. The decreases in IRs for BIW cables when penetrations, splices, and greater than 50 foot test lengths are used, demonstrated acceptable performance. The demonstrated acceptable IR

decreases meet the intent of NRC Information Notice (IN) 85-39 "Auditability of EQ Records at Licensees Facilities."

This violation is closed.

- 2.5 (Closed) Violation Part II.B (EA 88-159) (298/8628-06): During the November 1986 NRC EQ inspection, the licensee's EQDP No's. 12, 13, 36, 37, 49, 76, 81, 217, 222, and 228 for various pressure/level switches and transmitters, did not adequately establish qualification because the documentation in the file failed to address mounting, orientation, and interface requirements. NPPD has now revised CNS Procedure No. 3.12.2, Revision 5, "Equipment Qualification Data Package" to include a specific section on installed versus tested configurations. The NRC inspector reviewed the above EQDPs and verified that additional clarification was added to comply with the new procedural requirements. All other EQDPs are also in the process of being revised accordingly as applicable to the procedural requirements to specify mounting, orientation, and interface requirements. This EQDP revision effort is now 85 percent complete, and completion is targeted for June 1989.

This violation is closed.

- 2.6 (Closed) Violation Part II.C (EA 88-159) (298/8628-04): During the November 1986 NRC EQ inspection, the licensee's EQDP No. 4 contained documentation for five types of Raychem coaxial cable and it could not be determined whether Rayolin F and R insulation materials that were type tested were the same as those installed. NPPD completed a cable review walkdown in June 1988, in which it was determined that neither Rayolin types are used in EQ applications at CNS. This Notice of Violation required no written response from the licensee.

This violation is closed.

- 2.7 (Closed) Violation (298/8826-01): During the November 1986 NRC EQ inspection, the licensee's EQDP No's. 224 and 31A did not contain qualification documentation for Okonite T95/35 tape cable field splices to Limatorque motor operator field cable power leads with fiberglass braided jackets. NPPD has now revised CNS Procedures 7.3.26.1 and 7.3.26.2 to now require that the jacket be stripped back for cable tape splice applications to field fiberglass jacket motor leads. Consequently, Okonite splice tape sealing occurs between the tape and the field cable insulation as demonstrated by an Okonite type test documented in EQDP 224. All Okonite tape splices to Limatorque motor operators at CNS now have been installed using this procedural guidance. One exception called for by these CNS procedures prohibits the stripping back of the fiberglass braid which would result in the destruction of the jacket/insulation integrity. In these cases, the Okonite T95 tape is bonded directly to the outer cable assembly which is made up of Nomex insulation (paper layers) compressed with a varnished fiberglass braid. NPPD has tested this application to the CNS worst case accident profiles inside and outside the drywell. The type test results have demonstrated these splice

configurations can survive up to 46 hours during these accidents. During the NPPD walkdown of Limitorque motor operators inside drywell, seven operators were identified which have the Nomex fiberglass braided motor lead splices. All seven require only a 1 hour operability time during the accident conditions which is well within the demonstrated 46 hour type testing survival period.

This violation is closed.

- 2.8 (Closed) Open Item (298/8826-02): During the November 1986 NRC EQ inspection, the licensee's EQDP No. 31 contained inadequate documentation to establish qualification for T&B, RB-4 and RC-6 nylon crimp connector splices used by the manufacturer in the construction of dual voltage motor operators. The NRC inspector reviewed the timeliness of NPPD actions to correct any deficient conditions in Limitorque motor operators in accordance with the guidance given in IN 86-03 "Potential Deficiencies in Environmental Qualification of Limitorque Motor Valve Operator Wiring." During a walkdown of CNS by NPPD, it was determined that all T&B nylon crimp type connector splices used in dual voltage motor operators have been replaced with qualified Okonite T95/35 tape splices. Dual voltage motor operators are not used within the drywell at CNS with one exception: Motor Operator RHR-MOT-M018 used in 480VAC service. The motor operator, however, was retrofitted using qualified Buchanan terminal blocks in lieu of the T&B splices.

This open item is closed.

3.0 Programs for Installation of Heat Shrinkable Tubing (HST)

The NRC inspector reviewed the licensee's program for the installation and inspection of HST used on electrical and instrumentation splice connections and terminations. The licensee's review was performed in response to the issuance of IN 86-53, "Improper Installation of Heat Shrinkable Tubing" dated June 26, 1986, which identified industry problems with installation of splice connections manufactured by Raychem. NPPD's established program required an inspection of all safety-related splice connections in a harsh environment for instrument, control, and motor circuits (both 480 and 4160 VAC) in accordance with IN 86-53.

To ensure that Raychem splice connections are properly installed at CNS, NPPD issued the following CNS procedures which were reviewed by the NRC inspector:

<u>Procedure No.</u>	<u>Revision No.</u>	<u>Title</u>
7.3.26.3	2	EO Raychem WCSF-N Insulated Splices (Bolted)
7.3.26.4	0	Special 1" Overlap Raychem WCSF-N Insulated Splices (Bolted)

7.3.26.5	0	Special 1" Overlap Raychem WCSF-N Insulated Splices (Crimped)
7.3.26.6	1	EQ Raychem WCSF-N Wire and Cable Insulation Repairs
7.3.26.7	0	EQ Raychem WCSF-N Rosemount Conduit Seal Splices
7.3.26.8	0	EQ Raychem 4160 V Motor Head Splices

The NRC inspector walked down the following equipment at CNS to examine the quality of the Raychem installations in accordance with CNS Procedures 7.3.26.3, 7.3.26.5, and 7.3.26.7 above:

<u>Tag No.</u>	<u>Description</u>	<u>Manufacturer</u>
PC-PT-20	Torus Pressure	Rosemount 1153D Transmitter
SW-FT-387A	Service Water Flow-Reactor Heat Exchanger A	Rosemount 1153D Transmitter
SW-FT-387B	Service Water Flow-Reactor Heat Exchanger B	Rosemount 1153D Transmitter
RHR-TE-94A	Temperature - RHR Heat Exchanger Inlet	Conax Resistance Temperature Detector (RTD)
RHR-TE-94C	Temperature - RHR Heat Exchanger Outlet	Conax RTD
RHR-TE-94B	Temperature - RHR Heat Exchanger Inlet	Conax RTD
RHR-TE-94D	Temperature - RHR Heat Exchanger Outlet	Conax RTD

The following attributes were observed by the NRC inspector and were indicative of proper installation of Raychem HST:

- ° Evidence of uniform heating around the circumference to the starting point and moving progressively to each end.
- ° Uniform overall shrinkage as evidenced by a smooth shiny outer surface.
- ° Small bead of red adhesive visible at both ends.

- HST properly positioned allowing appropriate sleeve lengths.
- No surface blistering.
- No excessive bend radii.
- Assembly (i.e., sleeves, filters, spacers, breakouts, etc.) was in agreement with the drawings contained in each of the above CNS procedures.

Based on the review of the above CNS procedures and a walkdown to sample installed splice configurations by the NRC inspector, it appears that the licensee was implementing a program that ensures proper installation of Raychem splice connectors.

No violations or deviations were identified.

4. Exit Interview

The inspection scope and findings were summarized in an exit meeting held at the corporate office on March 30, 1989, with the licensee personnel indicated in paragraph 1 above. The licensee did not identify as proprietary any of the materials provided to or reviewed by the NRC inspector during the inspection.

ATTACHMENT 2

UPDATE FORM

FACILITY: CNS
DOCKET: 298

ORIGINATORS NAME: JOHNSON

TYPE: u

ITEM NO.: 298 / 862801

REPORT: 8628

PARAGRAPH: 4f1

FUNCTIONAL AREA:

DESCRIPTION: BIW BOSTRAD 7E CABLE

STATUS CODE: C

UPDATE/CLOSE
PARA/REPORT 2.4 / 50-298 / 89-13

RESPONSIBLE SECTION: PSS / DRS

DETAILS: _____

