APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-267/86-24

Docket: 50-267

Licensee: Public Service Company of Colorado
P.O. Box 840
Denver, Colorado

Facility Name: Fort St. Vrain Nuclear Generating Station (FSV)

Inspection At: Platteville, Colorado

Inspection Conducted: August 18-21, 1986 and September 8-11, 1986

Inspectors: D. E. Norman 10/28/86
D. E. Norman, Reactor Inspector, Engineering Section, Reactor Safety Branch — Date

Gregory A. Pick 10/28/86
G. Pick, Reactor Inspector, Operations Section, Reactor Safety Branch — Date

A. R. Johnson 10/28/86
A. R. Johnson, Reactor Inspector, Engineering Section, Reactor Safety Branch — Date

Approved: R. E. Ireland 10/28/86
R. E. Ireland, Chief, Engineering Section, Reactor Safety Branch — Date

Inspection Summary

Inspection Conducted August 18-21, 1986, and September 8-11, 1986 (Report 50-267/86-19)

Areas Inspected: The Region IV team made a routine, unannounced inspection of the licensee's equipment qualification outage progress.

Results: Within the area inspected, no violations or deviations were identified.

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DETAILS

1. Persons Contacted

Licensee Personnel

D. Warembourg, Manager, Nuclear Engineering
J. Eggebroten, Superintendent, Technical Services Engineering
M. Lehr, Supervisor, QA Engineering
+L. Singleton, Manager, QA
+*G. Sansman, Consulting Engineer, NED
+*A. Greenwood, Supervisor, QA Auditing
D. Hood, Shift Supervisor
+*R. Craun, Site Engineering Manager, NED
*J. Jackson, Supervisor, QA/QC
*J. Grambling, Supervisor, Nuclear Licensing, Operations
+*W. Schwartz, Engineer, DiBenedetto Associates
*R. Doyle, Engineer, QA
*R. Gappa, Engineer, NED
+*M. Capella, Consulting Engineer, Stone and Webster
+*M. Ferris, QA Operations Manager
+*T. Prenger, QA Services Manager
+*W. Ledford, Engineer, QA
+*D. Brown, Supervisor, I&C
*C. Fuller, Station Manager
+R. Williams, Vice President, Nuclear Operations
+J. Gahm, Manager, NPD
+J. Selan, PSC Licensing
+G. Redmond, PSC QA
+M. Niehoff, PSC Nuclear Design Manager
J. Abiles, DiBeneditto Associates
F. Novachek, PSC Technical/Administrative Services Manager, NPD

NRC Personnel

+P. Shemanski, NRR
+R. Farrell, Senior Resident Inspector, RIV
+J. Fehringer, INEL/NRC Contractor
+M. Yost, INEL/NRC Contractor

*Present at exit meeting August 21, 1986.

+Present at exit meeting September 10, 1986.

2. Environmental Qualification (EQ) Program Review

The licensee is in the final stages of completing documents required to fully implement requirements of 10 CFR 50.49. The NRC inspector reviewed the following documents:

- Fort St. Vrain EQ Overview, Second Draft - This document provides details necessary to develop procedures for assuring that all aspects of the FSV EQ program have been properly implemented. The overview summarizes the method used to identify equipment to be included in the EQ program, maintenance of equipment qualification status, and assignment of responsibilities for implementation of the EQ program.

- NPD EQ Program Overview, First Draft - This document identifies requirements for the operation, maintenance, and testing of EQ equipment and interfacing equipment, and the assignment of NPD responsibilities for implementation of this portion of the EQ program.

- Preventive Maintenance Equipment Review (SMAP-27), Issue 1, dated April 2, 1986 - This procedure describes the methods used to identify, review, and incorporate preventive maintenance information of plant equipment into the PM program. Two types of maintenance are addressed in the procedure:

  - Required PM - maintenance required by equipment manufacturer, vendor, or others to keep equipment qualified.

  - Recommended PM - maintenance recommended by manufacturer, vendor, or others to extend equipment life.

The EQ master equipment list (MEL), dated August 8, 1986, was reviewed by the NRC inspector. Preparation of the MEL is covered in the FSV EQ overview draft. All data required by the draft is not shown on the MEL; however, it is expected that the additional data will be provided in the MEL in parallel with completion of the overview document. It is also recognized that the MEL is a dynamic document, and equipment listed therein will change as equipment is added to or deleted from the EQ program.

3. EQ Documentation Package Review

The NRC inspectors reviewed EQ documentation packages (binders) for Limitorque and Rotork valve operators, realizing that the binders were incomplete because of ongoing maintenance and/or modifications to the operators.

a. Limitorque Operators - The qualification basis for the ten Limitorque operators included on the MEL was Limitorque Report B0058, dated January 11, 1980, and Sargent and Lundy (S&L) analysis reported in CQD File No. 027605. The S&L analysis provided justification for corrective actions required to upgrade the operators to requirements of DOR guidelines and 10 CFR 50.49. The following items, which could impact the qualification status of certain equipment, were referred to the licensee for further consideration:

- Orientation of some operators installed in the plant was apparently different than the tested orientation. Justification for the qualification of the non-tested orientation should be provided.

- The licensee had not identified whether heaters were installed in the operators and, if so, whether they were energized. Since heaters were not tested and qualified, if installed, they should be analyzed to determine possible impact on the operators.

- Motors with class B insulation were qualified by being wrapped with insulation. This condition should be justified by analysis.

- Some MOV operator motors were identified as requiring both motor replacement (with RH insulation) and to be wrapped with insulation. This is a possible conflict as both may not be required.

- A maintenance procedure could not be identified which required grease change in the operators. This is reportedly a mandatory maintenance item.

- The Limitorque qualification binder did not contain nor did it reference test reports for internal items different from those qualified in the operator test report (e.g., internal wiring).

b. Rotork Operators - The qualification basis for the four Rotork operators on the MEL was Wyle Report 43979-1, Revision A, dated October 24, 1978, and S&L Analysis reported in CQD File No. 028079.

The S&L analysis led to a decision to replace commercial grade operators with nuclear grade operators. It also identified several items in the replacement operators which must be periodically replaced in order to maintain qualification of the operators. The following items, which could impact the qualification status of certain equipment, were referred to the licensee for further consideration:

- The operator model covered in the test report is not the same as the ones installed at FSV. A similarity analysis is required between tested operators and new operators which are to be installed at FSV.

- In some cases, operators are to be installed in an orientation different than the one covered by the test report. An analysis is required to determine acceptability of the installed orientation.

- Procedures were not in place for scheduling and performance of maintenance to maintain qualification status.

c. Amp Splices - Qualification basis for Amp Butt Splices used at FSV is Amp Qualification Test Report 110-11004 dated February 2, 1982, and S&L analysis Report CQD-029665, Revision 2, dated August 25, 1986. The splice is restricted to use inside a NEMA Type 3 ventilated electrical box. The licensee stated that the only application of Amp splices is for Parker switches where the pigtails are too short to accommodate Raychem splices and are enclosed in boxes or condoletts.

d. Cables - The licensee has placed all cables into the following classifications:

- Classification 1 - Cable manufacturer is known and a qualification test report is available.
- Classification 2 - Cable manufacturer is known, but no test report is available.
- Classification 3 - Cable manufacturer is not known and no test report is available.

Qualification binders were reviewed for the following cables:

(1) Cerro/Rockbestos - This is a classification 2 cable for which the manufacturer is known, but a qualification test report was not available.

The basis for qualification of classification 2 cable which did not have test reports available was to select a test report which qualified cable with insulation similar to cable shown on FSV purchase orders. Analyses were performed and the conclusion reached that formulations of the cable insulation were similar since both were purchased to meet requirements of IPCEA standards.

(2) Eastern - This is classification 3 cable procured from Eastern Electric Wire and Cable Company (distributor) for which the manufacturer is not known and the existence of specific manufacturers test reports for FSV cable could not be verified. The qualification is based on similarity analysis between the Eastern FSV installed 600 volt control cable and other known manufacturers' tested cable. The qualification basis is primarily addressed in the Wyle Laboratories Report No. 17825-FSV 57 Assessment, Revision B, dated July 19, 1986, and the S&L Justification/Analysis, Calculation No. CQD-028391, Revision 00, dated July 19, 1986. The qualification documentation supports qualification of Eastern supplied cable for a normal service life of 35 years followed by a 30-day DBE/Post DBE condition at FSV.

Eastern supplied 12 AWG, 600 volt control cable (various number of conductors) with 30 mil cross-linked polyethylene (XLPE) insulation, and 45 mil polyvinyl chloride (PVC) jacket; it was purchased from Eastern to conform to IPCEA S-61-402, Section 3.9, and S-66-524, Section 3, per PSC purchase specification No. 93-I-53B, Revision D. Eastern certified these cables as meeting all requirements of PSC specification 93-I-53B.

The similarity analysis cited above establishes that the XLPE insulated cable used at FSV is representative of a limited range of XLPE formulations regardless of manufacturer. The basis for qualification maintains that cables which meet the above IPCEA specification performance requirements will limit the range of cable material compositions. The similarity analysis concluded that all XLPE insulated cables manufactured to the above IPCEA specification standards under PSC's procurement specification 93-I-53B, will perform similarly under the relatively mild accident conditions of the FSV plant, and that relatively minor compositional changes between manufactures' formulations purchased under IPCEA standards will have no appreciable affect on the performance of XLPE insulated cable. The similarity analysis establishes a comparison between the FSV Eastern XLPE cable and other XLPE insulated cable manufacturers (e.g., Rockbestos, G.E., Brand-Rex, and Champlain), which have been purchased to IPCEA standards and successfully tested to IEEE 323-1974 and IEEE 383-1974. The similarity analysis fully addresses:

(a) physical and aging requirements (tensile, elongation, aging and environmental cracking);

(b) radiation (414 rads during a 40-year life at FSV); and

(c) the use and efforts of various types of additives during cable manufacture (antioxidents/stabilizers, colorants, cross-linking agents, external lubricants, filters/extenders, fire retardants, heat stabilizers, UV stabilizers).

e. Qualification progress was reviewed by plant walkdown and review of binders for the equipment listed below:

(1) NAMCO Limit Switches

(2) NPK ASCO Solenoids

(3) Foxboro Transmitters, Model NE 13D Series

(4) Honeywell Microswitches

(5) Gould ΔP Switches

(6) ITT Circ Speed Valves

The information in the binders for this equipment appeared to be acceptable.

4. Results of Licensee EQ Equipment Walkdown

The licensee conducted an EQ walkdown according to Procedure SEMAP-1, "Environmental Qualification Walkdown Procedure," dated December 6, 1985. After reviewing the EQ walkdown procedures and a few walkdown packages and after discussions with licensee personnel, the overall walkdown process was determined. PSC had contracted with the Tenera Corporation to conduct a preliminary walkdown to verify what was actually installed at FSV. The Tenera Corporation walkdown generated field verification worksheets (FVW) which described components, verified locations, and identified any discrepancies.

The licensee's draft EQ overview policy concerning environmental qualification stated that credit was not taken for the Tenera walkdown.

Fort St. Vrain Nuclear Engineering Division (NED) personnel conducted a second walkdown utilizing SEMAP-1. The walkdown package included the procedures, enclosed corrective action data sheets (CADS), and the FVW from the Tenera walkdown. After this initial walkdown, personnel from NPD repeated the walkdown, focusing on the CADs packages to verify the extent of corrective action required and to generate packages to correct deficiencies. In order to get the CADs into the normal plant programs, Station Service Requests (SSRs) were generated by NPD to cause correction of the deficiencies found.

Concurrent with the above process, S&L went through analyses, issuing qualification binders on the components identified from the Tenera walkdowns and identifying problems through an "At Risk" memo process. Change Notices (CNs) and the corresponding controlled work procedure deviation request (CWP-DR) were issued to correct the deficiencies.

At the time of this inspection, the CADS package corrections had not been completed for all components at FSV.

The NRC inspector reviewed the CADS packages related to Limitorque Motor Operators. The CADs package consisted of a Comment Section, a Construction/Rework Instructions Section, a Sketch, CADS DIR sheets, and other information as previously mentioned.

The following CADS packages were reviewed:

Valve	CADS Packages
HV-2237	1670, 1671, and 1672

HV-2238	1673, 1674, and 1675
HV-3108	1948
HV-3109	1950 and 1951
HV-3110	1952, 1953, and 1954
HV-31118	1955, 1956, and 1957
HV-31119	1958, 1959, and 1960
HV-31120	1961, 1962, and 1963
HV-4225	1964, 1965, and 1966
HV-4257	1967, 1968, and 1969

The NRC inspector reviewed the rework/reinstallation packages for Limitorque Operators and Rotork Operators, CNs 2294 and 2232, respectively.

The Limitorque rework packages required replacement of unidentifiable wire with qualified wire; the installation of gland seal kits on two valves; and wrapping insulation around eight motors. Various CWP-DR were reviewed and are listed:

Valves(s)	CWP-DR
HV-2237	86-0147
HV-2238	86-0148
HV-3108 and HV-31118	86-0149
HV-3109 and HV-31119	86-0150
HV-4257	86-0151
HV-3110 and 31120	86-0152
HV-4225	86-0153

The Rotork rework/reinstallation packages required replacement of the four commercial grade operators with environmentally qualified operators.

The CWP-DRs utilized are listed:

Valves	CWP-DR
HV-2291 and HV-22131	86-0101
HV-2290 and HV-22132	86-0102

It was noted by the NRC inspector that SEMAP-1 did not include inspection requirements for all internal Limitorque items which could possibly deteriorate due to temperature aging (e.g., terminal blocks, switch material, etc.) nor for motor drains and gear box pressure relief. The licensee stated that a new walkdown procedure for Limitorque operators would be developed and another walkdown performed.

5. Exit Interview

Exit meetings were held on August 21, 1986, and September 10, 1986, at which time results of the NRC inspection were discussed with FSV staff members.