

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/82-21(DETP)

Docket No. 50-483

License No. CPPR-139

Licensee: The Union Electric Company
Post Office Box 149
St. Louis, MO 63166

Facility Name: Callaway, Unit 1

Inspection At: Callaway Site, Callaway County, MO

Inspection Conducted: November 29-30 and December 1-3, 1982

Inspector: R. Mendez

R. Mendez 3/7/83

Approved By: C. C. Williams, Chief
Plant Systems Section

C. C. Williams 3/7/83

Inspection Summary

Inspection on November 29-30 and December 1-3, 1982 (Report No. 50-483/82-21(DETP))

Areas Inspected: Observation of electrical installation activities, the storage and maintenance of electrical equipment, the installation of electrical components and review of QA/QC records. This inspection involved a total of 30 inspector-hours by one NRC inspector, including six inspector-hours during off-shifts.

Results: Of the four areas inspected, no items of noncompliance were identified in two areas. Two apparent items of noncompliance (Severity Level V - failure to follow procedures - Paragraph 4.e; Severity Level V - examples of failure to properly protect equipment - Paragraphs 2.e.(1) and 4.e.(1)) were identified in two areas.

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DETAILS

1. Persons Contacted

Union Electric Company (UECo)

- M. I. Doyne, General Superintendent, Callaway Construction
- *J. A. McGraw, Supervising Engineer, Nuclear Construction
- *J. R. Veatch, Supervising Engineer, Construction QA
- S. M. Hogan, QA Engineer
- P. W. Gudt, QA Engineer
- *M. E. Lazarowitz, QA Consultant
- *A. D. Sussani, QA Consultant
- *B. K. Stunfield, QA Consultant

Daniel International Corporation (DIC)

- *W. L. Petrie, Project QA Engineer
- *R. Glassner, Staff
- *J. C. Weaver, Project Electrical Manager (Delcon)
- *D. W. Gault, Quality Engineer
- *M. K. Smith, Audit Response Coordinator

The inspector also contacted and interviewed other licensee and contractor personnel, including crafts persons, technical, and engineering staff members.

*Denotes those persons present at the exit meeting on December 3, 1982.

2. Observation of Work Activities - Electrical Components

The inspector observed the installation activities pertaining to the following electrical components.

a. Motor Operated Valves HV35, HV8804A

- (1) The installation of the subject motor operated valves (MOV) were acceptable. MOV HV8804A was installed in accordance with isometric Drawing No. M-23EJ011(Q), Revision 3. MOV HV35 was installed in accordance with isometric Drawing No. M-03AL01(Q), Revision 9.
- (2) Receipt inspections were performed and documented on Material Receiving Reports.
- (3) At the inspector's request, the licensee removed the operator housing from MOV HV35. The inspector verified that the internal heater was energized and that the MOV internal components were free of damage and corrosion.
- (4) Storage and maintenance requirements were delineated. Records indicated that these requirements were being implemented.

b. Auxiliary Feedwater Pumps, 2DPAL01A, 2DPAL01B

- (1) Records indicated Motor 2DPAL01A was stored in the warehouse.
- (2) Receipt inspection for Motor 2DPAL01B was performed and documented on October 27, 1977.
- (3) The inspector verified that the internal heater for 2DPAL01A was energized and the motor was adequately protected.
- (4) Storage and maintenance requirements were delineated. Records indicated that these requirements were being implemented.

c. Residual Heat Removal Motor - PEJ01A

- (1) Installation records indicated the subject motor was stored in place.
- (2) Receipt inspection was performed and documented on a Material Receipt Report.

d. Generator Control and Relay Panel, NE107

The installation of the subject panel appeared acceptable. The mounting pad was constructed in accordance with Drawing No. R-0511-012, Revision 3. The control panel was installed in accordance with Drawing No. 01761390, Revision 20.

e. The licensee's Quality Control Procedure QCP-305 requires that equipment be adequately protected to prevent damage from other construction activities. During a tour of the plant, the inspector observed conditions where the preservation of Class 1E equipment was not being adhered to prevent damage and deterioration. The following circumstances were observed in areas where construction activities are evident.

- (1) As of December 3, 1982, a scaffold was found placed on four safety-related Equipment Panels NG01, NG02, NG03 and NG04.
- (2) Flexible conduit connected to Raceway 1U1222 was broken, leaving the cable exposed. In addition, the cable jacket was damaged and the minimum bend radius apparently exceeded.

This failure to adequately protect Class 1E equipment from on-going construction and accomplish activities affecting quality using documented procedures is considered to be in noncompliance with 10 CFR 50, Appendix B, Criterion XIII as described in the Appendix of the report transmittal letter (50-483/82-21-01).

f. The inspector observed two plant areas where nonsafety-related pipes hang over Class 1E equipment without seismically qualified hangers. The areas of concern were a six inch pipe over Load Center Transformer XNG001 and similar configurations in the immediate area.

Another example occurred in the cable spreading room where a fire protection pipe is placed between cable tray Sections 1J1G92 and 1C8J94 and also 1J1G60 and 1C8J60. This pipe comes within three inches of 1C8J94 and about two inches from 1C8J60. It appears that these situations do not meet the intent of the Regulatory Guide 1.29, Seismic Design Classification. Pending a review of the licensee's program to identify similiar situations and Bechtel's analysis of the possible conflicts with Regulatory Guide 1.29, this item will remain unresolved (50-483/82-21-02).

3. Observation of Electrical Cables and Hanger Installation Activities

- a. The inspector viewed the following terminations:

01BBG39AC
01BBG39AE
01BB134HA
01BB134JA
01BBK40AE
01ECG01AA
01ECG01AF
01AC1385B
01BB134KA
01ECY0BAB
04BB134JA

The inspector verified that the cables were terminated per their respective termination cards and in accordance with the latest procedures. The cables were properly identified as to size and type and were undamaged.

Separation problems were not identified for the above terminations except in control room Cabinets SB037 and SB038, where nonsafety cables come in close proximity with Class 1E cables, in apparent violation to the licensee's commitment of a minimum six inch separation inside panels as stated in the FSAR Section 8.1.4.3. However, the licensee takes exception in FSAR Section 8.3.1.4.1.1.f which states that, "...field run nonsafety-related shielded cables having a signal of 100V or less are routed in common wire ways with safety-related shielded cables with no physical separation. Internal cabinet safety and nonsafety-related cable are similiarly routed." The inspector expressed concern that while the separation problem for lower voltage cables is addressed, this may not preclude fault currents from occurring in nonsafety cables, thereby, degrading the Class 1E circurts in the event the low voltage cables are routed with other nonsafety or a redundant division cable.

The inspector will discuss this issue with NRR to determine what action, if any, is to be taken to resolve the apparent conflict in the FSAR Commitments. This matter is unresolved (50-483/82-21-03).

- b. The inspector observed the as-built installation of six safety-related conduit hangers associated with MOV's HV8804A and HV35. The installation of four of the conduit supports were in accordance

with drawing details but two of the hangers are apparently not in accordance with the drawings, for example:

- (1) The installation Drawing No. E-OR1908Q, Revision 11, for Hanger C-602 specified that only Conduit 141222 be supported from the hanger. However, Conduits 141007 and 141008 were observed to be supported from the subject hanger. In addition, the location of the hanger exceeded the ± 4 inch tolerance allowed by specification in that the actual location was off by about $1\frac{1}{2}$ feet.
- (2) The installation Drawing No. E-OR1153Q, Revision 12, for vertical unit strut hangers is specified as Unistrut P-1001 and P-5000 type. The inspector observed the unistrut to be P-1000.

It is expected that the licensee will issue revised drawings to reflect the as-built installation of hangers location. Pending review of the revised drawings this item is open (50-483/82-21-04).

- c. During a tour of the cable reel yard the inspector observed that a nonconforming cable reel No. 11472 was not segregated or roped off from other safety-related cable reels. The subject cable reel was properly identified with a hold tag as having the cable exceed the minimum bend radius. However, the cable jacket was nicked in several places and half the cable reel flange on one side was missing. In addition, a prompt disposition was not evident since the reel had been found nonconforming since October 1980.

This item will remain open until the cable reel is segregated in some fashion and prompt corrective action is taken to disposition the reel and cable (50-483/82-21-05).

- d. The inspector observed the licensee's method for temporarily supporting pulled or partially pulled Class 1E cables. Safety-related Division 1 Cable No. 4SAZ18SA was determined to be supported in a manner which resulted in the cable exceeding the minimum bend radius of two inches. The licensee took prompt corrective action, issued Deficiency Report No. 250-9052E and had the cable resupported so that it would not exceed the minimum bend radius.

Pending a review of the continuity and insulation resistance test results of the subject cable, this item is open (50-483/82-21-06).

4. Review of Records and Procedures

The inspector reviewed the receipt inspection records, storage and maintenance records, and installation records pertaining to the electrical equipment in Section 2 of this report. The records were acceptable and retrievable. Other areas of review included:

- a. During a review of the receipt inspection checklists for the Auxiliary Feedwater Pumps 2DPAL01A and 2DPAL01B the inspector noted that the environmental and seismic qualification documentation for the pumps were not checked as being received. It was determined that at the time of procurement and purchase the seismic qualifications to IEEE 323 had not been in affect. The licensee produced a copy of the seismic qualification that is in accordance with Bechtel Specification.

The environmental qualifications to IEEE 344 for the motors were being tracked by a Supplier Deviation Disposition Report (SDDR). The licensee has stated that a copy of the environmental qualification documentation is presently in their corporate office. The auxiliary Feedwater Pump motors have been conditionally released to the field.

- b. The licensee's Work Procedure (WP) 301 addresses field run installation of hangers for safety-related raceway. The inspector determined that Class 1E hangers were normally not field run Quality Control Procedure (QCP) 301 addresses the proper review plan relative to design evaluation or analysis in the event hangers are field run.
- c. The storage and maintenance records for RHR Pump Motor PEJ01A and Auxiliary Feedwater Pump Motors 2DPAL01A and 2DPAL01B were reviewed. The records indicate the motors in storage locations are protected from hostile environments, have their internal heaters energized, the shafts are rotated and insulation resistance tests are accomplished according to schedule.
- d. During an outside electrical construction audit review by an independent group (EDS) one of the findings concerned sediment found at the bottom of vital Class 1E batteries. The auditor expressed concern that the sediment would present a problem during the design life of the batteries. The inspector questioned the licensee to determine if the concern had been addressed. The licensee showed the inspector a copy of Bechtel Specification No. 10466-E-050, Section 6, which states in part, "Sufficient sediment space shall be provided so that the battery will not have to be cleaned out during its normal life." The licensee's corporate office has also addressed this concern. The response to the audit finding appears adequate.
- e. During a review of selected pull tension calculations for Class 1E cable, it appeared that the sidewall pressure for Cable 1ALB01AA (pulled through conduit 1B2F1E) was exceeded. Bechtel's Specification E-01013 in Section 5.3.3 states in part that, "neither the pulling tension nor the sidewall pressure shall exceed the maximum value in Appendix B." In Appendix B, the maximum allowable sidewall pressure in pounds for a 5KV 3/C 250 MCM triplexed cable is 450R pounds, where R is in feet. The maximum pull tension for a pulling eye is 6000 pounds. In this particular case the sidewall pressure is the limiting factor since the largest radius of the three bends is three feet.

- (1) The tension exerted in pulling Class 1E Cable No. 1ALB01AA apparently resulted in the maximum allowable sidewall pressure exceeding Bechtel's design specification. Bechtel Drawing E-01013 specifies that the sidewall pressure for the subject cable will not exceed 450R when pulled through a bend. However, the cable was pulled through a three foot radius bend with a tension of 2300 pounds, in apparent violation to Bechtel's design criteria of 1350 pounds. The conflict appears to have been caused by Delcor. incorporating the design criteria of three cables when pulled in a triplex formation. Cable 1AL01AA is already in a triplexed configuration, consequently incorporating the maximum allowable tension equation $T_{max}=(P_{max})2R/W$ into sidewall pressure calculations appears redundant.

This failure to accomplish activities affecting quality using documented instructions in accordance with design criteria is considered to be in noncompliance with 10 CFR 50, Appendix B, Criterion V as described in the Appendix of the report transmittal letter (50-483/82-21-07).

The inspector identified other concerns pertaining to the method of determining and calculating sidewall pressure. The following issues are related to the item of noncompliance above and are considered unresolved:

- (2) The maximum sidewall pressures for the first two bends of the cable pull were not calculated. The calculations are critical since the bends have a two foot radius and sidewall pressure can easily be exceeded for relatively short conduit runs.
- (3) Re-verification of the pull tension along intermediate points of Conduit 1B2F1E can not be made since the length of the conduit run from the second bend to the third bend is not incorporated on the cable tension calculation sheet.
- (4) Delcon appears not to have made the correct substitutions into the equation for the subject cable. The sidewall pressure constant and the sidewall pressure were used interchangeably resulting in an extra "R" term used to calculate the maximum allowable tension. For example, if the equation in the calculation sheet ($T_{max}=(P_{max})2R/W$) were correctly substituted, the resulting pull tension around a three foot radius bend would be 7,500 pounds. Whereas the correct calculated tension would be 2,500 pounds.
- (5) Pull tensions for the first two bends were not recorded on the cable pull sheet.
- (6) Bechtel's specifications for determining sidewall pressure is not consistent with the manufacturer's specification values.

Bechtel's maximum sidewall pressure value is $450R$, where R is the radius. This is contrary to the manufacturer's specification value of $225Rd$, where d is the diameter of an individual conductor.

- (7) The method in which a triplexed cable is wound may subject an individual conductor to the full tension when pulled through a bend. That is, the tension is not distributed evenly between all of the conductors in the cable. Consequently, the sidewall pressure may be exceeded if pulled in the same manner, as for example, a 3-conductor cable with a single jacket. The licensee appeared not to have correctly implemented the manufacturer's suggested installation data for triplex cables.

Pending resolution of Items (2), (3), (4), (5), (6) and (7) these issues are unresolved (50-483/82-21-08).

5. Unresolved Items

Unresolved items are matters about which more information is required in order to determine whether they are acceptable items or items of noncompliance or deviations. Unresolved items during this inspection are discussed in Paragraphs 2.f. and 4.e.

6. Open Items

Open items are matters, not otherwise categorized in the report, that need to be followed up on a future inspection. Open items disclosed during this inspection are discussed in Paragraphs 3.b, 3.c, 3.d, and 4.b.

7. Exit Meeting

The inspector met with licensee representatives (denoted under Person Contacted on December 3, 1982). The inspector summarized the scope and findings of the inspection. The licensee representatives acknowledged the findings reported in previous paragraphs.