

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/84-27(DE); 50-455/84-19(DE)

Docket Nos. 50-454; 50-455

Licenses No. CPPR-130; CPPR-131

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Byron Station, Units 1 & 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: April 24-27, April 30-May 4 and May 10-11, 1984

Inspectors: R. S. Love *R.S. Love* 6/6/84
Date

C.C. Williams
E. Christnot 6/6/84
Date

C.C. Williams
Approved By: C. C. Williams, Chief 6/6/84
Plant Systems Section Date

Inspection Summary

Inspection on April 24-27, April 30, May 4, and May 10-11, 1984 (Report No. 50-454/84-27(DE); 50-455/84-19(DE))

Areas Inspected: Review of licensee action on previously identified items. This involved the review of applicable procedures, drawings, records and calculation on-site and at Sargent and Lundy (licensee's A/E). This inspection involved a total of 146 inspection hours by two NRC inspectors. Six of these inspector hours were expended in Nuclear-General Employee Training which will be required for unfettered access (Ref. 10 CFR 50.70).

Results: In the areas inspected, two items of noncompliance were identified (Paragraph 2.c, failure to identify and control nonconforming conditions-Criterion XVI, and Paragraph 2.d, failure to assure that activities affecting quality are prescribed in instructions or procedures-Criterion V).

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DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

G. Sorensen, Construction Superintendent
K. J. Hansing, Quality Assurance Superintendent
*J. O. Binder, Project Electrical Supervisor
*R. B. Klingler, Project Quality Control Supervisor
*J. L. Bergner, Quality Assurance Supervisor
*M. V. Dellabetta, Electrical Quality Assurance Engineer
*E. T. Sager, Electrical Field Engineer
*J. W. Rappeport, Quality Assurance Engineer
E. L. Martin, Quality Assurance Supervisor
J. W. Zid, Quality Assurance Engineer
P. T. Myrda, Quality Assurance Supervisor

Hatfield Electric Company (HECo)

D. L. Heider, QA/QC Manager
S. Hubler, Lead Quality Control Inspector

Sargent and Lundy (S&L)

J. D. Regan, Electrical Engineer
B. G. Treece, Senior Electrical Project Engineer
J. F. Clancy, Quality Assurance
T. R. Eisenbart, Electrical Engineer
J. J. Kamba, Senior Structural Engineer
T. J. Ryan, Structural Project Engineer

The inspectors also contacted and interviewed other licensee and contractor personnel during this reporting period.

*Denotes those present at the exit interview conducted on May 4, 1984.

2. Action on Previously Identified Items

- a. (Closed) Noncompliance (50-454/80-09-01; 50-455/80-08-01): During a previous inspection it was identified that the requirements of the Byron SAR and Specification 2831 were not adequately translated into Specification 2815 in that corrosion protection (painting) was not specified for the exposed carbon steel material and exposed spot welds utilized in the installation of seismic Category I electrical raceway hanger supports. Engineering Change Notice (ECN) Number 4362 was issued to revise Specifications F/L 2815 and F/L 2831. The licensee's painting contractor (Midway Industrial Contractor, Inc.) has a program in place that will assure that the items have been painted. CECo Project Construction Department (PCD) is monitoring the progress of the painting contractor. This item is closed.

b. (Closed) Unresolved Item (50-454/82-17-02; 50-455/82-12-02): During a previous inspection it was identified that conduit and cable tray hanger bolts no longer met the bolt torque requirements as specified in the applicable procedures. The licensee was requested to evaluate these relaxed torque conditions and determine if they were acceptable. With respect to cable tray hangers, as part of the hanger reinspection program, the hanger bolt torque was verified and any bolts found not meeting the torque requirements were re-torqued to procedure requirements. With respect to conduit hangers, a reinspection of 300 conduit hangers was conducted. This reinspection identified 89 conduit hanger bolts with less than the specified torque. These hangers were then analyzed for worst case conditions. This analysis was reviewed by the inspectors and found to be adequate. The analysis identified that the conduit hanger would have performed their design function in the as-found condition. This item is closed.

c. (Open) Unresolved Item (50-454/82-17-04; 50-455/82-12-04): During a previous inspection it was identified that the hanger connection details under fireproofing were being accepted without QC inspection. The HEC Co QA Manager had instructed the QC inspectors to accept connection details covered by fireproofing based on the information on the weld traveler for the subject connection detail. These instructions were documented in QA/QC Memorandum Number 295. These instructions were provided in conjunction with the cable pan hanger reinspection required by HEC Co NCR 407. At that time, the Region III inspector informed the licensee that the weld traveler could be utilized for acceptance providing the hanger connection detail used was noted on the traveler. In accordance with a CEC Co letter, dated September 22, 1982, HEC Co was required to submit certain data pertaining to this reinspection program on a periodic basis. During this reporting period, the Region III inspector reviewed these data provided by HEC Co. These data indicated that of 4,308 hangers reinspected, fireproofing had to be removed from 131 hangers to determine acceptance. This report indicated that 3 of the hangers were rejected after the fireproofing was removed. To determine why these three hangers were rejected, the inspectors reviewed the applicable weld travelers, hanger de-hang/re-hang forms (HDRF), rework requested, field change request (FCR), deficiency reports (DR), nonconformance reports (NCR), and the hanger inspection checklists. Following are the results of this review:

(1) Hanger 8HV11 on Drawing 0-3097H, Revision T.

- . HDRF 1151 indicates hanger originally installed August 19, 1980. HEC Co could not locate a weld traveler for this installation.
- . FCR 1807, dated August 19, 1980, was issued to relocate the hanger.
- . DR 119, dated June 11, 1982, stated that the hanger could not be inspected due to installation of fireproofing. This DR was closed on December 21, 1982.
- . HDRF-1151, dated September 30, 1982, indicates that the hanger was not installed per the drawing and FCR 1807. Hanger was removed on October 12, 1982.

- . Weld Traveler 19038, dated October 12, 1982, states, "Welded plate to tube steel and structural steel (South side only)." Accepted by QC Welding Inspector.
- . Weld Traveler 19039, dated October 15, 1982, states, "Repaired weld on plate to structural and tube steel". Accepted by QC Welding Inspector.
- . HDRF 1151 indicates hanger was reinstalled on October 22, 1982.
- . Hanger installation was accepted by QC.
- . The following discrepancies were observed:
 - Initial weld traveler missing,
 - Weld traveler for North side of hanger missing,
 - NCR, DR, or Inspection Report (as applicable) identifying that the hanger was not installed per drawing and FCR 1807 was missing.

(2) Hanger H005, Drawing 1-3051H, Revision H

- . Weld Traveler 24943, dated July 26, 1978, documents the installation of the hanger. Accepted by QC Welding Inspector.
- . Inspection checklist, dated September 27, 1982, rejected the hanger because the inspector could not verify the hanger type and configuration. Was later accepted by Memo #295.
- . HECO to CECO summary report, dated October 10, 1983, indicates this hanger was rejected during the reinspection.
- . The following discrepancies were observed:
 - No documentation to show why the hanger was rejected,
 - No documentation to indicate that the hanger was repaired or reworked, as applicable,
 - No inspection checklist/weld traveler to indicate that the hanger is now acceptable.

(3) Hanger H 153, Drawing 1-3061H, Revision S,

- . Inspection checklist, dated February 22, 1984, was a final acceptance of this hanger. The checklist referenced: FCR 22920, Revision 1; FCR 21871; Rework Request 648; DR 1025; and HDRF 2197.
- . Work Request 648 involved the removal and replacement of the hanger horizontal members.
- . FCR 21871 involved the pan to hanger attachments. Work Request 648 and FCR 21871 were not in the area of concern and the inspector chose not to followup on these items during this inspection.
- . DR 1025, dated October 23, 1982, documents that Connection No. 1 was a DV5 detail instead of a DV4 as specified, and Connection No. 2 was a DV89C2 instead of a DV89E1 as specified.
- . FCR 22920, dated November 8, 1983, changed connection No. 1 to a DV3 detail and Connection No. 2 to a DV89G2.

The following discrepancies were observed:

The inspectors could not determine how FCR 22920 was implemented in that a HDRF/Work Request was not available for review. The inspection checklist, dated February 22, 1984, indicated that Details DV3 and DV89G2 were actually installed.

- (4) Based on the results of the records review of the three rejected hangers, the inspectors elected to review a random sample of the records for hangers that had been reinspected and accepted by HECO QC. Following are the results of this review:
- (a) Hanger H043, Drawing 0-3061H, Revision M, was accepted on Inspection Report 4270, dated October 5, 1982. Inspection appeared to be adequate.
 - (b) Hanger H148, Drawing 0-3063H, Revision L, was accepted on Inspection Report 4172, dated October 21, 1982. Inspection appeared to be adequate.
 - (c) Hanger H001, Drawing 1-3051H, Revision H, was accepted on Inspection Report 3650, dated September 17, 1982. Connection details 1 and 2 were accepted on the Inspection Report based on Weld Traveler 24900, dated July 18, 1978. A review of the traveler indicated that a DV84 connection detail was utilized as specified on the drawing. This was found to be acceptable.
 - (d) Hanger H008, Drawing 1-3051H, Revision H, was accepted on Inspection Report 3657, dated October 7, 1982. Connection details 1 and 2 were accepted based on Weld Traveler 24943, dated July 26, 1978. During a review of the traveler, it was observed that the traveler did not indicate which connection details were used to attach the hanger to the structural steel, i.e., details 1 and 2. Based on the documentation presented, this hanger installation could not be accepted by the Region III inspectors.
 - (e) Hanger H080, Drawing 0-3051H, Revision L, was accepted on Inspection Report 3484, dated October 16, 1982. Connection details 1 and 2 were accepted based on Weld Travelers 24801, 24804, and 24834. During a review of these travelers, it was observed that the travelers did not denote which connection details were used to attach the hanger to the structural steel. Based on the documentation presented, this hanger installation could not be accepted by the Region III inspectors.
 - (f) Hanger H028, Drawing 0-3051H, Revision L, was inspected on Inspection Report 3433, dated October 5, 1982. This Inspection Report referenced DR542. During a review of this DR, it was observed that the auxiliary steel plate size was listed as being the wrong size. This item was not disposition nor corrected and the DR was improperly

closed. Based on the documentation presented, this hanger installation could not be accepted by the Region III inspectors.

(g) Hanger H085, Drawing 1-3051H, Revision H, was noted as being unacceptable on Inspection Report 3734, dated July 30, 1982. Reasons noted were: (1) unable to verify connection details 1 and 2 because they were covered with fireproofing, and (2) weld travelers did not specify the connection details installed. On September 27, 1982, this hanger was accepted per Memo 295. Based on the documentation presented, this hanger could not be accepted by the Region III inspectors.

(5) Based on the results of the documentation review for the ten above listed hangers, the Region III inspectors terminated their review of cable tray hanger documentation. On April 26, 1984, the inspectors conducted a mini-exit-interview with CECO and HECO QA and construction personnel. During this interview, the inspectors reviewed their concerns with the acceptability of the cable tray hanger documentation. The inspectors requested that the licensee review the hanger documentation and determine what hangers were unacceptable. On May 1, 1984, the inspectors were informed by the licensee that there were approximately 345 hanger that were accepted based on Memo 295.

The licensee stated that approximately 6000 hanger packages were reviewed by CECO QA and HECO QC personnel. The licensee continued to provide daily updates on the progress of the hanger reinspection effort and their findings. During a telephone conversation between Mr. J. Binder (CECO) and Mr. R. S. Love (RIII) on May 11, 1984, Mr. Binder provided the following results of the reinspection effort:

. Total number of hangers requiring reinspection	314
. Number of hangers inaccessible	19
These hangers were documented on HECO NCR 990	
. Total number of hangers reinspected	295
. Total number of deficiencies identified	129
. Deficiencies by attribute:	
Welding fitup	91
Wrong connection detail	7
Wrong weld length, elevation, auxiliary steel plate size, and missing bolts	31

Fit up deficiencies are documented on HECO NCR 989. Connection detail and steel plate deficiencies, etc. are documented on HECO DRs 4921-4928, 4930, 4932, 4934-4937, 4943, 4945-4948, 5003, 5007, 5013-5017, 5019, and 5022-5032.

- (6) As a result of the inspector's observations noted above, the inspectors requested that the licensee provide the last three audit/surveillance reports performed by CECO in the area of hanger acceptance for the subject reinspection program. As stated earlier in this report, this initial reinspection effort involved 4308 hangers. The CECO QA Engineer informed the inspectors that to the best of his knowledge, no audits or surveillances were performed in this area and furthermore, he (CECO QA Engineer) was not aware of this hanger reinspection program. On May 10, 1984, Messrs. C. C. Williams and R. S. Love of the Region III staff contacted Mr. K. J. Hansing, CECO QA Superintendent, by telephone and discussed the reinspection program and lack of CECO QA audits and/or surveillances in this area. In summary, Mr. Hansing stated that: (1) CECO QA was aware of the hanger reinspection program; (2) CECO QA chose not to perform a special audit/surveillance of this hanger reinspection program; (3) CECO QA was not aware of Region III's interest in this program. It should be noted that Region III's involvement with this reinspection effort was documented in Inspection Reports 454/82-17; 455/82-12 and 454/83-48.

On May 11, 1984, Mr. R. S. Love, Region III, contacted Messrs. J. O. Binder, J. L. Bergner and others of the CECO PCD and QA Byron site organization by telephone. During this conversation it was learned that CECO QA had in fact performed an audit of the subject reinspection program in June 1983 and had a concern with HECO Memo 295. Mr. Bergner did not elaborate on this concern. Mr. Binder stated that during this inspection period, he (Mr. Binder) directed the HECO QA/QC Manager to prepare a letter to cancel Memo 295. Upon review of the sequence of events and the results of the hanger reinspection effort, it would appear that the 129 deficiencies observed on 119 safety-related cable tray hangers would have gone undetected if the Region III inspectors had not uncovered the problem areas and requested CECO to perform an indepth review of hanger documentation and the subsequent reinspection program. The licensee was informed that failure to establish a program to assure that conditions adverse to qualify are promptly identified and corrected is an item of noncomplacance in accordance with Criterion XVI of 10 CFR 50, Appendix B (50-454/84-27-01; 50-455/84-19-01).

- d. (Open) Noncompliance (50-454/82-17-05; 50-455/82-17-05): During a previous inspection it was identified that the licensee was not identifying, controlling, and correcting cable tray separation violations. As part of the corrective action, during the latter part of 1982 and early 1983 a concerted effort was made by CECO, HECO and S&L to identify all cable tray separation violations. This information was compiled and analyzed by S&L. The corrective action were: (1) relocate one or more cable trays to correct the violations; or (2) install cable tray covers on one or more of the cable trays (by the installation of covers, the separation criteria is reduced

from 3" horizontal and 12" vertical to 1" horizontal and 1" vertical); or (3) based on the analysis, accept the installation as installed; and (4) place a distinctive mark (black octagon mark) on the applicable drawings to indicate that a separation violation had been identified in that area and that the violation had been analyzed by the engineer, S&L.

During this reporting period, the inspectors: (1) reviewed the engineer's analysis and found it to be adequate; (2) reviewed selected drawings and verified that they were marked to indicate that the engineer had analyzed the separation violations; (3) reviewed select drawing to verify that tray covers were specified as part of the corrective action; and (4) toured the power block and identified separation violations and verified that the violations had been addressed by the engineer and appropriate action taken. During interviews with S&L personnel identified in Paragraph 1 of this report, the inspectors were informed that several notes had been added or revised on Drawing 6E-0-3237B, February 1983 revision, to prevent recurrence of cable tray separation violations. During a review of Drawing 6E-0-3237B, Revision L, it was observed that Note 47 directed the electrical contractor, HEC0, to install cable tray covers in accordance with the electrical specifications when the 3" horizontal and 12" vertical separation requirements were violated even though the applicable drawing does not show the subject tray to be covered. Note 48 directs the electrical contractor to notify S&L if the 1" metal to metal separation is violated after the installation of cable tray covers. During a review of HEC0 9 Series procedures, it was observed that the requirements of Note 48 were adequately addressed but the requirements of Note 47 were not addressed. During interviews with the CEC0 Project Electrical Supervisor, CEC0 Electrical QA Engineer, CEC0 Electrical Field Engineer, HEC0 QA/QC Manager, and HEC0 Project Engineer, it appeared that these personnel were not aware of the requirement of Note 47 on Drawing 6E-0-3237B until it was brought to their attention by the Region III inspectors. It was also learned that HEC0 QC, engineering, and construction were not verifying cable tray separation.

During this reporting period, the licensee instituted a program to determine the amount of safety-related cable tray installed in Units 1 and 2 since February 1983 (effective date of Note 47). As a result of this review, it was determined that 83 cable tray inspection reports (Note: each report can address 1 or more sections of cable tray) had been prepared for Unit 1, and cable tray separation requirements were not verified (Reference: HEC0 NCR 975, dated May 4, 1984), and 41 reports were submitted for Unit 2 (Reference: HEC0 NCR 976, dated May 4, 1984). The licensee was informed that failure to assure that activities affecting quality are prescribed in documented instructions or procedures is an item of noncompliance in accordance with Criterion V of 10 CFR 50, Appendix B (50-454/84-27-02; 50-455/84-19-02).

- e. (Closed) Noncompliance (50-454/82-17-06; 50-455/82-12-06): During a previous inspection it was identified that the licensee was not identifying, controlling, and correcting cable separation violations inside of panels, cabinets, motor control centers, switchgear, etc. As part of the corrective action, during the latter part of 1982 and early 1983, a concerted effort was made by CECO, HECO and S&L to identify all cable separation violations inside of equipment. This information was compiled and analyzed by S&L. The corrective actions were: (1) relocate/reroute one or more of the cables to correct the violation; or (2) install fire barriers between the involved cables; or (3) route one of the involved cable inside a conduit that qualifies as a fire barrier; or (4) based on the analysis, accept the installation as installed; and (5) establish a program to inform S&L of future violations so that they could be analyzed and corrective action assigned.

During this reporting period, the inspectors: (1) reviewed the engineer's analysis and found it to be adequate; (2) reviewed the electrical contractor's (HECO) termination inspection procedure and identified that the QC inspector was required to inspect for and identify separation violations between safety-related and non-safety-related cables and between redundant cables; and (3) verified implementation of this program by reviewing cable separation problem reports that were being forwarded to the engineer for analysis. The corrective actions and the corrective actions to prevent recurrence appeared to be adequate. This item is closed.

- f. (Closed) Noncompliance (50-454/83-37-01): During a previous audit, it was identified that the CECO Manager of Quality Assurance had established an Interim Lead Auditor certification program that was not documented in the CECO Quality Assurance Manual, or in the CECO Topical Report nor is it permitted by ANSI N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants." This informal program had been established within CECO to certify an individual as an Interim Lead Auditor when he/she did not meet the qualification requirements of a lead auditor as specified in ANSI N45.2.23-1978.

As part of CECO's corrective action, the Interim Lead Auditor concept was discontinued, the personnel holding Interim Lead Auditor certifications were de-certified, and records were reviewed to determine the names of personnel that had been certified that did not meet the minimum qualification requirements. The records review indicated that between 1977 and 1983, eight (8) CECO personnel had been certified as Interim Lead Auditors by the CECO Manager of Quality Assurance. The audits performed by these 8 people were reviewed and evaluated by qualified CECO Lead Auditors. With a few exceptions, the audit reports and the objective evidence and the audit deficiency close outs were in compliance with the CECO audit program. During a review of these audit evaluations, the most significant audit deficiencies observed by the Region III inspectors were:

- (1) One item on the checklist had insufficient objective evidence for acceptance. This attribute was adequately covered on a subsequent audit by a different auditor and found acceptable.

- (2) One item as relating to records storage was marked acceptable and from the information documented in the report, it should have been listed as a deficiency. This item was subsequently identified and corrected.

The corrective action and corrective action to prevent recurrence appears to be adequate. This item is closed.

- g. (Open) Noncompliance (50-454/83-49-04): During a previous inspection, it was identified that Kellem type cable grips (used to support electrical cables in cable pan risers and in vertical conduit runs) were not installed in accordance with the electrical specifications. This item is also identified in 10 CFR 50.55(e) reports 454/83-14-EE and 455/83-14-EE. During this reporting period, the Region III inspectors observed that the installation of cable grips in safety-related risers R277, R345, R368, and R369 were deficient in that they were not supporting the cables in accordance with the design specifications. Pending verification of the licensee's corrective action, this item remains open. This item has been assigned Category 1 and must be closed prior to fuel load.
- h. (Closed) Open Item (50-454/84-02-03; 50-455/84-02-03): During the ASLB hearing for Byron Station, Unit 1, the licensee stated that the cable pull reports for cables already installed are being reviewed to ensure that the maximum allowable cable pulling tension and maximum allowable cable sidewall pressure had not been exceeded. As documented in Inspection Report No. 50-454/84-09 and 50-455/84-07, the Region III inspector reviewed the on-site records and with one exception (Noncompliance 454/84-09-02; 455/84-07-02), these records were found to be adequate. During this reporting period, the Region III inspectors reviewed the engineering calculations at the engineer's facilities. The engineering analysis was performed utilizing one or more of the following methods:
 - (1) Calculations for an assumed worst case conduit configuration containing a worst cable configuration, i.e. conduit run with four 90° bends with minimum bend radius (270° total bends allowed at Byron Station) and with the maximum cable density. Utilizing this methodology, a critical conduit length was calculated for each conduit size. Using this information, a review of the approximate 2600 conduit runs was made. If the actual length of the conduit run approached the calculated critical length, that run was flagged for further analysis per paragraph (2) below. Worst case accepted, as observed by the inspectors, during this first cut, had a safety factor of approximately four, i.e. allowable pulling tension 400# versus calculated of approximately 100#.
 - (2) Calculations for an assumed worst case conduit configuration (4-90° bends) containing the actual installed cable configuration. The worst case accepted, as observed by the inspectors, had a safety factor of approximately 3.3. Again, questionable conduit runs were flagged for analysis per paragraph (3) below.

(3) Calculations for actual conduit configuration containing the actual cable configuration. Worst case accepted, as observed by the inspectors, had a safety factor of approximately 4.7. Upon completion of this three step analysis, three conduit runs were questionable. They were analyzed by Okonite Company, cable manufacturer, as described in paragraph (4) below.

(4) The following information was forwarded to Okonite to assist in their evaluation of cables installed in conduits COA-6158, COA-6192 and COA-6193:

- . Conduit size - all 5"
- . Conduit configuration from as-built drawings
- . Cable configuration from cable pull cards
 - Conduit COA-6158 - 2 - 1/C-750 MCM, 5KV, cables
 - Conduit COA-6192 and 6193 - 3 - 1/C-750 MCM, 5KV, cables
- . Cable pull direction

The maximum cable pulling tension for the subject cables was not in question for these three installations in that the maximum allowable tension for the 2-1/C-750 MCM cable pull is 120,000# and 180,000# for the 3-1/C-750 MCM cable pull. Due to conduit configuration, Okonite was requested to perform an analysis for possible cable sidewall pressure violations. Okonite's letter of October 11, 1983 indicates that they performed their analysis and found no sidewall pressure violations. It should be noted that each cable manufacturer establishes the maximum cable sidewall pressure that their cables are designed to withstand without causing damage to the conductor insulation. Based on the results of previous inspections and documentation reviewed during this inspection, the inspectors have a reasonable assurance that these safety-related cables will perform their intended function. This item is closed.

- i. (Closed) Unresolved Item (50-454/84-09-01; 50-455/84-07-01): During a previous inspection, it was observed that there were several outstanding NCRs that were prepared to document possible over tensioning of safety-related cables during initial installation or during rework (pull back). During this reporting period, the inspectors reviewed the disposition and implementation of CECOs. NCRs F838, F839, F845, F864, and F865. The inspectors also reviewed the back up data for these NCRs and found it to be adequate. This item is closed.
- j. (Closed) Noncompliance (50-454/84-09-02; 50-455/84-07-02): During a previous inspection it was identified that HECO DR 3382 was inadequately dispositioned, resulting in 12 cables being installed whose quality was indeterminate. Subsequent to the inspectors findings, HECO prepared NCR 841 to document the overstressed cables. During this inspection, the inspectors verified that the cables had been replaced, and action to prevent recurrence had been implemented. This item is closed.

3. Licensee Action on 10 CFR 50.55(e) Reports

(Closed) 10 CFR 50.55(e) Report (454/82-07-EE and 455/82-07-EE): Direct current (DC) control power cable failures. Several single conductor ASW #2 DC control power cables, which run from the auxiliary building to the essential service water cooling tower in an underground duct, have failed to ground. The failures occurred after the cables had been tested and placed in service. The inspectors reviewed the licensee's action on the failure of DC cables 1 DC 073 and 1 DC 075 in Unit 1 and DC cables 2 DC 073, 2 DC 074 and 2 DC 075 in Unit 2. Records indicated the following:

- a. Cables, 1 DC 073 and 1 DC 075 in Unit 1 were replaced by multi-conductor cables 1 DC 742 and 1 DC 243 respectively.
- b. Cables 2 DC 073, 2 DC 074 and 2 DC 075 in Unit 2 were replaced by multi-conductor cables 2 DC 244, 2 DC 245 and 2 DC 243 respectively.
- c. Two nonconformance reports (NCR) 666 and 732 were written documenting the failures and both NCR's were closed out on April 18, 1984.
- d. A sample of the cables was pulled and tested by the manufacturer. The sample failed a production test (e.g. a 13,500 volt spark test) which it had passed prior to shipment.
- e. The probable failure to pass the test was due to elongation of the cable insulation.

The inspectors determined from a review of installation records that the cables were replaced in accordance with approved procedures. This item is closed.

4. Conductor Butt Splices

Due to the problems encountered with conductor butt splices at other Nuclear Plants, the inspectors queried the licensee as to what actions had been taken or were planned to verify the acceptability of the butt splices at the Byron Station. The inspectors were informed that CECO QA initiated a review of approximately 11,000 cable termination reports and identified 646 of these reports that documented the installation of butt splices. Between March 13-16, 1984, CECO QA and HECO QC randomly checked 221 safety-related and 78 non-safety-related conductor butt splices. Following are the results of the checks made on the 221 safety-related butt splices as documented in CECO QA Surveillance Report 5944, dated March 27, 1984:

- . 27 splices were not inspected because they were covered with tape or heat shrink material.
- . 194 splices were visually inspected and 72 were "tug-tested".
- . 1 butt splice failed the tug-test and was replaced.
- . 16 splices were identified as defective and replaced. Failure attributes were not provided.
- . All 194 butt splices were installed with the proper crimping tool.

CECo NCR F899, dated April 5, 1984, was prepared to document that the conductor insulation on cables provided by Okonite Company would not fit inside the insulation barrel of Amp butt splice connectors. This NCR has been forwarded to CECo Project Engineering Department (off-site) for resolution. As of May 4, 1984, a resolution/disposition had not been received on-site.

To understand why the conductor butt splices were rejected, the inspectors requested the applicable inspection checklists/termination reports for review. The inspectors reviewed the following Cable Inspection Termination Reports (CITR) and Equipment Modification Inspection Requests (EMIR):

<u>Report No.</u>	<u>Cable No.</u>	<u>No. Rejects</u>	<u>Remarks</u>
CIRT 12318	2SX033	1	Butt Splice Replaced
CITR 12130	1RH058	2	Butt Splice Replaced
CITR 12119	1RH062	1	Butt Splice Replaced
CITR 12143	1RH063	3	Butt Splice Replaced
CITR 12145	1CS080	2	Butt Splice Replaced
CITR 12144	1RH102	2	Butt Splice Replaced
CITR 12131	1RH059	3	Butt Splice Replaced
CITR 12150	1RH042	1	Butt Splice Replaced
CITR 12123	1RH043	1	Butt Splice Replaced
EMIR 5990	10G165	1	Cut insulation between Butt Splice and terminal lug-replaced.
EMIR 5988	1RC159	1	Cut insulation-repaired with shrink-fit material
	1RC137	1	Bad crimp on connector- replaced
	1RC147	3	Cut insulation-replaced
	1RC168	1	Exposed copper at splice replaced
	1RC170	1	Exposed copper at Splice- replaced
	10G157	1	Butt splice replaced
	10G158	1	Cut insulation-repaired with shrink-fit material
	10G163	<u>1</u>	Butt splice replaced

27 Total

From the above information, it would appear that an addition ten butt splices were rejected and repaired during the repair of the 17 rejected by CECo QA. Utilizing this latest information, it would appear that the reject rate 27/194 is 13.9%. During interviews with the CECo and HECO personnel involved in this reinspection effort, the inspectors were informed that the largest number of rejected butt splices were because the conductor (copper) was not visible at the connector crimp.

The inspectors also performed a general review of the 646 CITRs identified by the licensee that documented butt splices. It was observed that a large percentage of these splices were associated with the termination of

metal shielding braid or tape-shield on control or instrument cables as addressed in S&L Standard EA-215. The inspectors made a detailed review of 34 of these CITRs. Following are the results of this review:

<u>CITR No.</u>	<u>Cable No.</u>	<u>No. of Splices</u>	<u>Remarks</u>
119	1MS528	1	
11942	1AF181	1	
11941	1AF180	1	
11940	1AF179	1	
11939	1AF170	1	
11935	1VA053	1	Replaced-damaged conductor insulation
11933	1VA533	1	
11918	1DC245	1	
11906	1VC590	1	Replaced-damaged conductor insulation
11905	1CV548	2	Replaced-damaged conductor insulation
11904	1CV491	2	Replaced-damaged conductor insulation
11891	1CS116	2	
11860	1SI528	1	Replaced butt splice
11859	1SI523	1	Replaced butt splice
11858	1VA043	1	Replaced butt splice
11857	1VA102	1	Replaced butt splice
10898	1NR228	1	Shield braid splice
10897	1NR227	1	Shield wire splice
10896	1NR226	1	Shield wire splice
8037	1VA818	1	
8033	1VA707	1	
7985	1VA709	1	
7964	1VA705	1	
7963	1VA817	1	
5594	1NR014	1	In process inspection
5550	1CC010	1	
5549	1CC001	1	In process inspection
5534	1FW218	3	
5528	1RC439	1	In process inspection
5527	1NR102	1	In process inspection
5526	1RC436	1	In process inspection
5272	1FW221	5	
4561	1MS308	4	
4391	1FW055	1	Crimp tool not calibrated-replaced butt splice.

Dates of these inspections ranged from March 3, 1982 thru February 25, 1984. It was observed that all of the inspection reports randomly selected were for Byron Station Unit 1. In the 34 reports reviewed, it appeared that there were five defective butt splices and six examples of damaged/cut conductor insulation identified.

To determine if all QC termination inspectors were documenting butt splices on CIRTs, the CECo Electrical Field Engineer interviewed the HECO Electrical QC termination inspectors and determined that only approximately 50% of those interviewed documented their inspection of butt splices. In view of the information obtained by CECo during their review of potential butt splice problems at the Byron Station (i.e., 13.9% reject rate), the Region III inspector expressed his concern as to why CECo failed to implement a 100% reinspection/inspection of conductor butt splices. As a result of the inspector's concern, CECo, Byron Station, provided a verbal notification to Region III of a potential 10 CFR 50.55(e) report on May 10, 1984, relative to electrical conductor butt splices. As a result of telephone conversations between Mr. R. Tuetken (CECo Byron Staff) and Mr. C. C. Williams (Region III) on May 10 and 11, 1984, CECo developed an inspection plan for the reinspection of electrical conductor butt splices at the Byron Station, Units 1 and 2. This inspection plan is documented in Mr. D. Farrar (CECo Director of Nuclear Licensing) letter to Mr. James G. Keppler (NRC Regional Administrator), dated May 17, 1984.

Region III has assigned an inspector to monitor the conductor butt splice reinspection program. Upon completion of the reinspection program, separate inspection reports (50-454/84-29 and 50-455/84-21) will be issued to document the findings and corrective action taken.

5. Exit Interview

The inspectors met with the licensee representatives (denotes in paragraph 1) at the conclusion of the on-site portion of the inspection on May 4, 1984, and discussed the scope and concerns of this inspection. As stated in paragraph 4 of this report, Region III personnel discussed the concerns of this inspection with Mr. R. Tuetken on May 10 and 11, 1984 by telephone. On May 25, 1984, Mr. R. Love telephonically presented the findings of this inspection to Mr. R. B. Klingler (CECo Byron Station staff). The licensee acknowledged this information.