

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/84-29(DRS); 50-455/84-21(DRS)

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 and 2

Inspection At: Byron Site, Byron Illinois

Inspection Conducted: May 14 through July 10, 1984

Inspectors: *E. F. Christnot*  
E. F. Christnot

7/23/84  
Date

*R. Mendez*  
R. Mendez

7/23/84  
Date

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

7/23/84  
Date

Inspection Summary

Inspection on: May 14 through July 10, 1984 (Report No. 50-454/84-29(DRS); 50-455/84-21(DRS))

Areas Inspected: Licensee action on a 50.55(e) item. This inspection involved a total of 60 inspector-hours onsite by 2 inspectors including 12 inspector-hours onsite during off-shifts.

Results: In the areas inspected no items of noncompliance were identified.

## DETAILS

### 1. Persons Contacted

#### Commonwealth Edison Company (CECo)

M. E. Lohmann, Assistant Construction Superintendent  
J. O. Binder, Project Electrical Supervisor  
R. Tuetken, Startup Coordinator  
J. L. Borgner, Quality Assurance Supervisor  
M. V. Dellabetta, Electrical Quality Assurance Engineer  
J. W. Rappeport, Quality Assurance Engineer  
E. L. Martin, Quality Assurance Supervisor  
J. W. Zid, Quality Assurance Engineer

#### Hatfield Electric Company (HECo)

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

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

### 2. Licensee Action On 10 CFR 50.55(e) Reports

10 CFR 50.55(e) Report (454/84-03-EE and 455/84-03-EE): Deficiencies in butt splices in electrical conductors. The inspectors were dispatched to the Byron Station to monitor the licensees' conductor butt splice reinspection program as described in the inspection reports (50-454/84-27 and 50-455/84-19). The licensees' reinspection program involved five (5) areas as follows:

#### a. Instruction and Training

Hatfield Electric Company (HECo) issued HECO Instruction E, Revision 0, dated May 21, 1984. The instruction discussed the steps to be followed by the inspection teams in the field. A video tape training session was made by HECO with the Commonwealth Edison Company (CECo) Byron Station, Project Electrical Supervisor as the instructor. The training session was conducted on May 24, 1984 and was attended by the HECO level II Field QC Inspectors. The Region III Inspector reviewed the video tape with a CECO QA representative. While touring the plant and monitoring the field activity in company with a CECO QA Engineer and a licensee representative from CECO Construction, the Region III inspector noted that certain activities involving uncovered butt splices were not clearly stated in HECO Instruction E, Revision 0. The licensee's representatives were informed, and as a result, HECO Instruction E, Revision 1, dated May 30, 1984 was issued. Additional training on the revision was given to the inspection teams and the training was observed by a Region III inspector and a CECO QA Engineer. No discrepancies were noted in the training of the inspection teams.

HECo Instruction E established criteria for both covered (either heat shrink insulation or nuclear grade cement and tape) and uncovered butt splices. The criteria for covered butt splices were as follows:

- (1) The butt splice installed appears to have been crimped with the proper tool.
- (2) The butt splice installed is the proper size for the size of cable.
- (3) The conductor crimp is approximately centered on the wire barrel.
- (4) The end of the conductor is visible beyond the point of crimp.

The criteria for uncovered butt splices were as follows:

- (5) The butt splice installed appears to have been crimped with the proper tool.
- (6) The butt splice installed is the proper size for the size of cable.
- (7) The conductor crimp is approximately centered on the wire barrel.
- (8) The end of the conductor is visible beyond the point of crimp.
- (9) The conductor insulation is approximately flush with or under the insulating sleeve of the butt splice.

b. Field Inspection Teams

Each team was made up of one (1) CECo Operations Analysis Department (OAD) Engineer, one (1) HECo Level II Field QC Inspector and two (2) Electrical Production Terminators. The OAD Engineers reviewed HECo Instruction E before the actual start of the reinspection. The HECo inspectors attended or viewed the video tape training sessions and were administered a test to determine their understanding of the instruction. The inspector, in company with a CECo QA representative, reviewed the test results and no discrepancies were noted. The actual inspection in the field commenced on May 29, 1984 and was placed on temporary hold on June 5, 1984 to await an outage of safety division 12. From May 29 through June 3, 1984, ten (10) to eight (8) teams were in the field each day performing the reinspection. On June 4, 1984, only four (4) teams were required. The inspection effort was completed on June 19, 1984 during an outage of safety division 2.

c. CECo QA Involvement

The CECo QA Department provided a QA Engineer to be onsite and in the plant to observe the field activity and to perform a special audit to document the field activities. The special audit consisted of five (5) areas as follows:

- (1) Verify that butt splices were inspected per HECo Instruction E.
- (2) Verify that butt splices found to be deficient during the inspection were properly dispositioned.

- (3) Verify that personnel performing the reinspection of the butt splices were properly trained to the appropriate instructions.
- (4) Verify that butt splice inspections were adequately documented.
- (5) Verify that properly calibrated tools were used when butt splices were replaced.

The inspectors observed QA Engineers in the field monitoring the field activity. A QA Engineer accompanied the Region III inspectors at various times.

d. Equipment Inspected

The following equipment was inspected in Unit 1 and Unit 2:

<u>Equipment</u>	<u>Number</u>
Local Control Panels	25
Main Control Boards	19
Ventilating Control Panels	61
4.16 KV and 6.9 KV switchgear	12
480 volt unit substations	8
480 volt motor control centers	34
D. C. switchgear	17
Instrumentation Power Distribution Panels	8
Containment Penetrations*	22
Annunciator and Control Cabinets	40
Remote Shutdown Panels	4
Diesel Generator Panels	4

\*Inside and outside containment

The Region III inspector observed field activities and interviewed various team members at numerous equipment locations throughout the inspection period.

e. Results of Butt Splice Dissection and Inspection

The inspection activities identified 1,311 butt splices installed on approximately 454 safety related cables (reference letter from T. R. Tramm to J. G. Keppler, dated July 2, 1984) with 747 being identified as uncovered and 546 identified as covered with either heat shrink insulation or nuclear grade cement tape. The tabulation of the results of the butt splice dissection and inspection are as follows:

(1) Uncovered Butt Splices

The total quantity of uncovered butt splices identified and reinspected was 747.

(a) Quantity rejected by the initial inspector	<u>275</u>
(b) Quantity found acceptable by 2nd inspector after dissection	<u>16</u>

(c) Quantity found acceptable based on manufacturer's documented test data	<u>196</u>
Total Acceptable After Dissection	<u>212</u>
(d) Quantity rejected for the inspection criterion in Section 2.1 (5), (crimped with proper tool).	<u>2</u>
(e) Quantity rejected for the inspection criterion in Section 2.a.(7), (crimp centered on wire barrel).	<u>10</u>
(f) Quantity rejected for the inspection criterion in Section 2.a.(8), (conductor visible beyond point of crimp).	<u>51</u>
Total Rejected After Dissection	<u>63</u>
Total Dissected Butt Splices	<u>275</u>

The accumulated results for uncovered butt splices inspected, therefore, yields 63 rejectable butt splices identified out of a total of 747 inspected.

The Region III inspectors and the CECQ QA Engineer witnessed the dissection and the 2nd inspectors evaluation at various times during the dissection process. On several occasions, discussions were held with the CECQ QA Engineer and other licensee representatives regarding the dissection, documentation and evaluations of the butt splices as they arrived from the field.

(2) Covered Butt Splices

Of the 564 covered butt splices identified, 92 butt splice installations were identified as being redundant and required inspection. These butt splices were all cut out and dissected in the construction office with the following results:

(a) Quantity of covered butt splices removed and dissected	<u>92</u>
(b) Quantity found to be acceptable after inspection	<u>16</u>
(c) Quantity found to be acceptable based on manufacturer's documented test data	<u>74</u>
Total Acceptable After Dissection	<u>90</u>
(d) Quantity rejected for the inspection criterion in Section 2.a.(3), (crimp centered on the wire barrel)	<u>2</u>
Total rejected after dissection	<u>2</u>
Total covered butt splices dissected and inspected	<u>92</u>

(3) Accumulated Results

There was a total of 1,311 installed butt splices identified in this program. 747 were found uncovered and were inspected. 564 were found covered (heat shrink material or nuclear cement and tape) and were documented with 92 removed and dissected.

(a) Total quantity of uncovered butt splices inspected	<u>747</u>
(b) Total quantity of covered butt splices dissected and inspected	<u>92</u>
(c) Total quantity of butt splice installations inspected in the program	<u>839</u>
(d) Total quantity of uncovered butt splices rejected	<u>63</u>
(e) Total quantity of covered butt splices dissected and rejected	<u>2</u>
(f) Total quantity of butt splice installations inspected and rejected during the program	<u>65</u>

During the dissection and inspection of the butt splices, the Region III inspectors and the CECo QA Engineers noted that approximately 270 butt splices appeared to have been installed using the wrong size crimping tool, (i.e. a No. 22-18 tool instead of a No. 14-16 tool (one size smaller)), however, the exact total number of such splices was not noted in the interim report.

The licensee is evaluating the safety significance of the rejected splices. They have not yet concluded that the deficiencies would have resulted in safety problems if they had not been identified.

This item is considered unresolved pending receipt of the final report from the licensee including the safety evaluation of the rejected butt splices (454/84-29-01; 455/82-21-01).

### 3. 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. An unresolved item identified during this inspection is discussed in Paragraph 2.

### 4. Exit Meeting

The Region III inspectors met with various licensee representatives, including CECo QA personnel, onsite periodically throughout the butt splice inspection effort to discuss the inspection findings. The last onsite meeting was held on June 14, 1984. The licensee representative contacted during the serial exits were as denoted in Paragraph 1 (CECo)