ORIGINAL

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

COMMONWEALTH EDISON COMPANY

(Byron Nuclear Power Station
Units 1 & 2)

Docket No. 50-454 OL
50-455 OL

VOLUME II

Location: Rockford, Illinois

Pages: 9401 -9438

Date: Friday, July 27, 1984

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VOLUME II

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY & LICENSING BOARD

In the matter of:	:	
COMMONWEALTH EDISON COMPANY,	:	Docket Nos. 50-454 OL 50-455 OL
(Byron Nuclear Power Station, Units 1 and 2)	:	

Main Courtroom
Federal Building
211 South Court Street
Rockford, Illinois

Friday, July 27, 1984
VOLUME II

The following is Volume II of the hearing in the above-entitled matter which was convened at 9:05 a.m., pursuant to recess.

BEFORE:

JUDGE IVAN W. SMITH, Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

JUDGE A. DIXON CALLIHAN, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission

JUDGE RICHARD F. COLE, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission.

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APPEARANCES:

On behalf of the Applicant Commonwealth Edison Company:

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-and-

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On behalf of the Intervenor DAARE SAFE:

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MS. BETTY JOHNSON
1907 Stratford Lane
Rockford, Illinois 61107

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VOLUME II - INDEX

LAY-INS

mgc20-4

P R O C E E D I N G S (Continued)

(At the request of the Chairman, this begins Volume II of the proceedings held Friday, July 27, 1984)

MS. GIBBS: At this time, Commonwealth Edison Company would like to present Mr. Bender and Mr. Treece as witnesses. They will testify as a panel on the subject of possible cable overtensioning.

Would you swear the witnesses, please.

Whereupon,

JAMES OWEN BINDER

BOBBY G. TREECE

were called as witnesses on behalf of the Applicant and, having been first duly sworn, were examined and testified as follows:

DIRECT EXAMINATION

BY MS. GIBBS:

Q Mr. Binder, would you state your full name for the record, please?

A (Witness Binder) James Owen Binder.

Q By whom are you employed?

A Commonwealth Edison.

Q What is your position?

A I am a Project Electrical Supervisor at the Byron site.

Q Do you have in front of you a document entitled

mgc20-5

"Summary of Direct Testimony of James O. Binder"?

A Yes, I have.

Q "Issues V and VI, Cable Overtensioning, as Limited by the Licensing Board's Order of June 8, 1984," together with a document entitled "Direct Testimony of James O. Binder on Issues V and VI, Cable Overtensioning, Limited by the Licensing Board's Order of June 8, 1984," together with certain attachments?

A Yes, ma'am, I do.

Q Are there any changes or corrections that you would like to make to this testimony?

A No. I have no changes, no corrections.

Q Did you prepare this testimony?

A Yes, with the advice of counsel, I prepared this direct testimony.

Q Is the testimony you have before you true and correct to the best of your knowledge and belief?

A Yes, ma'am, it is.

MS. GIBBS: Judge Smith, at this time, I would like to give a copy of Mr. Binder's testimony, with attachments, to the reporter and ask that it be admitted into evidence and incorporated into the record as if read.

MR. LEWIS: Your Honor, I don't know whether this is just a problem with the copy the Staff has, but the first page of the testimony itself of Mr. Binder was

mgc20-6

missing in the copy that the Staff received. It's the page, I believe, that has just preliminary questions regarding qualifications. I don't know if that problem is --

MS. GIBBS: Judge Smith, I have an extra copy. I'll be glad to give it to counsel for the NRC.

MS. JUDSON: Also true of our copy, I believe.

JUDGE SMITH: Let's go off the record.

(Discussion off the record.)

JUDGE SMITH: All right. The testimony is received.

(The prepared testimony of Mr. James Owen Binder follows.)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. STN 50-454 OL
	)	STN 50-455 OL
COMMONWEALTH EDISON COMPANY	)	
	)	
(Bryon Nuclear Power Station, Units 1 and 2)	)	

SUMMARY OF DIRECT TESTIMONY OF
JAMES O. BINDER ON ISSUES 5 AND 6
(CABLE OVERTENSIONING), AS LIMITED BY
THE LICENSING BOARD'S ORDER OF
JUNE 8, 1984

I. James O. Binder of Commonwealth Edison Company is the Project Electrical Supervisor at Byron Station.

II. Cable overtensioning concerns the amount of tension which is applied to electrical cable when it is pulled through conduit. If the applied pulling tension causes certain criteria, established by the cable manufacturer, to be exceeded, a cable could be rendered unable to perform its intended function.

III. The NRC has identified two items of noncompliance and two other items with respect to potential cable overtensioning, all of which have been satisfactorily resolved by Commonwealth Edison.

A. The NRC identified as an unresolved item the fact that Hatfield Electric Company, which is responsible for cable installation at Byron Station, used an installation procedure which

did not address how it would be verified that the allowable cable pulling tension had not been exceeded when small cables or instrument cables were pulled.

B. This item was resolved by revising the cable pulling procedure to address the required precautions to be taken when small cables or instrument cables are pulled.

C. The first item of noncompliance identified that the Hatfield Electric installation procedure did not address the requirements to calculate electrical cable sidewall pressure and did not provide instructions regarding electrical cable rework.

D. This item of noncompliance was resolved by revising the Hatfield Electric cable installation procedure to address the subjects identified by the NRC. In addition, Sargent & Lundy performed an analysis of all safety-related cables installed in conduit prior to the implementation of the revised procedure to determine their acceptability. All of these cables were found to be acceptable, i.e., they would perform their intended functions.

E. As part of an investigation of allegations concerning Hatfield Electric, the NRC identified as

an open item the Commonwealth Edison Nonconformance Reports (NCRs) which had been written concerning potential cable overtensioning.

F. This open item was resolved by the analysis mentioned in II. D., above, and by the satisfactory dispositioning of the Commonwealth Edison NCRs pertaining to potential cable overtensioning.

G. The second item of noncompliance identified that one Hatfield Electric Discrepancy Report (DR), which had been written concerning potential cable overtensioning, had received an inadequate response. This had resulted in 12 safety-related cables whose quality was indeterminate, in that one more of those cables had been overtensioned during the attempted pull-back of another cable.

H. That item of noncompliance was resolved by replacing all 13 safety-related cables involved, by reviewing all Hatfield Electric DRs for cables which had been pulled out of conduit, and by taking steps to prevent the recurrence of this type of incident.

IV. Based upon (1) the review of safety-related cables installed in conduit prior to the implementation of the revised cable pulling procedure in December, 1982, and (2) the revised cable pulling procedure used by Hatfield

Electric since December, 1982, all of the safety-related cables installed in conduit at Byron Station are acceptable. Their ability to perform their intended functions has not been impaired by overtensioning.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. STN 50-454 OL
	)	STN 50-455 OL
COMMONWEALTH EDISON COMPANY	)	
	)	
(Bryon Nuclear Power Station, Units 1 and 2)	)	

DIRECT TESTIMONY OF
JAMES O. BINDER ON
ISSUES 5 AND 6 (CABLE
OVERTENSIONING), AS LIMITED BY
THE LICENSING BOARD'S ORDER
OF JUNE 8, 1984

Q-1. Please state your name.

A-1. James O. Binder.

Q-2. What is your residence address?

A-2. My residence address is Rural Route 3, 13 Oak Grove Drive, Hampshire, Illinois 60140.

Q-3. By whom are you employed and in what capacity?

A-3. I am employed by Commonwealth Edison Company as Project Electrical Supervisor at Byron Station.

Q-4. Please describe your educational background.

A-4. I received a Bachelor of Science degree in electrical engineering from the University of Illinois in June, 1974. I received a Master of Business Administration degree from the Keller Graduate School of Management in

February, 1984. I am licensed as a professional engineer in the State of Illinois.

Q-5. Please describe your employment experience.

A-5. I have worked for Commonwealth Edison Company since June, 1974. My first position was as a Field Engineer in the Division Operational Analysis Department. In October, 1978, I was assigned to work at the Byron Station, and I have worked there continuously to this date. My first position at Byron Station was as a General Engineer in the System Operational Analysis Department; I was subsequently promoted to Principal Engineer. In December, 1980, I transferred to the Project Construction Department. I became Project Electrical Supervisor in June, 1981, and still hold that position today.

Q-6. Please describe your duties as Project Electrical Supervisor at Byron Station.

A-6. My duties include managing the activities associated with the electrical construction of the Byron Station, including supervision of the Project Costruction electrical department on site and contract administration concerning the electrical contractor, Hatfield Electric Company.

Q-7. Please describe the scope of your testimony.

A-7. My testimony is in response to Issues 5 and 6, relating to potential cable overtensioning, or overstressing, at Byron Station, as those issues have been limited by the Licensing Board's Order of June 8, 1984. My testimony describes the history of the question of cable overtensioning at Byron Station and sets forth the response which Commonwealth Edison has made to certain items of noncompliance and open items concerning this matter which the NRC identified during various inspections. The attachments to my testimony consist of certain NRC inspection reports and certain other documents which pertain to this matter. I am familiar with the contents of all of these attachments to the extent that they pertain to the cable overtensioning matter.

Q-8. Please describe the concept of cable overtensioning.

A-8. The concept of cable overtensioning concerns the amount of tension which is applied to electrical cable when it is pulled through conduit. When cable is installed in conduit it is pulled, either by hand or by machine, and a certain amount of tension is exerted on the cable in the process. Cable tension criteria have been established to give reasonable assurance that the cable's published rating will not be impaired during installation. These criteria address both maximum allowable

tensile strength and maximum allowable sidewall pressure. If the maximum allowable tensile strength of the cable were exceeded, thinning of the conductor(s) or breakage could occur. If the applied pulling tension caused the maximum allowable sidewall pressure to be exceeded, the insulation surrounding the conductor(s) could be damaged. Either of these events could render a cable unable to perform its intended function.

Q-9. Who establishes the criteria defining maximum allowable cable pulling tension for a cable?

A-9. The cable manufacturers establish these criteria for their cables.

Q-10. Who is responsible for cable installation at Byron Station?

A-10. The electrical contractor, Hatfield Electric Company, is responsible for cable installation at Byron Station.

Q-11. How does the electrical contractor know the amount of tension which is exerted on a cable during a cable pull?

A-11. The electrical contractor monitors the tension exerted on a cable during a cable pull using an instrument known as a dynamometer.

Q-12. How are instructions given to the electrical contractor regarding the allowable cable pulling tensions for cables installed in conduit?

A-12. The architect-engineer, Sargent & Lundy, utilizing cable pulling information supplied by each cable manufacturer, determines the allowable pulling tensions for each cable type. This information appears on the installation drawings issued to the contractor by Sargent & Lundy. In addition, the contractor has developed a procedure, accepted by the architect-engineer, which describes the steps to be taken regarding the calculation, monitoring and recording of cable tensions for cable installation.

Q-13. Please describe how the question of possible cable overtensioning first arose.

A-13. During an inspection conducted in September, 1981, the NRC inspector observed that the Hatfield Electric procedure governing class 1E cable installation did not address how it would be verified that the allowable cable pulling tension had not been exceeded when small cables or instrument cables were pulled. See Attachment A (Inspection Report 50-454/81-16; 50-455/81-12) at pages A-7 to A-8.

Q-14. What action was taken in response to this observation?

A-14. In response to this observation, the Hatfield Electric cable pulling procedure was revised to address the required precautions to be taken when small cables or instrument cables are pulled. See Attachment B (Inspection Report 50-454/83-16) at page B-6.

Q-15. Please describe the next event which occurred concerning possible cable overtensioning.

A-15. An item of noncompliance (82-05-09c, 82-04-09c) related to the subject of cable overtensioning was identified during the NRC construction team inspection conducted at Byron Station in the Spring of 1982. This inspection found that Hatfield Electric's cable installation procedure did not address the requirements to calculate electrical cable sidewall pressure prior to pulling cable and did not provide instructions regarding electrical cable rework. See Attachment C (Inspection Report 50-454/82-05; 50-455/82-04) at pages C-70 to C-71.

Q-16. Please describe how this item of noncompliance was resolved.

A-16. The resolution of this item involved two phases. First, the Hatfield Electric procedure regarding cable installation was revised to address both the calcu-

lation of the allowable pulling tension considering sidewall pressure limitations and instructions regarding electrical cable rework. As explained in a letter from Commonwealth Edison to the NRC dated November 5, 1982 (Attachment D), Sargent & Lundy specified allowable pulling tensions for cable in conduit which considered both the tensile strength of the conductors and the allowable sidewall pressure. Methods were also established to determine the allowable pulling tension for multiple cable pulls in conduit and for cable pulls in conduit with non-standard radius bends. In addition, the Hatfield Electric procedure was revised to implement these instructions for new cable installation as well as for cable rework. This revision also required inspectors to monitor (with a dynamometer) and record the maximum tension reached during all cable pulls. The revised procedure was implemented in December, 1982. See Attachment D at pages D-2 to D-3. The NRC found the revised procedure to be satisfactory and closed this portion of the item of noncompliance in its May, 1983 Inspection Report. See Attachment B at page B-6.

Q-17. Please describe the second phase of the resolution of this item of noncompliance.

A-17. As stated above, the revised Hatfield Electric procedure regarding cable pulling was implemented in December, 1982. In order to verify that the sidewall pressure was not exceeded for cables installed prior to the date of the revised procedure, Commonwealth Edison committed to review the cable pull reports for previously installed cables against the current criteria. If it were found that the allowable sidewall pressure had been exceeded, the Company committed to take appropriate corrective action with the advice of the cable manufacturer. These actions would ensure that all cables, regardless of when they were installed, would perform their intended functions. See Attachment D at page D-3. This review was carried out by Sargent & Lundy, which performed an analysis of all safety-related cables installed in conduit prior to December, 1982. The scope of that analysis, the methodology used, the results of the analysis and the conclusions drawn from it are set forth in detail in the testimony of Bobby G. Treece of Sargent & Lundy. Based upon that analysis, it was concluded that all of the safety-related cables installed in conduit prior to the implementation of the revised criteria in December, 1982, were acceptable. The NRC inspectors reviewed Sargent & Lundy's analysis and concluded that there was a reasonable assurance that the safety-related cables that were

the subject of the analysis would perform their intended functions. See Attachment E (Inspection Report 50-454/84-27; 50-455/84-19) at pages E-14 to E-15.

Q-18. Please describe the next event relating to the possible overtensioning of cables.

A-18. As a result of allegations concerning the construction activities of the Hatfield Electric Company, the NRC conducted a special inspection between August 2, 1983, and January 18, 1984. One allegation which was investigated asserted that cables had been overstressed when pulled, even to the point of breaking the cable. The results of the NRC's investigation are set forth in Inspection Report 50-454/84-02; 50-455/84-02, which is Attachment F to my testimony. The NRC interviews related to that allegation revealed that individuals knew of only one instance where a cable had been overstressed to the breaking point; the persons interviewed stated that that cable had been replaced and the occurrence had been documented. The inspectors also reviewed the Commonwealth Edison Nonconformance Report (NCR) log and found that at least 25 NCRs concerning potential overtensioning of cables had been written. The NRC determined that the allegation constituted an open item (84-02-03) pending the verification of corrective action on: 1) cables installed

prior to the implementation of the revised cable pulling procedure in December, 1982, and 2) cables identified on NCRs and Discrepancy Reports (DRs) as potentially overtensioned. See Attachment F at page F-17.

Q-19. Please describe the steps which were taken to close this item.

A-19. My Answer number 17, above, describes the analysis which was undertaken by Sargent & Lundy in order to assure that cables installed prior to the implementation of the revised pulling procedure would perform their intended functions. That analysis was reviewed and accepted by the NRC, and that part of the item was closed, in Inspection Report 50-454/84-27; 50-455/84-19. See Attachment E at pages E-14 to E-15.

In order to close the remaining portion of this item, the NRC inspector reviewed the Commonwealth Edison NCRs which documented potential cable overtensioning. This review is documented in Inspection Report 50-454/84-09, which is Attachment G to my testimony. There were a total of 19 NCRs on this subject written by Commonwealth Edison. The NRC inspector also reviewed NCRs prepared by Hatfield Electric regarding the potential overtensioning of electrical cables. See Attachment G at pages G-6 to

G-12. Because certain of the Commonwealth Edison NCRs were not yet closed as of the date of that inspection, this item was considered unresolved (84-09-01). During the inspection referenced in 50-454/84-27; 50-455/84-19 (Attachment E), the inspectors reviewed the dispositions of the remaining Commonwealth Edison NCRs pertaining to potential cable overtensioning and found them to be acceptable. The NRC then closed this item. See Attachment E at page E-15.

Q-20. Please describe the disposition of these Commonwealth Edison NCRs pertaining to potential cable overtensioning.

A-20. Many of the cables were found to be acceptable as installed. Some of these were determined to be acceptable by an analysis performed by Sargent & Lundy, some were determined to be acceptable by an analysis performed by the cable manufacturer, and some were determined to be acceptable by testing, as recommended by the cable manufacturer. For the remaining cables, it was determined that the maximum allowable pulling tension had in fact been exceeded and the cables were therefore unacceptable.

Q-21. What was the engineering disposition of the cables which were determined to be unacceptable?

A-21. The engineering disposition was to replace the cables.

Q-22. Were those cables replaced?

A-22. Yes.

Q-23. Did the NRC identify an item of noncompliance in regard to cable overtensioning during the inspection documented in Inspection Report 50-454/84-09; 50-455/84-07 (Attachment G)?

A-23. Yes. An item of noncompliance is described at pages G-12 to G-13 of that Inspection Report.

Q-24. Please describe this item of noncompliance.

A-24. During a review of 1000 discrepancy reports prepared by Hatfield Electric, the NRC inspector identified one report, DR 3382, which, after interviewing the Hatfield Electric cable pulling and QC personnel involved, was determined to have been inadequately dispositioned. DR 3382 is Attachment H to my testimony. The DR had been prepared to document the fact that, while attempting to remove a cable from a conduit which contained other cables, the remaining 12 cables were subjected to 500 pounds total tension. As the distribution of the 500 pounds of tension among the 12 remaining cables could not be verified, one or more of the cables may have been subjected to the total 500 pounds of tension exerted during the pull, and therefore been overtensioned. Because the Hatfield Electric QC inspector's written description of the problem was unclear in that

it failed to specifically state that only one of the 13 cables was being pulled on, the Hatfield Electric engineer who evaluated the DR mistakenly assumed that the 500 pounds of tension had been applied to all 13 cables in the conduit. The engineer then calculated the allowable pulling tension for the 12 remaining cables to be 557 pounds. Because the 500 pounds of tension which had been applied during the pull was less than the 557 pounds of allowable tension which had been calculated, the engineer concluded that the 12 remaining cables were acceptable as installed. The DR was returned to QC and was closed based on the engineer's response that the cables had not been overtensioned. The NRC inspector concluded that the failure to provide an adequate response to DR 3382 had resulted in 12 safety-related cables whose quality was indeterminate, in that one or more of those cables was overstressed during the attempted pull-back of another cable. This was identified as item of noncompliance 84-09-02.

Q-25. Did you review the circumstances surrounding DR 3382 to determine the cause of the inadequate disposition?

A-25. Yes.

Q-26. Please describe the results of your review.

A-26. After discussions with the NRC inspector and the Hatfield Electric engineer who evaluated the DR, I concluded that DR 3382 had been inadequately dispositioned for the following reasons:

1) The QC inspector who wrote the DR failed to provide an accurate written description of the problem;

2) Due to the inaccurate description, the engineer's evaluation did not address the actual problem;

3) The verification of the resolution of DR 3382 was not completed by the same QC inspector who had witnessed the problem and written the DR. This QC Inspector determined that the engineering resolution adequately addressed the problem as described. The DR was therefore closed.

Q-27. Was there any evidence that the cable overtensioning which occurred was not properly reported in accordance with written procedures?

A-27. No. The proper reporting procedures were followed. It was due to an inaccurate description of the problem on the DR that inadequate corrective action was taken.

Q-28. Please describe the resolution of item of noncompliance 84-09-02.

A-28. The resolution of this item of noncompliance comprised three parts. First, Hatfield Electric prepared NCR 841 to document the potentially overtensioned cables identified in item of noncompliance 84-09-02. I dispositioned

this NCR by requiring that all 13 cables be replaced. This action was taken. Second, Hatfield Electric DRs for all other cables which were pulled out of conduit were reviewed to confirm that the inaccurate description associated with DR 3382 was an isolated incident. See Attachment I (Letter from Commonwealth Edison to the NRC dated April 25, 1984, enclosing Response to Notice of Violation). Third, Commonwealth Edison took steps to prevent recurrence of this type of incident, as outlined in my February 2, 1984 letter to Hatfield Electric (Attachment J to my testimony). This letter sets forth the criteria for determining the allowable pulling tension when cable is to be pulled out of conduit. The use of these criteria will assure that any cables remaining in a conduit will not be over-tensioned when a cable or cables are pulled out. This letter also re-emphasizes that cables should never be pulled unless the cable pulling crew and the QC personnel know what the allowable pulling tension is for the cable pull to be performed. Finally, this letter stresses that when a problem is identified, it is important that the deficiency be clearly described so that it can be properly evaluated and dispositioned. See Attachment J at page J-2. The NRC accepted the Company's resolution of this matter and closed this item in Inspection Report 50-454/84-27, 50-455/84-19. See Attachment E at page E-15.

Q-29. What is your opinion of the condition of the safety-related cables installed in conduit at Byron Station with respect to potential cable overtensioning?

A-29. In my opinion, the safety-related cables installed in conduit at Byron Station are acceptable. Their ability to perform their intended functions has not been impaired by overtensioning.

Q-30. Please describe the basis for that opinion.

A-30. For all safety-related cables installed in conduit before December, 1982, my opinion is substantiated by the analysis which was performed by Sargent & Lundy. This analysis is described in Answer 17, above, and in the testimony of Mr. Treece of Sargent & Lundy. For all safety-related cables installed after December, 1982, my opinion is based upon the revised cable pulling procedure used by Hatfield Electric. I believe that that procedure adequately addresses cable installation activities with respect to cable pulling tensions. Finally, I believe that all Commonwealth Edison NCRs and all Hatfield Electric DRs and NCRs which have been written addressing potential cable overtensioning problems have been properly reviewed and dispositioned.

Binder
Attachment A

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

OCT 2 7 1981

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the routine safety inspection conducted by Mr. R. S. Love of this office on September 22-25, 1981, of activities at Byron Generating Station, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131 and to the discussion of our findings with Mr. R. Tuetken, Assistant Project Superintendent at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as specified in enclosed Appendix A. A written response, submitted under oath or affirmation, is required.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter, the enclosures, and your response to this letter will be placed in the NRC's Public Document Room. If the enclosures contain any information that you or your contractors believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within seven (7) days from the date of this letter of your intention to file a request for withholding; and (b) submit within twenty-five (25) days from the date of this letter a written application to this office to withhold such information. Section 2.790(b)(1) requires that any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons which are the bases for the claim that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The

information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosures, and your response to this letter will be placed in the Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

C. E. Norelius

C. E. Norelius, Director
Division of Engineering and
Technical Inspection

Enclosures:
1. Appendix A, Notice of Violation
2. IE Inspection Reports No. 50-454/81-16 and No. 50-455/81-12

cc w/encls:
Louis C. DelGeorge
Director of Nuclear Licensing
Gunner Sorensen, Site Project Superintendent
V. I. Schlosser, Project Manager
R. E. Querio, Station Superintendent
DMB/Document Contorl Desk (RIDS)
Mary Jo Murray, Office of Assistant Attorney General
Myron M. Cherry

Appendix A

NOTICE OF VIOLATION

Commonwealth Edison Company

Docket No. 50-454
Docket No. 50-455

As a result of the inspection conducted on September 22-25, 1981, and in accordance with the Interim Enforcement Policy, 45 FR 66754 (October 7, 1980), the following violation was identified:

10 CFR 50, Appendix B, Criterion XVI, states in part, "Measures shall be established to assure that conditions adverse to quality...are promptly identified and corrected."

Commonwealth Edison Company Topical Report No. CE 1-A, Revision 9, Section 16, states in part, "A corrective action system will be used to assure that such items...which are adverse to quality and might affect the safe operation of a nuclear generating station are promptly identified and corrected."

Contrary to the above, the licensee had not taken the necessary actions to assure that an identified item of noncompliance, concerning the separation criteria between safety-related and non-safety-related cables, was promptly corrected. This is exemplified by the fact that the appropriate Hatfield procedure addressed in the licensee's correspondence, was not being implemented as of September 24, 1981. The licensee committed to have the procedure implemented by June 1, 1981. (Reference CECo letter dated May 7, 1981, from Cordell Reed to James G. Keppler.)

This is a Severity Level V violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation. Consideration may be given to extending your response time for good cause shown.

OCT 23 1981

Dated

C. E. Norelius

C. E. Norelius, Director
Division of Engineering and
Technical Inspection

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Reports No. 50-454/81-16; 50-455/81-12

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 Generating Station, Units 1 and 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: September 22-25, 1981

Inspector: F C Hawk for R. S. Love 10/21/81

Approved By: F C Hawk F. C. Hawkins, Acting Chief 10/21/81
Plant Systems Section

Inspection Summary

Inspection on September 22-25, 1981 (Reports No. 50-454/81-16; 50-455/81-12)
Areas Inspected: Follow-up on previously identified inspection findings; review of electrical procedures and records. This inspection involved a total of 30 inspector-hours onsite by one NRC inspector.
Results: Of the areas inspected, one apparent item of noncompliance was identified (Criterion XVI - failure to promptly identify and correct items of nonconformance - Paragraph 2.a).

DETAILS

Persons Contacted

Commonwealth Edison Company

G. Sorensen, Project Superintendent
*J. O. Binder, Project Electrical Supervisor
*R. B. Klingler, Quality Assurance Supervisor
*M. A. Standish, Quality Assurance Superintendent
*R. Tuetken, Assistant Project Superintendent

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

*Denotes those present at the exit interview.

1. Licensee Action on Previous Inspection Findings

   a. (Open) Noncompliance (50-454/80-09-01; 50-455/80-08-01): CECO did not ensure that Sargent and Lundy (S&L) adequately translated the requirements of the Byron PSAR and S&L Specifications 2831 into S&L Specifications 2815 in that corrosion protection was not specified for the exposed carbon steel material and exposed spot welds used in the installation of seismic Category 1 electrical cable tray hanger supports. Due to the unavailability of personnel, the inspector was unable to obtain the answers to the questions contained in NRC letter to CECO dated August 14, 1981.

   b. (Open) Noncompliance (50-454/80-12-01; 50-455/80-11-01): CECO did not ensure that Sargent and Lundy adequately translated the requirements of 10 CFR 50, Appendix A, Criterions IV and V, into the design of the cooling water piping for Emergency Diesel Generator 1B in that the cooling water lines for D/G 1B pass through the room housing Unit 1A. As indicated in NRC letter to CECO, dated November 18, 1980, this matter has been referred to our headquarters staff for resolution. We will advise you of their findings.

   c. (Closed) Noncompliance (50-454/80-15-01; 50-455/81-14-01): Activities affecting quality were not prescribed by instructions, procedures, or drawings in that: (1) Requirements were not established for the hardware used to assemble the seismic Category 1 battery racks to be capable of withstanding acidic atmosphere; (2) Documented instructions were not established to conduct timely inspections; (3) Documented instructions were not established to control instruments which were determined to be defective during bench testing.

      (1) Station Procedure BHS 8.2.3.2.C-1 (125V Battery Bank and Charger Operability, Revision 0, dated August 1981) includes an inspection point to verify that the battery rack and battery rack hardware is free of corrosion.

(2) Procedure QC-3, Paragraph 9.1, was revised to incorporate an "Inspection Request" form to ensure timely inspection. Most of the inspection requests were honored the same day they were prepared.

(3) The licensee has taken and completed action to control (tag) the defective instruments and revise the procedure.

d. (Open) Noncompliance (50/454/80-25-09; 50-455/80-23-05): Safety related cables were bundled with non-safety related cables in the lower cable spreading room in violation of IEEE 384 and FSAR commitments. Procedure 10, "Class 1E Cable Installation" was revised to incorporate a 12" separation requirement. This procedure was implemented on September 24, 1981. This item will remain open until implementation can be verified.

e. (Open) Noncompliance (50-454/80-25-13): Welds on cable pan bent plate stiffeners do not conform to Sargent and Lundy (S&L) Standard STD-EB-701. Pittsburgh Testing Laboratories made sketches of a pre-determined number of stiffener plate welds, showing weld size, cracks, lack of fusion, craters, undercut, porosity, weld profile and underrun. This information was forwarded to S&L for evaluation. This item will remain open until the results of S&L's evaluation can be reviewed.

f. (Closed) Unresolved item (50-454/80-25-15; 50-455/80-23-06): Incomplete/inaccurate documentation received from Okonite Cable Company for 5KV power cable. The inspector reviewed the documentation for the subject cable. All required documentation is on-site and the Quality Assurance Traceability Schematic has been corrected to show the proper QC Length Number.

g. (Closed) Noncompliance (50-454/80-25-16): The minimum separation criteria for redundant impulse sensing lines as specified in the Byron PSAR was not translated into instructions, procedures, specifications, and drawings. Engineering Change Notice Number 1958, dated January 14, 1981, was issued to incorporate separation criteria and color coding requirements for all instrument sensing lines into Specifications F-2906 and F/L-2739.

2. Review of Electrical Procedures and Records

a. In accordance with Commonwealth Edison's (CECo) commitment to the NRC (May 7, 1981 letter from Cordell Reed to James G. Keppler, Paragraph 2.a), Procedure Number 10, "Class 1E Cable Installation", Revision 10, Issue 2, was prepared to incorporate the 12 inch separation requirement between Class 1E and non-Class 1E cables in free-air. This procedure was approved with comments by Sargent and Lundy (S&L) of August 7, 1981 and transmitted to Hatfield Electric by CECo on August 13, 1981.

While attempting to close Noncompliance 50-454/80-25-09; 50-455/80-23-05, which concerns the separation of Class 1E and non-Class 1E cable in free air, it was observed that the separation problems identified on a previous inspection had been corrected, but there are still separation problems in the lower cable spreading room.

During discussions with the Hatfield Quality Assurance Manager on September 24, 1981 (AM), it was learned that Hatfield chose not to implement Revision 10, Issue 2 but were implementing Revision 9, Issue 1, dated February 3, 1981.

The inspector queried the licensee as to when they planned to honor their commitment of May 7, 1981.

On September 24, 1981 (PM), CECo issued a letter to Hatfield directing them to implement Procedure Number 10, Class 1E Cable Installation, Revision 10, Issue 2, dated June 8, 1981 with S&L comments immediately.

The Region III inspector informed the licensee of the failure to assure that conditions adverse to quality are promptly identified and corrected is an item of noncompliance in accordance with 10 CFR 50, Appendix B, Criterion XVI as described in Appendix A of the report transmittal letter. (50-454/81-16-01; 50-455/81-12-01)

b. During a tour of the Unit 1 containment, it was observed that the cable pan markings on 1396E-C2E and 1396R-P2E exceeded the 15 foot maximum spacing requirements of S&L drawing 6E-0-3390, Hatfield Procedure 9E, "Class 1 Cable Pan Identification," Revision 6, Issue ', dated January 23, 1981 and IEEE 384-1974 as committed to in Byron FSAR, Paragraph 8.3.1.4.2.1.

During discussions with the Hatfield Quality Assurance Manager on September 24, 1981, it was learned that Hatfield chose not to implement Procedure 9E after it had been reviewed and accepted by S&L on January 26, 1981. The licensee informed the inspector that Hatfield's failure to implement Procedure 9E had been identified by CECo during an audit of Hatfield on September 9-10, 1981 and were awaiting their response. Pending a review of the response to the subject audit, this matter is unresolved. (50-454/81-16-02; 50-455/81-12-02)

c. The Region III inspector observed that Hatfield Procedure 10, Revision 10, Issue 2 (Class 1E Cable Installation) did not address how the licensee was going to verify that the maximum cable pulling tension had not been exceeded when small cables and/or instrumentation cables were pulled. (i.e., cables that have a maximum pulling tension that is less than the force that can be exerted on a cable by one person) Tests performed on other projects indicate this force to be approximately 125 pounds.

Pending a detailed review of cable pulling records to verify that maximum cable pulling tensions have not been exceeded, this item is unresolved. (50-454/81-16-03; 50-455/81-12-03)

d. During an inspection of the main control room, it was observed that the safety related switches, instruments, recorders, etc. were not distinctively identified as being in the protection system as required by Paragraph 4.22 of IEEE-279. Pending a review of the technical specifications, FSAR requirements, etc., this item is unresolved. (50-454/81-16-04; 50-455/81-12-04)

e. During an inspection of Unit 1 containment, it was observed that the horizontal separation between Class 1E and non-Class 1E cable trays was approximately six inches. Trays involved were 1396E-C2E and 1396CC-C2B and 1396-P2E and 1396B-P2B. Paragraph 8.3.1.4.2.2 of the Byron FSAR discusses minimum raceway separation criteria for:

(1) Minimum spacing for Engineering Safety Features (ESF) Divisions and Reactor Trip System (RTS) Channels.

(2) Separation for Non-Safety-Related Cable Trays.

The FSAR does not discuss the separation requirements for Safety-Related (ESF & RTS) Cable Trays and Non-Safety-Related Cable Trays.

Sargent and Lundy (S&L) drawings 6E-1-4027A, B, and C, Revision A, dated May 16, 1977 have interpreted the "Separation Requirements for Non-Safety-Related Cable Trays" to encompass the separation requirements between Safety Related and Non-Safety-Related Cable Trays. This item is unresolved pending a review of S&L calculations for all Safety-Related/Non-Safety-Related separation requirements where they deviate from the criteria established in IEEE-384. (50-454/81-16-05; 50-455/81-12-05).

Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or items of noncompliance or deviations. Unresolved items disclosed during this inspection are discussed in Paragraphs 2.b, 2.c, 2.d, and 2.e.

Exit Meeting

The inspectors met with licensee representatives (denoted under Persons Contacted) on September 25, 1981. The inspectors summarized the scope and findings of the inspection. The licensee representatives acknowledged the findings reported in previous paragraphs.

Binder
Attachment B

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAY 31 1983

Docket No. 50-454

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the routine safety inspection conducted by Mr. R. S. Love of this office on March 21-25, and April 4-8, 1983, of activities at Byron Station authorized by NRC Construction Permit No. CPPR-130 and to the discussion of our findings with Mr. G. Sorensen at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as specified in the enclosed Appendix. A written response is required. Information gathered in this inspection indicates that the use of interim lead auditors who are not certifiable per ANSI 45.2.23 may be common practice at CECo construction sites. Please include in your response to the item of noncompliance a discussion of the extent of this practice at all CECo sites, including steps being taken to remedy the problem. Also, include in your response the steps you plan to take to assure that audits conducted by non-certifiable lead auditors were properly conducted.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosure(s), and your response to this letter will be placed in the Public Document Room.

Commonwealth Edison Company

MAY 31 1983

The responses directed by this letter (and the accompanying Notice) are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

W. S. Little, Chief
Engineering Branch II

Enclosures:
1. Appendix, Notice of Violation
2. Inspection Report No. 50-454/83-16(DE)

cc w/encls:
D. L. Farrar, Director of Nuclear Licensing
V. I. Schlosser, Project Manager
Gunner Sorensen, Site Project Superintendent
R. E. Querio, Station Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII Braidwood
Philip L. Willman, Esq. Assistant Attorney General Environmental Control Division
Reed Neuman, Esq., Assistant Attorney General
Ms. Jane M. Whicher
Diane Chavez, DAARE/SAFE

Appendix

NOTICE OF VIOLATION

Commonwealth Edison Company Docket No. 50-454

As a result of the inspection conducted on March 21-25, and April 4-8, 1983, and in accordance with the NRC Enforcement Policy, 47 FR 9987 (March 9, 1982), the following violation was identified:

10 CFR 50, Appendix B, Criterion II, states, in part, "The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained."

Commonwealth Edison Company (CECo) letter, L. O. DelGeorge to D. G. Eisenhut, U.S. NRC, Director, Division of Licensing, dated August 17, 1981, affirmed CECo commitment to Regulatory Guide 1.146, August 1980 and ANSI N45.2.23-1978 as required by Generic Letter 81-01.

ANSI N45.2.23-1978, paragraph 2.3, states, "An individual shall meet the requirements of paragraphs 2.3.1 through 2.3.5 prior to being designated a lead auditor."

ANSI N45.2.23-1978, paragraph 2.3.1, states, in part, "Education and Experience. The prospective lead auditor shall have verifiable evidence that a minimum of ten (10) credits under the following scoring system have been accumulated. Education (4 credit maximum). Experience (9 points maximum). Other credentials of professional competence (2 credit maximum). Rights of Management (2 points maximum).

Contrary to the above, the Commonwealth Edison Company Quality Assurance Lead Auditor performing the Power-Azco-Pope audit was not adequately qualified and/or trained to perform lead auditor functions. Details of apparent noncompliance to the above requirements are delineated in paragraph 3.A.(1) of the attached report.

This is a Severity Level IV violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

May 27 1983
Dated

W. S. Little, Chief
Engineering Branch II

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/83-16(DE)

Docket No. 50-454 License No. CPPR-130

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

Facility Name: Byron Station, Unit 1

Inspection At: Byron Site, Byron, IL

Inspection Conducted: March 21-25 and April 4-8, 1983.

Inspector: R. S. Love 5/27/83

Approved By: C. C. Williams, Chief 5/27/83
Plant Systems Section

Inspection Summary

Inspection on March 21-25 and April 4-8, 1983 (Report No. 50-454/83-16(DE))
Areas Inspected: Review of licensee action on previously identified items. Reviewed installation of instrument sensing lines, installation and termination of instrumentation cables, and the review of associated procedures and records. This inspection involved a total of 69 inspection-hours by one NRC inspector.
Results: In the areas inspected, one potential item of noncompliance was identified. The licensee failed to assure that CECo lead auditors were properly qualified and certified (Paragraph 3.A.(1)).

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

#*G. Sorensen, PCD Construction Superintendent
#*R. Tuetkon, PCD Assistant Construction Superintendent
*J. T. Westermeier, PED Project Engineer
*M. A. Stanish, QA Superintendent
#*R. B. Klingler, Staff Assistant
*P. T. Myrda, QA Supervisor
#*R. A. Westberg, QA Engineer
*A. J. Rosenbach, QA Inspector
*F. A. Mazzini, QA Engineer
*M. E. Lohmann, PCD Mechanical Supervisor
K. J. Hansing, QA Supervisor
E. Sager, Field Engineer
J. Binder, Project Electrical Supervisor
R. G. Gruber, QA Engineer

Power-Azco-Pope (PAP)

R. P. Larkin, QA Manager
R. C. Schulz, Project Manager
*D. M. Nelson, QC Supervisor
*M. C. Donohoe, Engineering Manager

Hatfield Electric Company (HECo)

T. Hill, QA/QC Manager
J. D. Spangler, Lead Welding Inspector (PTL)
R. Quias, Welding Inspector (PTL)
G. A. Cason, QC Lead Inspector (PTL)

Westinghouse

*M. D. Pitlyuk, Manager
*G. L. Laughlin, Engineer

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

*Denotes those present at the exit interview on March 25, 1983
#Denotes those present at the exit interview on April 8, 1983.

2. Action on Previously Identified Items

(CLOSED) Noncompliance (50-454/80-25-13): This item pertained to the failure to apply hold tag on items identified on CECo Nonconformance Report (NCR) F-529. This NCR identified the fact that the cable tray

stiffener welds did not meet the requirements of AWS D1.1 and the purchase order specifications. Weld profile maps were prepared on cable tray stiffner welds that did not meet the acceptance criteria. The design engineer, Sargent and Lundy (S&L), performed an analysis on the identified weld and with a few exceptions, found that the welds met the design intent. The welds that did not meet the design intent were repaired by the electrical contractor. Paragraphs 3.10.3.2.2.a.1 of the FSAR was revised by Amendment 41, February 1983, to state, "Deviations from the AWS requirements for specific weldments are made on the basis of design calculations." This item is closed.

(CLOSED) Unresolved Item (50-454/81-16-03; 50-455/81-12-03): Hatfield procedures did not address methods to verify that maximum cable pulling tension had not been exceeded when small cables were pulled. S&L drawing 6E-0-3000B, Sheets 1 thru 5, and Hatfield Procedure No. 10 were revised to address the required precautions to be taken when small cables are pulled. This item is closed.

(CLOSED) Unresolved Item (50-454/81-16-04; 50-455/81-12-04): This item identified that the safety-related switches, instruments, recorders, etc., in the main control room were not distinctly identified as being in the protection system. Paragraph 8.3.1.3.3 of the FSAR identifies the fact that the switches, instruments, records, etc. in the main control room would not be color-codes to identify the items as being in the protective system. This item is closed.

(CLOSED) Noncompliance (50-454/82-05-09b; 50-455/82-04-09b): This item identified that HECo procedure number 6 did not address corrective action to prevent recurrence when a nonconformance or deviation was identified. Procedure 6, Revision 11, dated October 9, 1982, now addresses corrective action to prevent recurrence. A review of HECo NCRs indicates that the procedure is being implemented. This item is closed.

(CLOSED) Noncompliance (50-454/82-05-09c; 50-455/82-04-09c): This item identified that HECo procedures did not address the precautions to be taken to prevent exceeding maximum cable sidewall pressure during cable installation. Also, this procedure did not address cable rework. HECo Procedure 10, Revision 19, dated February 14, 1983, satisfactorly addresses cable rework and steps to be taken so as not to exceed cable sidewall pressure. This item is closed.

(CLOSED) Noncompliance (50-454/82-05-11d; 50-455/82-04-11d): This item identifies that PAP procedure QC-4 did not address corrective action to prevent recurrence when a nonconforming condition was identified. PAP Procedure QC-4, Revision 10, dated Spetember 21, 1982, satisfactorly addresses corrective action to prevent recurrence. This item is closed.

(CLOSED) Open Item (50/454/82-05-12; 50-455/83-04-12): This item identified that CECo NCRs were remaining open for an extended period of time. A review of the identified NCRs indicates that a concerted effort has been made to implement the disposition and close these NCRs. The CECo PCD Staff Assistant is implementing a tracking system to expedite the closure of NCRs. This item is closed.

(CLOSED) Noncompliance (50/454/82-05-13; 50/455/82-04-13): This item identified that NCRs were being improperly closed/voided by CECo and HECo. Improperly closed/voided NCRs were reopened by preparing a new NCR. These NCRs were then properly closed and procedure were revised so as to mitigate the possibility of this situation re-occuring. This item is closed.

(CLOSED) Open Item (50-454/82-05-15; 50-455/82-04-15): This item identified that there was not a procedure inplace that addressed the installation of covers on cable tray and risers. HECo Procedure 9C, Revision 1, was prepared to address the installation of cable tray and riser covers in accordance with S&L drawings. This item is closed.

(CLOSED) Unresolved Item (50-454/82-05-16; 50-455/82-04-16): This item identified that HECo procedure 9E did not meet the requirements of IEEE-384 as relating to marking of cable tray risers. Procedure 9E, Revision 10, Paragraph 5.3.1, now requires risers to be identified every 15'. This is in accordance with IEEE-384. Inspection Reports for the retro-fit of riser markers were reviewed by the inspector. This item is closed.

(CLOSED) Unresolved Item (50-454/82-17-01; 50-455/82-12-01): This item identified the possibility of QC inspectors inspecting items that they had installed or worked on. Hunter, HECo, and PAP are utilizing craft personnel as QC inspectors. These contractors reviewed their records and determined that no QC inspector had final inspected his own work. This item is closed.

3. Functional or Program Areas Inspected

A. Powers-Azco-Pope (PAP)

(1) The Region III inspector reviewed the last three CECo audits of PAP, (PAP is the licensee's non-electrical instrumentation installation contractor). These audits were conducted on June 8 thru 10, 1982, December 15 thru 21, 1982, and February 1 thru 4, 1983. The findings and concerns identified during the audits were corrected by PAP.

During the review of CECo audit reports, the Region III inspector observed that the CECo lead auditor that performed the PAP audit was classified as an Interim Lead Auditor. The auditor's qualification and certification records contained a letter from the Byron Station Quality Assurance Superintendent to the CECo Manager, Quality Assurance. This letter (BY8067, August 24, 1982) was a request for Interim Lead Auditor Certification for the subject auditor. However, the letter indicated that the lead auditor candidate, based on education, experience, etc,... had accumulated eight (8) points to date. This is less than the minimum of 10 credit points specified by ANSI N45.2.23-1978. Moreover, an approved procedure allowing the use of lead auditors who do not meet the minimum requirements of the referenced code

was not available. This letter received the concurrence of the CECo Manager, Quality Assurance on August 26, 1982.

Interim Lead Auditor Certification is not addressed in the CECo Quality Assurance Manual, CECo Topical Report (CE-1-A), nor in ANSI N45.2.23-1978. CECo letter, L. O. DelGeorge to D. G. Eisenhut, U.S. NRC, Director, Division of Licensing, dated August 17, 1981, affirmed CECo commitment to Regulatory Guide 1.146, August 1980 and ANSI N45.2.23-1978 as required by Generic Letter 81-01.

During interviews with Byron Station Quality Assurance personnel, including site Quality Assurance Superintendent, the Region III inspector was informed that it has been standard practice within CECo to certify an individual as an Interim Lead Auditor when he/she does not meet the qualifications of a Lead Auditor.

The licensee was informed that failure to assure that Lead Auditors were trained, qualified, and certified in accordance with the CECo Quality Program and ANSI N45.2.231978, was an item of noncompliance in accordance with Criterion II of 10 CFR 50, Appendix B (50-454/83-16-01).

(2) During this reporting period, the Region III inspector reviewed three CECo Material Receiving Reports (MRR) for material to be installed in the safety-related instrumentation system by PAP. Following are the results of this review:

(a) MRR-50225 was for 3/8" x 1/2" U-bolts. The original purchase order stated that three U-bolts were to be manufactured to the ASME Code, Section III, Subsections NF-2130 and NF-2150, 1974 edition through summer 1975 Addenda. The Code edition and addenda was revised (CECo letter to Elcen Metal Products Company, December 12, 1979) to read 1977 edition through summer 1977 addenda. Certificate of Conformance, September 2, 1980, stated that the 3/8" x 1/2", SA-36, Batch/Lot No. A000812A, U-bolts meet the requirements of Subsection NF of the 1977 ASME Code through 1977 addenda.

(b) MRR-50554 was for 81 safety-related pressure gauges per Purchase Order 247695. Certificate of Conformance, July 10, 1981, was in the documentation package. Engineering qualification tests (environmental, radiation, seismic, etc.) have been submitted to Sargent & Lundy for their evaluation and approval.

(c) MRR-52904 was for 3 safety-related Rosemount 1153 pressure transmitters per Purchase Order 261620. Certificate of Conformance, September 21, 1982, was in the documentation package. Preliminary qualification test data to the requirements of IEEE-323 and IEEE-344 has been submitted to

CECo. This data indicates that the pressure transmitter will qualify to the requirements of IEEE-323 and IEEE-344. Final test data is being prepared by Wyle Laboratories.

No items of noncompliance were identified in this area.

(3) During this reporting period, the Region III inspector reviewed the following PAP procedures:

- FP-1, Document and Drawing Control, Revision 5
- FP-2, Control of Procurement and Requesitioning of Material and Services, Revision 9
- FP-4, Material Storage, Revision 6
- FP-5, Weld Filler Material Control, Revision 10
- FP-12, Cold Bending of Pipe and Tube, Revision 6
- FP-13, Hanger Installation and Control, Revision 9
- FP-16, Identification and Marking of Pipe and Components, Revision 8

The above listed procedures appeared to be adequate.

(4) During this reporting period, the Region III inspector reviewed the installation of the instrument sensing lines for the following instruments:

(a) 1 FT-0434 - Loop "C" flow, instrument mounted on panel 1PL66J, located in the Containment Building at 377' elevation between Radius 1 and 2. The instrument sensing lines were installed in accordance with drawings T4-1FT-0434, Sheets 1, 2, and 3 and were identified in accordance with Field Change Request (FCR) 15437. This FCR modified specification F-2906. The installation and separation appeared to be adequate.

(b) 1 LT-548 and 1 LT-549 - Redundant level transmitters for Steam Generator No. 4. During a walk down of the sensing lines for these instruments, the Region III inspector observed that there was only a 2" separation (18" required) between the sensing lines near hangers 1LT548H135-12 and 1LT549H136-7. The licensee's instrumentation installation contractor (PAP) prepared Fabrication/Installation Surveillance Report No. 992, March 24, 1983, to document the separation violation identified by the NRC.

In accordance with FCR-15437, the licensee has instituted a program to identify instrument sensing line separation violations for Containment Building safety-related RPS sensing lines:

1. PAP prepares as-built drawing of the installation and submits these drawings to Westinghouse Electric Corporation-Nuclear Technology Division (WNTD) for review.

2. Utilizing their computer system, WNTD reviews the as-built drawings for separation violations.

Violations are then analyzed on a case by case basis to determine acceptability and/or provide recommended resolutions.

To confirm that this method of analysis will in fact identify separation violations, the Region III inspector requested that a computer run be made on the sensing lines for instruments 1LT-548 and 1LT-549. Note the full computer run for instrument sensing lines for Unit #1 is scheduled for June 1983. The inspector also requested that WNTD be provided the information on the separation violation observed.

During the week of April 4-8, 1983, WNTD performed an analysis on the subject sensing lines. This analysis indicated a separation of 3", center to center, in the same area identified by the Region III inspector.

Pending a review of the Unit #1 final separation analysis by WNTD, this item is open (50-454/83-16-02).

(5) During this reporting period, the Region III inspector reviewed the installation and inspection documentation and as-built drawings for the following instrument sensing lines:

(a) Pressurized level transmitter 1LT-0460
Installation drawing T146-1LT-0460, Sheet 1 of 4, Revision 5; Sheet 2 of 4, Revision 6; Sheet 3 of 4, Revision 6; and Sheet 4 of 4, Revision 8.

As a result of a previously identified item of noncompliance (Reference 454/82-05-19; 455/83-04-19), PAP has instituted an extensive re-inspection program. During a review of the sensing line installation records for this instrument, it was observed that for Weld Numbers 1 thru 16, 8 of these welds were rejected during the re-inspection. The original weld inspection was performed on October 29, 1980 by Inspector "A". A review of Inspector A's qualification records indicated that he had been certified as a Level I weld inspector on November 1, 1980, and a Level II weld inspector on November 15, 1980. Inspector "A" was terminated on July 8, 1981. It is the Region III inspectors understanding, that, as a minimum, all accessible welds inspected by Inspector "A" through April 1981 will be re-inspected. This understanding is based on interviews with licensee and contractor personnel and a review of the re-inspection program. This re-inspection effort is being tracked by the item of noncompliance referenced above.

(b) Loop C flow transmitter 1FT-0434
Installation drawing T4-1FT-0434, Sheet 1 of 3, Revision 4; Sheet 2 of 3, Revision 6; Sheet 3 of 3, Revision 3.

During a review of the sensing line installation records for this instrument, it was observed that Inspector "A" (Reference paragraph (5).a above) performed a visual inspection on 56 welds in this system in one day. Per the re-inspection program, these welds are scheduled for re-inspection. It was also observed that the Authorized Nuclear Inspector (ANI) performed/observed one visual weld inspection and 6 liquid penetrant examinations (PT) on the welds in this system. The re-inspection effort for this system is being tracked by previously identified item of noncompliance (Reference 454/82-05-19; 455/82-04-19).

(6) Summary of PAP Re-Inspection Effort, as of April 3, 1983.

(a) As a minimum, the first three months of each certified inspectors (21) work will be re-inspected. Depending upon the reject rate as defined in the procedure, the re-inspection for a given inspector's work may encompass an additional three months or longer.

(b) The initial scope (three months per inspector) of the re-inspection effort has been defined.

(c) Approximately 25% of the re-inspection effort has been completed. To date, April 3, 1983, 125 valid welding rejects have been identified.

B. Hatfield Electric Company (HECo)

(1) During this reporting period, the Region III inspector verified the installation and termination of instrumenation cables for instrument 1FT0434, 1LT0548, and 1LT0549. This verification consisted of a physical walkdown of the cables, inspection of the terminations, and a review of the associated records.

(a) Loop C flow transmitter 1FT-0434 is mounted on instrument rack, 1PL66J. Signal sent to Process I&C Protection Channel 1, Cabinet 1, Panel 1PA01J.

1. Cable 1RC-723 - From transmitter 1FT-0434 to junction box 1JB-428R. As of April 7, 1983, this cable has not been installed.

2. Cable 1RC-364 - From 1JB-428R to electrical penetration E24-1S105E-1K1R. Cable type - 1TW-PR #16 (shielded), 600 volt. Reel No. 02166-39. Installed December 4, 1980 to Revision A of the pull card. Cable routing

is as follows: 1JB-428R, C1R-1303-1K1R, 1JB-334R, C1R-2301-1K1R, 1JB-348R, C1R-2371-1K1R, 1JB-623R, C1R-4326-1K1R, 1377U-1K1R, 1359U-1K1R, terminating (inline splice) at electrical penetration, inside Containment Building.

3. Cable 1RC-363 - From electrical penetration E24-1S105-1K1R to Panel 1PA01J. Cable type 1TW-PR #16 (shielded), 600 volt. Reel No. 02166-41. Installed April 5, 1981 to Revision B of the pull card. Cable routing is as follows: inline splice at penetration, 1823D-1K1R, 1829D-1K1R, 1973D-1K1R, 1828D-1K1R, 1827D-1K1R, 1R319-1K1R, 11885F-1K1R, 11886F-1K1R, 11887F-1K1R, 11888F-1K1R, 11889F-1K1R, 11890F-1K1R, 11891F-1K1R, 1R401-1K1R, Panel 1PA01J.

This installation was in accordance with drawings, cable pull card and S&L Cable Tabulation printout.

(b) Steam Generator No. 4 level transmitter 1LT-0548. Signal to Process I&C Protection Channel 3, Cabinet 3, Panel 1PA03J.

1. Cable 1FW-057 - From transmitter 1LT-0548 to electrical penetration E51-1S107E-1K3R. Cable type - 1TW-PR #16 (shielded), 600 volts. Reel No. 02166-69. Installed October 21, 1982 to Revision B of the pull card. Cable routing is as follows: 1LT-0548, C1R-4103-1K3R, 1JB074R, C1R-4104-1K3R, terminating at the penetration, inside containment.

2. Cable 1FW-056 - From electrical penetration E51-1S107E-1K3R to Panel 1PA03J. Cable Type 1TW-PR 316 (shielded), 600 volts. Reel No. 0216631. Installed April 2, 1980 to Revision B of the pull card. Cable routing is as follows: inline splice at penetration, 1798J-1K3R, 1797J-1K3R, 1972J-1K3R, * 1C216D-1K3R, 11880A-1K3R, 11881A-1K3R, 11882A-1K3R, 11883A-1K3R, 1R400-1K3R, Panel 1PA03J, terminal block F, landing points 10, 11, and 12.

*Where cable 1FW-056 enters conduit 1C216D-1K1R, it was observed that the cable jacket was damaged at cable footage marker 4684. The shield wire was exposed but did not appear to be damaged. The licensee's electrical contractor, HECo, prepared NCR 597, April 6, 1983, to document the damaged cable jacket. Also, during the labeling of conduits 1C216C and 1C216D, the markings were reversed on both ends of these embedded conduits. Field Change Request (FCR) 22863, April 7, 1983, was prepared to have this error corrected on the as-built drawing. This item is open

pending a review of NCR 597 for proper closure and review of FCR 22863 for approval and correction of as-built drawing (50-454/83-16-03).

Except as noted, this installation was in accordance with drawings, pull cards, and S&L Cable Tabulation printout.

(c) Steam Generator No. 4 level transmitter 1LT-0549. Signal to Process I&C Protection Channel 2, Cabinet 2, Panel 1PA02J.

1. Cable 1FW-049 - From transmitter 1LT-0549, Rack 1PL57J, to electrical penetration E35-1S106E-1K2R. Cable installed November 5, 1981, to Revision A of the pull card. Cable type - 1TW-PR #16 (shielded), 600 volts. Reel No. 02166-46. Cable routing is as follows: 1LT-0549, C1R4478-1K2R, 1JB088R, C1R5124-1K2R, terminating at penetration, inside containment.

2. Cable 1FW-049 - From electrical penetration E35-1S106E-1K2R to Panel 1PA02J. Cable installed April 8, 1981 to Revision A of the pull card. Cable type 1TW-PR #16, 600 volts. Reel No. 02166-41. Cable routing is as follows: inline splice at penetration, 11458H-1K2R, 1R364-1K2R, 11467H-1K2R, 11485H-1K2R, 11464H-1K2R, 11418H-1K2R, 11417H-1K2R, 11620H-1K2R, 11623H-1K2R, 11624H-1K2R, Panel 1PA02J, terminal block J, landing points 22, 23, and 24.

This installation was in accordance with drawings, pull cards, and S&L Cable Tabulation printout.

(2) Summary of HECo Re-Inspection Effort as of April 3, 1983.

(a) As a minimum, the first three months of 22 certified inspectors work will be re-inspected. The 22 inspector equals 1 in 5 of all inspectors employeed by HECo since start of project. Depending upon the rejection rate as defined in the procedure, the re-inspection for a given inspector's work may encompass an additional three months or 100% of his/her work. In addition, the original sample size of inspectors may be increased 50%.

(b) The initial scope (three months per inspector) of the re-inspection effort has been defined.

(c) Approximately 5% of the inspection effort has been completed.

4. Status of Installation Effort

	Unit 1	Unit 2
Cable tray installation	100%	98%
Conduit installation	90%	54%

Cable installation	80%	34%
Cable terminations	80%	30%
Equipment installation	100%	90%
Instruments & sensing lines	98%	01%

5. Open Items

Open items are matters, not otherwise categorized in the report, that need to be followed up on in future inspections. Open items disclosed during this inspection are discussed in paragraphs 3.A.(4).b and 3.B.(1).b.2.

6. Exit Interview

The inspector met with licensee representatives (denoted under Persons Contacted) on March 25 and April 8, 1983. The inspector summarized the scope and findings of the inspection. The licensee representatives acknowledged this information.

Binder
Attachment C

NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN ILLINOIS 60137

JUN 24 1982

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the special safety inspection conducted by Mr. D. H. Danielson and other staff members of this office on March 29-31, April 1-2, 5-9, 12-16, and May 11, 1982, of activities at Byron Station, Units 1 & 2, authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131. This last refers to the discussion of our findings with Mr. W. Stiede and others of your staff during a meeting in our offices on May 7, 1982.

The purpose of this special team inspection was to assess the adequacy of certain aspects of the quality assurance/construction activities at the Byron Station. The scope of this assessment included audits of quality assurance program interfaces and overview, corrective action systems, design change control, material traceability of installed structures and components, electrical cable installation, inprocess inspections, and effectiveness of quality control inspectors. Within these areas the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel. In general, within the areas inspected, the quality assurance program for the Byron Station appeared good. However, examples of program implementation deficiencies were identified which require corrective action on your part. Please note that we expect Commonwealth Edison Company to review programs for its other facilities under construction to assure that similar problems do not exist at these facilities.

The activities that appeared to be in noncompliance with NRC requirements are specified in the enclosed Appendix. A written response is required. In responding to noncompliance Item #2, please describe the action taken or planned to assure that: (1) other quality control inspectors are properly

C-1

trained and certified, (2) quality control inspectors working for contractors that have completed safety-related work and no longer have personnel on site were properly trained and qualified to perform the inspection functions assigned, and (3) inspections performed by quality control inspectors that were improperly trained and qualified were valid.

We are also concerned about your past performance concerning the staffing of the Byron QA Superintendent position and the on-the-job training of your Byron Site Quality Assurance personnel as discussed in the details of this report. Please provide us with a response explaining what action you will be taking to assure that your Quality Assurance Organization is staffed and trained to a level that will ensure effective oversight of quality activities.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter, the enclosures, and your response to this letter will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractors) believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within ten (10) days from the date of this letter of your intention to file a request for withholding; and (b) submit within twenty-five (25) days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than seven (7) days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with Section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons which are the bases for the claim that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosures, and your response to this letter will be placed in the Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

T. E. Norelius, Director
Division of Engineering
and Technical Programs

Enclosures:
1. Appendix, Notice of Violation
2. Inspection Report No. 50-454/82-05 and No. 50-455/82-04

w/encls:
Louis O. DelGeorge, Director of Nuclear Licensing
J. I. Schlosser, Project Manager
Conner Sorensen, Site Project Superintendent
T. E. Quaric, Station Superintendent
PDR Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII Braidwood
Byron Siegstadt, Office of Assistant Attorney General
Myron M. Cherry

Appendix

NOTICE OF VIOLATION

Commonwealth Edison Company

Docket No. 50-454
Docket No. 50-455

As a result of the inspection conducted on March 29-31, April 1-2, 5-9, 12-14, and May 11, 1982, and in accordance with the NRC Enforcement Policy, 47 FR 9987 (March 9, 1982), the following violations were identified:

1. 10 CFR 50, Appendix B, Criterion I, states in part, "The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components shall be clearly established and delineated in writing" and "Such persons and organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided."

   The Licensee's Topical Report, CE-1-A, Revision 20, Section 1.A states "Edison has prime responsibility for controlling the quality of on-site work by field contractors,"... "The Commonwealth Edison Company Quality Assurance Program for Nuclear Generating Stations covers the organization arrangement whereby the Quality Assurance Department is a separate and independent organization."

   Contrary to the above:

   a. On March 30, 1982, it was identified that the Quality Assurance Manager for Hatfield Electric Company, as shown in the Quality Assurance Manual, reports to the Vice-President, who is located on site and has direct responsibility for cost and schedule.

   b. On April 2, 1982, it was identified that the Quality Assurance Manager for Powers-Azco-Pope, as shown in the Quality Assurance Manual, reports to the Project Manager, who has direct responsibility for cost and schedule.

   c. On April 8, 1982, it was identified that the Project Construction Department of the licensee is part of the approval chain regarding the hiring and promoting of contractor's quality assurance personnel.

   d. On March 30, 1982, it was identified that the Hatfield Electric Company has been operating with a Quality Assurance Organization other than that described in their Quality Assurance Manual.

e. On April 4, 1982, it was identified that Johnson Controls, Inc. has been operating with a Quality Assurance Organization other than that described in their Quality Assurance Manual.

This is a Severity Level IV violation (Supplement II).

10 CFR 50, Appendix B, Criterion II - Quality Assurance Program states in part, "The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained."

Commonwealth Edison Company (CECo) letter, L. O. DelGeorge to D. G. Eisenhut, U.S. NRC, Director, Division of Licensing, dated August 17, 1981, affirmed CECo commitment to Regulatory Guide 1.58, ANSI N45.2.6-1978 as required by Generic Letter 81-01.

ANSI N45.2.6-1978 - Paragraph 1.1 states in part, "This Standard delineates the requirements for the qualification of personnel who perform inspection, examination and testing to verify conformance to specified requirements of nuclear power plant items (structures, systems and components of nuclear power plants) where satisfactory performance is required to prevent postulated accidents which could cause undue risk to the health and safety of the public, or to mitigate the consequences of such accidents if they were to occur."

ANSI N45.2.6-1978 - Paragraph 1.2 states in part, "The requirements of this Standard apply to personnel who perform inspections, examinations, and tests during fabrication prior to and during receipt of items at the construction site, during construction, during preoperational and startup test...." The requirements apply to personnel of the owners..., plant designers and plant constructors...."

ANSI N45.2.6-1978 - Paragraph 2.2 states, "The capabilities of a candidate for certification shall be initially determined by a suitable evaluation of the candidate's education, experience, training, test results, or capability demonstration."

ANSI N45.2.6-1978 - Section 3.1 states, "The requirements contained within this section define the minimum capabilities that qualify personnel to perform inspections, examinations, and tests which are within the scope of this standard."

ANSI N45.2.6-1978 - Sections 3.2, 3.3, and 3.4 specify the personnel capabilities of Level I, II, and III inspectors respectively. Sections 3.5, 3.5.1, 3.5.2, 3.5.3 provide education and experience recommendations for Level I, II, and III inspectors.

ANSI N45.2.6-1978 - Section 4 states in part, "Personnel who are assigned the responsibility and authority to perform functions covered by this Standard shall have, as a minimum, the level of capability shown in Table 1...."

Contrary to the above, certain contractor QA/QC supervisors and inspectors were not adequately qualified and/or trained to perform safety-related inspection functions. Examples of apparent noncompliance are identified in paragraph h.(2) of the attached report.

This is a Severity Level IV violation (Supplement II).

3. 10 CFR 50, Appendix B, Criterion V states in part, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances ..."

The licensee's Topical Report, CE-1-A, Revision 20, Section 5 states, "The quality assurance actions carried out for design, construction, testing, and operation activities will be described in documented instructions, procedures, drawings, specifications, or checklists." "Activities affecting quality are required by the Edison quality program to be prescribed by documented instructions, procedures or drawings."

Contrary to the above, the following activities were not controlled by procedures or instructions:

a. On March 30, 1982, it was identified that Hatfield Electric Company was utilizing a Discrepancy Report System, which was not referenced or controlled by a procedure, to track and correct discrepancies and nonconforming conditions discovered during inspections of safety-related equipment.

b. On April 2, 1982, it was identified that Powers-Azco-Pope was utilizing a Fabrication Installation Surveillance System, which was not controlled by a procedure, to track and correct discrepancies and nonconforming conditions discovered during inspections of safety-related equipment.

c. On April 9, 1982, it was identified that Hatfield Electric Company procedures did not contain an electrical cable rework procedure nor the requirements to calculate electrical cable sidewall pressures prior to pulling cable.

d. On April 7, 1982, it was identified that the Hatfield Electric Company's NCR form contained a section titled "Action to Prevent Recurrence" but there was no direction in the body of Procedure Number 6 for actions to be taken to satisfy this requirement nor does the procedure assign responsibility for this section of the NCR.

This is a Severity Level IV violation (Supplement II).

10 CFR 50, Appendix B, Criterion XV, states in part, "Measures shall be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation."

The licensee's Topical Report, CE-1-A, Revision 20, dated February 17, 1982, Section 15, states in part, "Items involving construction, maintenance, and modifications which are found nonconforming...will be controlled to prevent their inadverent use or installation."

Contrary to the above:

a. On March 31, 1982, it was identified that three (3) CECo nonconformance reports (F-634, F-645, and F-682) had been voided rather than closed, with reference to corrective action taken to resolve the nonconformance. By voiding the subject NCRs, the tracking syster to verify that the approved disposition has been completed and corrective action to prevent recurrence is negated. Also, the voided NCRs are removed from the trend analysis system.

b. On April 7, 1982, it was identified that three (3) nonconformance reports (98, 99, and 100) had been voided by the Hatfield Electric Company rather than closed, with reference to corrective action taken to resolve the nonconformance. The subject NCRs were voided because an FCR was or would be issued to accept the items as installed. At the time the NCRs were voided, there was no assurance that all the FCRs would be approved. By voiding the NCRs, the tracking system to verify that the proposed disposition was accepted, was negated and the NCRs were removed from the trend analysis system.

c. On April 7, 1982, it was identified that the Hatfield Electric Company had improperly closed NCR 168, in that after CECo engineering dispositioned the subject NCR to replace the item, the Hatfield Electric Company closed the NCR without accomplishing the approved disposition. At the present time, there is a nonconforming cable installed, and the tracking system to replace the cable, has been negated.

This is a Severity Level IV violation (Supplement II).

10 CFR 50, Appendix B, Criterion V states, "Activities affecting quality shall be prescribed...and shall be accomplished in accordance with these instructions, procedures or drawings."

The licensee's Topical Report, CE-1-A, Revision 20, Section 2.2 commits to comply with the Regulatory Position of Regulatory Guide 1.58, Revision 2, which endorses ANSI N45.2.2-1972. Also Section 5 states, "The quality assurance actions carried out for design, construction, testing, and operation activities will be described in documented instructions, procedures, drawings, specifications, or checklists."... "Activities affecting quality are required by the Edison quality program to be prescribed by documented instructions, procedures or drawings."

Contrary to the above, the following activities were not accomplished according to procedures or instructions:

a. On April 2, 1982, it was identified that Powers-Azco-Pope was storing rejected material among accepted material in Warehouse No. 4. This is contrary to their Procedure No. FP-3.

b. On April 2, 1982, it was identified that Powers-Azco-Pope had not tagged a defective torque wrench with a Reject Tag. This is contrary to their Procedure No. FP-11.

c. On March 30, 1982, it was identified that Hatfield Electric Company did not tag torque wrenches which were past their calibration due date. This is contrary to their Procedure No. 24.

d. On April 5, 1982, of 13 reports reviewed it was identified that 12 nonconformance reports prepared by Powers-Azco-Pope did not address corrective action to prevent recurrence. This is contrary to their Quality Assurance Manual, Section B-8, paragraph B-8.8.2.

e. On April 7, 1982, it was identified that the conditions maintained by the licensee in Warehouse No. 1 and No. 5 were contrary to CECo Quality Procedure 13-1 and to the requirements of ANSI N45.2.2-1972.

This is a Severity Level V violation (Supplement II).

6. 10 CFR 50, Appendix B, Criterion VI, states, "Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality."

The licensee's Topical Report, CE-1-A, Revision 20, Section 6 states, "A document control system will be used to assure that documents such as specifications, procedures, and drawings are reviewed for adequacy and approved for release by authorized personnel."... "Each receiving office or area shall have a controlled method for checking receipt of new or revised documents and assuring that the latest revised document is in use."

Contrary to the above:

a. On April 4, 1982, of 12 drawings reviewed it was identified that one drawing located in the Johnson Controls Incorporated on-site office drawing file was not of the proper revision.

b. On April 7, 1982, of 10 drawings reviewed it was identified that two drawings located in the Hunter Corporation document station I-H were not of the proper revision.

This is a Severity Level V violation (Supplement II).

7. 10 CFR 50, Appendix B, Criterion IX, states in part, "Measures shall be established to assure that special processes, including welding..., are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes,...."

The licensee's Topical Report, CE-1-A, Revision 20, dated February 17, 1982, page 9-1, Revision 15, dated January 2, 1981, Section 9, "Control of Special Processes," third paragraph, states in part, that, "Process control procedures will be used as required by specifications, codes or standards, as applicable...."

The ASME B&PV Code Section III, 1974 Edition, Summer 1974 Addenda, Article NA-4000, Subarticle NA-4411, states in part, that "The program shall include measures to control the issuance and disposition of documents, such as..., instructions, procedures,..., including changes thereto, which prescribe the activities affecting quality. The measures shall assure that documents including changes..., and distributed to and used at the location where the prescribed activity is performed."

Contrary to the above, on April 13, 1982, it was identifed that welding was not being accomplished in accordance with applicable codes, in that, controlled welding procedure specifications with the associated welding parameter sheets were not located at the prescribed activity (welding) in 3 out of 4 locations checked.

This is a Severity Level V violation (Supplement II).

B. 10 CFR 50, Appendix B, Criterion XVII states, "Sufficient records shall be maintained to furnish evidence of activities affecting quality. Consistent with applicable regulatory requirements, the applicant shall establish requirements concerning record retention, such as duration, location, and assigned responsibility."

The licensee's Topical Report, CE-1-A, Revision 20, Section 2.2, commits to the Regulatory Position of Regulatory Guide 1.88, Revision 2, which endorses ANSI N45.2.9-1974.

Contrary to the above, on April 7, 1982, it was identified that Midway Industrial Contractors did not provide the security standards established by ANSI N45.2.9-1974, to preclude the entry of unauthorized personnel into the storage area and to guard against larceny and vandalism.

This is a Severity Level V violation (Supplement II).

10 CFR 50, Appendix B, Criterion XVIII states, "A comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.

The licensee's Topical Report CE-1-A, Revision 20, Section 2.2 commits to comply with the Regulatory Position of Regulatory Guide 1.144, Revision 1, which endorses ANSI N45.1.12-1977.

Contrary to the above, on March 29, 1982, it was identified that the audit reports of Commonwealth Edison Company, Powers-Azco-Pope, Pittsburgh Testing Laboratory, Johnson Controls, Incorporated, Hunter Corporation, and Hatfield Electric Company failed to include the criteria, established in ANSI N45.2.12-1977, regarding persons contacted in the audit and a summary of audit results including an evaluation statement regarding the effectiveness of the quality assurance program elements which were audited.

This is a Severity Level V violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

Date June 24 1982

C. E. Norelius, Director
Division of Engineering and
Technical Programs

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-454/82-05(DETP); 50-455/82-04(DETP)

Docket Nos. 50-454; 50-455 License Nos. CPPR-130, CPPR-131

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

Facility Name: Byron Station, Unit 1 and 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: March 29-31, April 1-2, 5-9, 12-14, and May 11, 1982

Inspectors: D. H. Danielson — 6/16/82

C. M. Peschel — 6/16/82

R. S. Love — 6/21/82

H. M. Wescott — 6/16/82

E. H. Nightingale — 6/21/82

W. Forney (SRI Byron.) — 6/16/82

P. Koshishian for IE Headquarters) — 6/14/82

Approved By: D. H. Danielson, Chief Materials and Processes Section — 6/16/82

Inspection Summary

Inspection on March 29-31, April 1-2, 5-9, 12-14, and May 11, 1982 (Reports No. 50-454/82-05(DETP); 50-455/82-04(DETP))

Areas Inspected: QA Program interfaces and overview; corrective action systems; design change control; material traceability of installed structures and components; electrical cable installation; inprocess inspections; QC inspector effectiveness. The inspection involved a total of 662 inspector-hours onsite by seven NRC inspectors.

Results: Of the areas inspected nine apparent violations were identified (failure to assure contractors are operating with a QA organization as described in their QA manual and to assure that QA is sufficiently independent from cost and schedule - paragraphs b.(6).(b), b.(8).(b), and b.(10).(b); failure of site contractors to control the issuance of documents - b.(10).(b); failure of site contractors to follow their procedures - paragraphs b.(10).(b), and c.(2).(d).2; failure of site contractors to accomplish activities in accordance with procedures - paragraphs b.(10).(b), c.(2).(e).1 and f.(2).(a); failure to include certain ANSI N45.2.12 criteria in CBCo audit reports of contractors - paragraph b.(10).(b); failure of a site contractor to meet certain security standards established by ANSI N45.2.9 for storage of records - paragraph b.(10).(b); failure to meet ANSI N45.2.6 qualification, certification and training requirements for contractor QC inspectors - paragraph h.(2); failure to specify complete and adequate corrective actions on nonconformance reports - paragraph c.(2).(a).2; failure to accomplish welding in accordance with applicable codes - paragraph g.(2).(d).

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*W. Stiede, Assistant Vice President
*L. DelGeorge, Director of Nuclear Licensing
*V. I. Schlosser, Project Manager
*W. J. Shewski, Quality Assurance Manager
*G. Sorensen, Project Superintendent
*K. Tuetken, Assistant Project Superintendent
*M. A. Stanish, QA Superintendent, Byron
R. J. Farr, QA Supervisor
K. J. Hansing, QA Supervisor
T. R. Sommerfield, QA Superintendent, Braidwood
J. J. Mihovilovich, Structural Supervisor, PCD
R. B. Klingler, QA Supervisor, PCD
G. F. Marcus, Director of QA, Engineering/Construction
J. O. Binder, Electrical Supervisor, PCD
M. E. Lohmann, Mechanical Supervisor, PCD
C. J. Tomashek, Startup Coordinator
H. J. Kuzmarek, QA Engineer
A. A. Juras, Project Operations Analysis Supervisor
*T. Tramm, Nuclear License Administrator
P. Donahin, Project Engineering Department
R. E. Querio, Startup Superintendent
*J. T. Westermeier, Project Engineer
R. Gruber, QA Engineer
J. Klink, QA Inspector
P. Nadzinski, QA Engineer
J. Toney, Engineering Assistant
P. Maguiba, QA Engineer
K. Key, Senior Buyer
L. Channell, Material Coordinator
R. Schwartz, QA Engineer

Sargent and Lundy Engineers (S&L)

R. Rabin, Senior QA Coordinator
D. Deruss, Engineer, PMD
*T. B. Thorsell, Senior Electrical Project Engineer
V. Crisci, Project Leader
J. Kelnosky, Electrical Project Leader

Westinghouse (W)

D. R. Fraser, Manager, SAMU
S. Stahl, QA Engineer, NTD
Y. Kau, Associate Engineer, PIDG

Hatfield Electric Company (HECo)

G. Vanderhei, Project Manager
J. Buchanan, QA Manager
A. Koma, QC Supervisor
R. Barzeloski, QA Supervisor
D. Stoner, QC Foreman
L. Broege, QC Inspector
J. Mulrene, QC Inspector

Powers-Anco-Pope (PAP)

R. Larkin, QA Manager
M. Donahoe, Engineering Manager
C. Cromer, QC Supervisor
A. Limia, QC Inspector

Blount Brothers Corporation (BBC)

R. H. Bay, QA/QC Manager
W. Wells, QC Inspector

Ebasco Services, Inc.

R. Detommaso, NDE Supervisor

Johnson Controls, Inc.

B. Sloan, QA Manager
S. Pearson, QC Inspector

Pittsburgh Testing Laboratory (PTL)

J. Troutman, Site Manager
J. Chasm, Calibration Technician
G. Mohammad, Site Auditor

Midway Industries Contractor, Inc.

M. Windsor, Site Manager

Nuclear Installation Services Company (NISCo)

J. Pruitt, QA/QC Manager

Nuclear Power Services (NPS)

W. Whitaker, Project QA Engineer

Reliable Sheet Metal Works, Inc.

A. M. Schlegel, QA Supervisor

Hunter Corporation

M. Somsag, QA Supervisor
L. Middick, QC Inspector
D. Cerasani, Piping Engineer
L. Hill, Auxiliary Building Superintendent
W. Everett, Containment Building Superintendent
D. Askland, Warehouseman
J. Morrison, Project Engineer
J. Young, Hanger Engineer
A. Simon, Administrative Supervisor, QA
R. Irish, Administrative Assistant, QA
H. Lundquist, Material Control Supervisor

U. S. Nuclear Regulatory Commission (Region III)

*C. E. Norelius, Director, Division of Engineering & Technical Programs
*S. Little, Chief, Engineering Inspection Branch
L. McGregor, Senior Resident Inspector, Braidwood
L. Cox, Secretary

*Denotes those personnel attending the exit meeting held at the USNRC Region III office on May 7, 1982. During the inspection at the Byron Station exit meetings were held on a daily basis in order to keep the licensee informed of any findings.

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

2. Function or Program Areas Inspected

a. General Background

The purpose of this special team inspection was to determine if there are indications of existing or potential construction problems similar to some of those identified at a number of other plants under construction. The scope of the assessments included quality assurance program interfaces and overviews, corrective action systems, design change control, material traceability of installed structures and components, electrical cable installation, inprocess inspections, and effectiveness of quality control inspectors.

Prepared By: J. M. Peschel

P. Keshishian

b. QA Program Interfaces and Overview

(1) Quality Assurance Manuals Reviewed

Pittsburgh Testing Laboratory Quality Assurance Manual #QA-M-1, Revision 4, September 21, 1979

Powers-Azco-Pope Quality Assurance Manual, Revision 3, December 7, 1981

Commonwealth Edison Topical Report, Revision 20, February 17, 1982

Johnson Controls, Inc., SECD Quality Assurance Program, Revision 0, June 29, 1978

Hatfield Electric Company Quality Assurance Manual, Revision 9, August 13, 1979

Ebasco Nuclear Quality Assurance Program Manual, Revision 10, September 30, 1981

Hunter Corporation Quality Assurance Manual, Revision 5, August 1, 1981

Nuclear Power Services, Inc., Quality Assurance Manual, Revision 1, January 13, 1981

Reliable Sheet Metal Works, Inc., Quality Assurance Manual, July 21, 1981

(2) Procedures Reviewed

(a) Commonwealth Edison Company

Byron Quality Instruction (BQI)

BQI-1, Revision 2, March 22, 1982
Generating On-Site Quality Instructions

BQI-7.1, Revision 2, March 22, 1982
On-Site Contractor Non-Conformance Reports

BQI-7.2, Revision 5, March 22, 1982
QA Handling of CECo Non-Conformances

BQI-9, Revision 4, March 22, 1982
QA Handling of Field Change Requests

BQI-10, Revision 4, February 25, 1982
Site QA Handling and Review of On-Site Contractor Procedures

BQI-11.1, Revision 4, March 22, 1982
Byron Site QA Audits
BQI-12.1, Revision 1, March 22, 1982
Installed Equipment Surveillance Instructions
BQI-24, Revision 1, March 22, 1982
Byron QA Training Program

Byron Site Instruction (BSI)

BSI-5, Revision 5, October 20, 1980
Material and Equipment Receiving, Receiving Inspection Storage, and Removal from Storage Instruction

Quality Procedure (QP)

QP, 2-1, Procedure for the Revision of the Quality Assurance Manual - Engineering, Construction and Operation, Revision 63, February 24, 1982
QP, 2-2, Training of Personnel to meet Quality Assurance Requirements, Revision 63, February 24, 1982
QP, 3-3, Classification of System, Components, Parts and Materials, Revision 63, February 24, 1982
QP, 4-2, Evaluation of Contractor's Quality Assurance Program, Revision 63, February 24, 1982
QP, 5-1, Quality Instruction and Procedures, Revision 63, February 24, 1982
QP, 7-1, Control of Procured Material and Equipment, Receiving and Inspection, Revision 63, February 24, 1982
QP, 12-1, Calibration Control of Commonwealth Edison Test and Measurement Equipment, Revision 63, February 24, 1982
QP, 15-1, Reporting Quality Nonconformance during Construction and Test, Revision 63, February 24, 1982
QP, 15-2, Reporting Incidents and Deficiencies that occur during Construction and Test, Revision 63, February 24, 1982
QP, 16-1, Corrective action for Reportable Deficiencies and Quality Nonconformances that occur during Construction and Tests, Revision 63, February 24, 1982
QP, 17-1, Quality Assurance Records, Revision 63, February 24, 1982
QP, 4-1, Request for Bid, Proposed Evaluation, and Recommendation, Revision 63, February 24, 1982
QP, 18-1, Quality Program Audits, Revision 63, February 24, 1982
QP, 18-2, Surveillance of Contractor Quality Assurance Control Activities, Revision 63, February 24, 1982

General Procedure

General Procedure No. 738, Site Buying, February 2, 1981

(b) Hatfield Electric Company Procedures

Procedure #6, Revision 6, January 15, 1982
Reporting of Damaged or Nonconforming Material or Equipment

Procedure #8, Revision 2, Issue 1, July 6, 1981
Audits

Procedure #9E, Revision 6, Issue 1, January 23, 1981
Class I Cable Pan Identification

Procedure #11, Revision 12, February 2, 1982
Class I Cable Termination and Splicing

Procedure #17, Revision 2, October 10, 1981
Qualification of Inspection and Audit Personnel

Procedure #19, Revision 4, Issue 1, January 24, 1981
Equipment Turnover Reporting

Procedure #20, Revision 8, November 20, 1981
Class I Exposed Conduit System Identification

Procedure #23, Revision 8, Issue 1, January 22, 1981
Concrete Expansion Anchor Installation

Procedure #24, Revision 1, Issue 2, January 28, 1981
Control and Calibration of Meters and Instruments

Procedure #29, Revision 5, November 20, 1981
Field Initiated Request for Design Changes

(c) Hunter Corporation Site Implementation Procedures

4.201 Revision 4, January 19, 1982
Installation Verification

7.502 Revision 7, August 20, 1981
Control of Measuring and Testing Equipment

11.101 Revision 4, April 28, 1981
Nonconformance Processing

12.301 Revision 5, March 19, 1981
Internal and External Site Quality Assurance Audits

20.513 Revision 9, June 8, 1981
Installation of Concrete Expansion Anchors

(d) Powers-Arco-Pope Procedures

QC-4 Revision 7, September 30, 1981
Nonconformance Control

QC-5 Revision 5, December 17, 1981
Site Audit

FP-3	Revision 9, December 22, 1981 Material Receiving Inspection Controls
FP-4	Revision 5, September 30, 1981 Material Storage
FP-11	Revision 7, January 21, 1982 Calibration and Control of Measuring and Test Equipment (M&TE)

(e) Pittsburgh Testing Laboratory Procedure

Resident Internal Quality Assurance Audit Plan, Revision 4, November 17, 1981

(f) Johnson Controls Inc., Procedures

QAS-210-BY	Revision 2, January 28, 1980 Auditor Training and Qualification
QAS-211-BY	Revision 2, February 5, 1980 Training and Indoctrination Procedure
QAS-710-BY	Revision 1, September 19, 1979 On-Site Document Control Procedure
QAS-1011-BY	Revision 3, January 10, 1980 Weld Rod Control
QAS-1210-BY	Revision 1, October 30, 1979 Calibration Control of Measuring and Test Equipment
QAS-1510-BY	Revision 0, April 17, 1979 Status Tag Usage Procedure
QAS-1610-BY	Revision 0, February 13, 1979 Nonconformance Control Procedure
QAS-1710-BY	Revision 0, September 18, 1979 Corrective Action
QAS-1910-BY	Revision 1, November 8, 1979 Audit Procedure
SP-611-BY	Revision 1, April 3, 1981 Field Change Control Procedure

(3) Audits and Miscellaneous Documentation Reviewed

(a) Commonwealth Edison Company

Audit Reports

#6-82-4
#6-82-08
#6-81-300
#6-81-308
#6-81-309
#6-81-330
#6-81-331
#6-81-336
#6-81-340

#6-81-344
#6-81-354
#6-81-357
#6-81-360

General Office Audit of Byron Construction Site, April 30, 1981.
General Office Audit of Byron Construction Site, November 8, 1981.
General Office Quality Assurance Audit of Byron Station, April 30, 1981.
General Office Quality Assurance Audit of Byron Station, November 8, 1981.
Management Audit at LaSalle, Byron, and Braidwood Construction Sites and the LaSalle Operating Station, April, 1981, by Energy Incorporated.

Miscellaneous Documentation

Site Mechanical Organization Chart, March 16, 1982.
Site Electrical Organization Chart, March 16, 1982.
Site Structural Organization Chart, March 16, 1982.
Site Project Construction Organization Chart, March 16, 1982.
1981 Byron Site QA Audit Schedule, Revision 0 and Revision 9.
1981 Byron Site QA Surviellance Schedule.
Byron Quality Assurance Organization Chart, March 22, 1982.
Byron Quality Assurance Status Reports, January 5, 1982 and February 4, 1982.
Byron Site Quality Assurance Semi-Monthly Report for December 1981.
1982 Byron Site Quality Assurance QP Training Schedule

(b) Hatfield Electric Company

Audit Reports

#81-02
#81-18
#81-19
#81-20
#82-04

Audit Report of Byron Site Procedure 5, 6 and 22 by Energy Incorporated, September 21, 1981.

Follow-up Management Audit Report by Energy Incorporated, September 21, 1981.

Trend Analysis Reports

#2, July 24, 1981, 2nd Quarter of 1981
#3, November 6, 1981, 3rd Quarter of 1981
#4, 4th Quarter of 1981
#1, March 25, 1982, 1st Quarter of 1982

Miscellaneous Documentation

Discrepancy Reports, "Trouble Letters" No.'s 640 - 670, 680 - 720.
1981 Audit Schedule
1982 Audit Schedule
Quality Assurance Audit Log
Memorandum from C. Van Lyssel to W. Brock concerning Quality Assurance Organization, March 17, 1982.

(c) Hunter Corporation

Audit Report

No. 084-4

Miscellaneous Documentation

Audit Summary
Fourth Quarter Audit Report
Follow-up Audit #1
Hunter Audit Summary Report for Fourth Quarter, 1981.
Hunter Corporation, Byron Site Quality Assurance Audit, June 3, 1981.
Hunter Corporation Quarterly Nonconformance Report (NR) Summary and Trend Analysis, December 29, 1981.

(d) Powers-Adco-Pope

Audit Reports

#52 September 29, 1981
#53 October 1, 1981
#54 November 12, 1981
#55 November 12, 1981
#56 November 16, 1981
#57 November 15, 1981
#58 November 25, 1981
#59 December 3, 1981
#60 December 29, 1981
#61 January 27, 1982
Management Review Audit, Byron, March 17, 1982

Miscellaneous Documentation

Weekly Storage Surveillance Report, March 10, 1982
Weekly Storage Surveillance Report, March 17, 1982
Weekly Storage Surveillance Report, March 24, 1982
Weekly Storage Surveillance Report, March 30, 1982

(e) Pittsburgh Testing Laboratory

Audit Reports

#81-21
#81-22
#81-23
#81-24
#81-25
#81-26
#81-27
#81-28
#81-29
Internal QA Audit #BY-3
Internal QA Audit #BY-4

Miscellaneous Documentation

Pittsburgh Testing Laboratory Organization Chart
Pittsburgh Testing Laboratory Inspectors Eye Examination Records

(f) Johnson Controls, Incorporated

Audit Reports

Yearly QA Program Audit No. 00501, May 16, 1980
Yearly QA Program Audit No. 10801, August 5, 1981
Audit Report, Bensenville Office, September 15, 1981

Nonconformance Reports

#C01BY November 14, 1980
#C02BY November 14, 1980
#C03BY December 4, 1980
#C04BY August 19, 1981
#C05BY February 23, 1982
#C06BY March 25, 1982
#C07BY April 2, 1982

(4) Interviews with Site Personnel

Interviews were conducted with sixteen personnel from Commonwealth Edison Company, six personnel from Hunter Corporation, three personnel from Powers-Azco-Pope, three personnel from

Hatfield Electric Company, two personnel from Pittsburgh Testing Laboratory and one person from Johnson Controls, Incorporated.

(5) Licensee's Qualit, Assurance Program

(a) Objective

The objectives of this assessment were to determine:

- that the licensee's Quality Assurance Program, including all amendments, has been approved by NRR.
- if the licensee has control of changes to the submitted Quality Assurance Program.
- if the Quality Assurance Manual is consistent with the approved Quality Assurance Program.

(b) Discussion

The inspectors reviewed:

1. the licensee's Topical Report, CE-1-A, Revision 00, and determined that the original program and all subsequent revisions have been approved by NRR. The licensee submits all changes to NRR and includes minor or typographical changes at the same time as substantive changes are submitted.

2. the licensee's Quality Requirements and Quality Procedures and determined that the licensee initiated and controlled changes to the program through QP-2-1. The procedure requires the same level of review for a QA Program change as the original program received. The program has provisions to input a change due to feedback of experience, regulatory requirements, codes and standards, audits, and reviews.

3. the licensee's Quality Assurance Manual and referenced documents to determine whether adequate QA plans and procedures have been established (written, reviewed, approved, and issued) to implement the docketed QA program. The reivew indicated that the 18 Criteria of 10 CFR 50, Appendix B were addressed by the Quality Procedures of the Quality Assurance Manual.

The inspectors reviewed 6 of the 25 Quality Assurance Manuals assigned to Byron Station to determine they were of the latest revisions. The following manuals were reviewed and no problems were detected.

Manual No.	Assigned To
111	Project Construction Superintendent
208	Byron Station Superintendent
177	CECo OAD Supervisor
191	Byron Station Maintenance Supervisor
62	Byron Station Technical Staff Supervisor
115	Byron Station Quality Assurance Superintendent

(4) Quality Assurance Program of Contractors

(a) Objectives

The objectives of this assessment were to determine if the licensee has approved and routinely audits the Quality Assurance Programs of contractors for consistency with 10 CFR 50, Appendix B, and to determine the current status and effectiveness of licensee management of the on-site Quality Assurance Programs.

(b) Discussion

The inspectors reviewed documentation, conducted extensive interviews with licensee and site contractor personnel, and reviewed portions of the licensee's and contractor's QA manuals to determine levels of staffing, organizational independence from cost and schedule, position descriptions, and to determine if the status and adequacy of the QA Programs were regularly reviewed by the licensee and contractor's management.

At the time of inspection the licensee had 13 contractors on site and each was performing safety related work under their own specific Quality Assurance Programs (QAPs). These QAPs had been submitted to the licensee for review and approval. The licensee had reviewed and approved the QAPs prior to the contractors start of work. The licensee was fully aware of its ultimate responsibility for site Quality Assurance and had its own QA organization on site to monitor the activities of the various site contractors through the mechanisms of surveillances and audits.

Table 1 is a matrix of licensee and on-site contractors performing safety-related work indicating the areas checked and compliance with these areas.

Noncompliance (454/82-05-01a; 455/82-04-01a)
10 CFR 50, Appendix B, Criterion I, requires that "Such persons and organizations performing quality assurance functions shall report to a management level such that

this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided."

Contrary to this requirement, the inspectors found that the QA Managers of both Hatfield Electric Company and Powers-Azco-Pope (PAP) reported directly to on-site managers who had direct responsibilities for cost and schedule for their respective contracts. The Hatfield QA Manager reported to the Vice-President and the PAP QA Manager reported to the Project Manager.

Unresolved Item (454/82-05-02; 455/82-04-02)
In addition to the foregoing, it appeared that the QA Representative for Johnson Controls had production responsibilities that also conflicted with organizational independence. A review of the activities of Pittsburgh Testing Laboratories (PTL) indicates that there is no PTL on-site QA organization other than a site auditor and that for a substantial period of time each week PTL activities are not under surveillance. This condition occurs because there are two shifts for PTL inspectors and only one auditor.

The questions regarding Johnson Controls and PTL could not be resolved during the current inspection and are an unresolved item.

(7) Licensee Management Assessment of the Quality Assurance Program

(a) Objective

The objective of this assessment was to determine if a periodic assessment of the licensee's Quality Assurance Program is conducted by Commonwealth Edison Company upper level management.

(b) Discussion

The inspectors reviewed audits of the Byron Construction site conducted by a General Office Audit Team. These semi-annual audits are supplemented by a biennial audit conducted by an independent auditing organization. The audits cover the entire scope of the Quality Assurance Program and are reviewed by upper level management.

The licensee's Quality Assurance organization is headed by a site QA Superintendent. He is assisted by two Supervisor's who direct the activities of thirteen QA Engineers and Inspectors in monitoring and auditing the activities of the site contractors. In addition four Pittsburgh Testing Laboratory personnel are assigned to the organization for specific documentation related assignments.

Each engineer and inspector is assigned a specific list of responsibilities so that all contractor activites and other QA monitoring systems are fully covered. This type of organization should be able to effectively monitor site QA activities. However, the execution of the program is not satisfactory, as evidenced by the many problems uncovered by the inspectors. One factor affecting the execution is the stability of service for the QA personnel.

A key individual in a QA Program is the on-site superintendent. He has the direct responsibility for the QA performance of the contractors and other plant related activities. It is he who anticipates problem areas, sees to the training of his staff, directs the activities of his staff and is instrumental in producing a quality product. Since January 1976 there have been five QA Superintendents at the Byron Site:

J. Fizzies	January 1976 to May 1976
D. Jeritz	May 1976 to August 1977
R. Cousden	August 1977 to May 1978
T. McIntere	May 1978 to January 1981
M. Stanish	January 1981 to Present

In addition to this undesirable condition, the QA Engineers and Inspectors have an average on-site service time of approximately fourteen months and have limited prior QA experience. Part of this on-site time was spent in training and qualifying for various QA duties.

In addition to this problem, manpower is currently being sent to other sites so that the QA effort is substantially weakened. Out of a staff of sixteen, three men have been, and currently are at other assignments:

R. J. Schwartz	La Salle Station	12/7/81 to 2/19/82; 3/19/81 to Present
J. S. Hale	La Salle Station	1/5/81 to 2/2t/82, 3/19/82 to Present
P. J. Nodgenski	Quad-Cities Station	9/14/81 to 9/25/81,
	Byron Pre-op Testing	4/5/82 to Present

The constant change over of personnel resulting in a minimum experience level and transfer of personnel could hinder the QA organization in meeting its obligation of effectively implementing a QA program.

In contrast to the experience level of the QA organization the inspectors made a review of the stability of the supervisory and engineering personnel in the construction organization. The key individuals and service time at the Byron Station are:

Title	Name	On Site Since
Project Superintendent	G. Sorensen	1976
Assistant Project Superintendent	R. Tuetken	1977
Lead Civil Engineer	J. Mihovilovich	1975
Lead Mechanical Engineer	M. Lohmann	*1981
Lead Electrical Engineer	J. Binder	1978

*Six years prior experience as a Mechanical Engineer at La Salle County Station.

The pronounced difference in site time and experience level indicates there is the potential for a problem with QA personnel continually being transferred. In an effort to determine the cause of this potential problem a meeting was held with the Corporate Manager of Quality Assurance, W. J. Shewski, on April 16, 1982. His explanation was the the transfer of the QA Superintendents was for promotional opportunities in four cases and a death in the case of one superintendent. His explanation for the large turnover and inexperience level of the QA Engineers and Inspectors was that he desired to seed the licensee departments with QA experienced personnel and also not deny them promotional opportunities.

This constant change over of QA personnel as contrasted to the stable and experienced work force of the construction group indicates the need to create greater promotional opportunities in the QA organization, or the need to have some sort of system instituted to require QA personnel to acquire minimum service time at nuclear sites.

The inspectors reviewed the training that was given to CECo QA personnel after they had completed corporate quality assurance training. The Byron QA training is an on-the-job type training and is intended to supplement the corporate training and enhance the development of new QA personnel.

A review of BQI-24, Revision 1, Byron QA Training Program, revealed that although the stated purpose of the instruction was to provide the necessary training to appropriate personnel as quickly as possible, there was no specified length of time in which the training was to be completed. A lack of prompt training was a finding annotated by the General Office Audit of November 1981. A review of on-the-job training records revealed that prompt training was still not being accomplished and that the corrective action to prevent

recurrance, stated in the audit response, was not being effectively implemented. The on-the-job training system had no provision to alert supervisory personnel when a new employee's training was lagging.

BQI-24 also states, "It is the new employees responsibility to obtain and maintain the required training." It is our belief that the training of new employees is a management responsibility and cannot be delegated to the new employee.

Attachment A to BQI-24 lists fourteen areas of training and specific individuals are designated as authorized trainers in each area. There are no lesson plans or other types of written guidance for the required training. The lack of a formalized training program is not conducive to the maintenance of a skilled, trained, and competent Quality Assurance Department. With some of the more experienced personnel assigned to duties at other locations the training of the QA department suffers.

Open Item (454/82-05-03; 455/82-04-03)
The inability of the licensee to dedicate resources to the Quality Assurance organization to see that their experience base is equivalent to other organizations, leads the inspectors to question the licensee's effectiveness in staffing the Quality Assurance Program Organization. In addition, there is no evidence of a Management Policy Statement emphasizing the dedication of the Company to Quality Assurance and quality in general. The licensee's position is that the Company policy is stated in the Quality Requirements of the Quality Assurance Manual. It is our belief that these are an explanation of the Quality Assurance Manual and not a statement of policy.

(8) Licensee Quality Assurance Organization

(a) Objective

The objective of this assessment was to determine if the Quality Assurance Program provides sufficient independence from cost and schedule.

(b) Discussion

The inspectors reviewed the organization charts in the licensee's Topical Report and they indicate adequate independence for the CECo Quality Assurance Organization. Further inspection resulted in concern regarding the activities of the Project Construction Department that

appear to be contrary to 10 CFR 50, Appendix B, Criterion I, regarding the independence of the Quality Assurance effort from production.

The licensee's site Project Construction Department is organized with a Manager, Technical Staff, Project Engineers and Field Engineers. The inspectors interviewed four supervisors and the assistant superintendent of the construction group and found each of them to be knowledgeable and experienced engineers fully capable of meeting their respective responsibilities. They all fully recognized the importance of quality assurance and control and were determined to build a quality plant.

The responsibilities of this group include:

- Advisor to Engineering for design suitability for constructability.
- Coordinate requests for field revisions.
- Receipt and storage of materials.
- Assist Project Engineering in development of overall schedule.
- Verify conformance and completeness of contractor's installation to specification requirements.
- Supervise and approve mechanical and structural construction tests.
- Coordinate and provide assistance for electrical construction tests.
- Coordinate preoperation tests.

The Project Construction QC Supervisor and Project Construction Electrical Supervisor have engaged in Quality Assurance activities independent of the Byron Superintendent of Quality Assurance and the offsite Manager of Quality Assurance. The licensee could not produce a position description for the areas of responsibilities and the duties of the Project Construction QC Supervisor. An example of specific QA activities engaged in by these supervisors is:

- Letter of November 13, 1981 from the Electrical and QC Supervisors to the on-site Vice President of Hatfield Electric Company suggesting duties and responsibilities of the QA/QC Manager and a suggested organization chart.

The activities of the two supervisors in QA activities appears to be contrary to 10 CFR 50, Appendix B, Criterion 1, that requires independence of QA supervisors from cost and schedule. In addition, it seriously undermines the effectiveness of the incumbent QA Superintendent

to monitor the activities of the site QA organizations. The activities of these two supervisors resulted in a reorganization of the Hatfield Electric Company QA/QC Department that was not described in the QA Manual. We believe that CECo QA should, at a minimum, be involved in a review and concurrence capacity when such suggestions are made to contractors.

In addition to the foregoing, a further problem with QA independence from cost and schedule arises in that the site Project Superintendent has final contractual approval for some contractor QA organizations concerning salary increases, promotions, and hires for QA non-manual personnel increases. The requests for such action from Hatfield Electric Company and Powers-Azco-Pope do not have a concurrence from the contractors Quality Assurance Department and come from the project construction management.

The following list indicate salary changes or promotions of QA inspectors for site contractors that were approved by the site Project Superintendent.

Date	Contractor	Position
2/24/82	Powers-Azco-Pope	QA Specialist
12/8/81	Hunter Corporation	QA Inspector
11/23/81	Hunter Corporation	QA Inspector
11/3/81	Hunter Corporation	QA Inspector
11/3/81	Hunter Corporation	QA Inspector

The inspectors recognize that the Project Superintendents' responsibility for contract administration requires his final approval for contractors staff size and changes in compensation, however, a question of satisfying the requirements of 10 CFR 50, Appendix B, Criteria I relative to QA independence arises. Mechanisms are currently now in effect for such independence in that the Pittsburgh Testing Laboratory contract is administered by the Corporate Quality Assurance Manager who is independent of cost and schedule.

Noncompliance (454/82-05-01b; 455/82-04-01b)

The lack of independence between the Quality Assurance Department and the Project Construction Department is in violation of 10 CFR 50, Appendix B, which states in part, "Such persons and organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided.

Open Item (454/82-05-04; 455/82-04-04)
The involvement of the Project Construction Department in Quality Assurance Activities indicates the need for an Interface Document or Interface Procedure to explain the interaction of the licensee's Quality Assurance Organization with the Contractor's Quality Assurance Organizations, and the relation of the Project Construction Department to all on-site Quality Assurance Organizations.

(9) Quality Assurance Responsibility

(a) Objective

The objective of this assessment was to determine if the licensee has the prime responsibility for establishing and executing the Quality Assurance Program.

(b) Discussion

The inspectors reviewed the Topical Report and the Quality Assurance Manual and interviewed the licensee's Corporate and Site Quality Assurance Managers and the Quality Assurance Manager of selected contractors. The documentation review and the interviews showed that the responsibility of the licensee was established, documented and understood by responsible personnel in both the licensee's and contactor's organizations.

The inspectors were concerned about the lack of a policy statement from upper management that went beyond the explanation provided in Quality Requirement 1.0 and provided assurance that upper management of CECo supported the Quality Assurance Program and it objectives.

(10) Licensee Oversight of Contractor Activities

(a) Objective

The objectives of this assessment were to determine if the licensee has effective oversight of contractor activities and has detailed knowledge of those activities.

(b) Discussion

The inspectors conducted interviews with Quality Assurance personnel from the licensee, Hatfield Electric Company, Hunter Corporation, Powers-Azco-Pope, Johnson Controls, Inc., and Pittsburgh Testing Laboratory. These interviews were supplemented by the review of related quality assurance procedures, audits and documentations, tour of work

areas, warehouses and field offices; and discussions with licensee and contractor personnel. As a result of the above the inspectors determined that the licensee has a program that should provide an effective oversight of contractor activities. The ability of the licensee to provide this oversight is questionable due to the manpower limitation discussed in the "Licensee Assessment of the Quality Assurance Program" section of this report and the findings noted below.

Contractor QA Manuals

A review of the operating organization of two contractors, Hatfield Electric Company and Johnson Controls, Inc., revealed that the present organizations were not described in the latest Quality Assurance Manual revisions.

Johnson Controls, Inc., changed the title of the Senior QA Representative associated with Byron from the Quality Assurance Representative to the Quality Assurance Manager and did not update their Quality Assurance Manual. Johnson Controls operated for approximately five months with this discrepancy, and Commonwealth Edison Company Quality Assurance was not aware of the discrepancy.

Hatfield Electric Company was operating with a Quality Control Supervisor and a Quality Assurance Supervisor, both of whom report to the Quality Assurance Manager and who are not reflected in the Quality Assurance Manual. The reason for this disparity is a letter from the licensee's Project Construction Department to the Hatfield Electric Company Vice-President suggesting an organization change.

Noncompliance (454/82-05-01c; 455/82-04-01c)

10 CFR 50, Appendix B, Criterion I states, "The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components shall be clearly established and delineated in writing."

The failure of Hatfield Electric Company to have its Quality Assurance Manual reflect the actual Quality Assurance Organization is contrary to the above and is an item of noncompliance.

The failure of Johnson Controls, Inc., to have its Quality Assurance Manual reflect the actual Quality Assurance Organization is contrary to the above and is an item of noncompliance.

The licensee has indicated that the above conditions have been corrected. These items will be examined during future inspections.

Safekeeping of Quality Records

A tour was made of the combined vault used by Johnson Controls, Westinghouse-SAMU, Midway Industrial Contractors, Ebasco Services, Inc., and Reliable Sheet Metal. The safes of Westinghouse SAMU and Midway Industrial Contractors were found unlocked and with no attendant at the door of the vault. The Westinghouse safe contained computer tapes which were described to be non-safety-related and the Midway safe contained quality records.

Noncompliance (454/82-05-05; 455/82-04-05)
10 CFR 50, Appendix B, Criterion XVII states, "Sufficient records shall be maintained to furnish evidence of activities affecting quality." ANSI N45.2.9-1974 states, "A full time security system shall be established to preclude the entry of unauthorized personnel into the storage area. This system shall guard against larceny and vandalism."

The failure of Midway Industrial Contractors to lock a safe containing quality records is contrary to the above and is an item of noncompliance.

The licensee has indicated that this situation and the condition of the Westinghouse-SAMU safe have been corrected. This item will be examined during a future inspection.

During tours of the combined vault, the Powers-Azco-Pope vault, the Hatfield Electric Company vault and the Licensee's vault, the inspectors noted that entrance holes for conduit and other such piping had not been sealed and possible air paths from the exterior existed.

Unresolved Item (454/82-05-06; 455/82-04-06)
ANSI N45.2.9-1974 states that permanent and temporary records storage facilities shall be constructed to protect the contents from possible destruction by fire.

The inspectors are concerned that with the possible air paths around conduits and pipes that the Halon System may not be able to extinguish a fire.

The licensee has indicated that action has been taken to correct this condition. This item will be examined during a future inspection.

Surveillances

The inspectors reviewed the licensee's Quality Assurance Department 1981 surveillance schedule and noted that approximately seven percent of the scheduled surveillances were not conducted and there was no documented reason for their omission. The licensee did conduct approximately 800 more surveillances than were scheduled with an increase being made in some areas due to problems discovered or to follow up on audit findings. We recognize that such increased attention is necessary, but are concerned about the omission of surveillances without substantiating documentation, as surveillances are one of the intergal methods by which the Quality Assurance Organization provides an oversight of contractor activities.

Open Item (454/82-05-7; 455/82-04-7)
The inspectors are concerned about the omission of scheduled surveillances without substantiating documentation.

The licensee indicated that this item will be corrected. This item will be examined during a future inspection.

Drawing Control

The inspectors reviewed selected drawings in the on-site office of Johnson Controls, Inc., and at Hunter Corporation's Document Station 1-H, at the 426 level in the containment.

Twelve drawings were chosed at Johnson Controls, and of those chosen one was not the latest revision as indicated on the Sargent and Lundy master drawing list located in the CECo Quality Assurance office. Drawing M3393, Page 4 of 12, was Revision B and should have been Revision C, which was issued February 12, 1982. The M3393 drawing series is not marked to indicate how many drawings are in the series but are annotated as 1 of "blank".

Ten drawings were reviewed at Hunter Corporation's Document Station 1-H, at the 426 level in the containment, and of these two drawings, CS-58 and RH-13, were not the proper revisions according to the Hunter Engineering Department master list. Hunter Corporation personnel explanined that the drawings in question were for work on the Unit 2 containment, which had been stopped, and all related drawings were supposed to have been recalled to document control. Hunter instituted an immediate recall of these drawings.

Noncompliance (454/82-05-08; 455/82-04-08)
10 CFR 50, Appendix B, Criterion VI states, "Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality." The failure of Johnson Controls, Inc., and Hunter Corporation to control the issuance of drawings is contrary to the above and an item of noncompliance.

The licensee indicated that the condition has been corrected. This item will be examined during a future inspection.

Process Traceability

The inspectors accompanied two CECo Quality Engineers, one electrical and one welding, on inspections in the containment, auxiliary building and the turbine building to determine if they could trace the installation and inspection process on welds, conduit hanger installation, and cable pan installation. No problems were identified.

Quality Assurance Procedures

Inspection identified that two on-site contractors performing safety related work were using forms which were not controlled by procedures.

Hatfield Electric Company is utilizing a Discrepancy Letter, also known as a Trouble Letter, for documenting incomplete construction, non-conforming construction, requirements for Field Change Requests and other discrepant items found during quality control inspections.

These Trouble Letters have been in use for approximately the last 18 months and about 800 have been generated in this time frame. The Trouble Letters are used as an intermediate document during inspections prior to corrective work or preparation of FCRs and NCRs and do not become part of the quality records. Trouble Letters numbers 640 thru 670 and 680 thru 720 were examined and it was found that in the inspectors opinion Trouble Letters 658, 662, 664, 669, 679, 696, 697, 700 and 721 should have been documented as non-conformance reports. As an example, in Trouble Letter 679, a Hatfield Electric Company QC Inspector reports a conduit strap backing plate that is not welded to a hanger. The failure to have a procedure for this Trouble Letter is contrary to Appendix B.

A similar condition exists with the instrumentation piping installer, Powers-Azco-Pope. When making Quality

Control inspections a Fabrication Installation Surveillance form, for which there is no prescribed procedure is used for purposes identical to the Hatfield Trouble Letter.

The inspectors examined FIS numbers 180 through 216 and in their opinion a number of the FIS's should have resulted in NCRs. As an example, FIS 186 reported items that were installed but did not have the required heat numbers.

We are not against the use of trouble letters or speed letters to expidite some contractor functions, however, when these documents are used to document inspection discrepancies they must be procedurally controlled.

Noncompliance (454/82-05-09a; 455/82-04-09a)

10 CFR 50, Appendix B, Criterion V states, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

The failure of Hatfield Electric Company to utilize a procedure to control their Discrepancy Records is contrary to the above and is an item of noncompliance.

The failure of Powers-Azco-Pope to control their Fabrication Installation Surveillances is contrary to the above and is an item of noncompliance.

The licensee has indicated that these conditions have been corrected. These items will be examined during a future inspection.

Audits

The inspectors reviewed audits that were conducted by the corporate and site quality assurance organizations of Commonwealth Edison Company, Hatfield Electric Company, Hunter Corporation, Powers-Azco-Pope, Johnson Controls, Incorporated, and Pittsburgh Testing Laboratory. The audits were conducted according to an audit schedule and the scope and content of the audits was acceptable. The audit reports consistently failed to include a list of persons contacted during the conduct of the audit and a summary of audit results, including an evaluation statement regarding the effectiveness of the quality assurance program elements which were audited, as required by ANSI N45.2.12.

Noncompliance (454/82-05-10; 455/82-04-10)

10 CFR 50, Appendix B, Criterion XVIII states that a comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.

ANSI N45.2.12-1977 states that audit reports shall provide a list of persons contacted during audit activities and shall have a summary including an evaluation statement regarding the effectiveness of the quality assurance program elements which were audited.

Contrary to the above, the audit reports of the [illegible], Hatfield Electric Company, Hunter Corporation, [illegible], Azco-Pope, Johnson Controls, Inc., and Pittsburgh Testing Laboratory consistently failed to include persons contacted during the audit and an evaluation statement regarding effectiveness of the program elements as illustrated in the examples listed below:

Auditor	Audit #	List of Persons Contacted	Evaluation Statement
CECo	6-81-330	Yes	No
CECo	6-81-308	Yes	No
CECo	6-81-336	No	Yes
CECo	6-81-357	Yes	No
CECo	6-81-309	Yes	No
CECo	6-81-344	Yes	No
CECo	6-81-340	No	No
CECo	6-81-300	No	No
CECo	6-82-08	No	No
Hatfield	81-02	No	No
Hatfield	81-18	No	No
Hatfield	81-19	No	No
Hunter	84-4	No	Yes
Hunter	None July 9, 1981	No	Yes
Johnson	00801	No	No
Johnson	10801	No	No
PAP	52	No	No
PAP	54	No	No
PAP	55	No	No
PTL	81-21	No	No
PTL	81-23	No	
PTL	81-25		

The licensee has indicated that action has been taken to correct this situation in future audits. This item will be examined during a future inspection.

Measuring and Test Equipment

The inspectors reviewed the procedure and methods for control of Measuring and Test Equipment used by Hunter Corporation, Hatfield Electric Company, Powers-Azco-Pope, Johnson Controls, Inc., and Pittsburgh Testing Laboratory and inspected various instruments in office and field locations.

The inspectors identified no problems with Hunter Corporation, Johnson Controls, Inc., and Pittsburgh Testing Laboratory (PTL).

During a review of torque wrenches in the Hatfield Electric Company Quality Assurance office and the Powers-Azco-Pope Quality Assurance office the following items were identified.

- Hatfield Electric Company: The storage of torque wrenches was not according to Hatfield Procedure #24 as the wrenches that were past the calibration date were not red tagged and they were stored on the same shelf as wrenches currently in calibration. HE-151, HE-142, and HE-135 are some of the untagged, uncalibrated torque wrenches stored with calibrated wrenches.

- Powers-Azco-Pope: One torque wrench, TW-4, was marked as defective, but did not have a Reject Tag as required by Section 5.15 of Powers-Azco Pope Procedure FP-11, Calibration and Control of Measuring and Test Equipment (M&TE).

Noncompliance (454/82-05-11A; 455/82-04-11a)

10 CFR 50, Appendix B, Criterion V states, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

The failure of Hatfield Electric Company to follow its procedure #24, with regard to tagging torque wrenches, is contrary to the above and is an item of noncompliance.

The failure of Powers-Azco-Pope to follow its procedure No. FP-11, with regard to tagging torque wrenches, is contrary to the above and is an item of noncompliance.

The licensee has indicated that these conditions have been corrected. These items will be examined during a future inspection.

Purchasing, Receiving and Storage

The inspectors reviewed the process used to obtain safety related material starting with a material request generated by a contractor and culminating with storage in a warehouse. The inspectors noted no discrepancies in the requesting, purchasing and receiving portions of the project, but during tours of warehouse areas the following items were noted:

- In Warehouse No. 1, safety-related equipment was stored on shelves that also contained lumber, boxes of paper, scraps of rubbish and food in a housekeeping atmosphere that did not meet the requirements of Section 6.2 of ANSI N45.2.2.

- In Warehouse No. 5, a pallet of bags containing charcoal type compound was stored above safety related valves. One of the bags had broken and the material had spilled onto the valves, shelving and floor, and the housekeeping was not in accordance with Section 6.2 of ANSI N45.2.2.

Noncompliance (454/82-05-11b; 455/82-04-11b)
10 CFR 50, Appendix B, Criterion V states, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

The conditions maintained by the licensee in Warehouses No. 1 and No. 5 were contrary to Quality Procedure 13-1 and to the requirements of ANSI N45.2.2-1972, and are an item of noncompliance.

The licensee has indicated that action has been taken to correct the warehouse conditions. This item will be examined during a future inspection.

- In Warehouse No. 4, Powers-Azco-Pope is storing material that is tagged Rejected next to Accept and Hold material and is not segregated as required by Section 5.6 of Powers-Azco-Pope Procedure No. FP-3, Material Receiving Inspection Control.

- Powers-Azco-Pope is attaching a red tag that says "Safety-Related" to material that has also been tagged with PAP's Accept Tag. The red tag is not referenced in any PAP or CECo procedure.

Noncompliance (454/82-05-11c; 454/82-04-11c)

10 CFR 50, Appendix B, Criterion V states, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

The failure of Powers-Azco-Pope to store rejected material in accordance with their procedure No. FP-3 is an item of noncompliance.

The licensee has indicated that this condition has been corrected. This item will be examined during a future inspection.

(11) Quality Assurance Staffing

(a) Objective

The objective of this assessment was to determine if the Quality Assurance Organizations of the licensee and contractors are adequately staffed.

(b) Discussion

The inspectors interviewed personnel involved in the management of the licensee's and selected contractor's Quality Assurance Organizations; and approximately 14 percent of the Quality Control inspectors employed by the contractors. Based on the interviews and a review of scheduled and completed audits and surveillance the inspectors were able to conclude that the Quality Assurance Organizations were supplied with sufficient manpower. The auditors of the selected organizations were found to be adequately qualified. Qualifications of Quality Control inspectors are discussed in detail in the "QC Inspector Effectiveness" section of this report.

The inspectors do not believe that the Quality Control Supervisor for Powers-Azco-Pope was qualified to be a Level II Supervisor on the day she was appointed to the position, as she did not have the one year of Level I experience as required by ANSI N45.2.6-1978. This is discussed in greater detail in section h., QC Inspector Effectiveness.

The CECo Quality Assurance Organization at Byron is fully staffed with 16 personnel, but the effectiveness of Quality Assurance section is being weakened by the

deployment of Byron Quality Assurance personnel at La Salle and Quad-Cities. This is discussed in more detail in pargarph b.(7), Licensee Assessment of Quality Assurance Program. In addition to the above, one Quality Engineer was transferred to the Operations Quality Assurance section during our inspection and a replacement is not scheduled to arrive until June 1982.

The transfer of the Quality Assurance personnel to support other programs is an area of concern.

(12) Trend Analysis Program

(a) Objective

The objective of this assessment was to determine if the licensee has an effective trend analysis program.

(b) Discussion

The inspectors reviewed the trend analysis reports of the licensee and Hatfield Electric Company. Licensee trending of NCR's is discussed in detail in section c., Corrective Action Systems. The licensee publishes an annual Trend Analysis Report which is a summary of NCR's by problem area for each contractor during the previous year, and the Corrective Action System is scheduled to be audited semi-annually.

(13) Compliance History

(a) Objective

The objectives of this assessment were to review the licensee's compliance history and the effectiveness of the associated corrective action.

(b) Discussion

The inspectors reviewed the licensee's history of noncompliances, unresolved items, 10 CFR 50.55(e) Reports, NCR's, IE Bulletins, IE Circulars, and IE Information Notices and reviewed the systems used to assign responsibility and to track the resolution of the problem. A review of all 10 CFR 50.55(e) reports and 30% of the noncompliances showed that the corrective action was appropriate, with the cause identified and action taken to prevent recurrence. NCR's and their resolution are discussed in detail in section c., Corrective Action Systems.

Except as noted, within the areas inspected, no items of noncompliance or deviations were identified.

Prepared By: R. S. Love

c. Corrective Action Systems

(1) Objective

The objective of this assessment was to determine if:

(a) corrective action procedures are adequate.
(b) responsibilities have been adequately defined and that the affected personnel have been trained and understand the procedures.
(c) procedures are being effectively implemented. This includes the areas of tracking and closeout, trending of nonconformances, and upper management's involvement.

(2) Discussion

(a) Commonwealth Edison Company (CECo)

1. Procedure Review

A review of CECo Quality Procedures QP No. 15-1, Revision 5, dated January 20, 1981, and QP No. 16-1, Revision 5, dated December 29, 1980, indicates that they appear to be adequate as relating to Corrective Action.

Adverse trends and problem areas are brought to the attention of the Vice President (Nuclear Operations), Manager of Projects, Project Manager and Manager of Quality Assurance.

2. Review of NCR Log

The inspector reviewed CECo's Nonconformance Report (NCR) log for the years 1979, 1980, and 1981. It was observed that for the year 1981, 101 NCRs were prepared and Hold Tags were applied in 96 instances. In the 5 instances where Hold Tags were not applied, the item was controlled by a Subcontractors tag or the NCR was generic in nature.

3. Review of Open NCRs

The inspector reviewed eleven open NRCs that were prepared during 1980. The following is a status of these NCRs.

a. F-491, dated April 7, 1980. There is an open 50.55(e) report on this item.

b. F-488, dated March 27, 1980. This NCR was sent to Project Construction Department (PCD) on May 15, 1980, for implementation of the disposition.

c. F-526, dated June 27, 1980. This NCR is still at Station Nuclear Engineering Department (SNED) undergoing evaluation.

d. F-539 dated July 22, 1980. This NCR is still at SNED undergoing evaluation, but, [illegible] information received by the NRC inspector, the subject cables have been terminated and [illegible] on a "Work can Proceed" notation on the NCR.

e. F-544, dated August 8, 1980. This NCR is still at SNED undergoing evaluation.

f. F-546, dated August 11, 1980. There is no open 50.55(e) report on this item.

g. F-563, dated October 22, 1980. This NCR was sent to PCD on August 27, 1981, for implementation of the disposition.

h. F-565, dated November 5, 1980. This NCR is still at SNED undergoing evaluation.

i. F-575, dated November 26, 1980. This NCR was sent to PCD on January 28, 1981, for implementation of the disposition.

j. F-577, dated December 8, 1980. This NCR was sent to PCD on February 13, 1981, for implementation of the disposition.

k. F-582, dated December 12, 1980. This NCR was sent to PCD on July 14, 1981, for implementation of the disposition.

Open Item (454/82-05-12; 455/82-05-12)

The NRC is concerned about NCRs that remain open for an extended period of time in that as the fuel-load date approaches, there may be a tendency to accept items without proper engineering evaluation, including back-up data, or to accept items that should be reworked or repaired. Pending review of the action taken to close the NCRs listed above, this is an open item.

4. Review of Voided NCRs

The inspector selected six voided NCRs for review. The subject procedures do not address voiding NCRs but this is an accepted practice in the industry when the NCR is voided for just cause.

a. NCR F-597 was missing from the QA Records Vault. The NCR log indicated that the NCR was prepared on January 27, 1981 to document that Pump Motor 0CC01P terminations were leaking. The log indicates this NCR was voided on April 13, 1981.

b. NCR F-600 was missing from the QA Records Vault. The NCR log indicated that the NCR was prepared on February 6, 1981 to document some damaged cables. The log indicates that the NCR was voided on April 3, 1981.

c. NCR F-634, dated March 23, 1981, was prepared to document a minimum bend radius violation on cable 1RH119 and to point out that the cause of the bend radius violation was that the weight of the cable pulled the loop out of cable tray. ECN 1992 was issued to add a device to prevent cable slippage. The NCR was voided on July 24, 1981, without an evaluation of the subject cable. The cable had an inspection/evaluation performed on the cable on April 7, 1982. Cable was [illegible]

d. NCR F-645, dated May 7, 1981, was prepared to document that Westinghouse furnished wattmeters installed on various panels supplied by Systems Control did not meet the 1% tolerance requirements. The NCR was voided on June 3, 1981. Systems Control letter to Commonwealth Edison Company, dated August 19, 1981, stated in part, "The wattmeters will be returned to Westinghouse for repair at their expense."

e. NCR F-650, dated May 18, 1981, was prepared to document certain nonconforming hangers. This NCR was voided on June 3, 1981, because it was being tracked on Hatfield NCR #296.

f. NCR F-682, dated October 28, 1981, was prepared to document that concrete had been placed next to a pipe, resulting in a weld on the pipe becoming unaccessible for inspec-

tion under ASME Section XI. ECN 2336, dated December 8, 1981, was issued to enlarge the opening around the pipe so the weld would be accessible for inspection. The NCR was voided on December 16, 1981, because the ECN resolved the problem.

Noncompliance (454/82-05-13a; 455/82-04-13a)
The items listed in paragraph c, d, and f, above are examples of improperly voided nonconformances. For item c, the issuance of the ECN 1982 was a good corrective action to prevent recurrence but did not resolve the bend radius violation. For item d, the return of the instruments to Westinghouse for repair was a good resolution to the problem, not reasoning for voiding. Again, the issuance of the ECN 2336 was satisfactory resolution to the problem identified in item f, not a reason to void the NCR. Improper voiding of the NCRs is an item of noncompliance with Criterion XV of 10 CFR 50, Appendix B.

5. Review of Closed NCRs

On April 1, 1982, the Region III inspector reviewed the following NCRs for proper closure and for corrective action to prevent recurrence:

F-562, dated October 14, 1980, closed January 6, 1982
F-627, dated March 24, 1981, closed January 6, 1982
F-635, dated March 24, 1981, closed June 22, 1981
F-656, dated June 12, 1981, closed July 21, 1981
F-673, dated August 17, 1981, closed January 19, 1982
F-687, dated January 8, 1982, closed February 16, 1982
F-683, dated October 2, 1981, closed February 11, 1982

6. Review of Trend Analysis

On April 1, 1982, the Region III inspector reviewed the trend analysis of NCRs prepared by CECo. This trend analysis is prepared by the Projects Engineering Department (off-site). Reports dated January 6, 1981, March 19, 1981, September 17, 1981, October 21, 1981, November 12, 1981, December 17, 1981, January 12, 1982, January 20, 1982, and February 17, 1982 were reviewed during this inspection. All of the aforementioned reports had the notation, "No trends are evident" or "No trends could be identified."

CECo QA (on site) does perform a trend analysis on contractor's nonconformances. On the trend analysis reviewed, they agreed with the analysis being performed by the individual contactors.

7. Interviews with Personnel

Interviews with CECo personnel indicate that they appeared to be knowledgeable in their own procedures on Corrective Action as well as their contractor's procedures.

(b) Blount Brothers Corporation (Blount)

1. Procedure Review

Blount utilizes a Deviation Report (DR) System versus an NRC system. If a DR requires CECo Project Engineering approval, CECo transcribes the information from Blount's DR onto a CECo NCR which is then forwarded to Project Engineering for approval.

A review of Blount's procedure number 4, Inspection Nonconformances and Corrective Action, Revision 8, Issue 9, dated February 12, 1981, indicates that it appears to be adequate as relating to correction action.

2. Review of NCRs

The inspector selected several DRs from the DR log for a detailed review for proper closure and corrective action to prevent recurrence. Following is a status of these DRs:

a. Q3-485, dated July 7, 1980. Closed October 14, 1980.
b. Q3-508, dated November 22, 1980. Closed January 22, 1981.
c. Q3-505, dated December 1, 1980. Closed February 23, 1981.
d. Q3-494, dated August 25, 1980. Closed June 2, 1981.
e. Q3-545, dated October 19, 1981. As of April 2, 1982, this DR was at CECo for final approval for closure.

On all DRs reviewed, for years 1980, 1981, and 1982, the action to resolve the nonconformance and the steps taken to prevent recurrence appeared to be adequate.

3. Review of Trend Analysis

Per Blount's procedure, trend analysis are documented annually but a running count of [illegible] in each deviation area which results in a continuous trend analysis. The trends noted by the inspector had been documented on Blount's trend analysis report. These reports appear to be given wide distribution and includes a copy to CPSC.

4. Interviews with Personnel

Interviews with Blount personnel indicate that the QA Manager was relatively new on the project but appeared to have an adequate knowledge of the procedures. The inspector was impressed by the knowledge displayed by the QC Inspector as pertaining to the DRs reviewed and the corrective action system in general.

(c) Hunter Corporation (Hunter)

1. Procedure Reviews

A review of Hunters Site Implementation Procedures Number 11.101, Nonconformance Processing, Revision 4, dated April 28, 1981, indicates that it appears to be adequate as relating to corrective actions.

2. Review of NCRs

The inspector made a general review of approximately 30 NRs and a detailed review of 10 NRs for proper closure and for corrective action to prevent recurrence. Following is a status of the NCRs that were reviewed in detail:

a. NR-099, dated May 5, 1980. Closed September 16, 1980.
b. NR-132, dated July 22, 1980. This NR was properly voided on August 4, 1980.
c. NR-119, dated July 15, 1980. Closed on December 15, 1980.
d. NR-193, dated January 28, 1981. Closed on March 18, 1981.
e. NR-263, dated September 17, 1981. Closed on October 14, 1981.
f. NR-151, dated August 4, 1980. Closed on February 16, 1981.
g. NR-159, dated July 3, 1980. This NR was properly voided on December 2, 1980.
h. NR-204, dated March 17, 1981. Closed on April 15, 1981.

i. NR-231, dated June 5, 1981. Closed on August 21, 1981.

i. NR-262, dated September 11, 1981. Closed on November 24, 1981.

3. Review of Trend Analysis

The inspector reviewed the nonconformance (NR) log for the years 1980, 1981 and 1982. It was observed that with the way the NR log was prepared, a trend would be observed. The inspector selected two attributes (unqualified welders and hold points bypassed) and performed a trend analysis for the years 1980 and 1981. A review of Hunters trend analysis for the same period of time indicated that the two analysis (Hunter's and the inspector's) were compatable for the two attributes selected. Through training, unqualified weld NRs dropped from 11 in 1980 to 2 in 1981 and bypassing of hold points dropped from 23 in 1980 to 11 in 1981. Hunter recognizes that they still have problems with hold points.

4. Interviews with Personnel

Interviews with Hunter personnel indicate that they appeared to have a good working knowledge of their system and procedures. Their system and applicable procedures appear to be adequate.

(d) Powers-Azco-Pope (PAP)

1. Procedure Review

A review of PAP Field Operating Procedure Number QC-4, Nonconformance Control, Revision 7, dated September 30, 1981 and PAP Quality Assurance Manual, Section B-8, Nonconforming Material and Parts, Revision 1, dated October 22, 1981, indicates that they appear to be adequate as relating to Corrective Action.

2. Review of NCRs

The inspector performed a general review of approximately 30 NCRs and a detailed review of 13 NCRs and 11 Corrective Actions Requests(CARs). The following is the status of the NCRs reviewed in detail:

a. NCR 14, dated July 25, 1980. Closed August 1, 1980

b. NCR 19, dated September 18, 1980. NCR was unacceptable, with the note - see NCR 20.

c. NCR 20, dated September 30, 1980. Closed October 1, 1980.

d. NCR 23, dated September 21, 1980. Closed June 24, 1981.

f. NCR 44, dated April 3, 1981. Closed April 24, 1981.

g. NCR 39, dated February 27, 1981. Closed March 4, 1982.

h. NCR 55, dated June 1, 1981. Closed August 13, 1981.

i. NCR 71, dated February 13, 1981. Closed November 16, 1981.

j. NCR 73, dated July 15, 1981. Closed July 24, 1981.

k. NCR 81, dated July 31, 1981. Closed November 9, 1981. Re-instruction was required as part of corrective action.

l. NCR 90, dated September 10, 1981. Closed January 6, 1982.

m. NCR 117, dated November 20, 1981. Closed December 28, 1981.

Noncompliance (454/82-05-11d; 455/82-04-11d)

Of the 13 Powers-Azco-Pope NCRs reviewed in detail, 12 of the NCRs did not contain any corrective action to prevent recurrence which is in violation of PAP's Quality Assurance Manual, Section B-8, Revision 1, dated October 7, 1981, Paragraph 13-8 8.2. The licensee was informed that this was an item of noncompliance with Criterion V of 10 CFR 50, Appendix B

3. Review of CARs and Trend Analysis

Of the 11 CARs generated by PAP as a result of their trend analysis, the corrective action appeared to be adequate.

4. Interviews with Personnel

Interviews with PAP personnel indicate that they appeared knowledgeable in their system and procedures.

(e) Hatfield Electric Company (HECo)

1. Procedure Review

The inspector reviewed HECo Procedure #6, Reporting of Damaged or Nonconforming Material or Equipment,

Revision 6, dated January 15, 1982, and Section XVI, Corrective Action, Revision 5, of the QA Manual. During review the following observation was made.

Noncompliance (454/82-05-09b; 455/82-04-09b)
The only reference to corrective action to prevent recurrence in the above mentioned procedures is in Section XVI, Paragraph 2.4, of the QA Manual. This paragraph discusses corrective action for adverse audit findings. The NCR form in use at the Byron Station, as contained in procedure 6, has a section titled "Action to Prevent Recurrence" but there is no directions in the body of the procedure for this section.

Failure to assure that applicable regulatory requirements are correctly translated into procedures and instructions is an item of noncompliance with Criterion V of 10 CFR 50, Appendix B.

2. Review of NCRs

The inspector reviewed approximately 180 NCRs for proper closure and for corrective action to prevent recurrence. The NCR log in use when most of the NCRs were prepared did not provide a description of the nonconformance, resulting in a larger number of NCRs reviewed. The following observations were made.

a. NCRs 98, 99, and 100 were prepared to document a violation of concrete expansion anchor (CEA) edge distance. The NCRs were voided on February 25, 1980, because an FCR was or will be issued to accept the CEAs as installed. One FCR (2500) was not issued until July 16, 1980. By voiding the NCRs, they were removed from the trending system. After this was pointed out by the NRC, the contractor prepared NCR 432, dated April 9, 1982, to document the items originally contained in NCRs 98, 99, and 100.

b. NCR 168, dated March 2, 1981, documented that a cable was deformed at routing point 1899B. CECo engineering evaluated the cable and dispositioned the NCR as "Remove, Damaged Cable" and pull a new cable. Hatfield made the decision, without CECo's concurrence, that the subject cable did not need to be replaced. The NCR was closed on August 22, 1981.

c. NCR 154, dated February 24, 1981, documents that cables 1FW441, 1FW482, and 1DC198 were damaged and the disposition was to replace the cables. Review of records indicate that cable 1DC197 was pulled out and scrapped on June 4, 1981 instead of cable 1DC198. The NCR was closed on June 4, 1981. A review of cable pull cards for cables 1DC197 and 1DC198 indicated that 1DC197 had been pulled and scrapped on June 4, 1981, and that 1DC198 was initially pulled on July 24, 1981. On April 6, 1982, the HECo QA Manager corrected the subject NCR and the attached documentation.

d. NCR 107, dated March 21, 1980. Closed November 21, 1980.

e. NCR 97, dated February 20, 1980. Closed August 21, 1981.

f. NCR 152, dated February 23, 1981. Closed June 24, 1981.

g. NCR 164, dated March 2, 1981. Closed August 15, 1981.

h. NCR 160, dated February 16, 1981. Closed September 3, 1981.

i. NCR 103, dated March 6, 1980. Closed January 8, 1981.

j. NCR 184, dated March 4, 1981. Closed June 5, 1981.

k. NCR 177, dated March 4, 1981. Closed March 23, 1981.

The inspector reviewed 42 NCRs generated between September 15, 1981 and February 15, 1982. The following is a status of the disposition of the subject NCRs:

23 - Use-as-is, FCR issued
4 - Repair the item
4 - Open as of April 7, 1982
3 - Voided
2 - Replace the item
1 - FCR issued to add side rails
1 - Reject the item
1 - Reorder replacement item
1 - Retrain the cables

1 - Closed - Being tracked by CECo NCR
1 - Clean the item
42

Noncomplainee (454/82-05-13b; 455/82-04-13b
The licensee was informed that items a and b above are additional examples where NCRs were improperly closed/voided and is an item of non-compliance with Criterion XV of 10 CFR 50, Appendix B.

3. Review of Trend Analysis

A review of Hatfields trend analysis for 1981 and 1982 indicates that it was adequate.

4. Interviews with Personnel

Interviews with HECo personnel indicate that they appeared knowledgeable in their procedures and system.

Except as noted, within the areas inspected, no items of noncompliance or deviations were identified.

Prepared by: H. M. Wescott

d. Design Change Control

(1) Objectives

The objectives of this assessment were to ascertain that, site design change interfaces are clearly defined and implemented, design change control is adequate, personnel understand and use appropriate procedures, and that the procedures are being implemented to assure the timely revising and distribution of drawings.

(2) Discussion

(a) Review of QA Manuals and Procedures

The inspector examined QA Manuals and Implementing Procedures as follows:

1. Nuclear Power Services, Section No. 3, Revision 1, dated December 30, 1980, "Design Control".

2. Powers-Azco-Pope QA Manual, Section B.1, Revision 1, dated October 7, 1981, "Design and Document Control".

3. Hunter Corporation QA Manual, Section 2, Revision 5, dated August 1, 1981, "Drawing and Specification Control".

4. CECo QA Manual, Quality Requirement, QR No. 3C, Revisions 1, 3, 13, and 18, dated December 29, 1980, December 29, 1980, September 9, 1980, and December 29, 1980 respectively, "Design Control".

5. CECo QA Manual, Quality Procedure, QP No. 3-2 thru Revision 13, dated November 12, 1981, "Design Charge Control".

6. Johnson Controls, Inc., QA Manual, Section 4, Revision 0, dated June 29, 1978, "Design Control".

7. Byron Site Instruction No. 20, Revision 8, dated December 17, 1981, "Instruction for Site Design Document Receipt, Distribution and Control".

8. Byron Site Instruction No. 21, Revision 0, dated July 13, 1978, "ECN Routing".

9. Westinghouse Policy/Procedure, WRD-OPR 3.0, Revision 2, dated March 20, 1981, "Design Control".

10. Westinghouse WRD-OPR 3.1 "Reactor Coolant System Design Definition (Power Capability Working Group)" Revision 3, dated March 22, 1981.

11. Westinghouse Instruction/Guidance SMD 1.4, Revision 4, dated January 18, 1982, "Byron Unit 1 Engineering Change Notice".

12. Westinghouse Instruction/Guidance SMD 1.5, Revision 0, dated October 31, 1980, Byron Unit "Field Change Requests".

13. AZCC Field Procedure FP-9, Revision 6, dated December 21, 1981, "Design Change Control"

(b) Review of Audits of Site Contractors

The inspector reviewed CECo's audits of site contractors concerning design change control as follows:

1. Sargent and Lundy Nos. 6-81-301, 6-81-314, 6-81-339 and 6-28-07.

2. Westinghouse SAMU No. 6-81-317.

3. Powers-Azco-Pope Nos. 6-81-326, 6-80-247 and 6-82-10.

4. Nuclear Installation Service Company Nos. 6-81-311 and 6-80-281.

5. Hatfield Electric Company Nos. 6-80-254 and 6-81-331.

6. Hunter Corporation Nos. 6-82-09 and 6-81-350.

7. Blount Brothers Corporation Nos. 6-80-248, 6-81-294 and 6-82-02.

8. Johnson Control, Inc. No. 6-80-250.

9. Hunter Corporation, Hatfield Electric Company, Reliable Sheet Metal Works, Inc., Powers-Azco-Pope Services, Inc., Blount Brothers Corporation, Westinghouse SAMU, Pittsburgh Testing Laboratory, and Nuclear Installation Services Company No. 3/8-10/82.

(c) Review of Design Specifications

The inspector reviewed design specifications as follows:

1. Certified piping design specification for the "Outdoor Essential Water System" dated February 19, 1982.

2. Certified piping design specification for the "Indoor Essential Water System" dated December 14, 1981.

3. Certified design specification for the "Reactor Vessel" dated May 15, 1972.

4. Design Criteria for Category 1 Cable Tray, Cable Tray Supports, Bus Duct Supports, HVAC Duct Supports, Conduit and Conduit Supports, DC-51-03 BY, BR.

It is noted that item 2. above did not have the Professional Engineer's Seal for Certification. Sargent and Lundy further researched ten piping design specifications and found three that did not have the required seal. These were to be revised to include the seal by April 23, 1982.

(d) Review of Control of Field Change Requests (FCR's) and Engineering Change Notices (ECN's)

The inspector randomly selected fifteen (15) FCR's and three (3) ECN's at Powers-Azco-Pope, seven (7) FCR's at Hatfield Electric Company, and three (3) ECN's at Westinghouse SAMC. They were verified to be under CECo control. Additionally five (5) traveller packages for in-process welding were verified to have the correct drawing revisions in place.

The following are the totals of FCR's and ECN's issued as of this inspection:

Electrical FCR's	4,492
Mechanical FCR's	13,702
Structural FCR-s	101
*Mixed FCR's	4,999
ECN's	2,454
TOTAL	25,746

*Mixed FCR's contain all disciplines prior to separation by discipline.

(e) Review Site Design Change Interface

The inspector reviewed the following:

1. Interface Control Agreement, Westinghouse Piping and Structural Evaluation Program for the Byron Station Unit 1, dated October 13, 1980. Paragraph 4.3 states that, "The Byron Project Engineering Organization, as the Owner, has overall responsibility for the activities described in this agreement."

2. Flow Chart for routing CECo Field Change Request, Byron Site Instruction No. 10, Revision 5, dated March 25, 1982.

(f) Personnel Interviewed

The inspector interviewed personnel from CECo, Westinghouse, Powers-Azco-Pope, Sargent & Lundy, Hatfield Electric Company, and Hunter Corporation.

Within the areas inspected no items of noncompliance or deviations were identified.

Prepared By: E. H. Nightingale

e. Material Traceability of Installed Structures and Components

(1) Objective

The objective of this assessment was to determine that material traceability was maintained from procurement through installation for structural beams, small bore piping and welding materials.

(2) Discussion

The following contractors were involved and their areas of responsibility are as indicated:

Hatfield Electric Company: Cable Trays
Hunter Corporation: Small Bore Pipe Systems
Powers-Azco-Pope: Small Bore Piping Systems
Blount Brother Corporation: Structural

(a) Hatfield Electric Company

1. Review of Procedures

The following site procedures were reviewed:
#5, Class I Materials and Equipment, Receiving and Inspection

#13AA, Class I Shielded Metal Arc Field Welding (S.M.A.F.W.)

#13AB, Class I S.M.A.F.W. (Procedure Qualification)

#13AC, Qualification of Welders

#13AD, Arc Welding Electrode Control

2. Review of Records

The documents reviewed for material traceability were as follows:

- Weld Material Request
- Material Certification
- Weld Rod Request
- Weld Data Sheet
- Weld Material Issue Tag

3. Review of Welder Qualification

The review of welder qualification records consisted of reviewing the original qualification records as well as the supportive documents pertaining to their "up-date" qualification records. Hatfield Electric Company welding efforts are to AWS Code which requires six (6) month re-qualification periods.

The following welders had their certification and qualification records reviewed:

Name	Welder ID#
N. Larrabee	NL
C. W. Werner	W
J. A. Dickson	MM
Greene	CG
R. S. Glenny	CF
C. Stagg	CS
W. McVay	BM
D. Gavin	DG
T. Whitcomb	TW
F. Plegge	FP

These ten (10) welders are representatives of the sixty (60) welders qualified by Hatfield and are presently on site.

4. Review of Weld Material Control

The review of weld material control procedures and direct observation of in-process activities indicate that sufficient efforts are being implemented to assure material traceability and control.

Open Item (454/82-05-14; 455/82-04-14)
The Hatfield daily weld rod issue log did not indicate the actual time weld rod was issued and returned. The log only noted "a.m." or "p.m." The licensee has provided information to indicate that Hatfield form HP-13AD-1 has been revised to include provisions for the actual rod issue and return times. This item will be reviewed during a future inspection.

(b) Hunter Corporation

1. Review of Procedures

The following site implementation procedures were reviewed:

1.601, QA Procedures and Instructions
3.102, Material and Services Procurement
3.602, Material Received and Inspected
5.101, Weld Filler Material Control
5.201, Welding Procedure Qualification Control
5.301, Welding Qualification
5.501, Weld Material Issuance
6.002, Visual Examination and Verification
6.501, NDE

2. Review of Records

The inspector selected three (3) safety related small bore piping systems for review of material traceability. The review of the data packages consisted of documentation from the purchase order to installation of the item. The systems involved were as follows:

- Safety Injection (3)
- Reactor Coolant (2)
- Chemical Volume (4)

The documents reviewed were as follows:

- Material/Services Request
- Material Receiving Report
- Receipt Inspection Checklist
- QA Documentation Requirements List
- Material List
- Requisition
- Shipping Order/Packing Slip
- Material Certificate
- NDE Request
- Process Sheet
- Weld Record
- Material List
- Material Certification
- Weld Material Issue Report

The inspector reviewed data packages for the following small bore piping systems:

SYSTEM	SPOOL PC	ITEM	HT #	MATERIAL REPORT
101[illegible]-S-CV-001	2	2" sch/160	462460	MSR 4967
101[illegible]-S-RC-001	1	2" sch/160	462460	MSR 4967
CH[illegible]-S-RC-001	105	3/4" sch/160	483245	MRR 9575
101[illegible]-S-SI-001	5	2" sch/160	462460	MSR 4967
101[illegible]-S-SI-001	16-5	2" sch/160	462460	MSR 4967

SYSTEM	SPOOL PC	ITEM	HT #	MATERIAL REPORT
1018-S-CV-100	1-5	3/4" sch/40	462224	MSR 4967
1016-S-CV-100	8-7A	2" sch/160	462460	MSR 4967
1016-S-CV-100	9-8	2: sch/160	462717	MSR 4967
1065-S-SI-100	29-10	1" sch/160	HD7123	MSR 4967

The total footage involved consisted of 19,884'.

An expanded study of small bore piping was made to include valves and fittings. Data packages for the following items were reviewed:

NAME	LOCATION	SYSTEM	SPOOL	MRR
Globe Valve	1RC8039B	S-RC-001-51	2	10084
M.O.V.	1RC8037B	S-RC-001-51	2	10062
M.O.V.	1-SI-8871	S-SI-001	33	10144

NAME	TYPE	HT #	SPOOL	MRR
CPLG Fitting	2.0" 6000# S.S.-S.W.	TL	2	4968
CPLG Fitting	3/4" 6000# S.S.-S.W.	EGJ	2	5038

3. Review of Welder Qualification

The review of welder qualification records consisted of reviewing the original qualification record as well as the supportive documents pertaining to their "up-date" qualification record. Hunter Corporation welding efforts are conducted to the ASME Code which requires three (3) month re-qualification periods. Hunter Corporation routinely re-certifies their welders in two (2) month periods to preclude any loss of certifications due to vacations, illness, etc.

The following welders had their certification and qualification records reviewed:

NAME	WELDER ID #
R. Sturm	D40
B. Strom	B17
D. Colby	E52
R. Decker	A38
D. Upstone	F19
E. baker	E56
B. Burns	E82
R. Bilyeu	B91

NAME	WELDER ID #
A. Arnold	E48
V. Burdene	C19
D. Radke	A12
L. Anderson	F3

These twelve (12) welders are representative of the 237 welders qualified by Hunter Corporation and are presently on site.

4. Review of Weld Material Control

The review of weld material control procedures and direct observation of in-process activities indicate that sufficient efforts are being implemented to assure material traceability and control.

The documents reviewed for material traceability are as follows:

- Weld Material Stores Requisition
- Purchase Requisition
- Materials/Services Request
- Material Receiving Report
- Receipt and Inspection Checklist
- Material Certificate

(c) Powers-Arco-Pope

1. Review of Procedures

The following procedures were reviewed:

- QC-4, Nonconformance Control
- FP-2, Control of Procurement and Requisitioning of Material and Services
- FP-3, Material Receiving, Inspection Control
- FP-5, Weld Filler Material Control
- FP-6, Material Handling
- FP-7, Transfer Package and Weld Record Control
- WE-2, Welders Performance Qualification and Control

2. Review of Records

The inspector selected three (3) safety related small bore piping systems for material traceability review. The review of the data packages consisted of documentation from the purchase order to installation of the item involved. The systems selected were as follows:

- Feedwater
- Containment Spray
- Reactor Coolant

The documents involved for review were as follows:

- Weld Filler Material Requisition
- Receiving Inspection Check List
- Final As-Built Isometric (Supplement Weld and Inspection Record)
- Material Certification
- Weld Rod Issue Tag
- P.O. (CECo Responsibility)
- NDE Records

A study of the data packages, for the systems selected, consisted of the following items:

SYSTEM	PIPE SIZE	HT #	REC. & INSP. Report #	ISO #
RX Coolant	0.50"	462,444	MRR# 7074	1FIS-4188
Feed Water	0.50"	M81,577	RIR# 040	1LT-542
Feed Water	0.50"	D85,772	RIR# 040	1LT-542
Feed Water	0.50"	E89,871	RIR# 040	1LT-542
Containment Spray	0.50"	744-783	MRR# 7074	1FT-CSC11

Total footage of piping involved consisted of 27,900'.

The suppliers of weld material for the Byron facility is Hunter Corporation. The pipe materials are supplied to the small bore piping contractors by CECo. Therefore, purchase orders are originated from these two (2) sources. This system of purchasing in large quantities by one contractor/licensee enhances material traceability.

An expanded study of small bore piping was made to include valves and fittings. Data packages for the following items were reviewed:

ITEM	HT#	FIELD WELD #	REC & INSP. REPORT #	ISO#
Coupling	EGJ	41	057	1FT-RC009
90 Elbow	OZ	52	131	1FT-403
Valve S/N N11591	1FV048	N/A	20049	11J-461
Valve S/N N11526	1RC025E	N/A	230	1FT-415

3. Review of Welder Qualification

The review of welder qualification records consisted of reviewing the original qualification record as well as the supportive documents pertaining to their "up date" qualification record. PAP welding efforts are conducted to the ASME Code which requires three (3) month re-qualification periods.

The following welders had their certification and qualification records reviewed:

Name	Welder ID#
B. Strom	CS
R. Sutherland	AF
H. Arteaga	DU
L. Flynn	DX
D. Tucker	BH
H. Mitchell	AJ
R. Boyle	BM
D. Shurely	CE
P. Meyers	DE
W. Meyers	DG

These ten (10) welders are representative of the 46 welders qualified by PAP and are presently on site.

4. Review of Weld Material Control

The review of weld material control procedures and direct observation of in-process activities indicate that sufficient efforts are being implemented to assure material traceability and control.

The documents reviewed for material traceability are as follows:

- Weld Filler Material Requisition
- Receiving Inspection Check List
- Material Certification
- Weld Rod Issue Tag
- Weld and Inspection Record

(d) Blount Brothers Corporation

1. Review of Procedures

The following procedures were reviewed:

- QC 3385 #1, Document Control
- QC 828 #2, Procurement Control
- QC 3012 #4, Inspection (Nonconformance and Corrective Action)
- QC 3262 #7, Calibration of Tools, Gauges and Instruments Concrete)
- QC 835 #10, Receiving, Storage and Handling
- QC 3333 #11, Welding - (AWS D1.1) 1974
- QC 845 #21, Structural Steel Erection
- QC 1992 #33, Personnel Qualification and Certification

2. Review of Records

The inspector selected nine (9) structural beams for material traceability. Beams selected were three from Unit #1 containment building and three beams from Unit #1 auxiliary building. Three more beams were selected from Unit #2 containment building.

Beams selected were as follows:

Beam I.D.	Building	Unit #	Drawing #
A22B2	Containment	2	E-205
A23B3	Containment	2	E-205
A24B1	Containment	2	E-205
A12B5	Containment	1	E-102
B11B52	Containment	1	E-102
B10-B1	Containment	1	E-102
33383	Auxiliary	1	E-201
32601	Auxiliary	1	E-201
60381	Auxiliary	1	E-201

The inspector reviewed the data packages for the following structural steel for material traceability.

Beam # 32601 - Film Roll 3 - Dr. #326

Index #	Heat #	SSL Letter Date
440	2R6969	12-28-76
435	J-31694	11-30-76
464	96266	12-28-76
474	96723	11-29-76
461	63062	11-08-76
Mill B8	L511159	02-28-77

Beam # 33383 - Film Roll 3 - Dr. #333

Index #	Heat #	S&L Letter Date
351	K-24080	11-10-76
474	96723	11-19-76

Beam #B104BB1 - Film Roll 1 - Dr. #B104

Index #	Heat #	S&L Letter Dale
11153	69C076	06-29-77
11127	69C050	07-01-77
90126	66C242	07-01-77
90127	69C167	08-10-77
80123	63729	05-26-77

Beam #A230BB3 - Film Roll 1 - Dr. #A230 - 80230

Index #	Heat #	S&L Letter Date
38	70C576	02-07-78
62	K58219	02-06-78
	K58377	02-06-78
573	T-7512	06-26-78
S-22	87495	06-27-78

Beam #B111BB2 - Film Roll 1 - Dr. #B111B

Index #	Heat #	S&L Letter Date
11113	VY4703	07-01-77
11106	70C266	07-01-77
90116	66C242	07-01-77
90127	69C167	08-10-77
80123	63729	05-26-77

Beam #A220B2 - Film Roll 1 - Dr. #A220

Index #	Heat #	S&L Letter Date
B-9	J-51717	12-13-77
S-43	44P489	07-19-78
B-1	A-325	Bolts 09-12-78
B-2	A-325	Bolts 06-09-78

Beam #A132B5 - Film Roll 1 - Dr. #A132

Index #	Heat #	S&L Letter Date
80139	24456	05-26-77
C-80119	W35079	07-11-77
A-80190	B-34009	08-10-77

Beam #603B1 - Film Roll 3 - Dr. #603

Index #	Heat #	S&L Letter Date
1407	10005	03-04-77
287	18216	10-12-76

Beam #A240BB1 - Revised to Beam #E144-1
S&L Drawing S-1001, Revision H., Dated 3-16-78, Note 10. Fabricated by Midcity Architectural Iron Company (on-site contractor).
Heat # K62702 and #83833
A-325 Bolts - C6810; 4048

3. Review of Welder Qualifications

The review of welder qualification records consisted of reviewing the original qualification record as well as the supportive documents pertaining to their "up-date" qualification records. Blount Brothers Corporation welding efforts are to AWS Code which require six (6) month re-qualification periods.

The following welders had their certification and qualification records reviews:

Name	Welder ID #
K. Knaub	K-5
R. Long	K-4
P. Fadness	P-4
R. Sullivan	B-4
D. Lower	L-4
W. Thompson	V-4
K. Flosi	W-3
R. Schusler	W-18
K. Todo	Y-4
D. S. Wielan	D-5

The ten (10) welders are representative of the fifteen (15) welders qualified by Blount Brothers Corporation and are presently on site.

4. Review of Weld Material Control

The review of weld material control procedures and direct observation of in-process activities indicate that sufficient efforts are being implemented to assure material traceability and control.

The documents reviewed for material traceability are as follows:

- Material Requisition
- Receiving Inspection Report
- Material Certification
- Weld Material Issue Sheet
- Weld Data Report

Within the areas inspected, no items of noncompliance or deviations were identified.

Prepared By: R. S. Love

f. Electrical Cable Installation

(1) Objective

The objectives of this assessment were to determine if:

- cable installation procedures are in accordance with FSAR commitments and that they are adequate for controlling cable installation activities.
- the cable installation personnel and QC inspectors have been adequately trained in this activity.
- safety related cables are routed, separated, and loaded in accordance with procedure requirements.

(2) Discussion

(a) Review of Electrical Procedures

The inspector reviewed the following Hatfield Electrical Company procedures:

1. Procedure No. 5, Class I Material and Equipment Receiving and Inspection, Revision 4, Issue 1, dated January 26, 1981. This procedure was reviewed and accepted by Sargent and Lundy on January 27, 1981.

2. Procedure No. 6, Reporting of Damaged and Nonconforming Material or Equipment, Revision 6, dated January 15, 1982. This procedure was reviewed and accepted by Sargent and Lundy on February 11, 1982.

3. Procedure No. 9-A, Class I, Cable Pan Hanger Installation, Revision 11, dated November 20, 1982. This procedure was reviewed and approved by Sargent and Lundy on December 23, 1981.

4. Procedure No. 9-B, Class I, Cable Pan Installation, Revision 9, dated November 20, 1981. This procedure was reviewed and approved by Sargent and Lundy on December 23, 1981.

5. Procedure No. 9-E, Class I, Cable Pan Identification, Revision G, Issue 1, dated January 23, 1981. This procedure was reviewed and approved by Sargent and Lundy on January 26, 1981.

6. Procedure No. 10, Class I, Cable Installation, Revision 14, dated February 8, 1982. This procedure was reviewed and approved by Sargent and Lundy on February 18, 1982.

Open Item (454/82-05-15; 455/82-04-15)
Procedure No. 9-B, Class I, Cable Pan Installation, Revision 9, dated November 20, 1981, did not address the installation of cable pan and riser covers. The inspector was informed that Procedure No. 9-C would address the installation of covers as required by the Byron/Braidwood FSAR. This is an open item.

Unresolved Item (454/82-05-16; 455/82-04-16)
During review of Procedure 9-E, Class I, Cable Pan Identification, Revision G, Issue 1, dated January 23, 1981, the inspector observed that paragraph 5.3.1 of the subject procedures states in effect that the requirements to apply segregation identification to raceway at a minimum of every 15' does not apply to risers. This is contrary to the requirements stated in paragraph 5.1.2 of IEEE 384-1974. Pending a review of installed riser identification markings for compliance to requirements, this item is an unresolved item.

Noncompliance (454/82-05-09c; 455/82-04-09c)
During review of Procedure No. 10, Class I, Cable Installation, Revision 14, dated February 8, 1982, the inspector observed that the subject procedure does not address:

a. the requirements to calculate electrical cable sidewall pressure. Maximum cable sidewall pressures are specified by the cable manufacturers,

b. electrical cable rework. Example - An electrical cable has been installed per Revision A of the cable pull card and Revision B of the pull card requires that the cable be "pulled back" to a given point in the raceway system and re-routed to a different landing point. What precautions are taken to prevent damage to the cable being "pulled back" and to the cables remaining in the raceway. This would be especially important when the cable was installed in conduit or duct banks. Another example would be that as a result of an NCR, a cable had to be removed (Ref. Hatfield NCR's 164, 154, 107).

Failure to provide adequate instructions or procedures to accomplish activities affecting quality in accordance with Quality Assurance Program provisions is an

item of noncompliance with Criterion V of 10 CFR 50, Appendix B.

(b) Review of Storage Facilities - Cable Yard

The inspector toured the Hatfield Electric Company cable reel yard to verify proper storage and to select several cable reel numbers for follow-up review of material receiving reports and vendor documentation. The cable reels were stored on dunnage (plywood), identified, and separated as to cable type. Electrical cable reel numbers 02146-409, 04146-215, 03867-7, and 01115-43 were selected for records review.

(c) Review of Electrical Work Activities

1. During a tour of the power block the inspector observed that the weld heat affected zone inside cable tray 11774J-C2E, located at the 439' elevation of the cable spreading room, had not been touched-up with zinc rich paint in accordance with Hatfield Electric Company Procedure No. 9-B, Class I, Cable Pan Installation, Revision 9, dated November 20, 1981. The licensee took immediate action to have the subject area cleaned and galvanoxed. This was the only area identified where the weld or heat affected zone had not been touched-up.

2. The inspector observed that non-safety related pipe number FP-41-4-10" was installed 3 1/2" from safety related cable tray number 11461J-C2E. These items are located in the Auxiliary Building between column lines 17 and P at the 426' elevation. Further investigation indicates that the fire protection (FP) system is classified as moderate energy piping and is seismically supported in the area observed. This appears to meet the intent of Regulatory Guide 1.29, Seismic Design Classification.

3. The inspector verified that electrical cable number 1VX105 was routed in accordance with the cable pull card, Revision A. The subject cable is a 12c/14, 600V and was pulled from cable reel 12146-201. The cable extends from 1AP32E (MCC 132X5) to 1VX02J (Vent System Local Control Panel). The cable was physically verified in routine points 11461J-C2E, 1R369-C2E, 1910F-C2E, 1R353-C2E, 11375M-C2E, and verified that the cable entered the conduit to the equipment.

The raceway was accepted on January 18, 1982, and cable pulled on January 19, 1982.

4. During discussions with an electrical foreman and one electrical craftsperson, the inspector observed that, with respect to cable pulling, they were very knowledgeable and proud of their work. The subject craftsperson assisted the inspector in verifying the routing of electrical cable 1VS105 (Ref. Paragraph (c)3 above).

(d) Review of Procurement Documentation - Class IE Cable

The inspector reviewed the procurement documentation relative to 600V and 5KV electrical cable. The inspector reviewed the cable specifications, Material and Equipment Receiving and Inspection Reports (MRR), and vendor documentation. The following observations were made:

1. The licensee purchased the following electrical cable from Okonite Company to Sargent and Lundy specification F-2823.

   a. Cable reel number 02146-409 contained 2500 feet of 2c/14, 600V cable and was received May 11, 1981 on MRR 50217.

   b. Cable reel number 04146-216 contained 3124 feet of 4c/14, 600V cable and was received April 22, 1980 on MRR 8569.

   c. Cable reel number 03356-7 contained 2011 feet of 3c/350 MCM, 600V cable and was received October 4, 1978 on MRR 4187.

   The following data was included in the on-site documentation packages for the above listed cables:

   - Certificate of Compliance
   - Certificate of Conformance
   - Certified Test Report
   - Results of Water Absorption Test
   - Results of Ozone Resistance Test
   - Results of High Potential Voltage Test
   - Sargent and Lundy letter, dated June 20, 1980, that accepted the results of Flame Tests and Tests for Design Basic Events.

2. The licensee purchased electrical cable, reel number 01115-43 from Okonite Company to Sargent and Lundy specification F2851. This reel contained 1094 feet of 1c/1000 MCM, 5KV cable and was received

July 11, 1979 on MRR 7032. The following data was included in the on-site documentation package for this cable:

- Certificate of Compliance
- Certificate of Conformance
- Certified Test Report
- Results of Water Absorption Test
- Results of Ozone Resistance Test
- Results of High Potential Voltage Test
- Sargent and Lundy letter, dated June 20, 1980, that accepted the result of Flame Tests and Tests for Design Basic Events.

(e) Review of Class 1E Cable Pull Cards

The inspector reviewed 20 completed cable pull cards to verify that correct cable type was installed, raceway was inspected prior to pulling cable, and that QC accepted the cable pull. The following typical observations were made:

1. Cable 1VX105 was pulled on January 19, 1982 from Cable Reel 12146-201. Revision A to the cable pull card indicates the cable type code as 12146 which is 12/c-14, 600 volt cable. The raceway was accepted on January 18, 1982, and the cable pull was accepted January 19, 1982. This was a complete pull.

2. Cable 1RC223 was pulled on April 9, 1981 from Cable Reel 02166-41. Revision A to the cable pull card indicates the cable type code as 02166 which is one twisted pair, #16 (shielded), 600 volt cable. The raceway was accepted on March 27, 1981, and the cable pull was accepted April 9, 1981. This was a complete pull.

3. Cable 1VC019 was pulled on June 23, 1981 from Cable Reel 09146-84. Revision A to the cable pull card indicates the cable type code as 09146 which is 9/c-14, 600 volt cable. The raceway was accepted on June 22, 1981 and the cable pull was accepted on June 23, 1981. This was a complete pull.

Except as noted, within the areas inspected, no items of noncompliance or deviations were identified.

Prepared By: M. M. Wescott

8. In-Process Inspection

(1) Objectives

The objective of this assessment was to ascertain that in-process inspection procedures are adequate and properly implemented.

(2) Discussion

(a) Review of Procedures

The inspector reviewed procedures concerning in-process inspection as follows:

1. Powers-Azco-Pope Quality Control Field Procedure FP-7, Revision 6, dated October 16, 1981, "Traveller Package and Weld Record Control PAP Isometric and Installation Control".

2. Powers-Azco-Pope QC-6, Revision 6, dated September 30, 1981, "Quality Assurance Documentation".

3. Hatfield Electric Company Procedure 9-A, Revision 11, dated November 20, 1981, "Class I, Cable Pan Hanger Installation".

4. Hatfield Electric Company Procedure 9-B, Revision 9, dated November 20, 1981, "Class I, Cable Pan Installation".

5. Hatfield Electric Company Procedure 20, Revision 8, dated November 20, 1981, "Class I, Exposed Conduit System Installation".

6. Hunter Corporation, Site Implementation Procedure SIP No. 1.601, Revision 1, dated March 3, 1981, "Quality Assurance Procedures and Instructions".

7. Hunter Corporation, SIP No. 4.201, Revision 4, dated January 19, 1982, "Installation Verification".

(b) Observation of Work Activities

The inspector accompanied two Hatfield Electric Company QC inspectors and observed their inspection of conduit hangers located in the control room.

The inspector also observed the inspection and torquing of four concrete expansion anchors.

(c) Review of Records

The inspector reviewed records as follows:

1. Hunter Corporation completed traveller packages for welds Numbered 45, Part No. 1-SA-76-AD-3; 565, Part No. 1-CC-50-B-4"; Number 571, Part No. 1-CC-50-C-6"; Number 1608, Part No. 1-CC-50-C-6" rework; Number 1171 and 1178, Line No. 1-D-C-33-CA-3/4".

2. Hunter Corporation Field Order JTP No.'s 5-PS-100-78, 5-PS-10-77, HOG-72-1, S-NT-100-2-15-A, and OG-61-7.

3. Hatfield Electric Company QA Process Sheet File No. 13.09B.1, Class I, Cable Pan Inspection Checklists (approximately 33 checklists).

4. Hatfield Electric Company Concrete Expansion Anchor File No. 13.25.02, Travellers 1901 thru 1950.

5. Hatfield Electric Company Conduit Inspection Reports, File No. 13.20.01, 766 thru 850.

(d) Personnel Interviewed

The inspector interviewed two QC inspectors from Hatfield Electric Company.

Noncompliance (454/82-05-17; 455/82-04-17)

The inspector interviewed four welders performing in-process safety related welding (two from Hunter Corporation and two from Powers-Azco-Pope). Three of the welders did not have the welding procedure specification (WPS) with the traveller packages. When the inspector asked where the WPS was, two welders did not appear to know what a WPS was and one stated that he knew the WPS should be in the weld material issue point but stated that he had not seen it.

This item is considered to be in noncompliance with the requirements of 10 CFR 50, Appendix B, Criterion IX.

Except as noted, within the areas inspected, no items of noncompliance or deviations were identified.

Prepared By: W. Forney

h. QC Inspector Effectiveness

(1) Objective

The objectives of this assessment were to determine if:

(a) any problems exist that inhibit an inspector from properly executing his assigned functions.

(b) the training, qualifications, and certification of QA/QC personnel working for contracting organizations to the licensee are in compliance with 10 CFR 50, Appendix B, ANSI N45.2.6-1978; ANST SNT-TC-1A, USNRC Regulatory Guides 1.58, USNRC Generic Letter 81-01, CECo Quality Assurance Program Manual; CECo Response to Generic Letter 81-01 (L. O. DelGeorge to D. G. Eisenhut-August 17, 1981); and Contractor Quality Assurance Manuals.

(2) Discussion

Individuals selected for interview were chosen at random by the NRC inspector. All contractors utilizing QA/QC personnel to monitor and accept production activities at the site were selected. The organizations selected, production function monitored by the inspectors, number of inspectors in the organization, number of inspectors interviewed and percentages are identified in Table 2. Each inspector interviewed was asked a standard set of questions The answers provided were summarized and are provided as Table 3.

Individuals selected for QA/QC inspector interview were requested to provide the record of their training, qualification and certification to the inspector. The inspector reviewed each of the training, qualifications and certification records to verify compliance with applicable regulatory requirements, standards and commitments. In verifying the implementation of the approved requirements emphasis was placed on (1) determination of initial capability by suitable evaluation (2) evaluation of performance/reevaluation (3) written certification in appropriate form (4) physical requirements identified and examined yearly, and (5) qualification criteria followed and (6) records of qualification established and maintained.

Table 3 is provided as a summary of inspector answers to the standard set of interview questions. Answers to questions 1, 2, 4, 5 are self evident and do not require further definitions. However, the answers to remaining questions require further clarification and conclusions.

Question 3 - relates to the number of inspectors that indicated during their answer to Question 2 that they had prior inspection experience. Of the 30 inspectors interviewed 47% indicated prior inspection experience; however, only 27% had prior inspection experience in nuclear work related activities.

Question 6 - of the 19 inspectors interviewed that regularly worked frequent or excessive overtime one worked less than 8 hours weekly, fourteen worked from 8 to 16 hours weekly, and four work greater than 16 hours weekly. The two inspectors that provided qualified answers indicated the overtime was intense at times based upon fluctuations of production activities. All of the inspectors that answered yes or qualified their answer were asked if the frequent or excessive overtime caused the accuracy of their inspections to be deminished. Without exception, none of the inspectors felt the accuracy of their inspections were affected.

Question 7 and 8 - the inspectors that provided a qualified answer to these questions indicated that the lack of adequate staff and/or failure to conduct inspections promptly were a result of fluctuations in production activities.

Open Item (454/82-05-18; 455/82-04-18)

Question 9 - indicates that inspectors generally do not feel they have the authority to stop an activity in their contractor's work that is not being properly performed, nor have they been provided written management policy in this area. The inspectors that provided qualified answers indicated that they would inform the area supervisor. The inspectors were also asked if they felt they could immediately stop the work activity of another contractor worker who was performing work that was hazardous to safety related equipment. The majority of inspectors indicated they did not have that authority.

The licensee management committed to take actions to re-emphasize to all inspectors their responsibility to stop an activity which does not conform to applicable quality requirements. This item will be examined during a future inspection.

Question 10 - the majority of inspectors interviewed indicated that the training they received was adequate for the work activity they are required to perform. One inspector did not feel his training was adequate and the remaining inspectors felt that although their training was not the best, that if they needed additional guidance or clarification that management would provide the information immediately.

Question 11 - indicates that inspectors do not feel that a lack of inspection personnel is the cause for construction activities to come to a stop and is consistent with the answers provided in Question 8.

Question 12 - the inspectors that qualified their answer generally indicated that their activity did not require a check list but was normally accomplished utilizing a combination of installation plans and/or procedures.

Question 13 - the inspectors that qualified their answer indicated that they would have to follow the chain-of-command which could be untimely.

When asked to discuss their opinion of how their management portrays the relationship of quality to production the majority of inspectors stated that quality was first and production second, a number of inspectors stated that quality and production were on an equal basis, and a few of the inspectros (predominately from one contractor) stated that production was first and quality second.

When asked to discuss their opinion of the overall finished product of their contractors activities the majority of inspectors stated that the work generally exceeded minimum acceptable standards, a few stated the work generally met minimum standards, and no inspectors felt that the work did not meet minimum acceptable standards.

Noncompliance (454/82-05-19; 455/82-04-19)

Based on a review of training qualification and certification records of a minimum of ten percent of the QA/QC personnel working for contractors performing safety-related work it is apparent that an effective program does not exist to ensure that a suitable evaluation of initial capabilities is performed, that written certification is provided in an appropriate form, and that qualification criteria is established.

Certain contractor QA/QC supervisors and inspectors were not adequately qualified and/or trained to perform safety-related inspection functions. The following examples of apparent noncompliance were identified:

a. Contractor - Reliable Sheet Metal Works, Inc.

(1) The contractor Quality Assurance Manual did not require inspection personnel to be trained and certified to ANSI N45.2.6-1978.

(2) The certification record for the QA/QC supervisor did not contain a satisfactory basis for certification.

(3) The certification record for the QA/QC supervisor did not contain the level of capability.

b. Contractor - Johnson Controls, Inc.

(1) The certification records reviewed did not contain a determination of initial capability.

(2) The certification records reviewed did not contain a copy of the individuals high school diploma or verification of prior work history.

(3) The certification records reviewed did not support adequate testing prior to certification. It is noted that testing was accomplished by oral examination consisting of 25 questions to determine the individuals knowledge of 26 procedures. The oral examination noted the individual was weak in ability to work with drawings. However, there is no record to indicate additional training was provided or that the individual was subsequently tested and found to be proficient in his ability to work with drawings.

c. Contractor - Powers-Azco-Pope

(1) The certification records for the QC Supervisor did not provide an adequate determination of initial capability.

(2) The certification records for the QC Supervisor did not contain a high school diploma, or verification of previous employment.

(3) The certification records for the QC Supervisor did not contain adequate evaluation and justification for certifiation to Level I or subsequent certification to Level II Supervisor.

(4) The certification records for three (3) QC inspectors did not contain a high school diploma.

(5) The certification folder for three (3) QC inspectors did not contain verifications of prior employment.

(6) The certification records for the QC Supervisor and three (3) QC inspectors contain open book examinations that do not provide an adequate level of knowledge prior to certification. The records did not contain results of a capability demonstration to support certification.

(7) The certification records for three (3) QC inspectors did not contain adequate evaluation and justification for certification to Level I and subsequent certification to Level II inspector.

d. Contractor - Hunter Corporation

(1) The certification records for two (2) of the seven (7) QC inspector qualifications reviewed did not provide determination of equivalent inspection experience to support the level of certification.

e. Contractor - Hatfield Electric Company

(1) The certification records for three (3) of the nine (9) inspector qualifications reviewed did not contain a Certification Evaluation Sheet.

(2) The certification record for one (1) of the nine (9) QC inspector qualifications reviewed did not have records of examinations or work samples.

(3) The certification records for two (2) of the nine (9) QC inspector qualifications reviewed did not provide complete evaluation and justification for certification to perform the level of inspection identified.

f. Contractor - Blount Brothers Corporation

(1) The certification record for one (1) of the two (2) QC inspector qualifications reviewed did not indicate the expiration date of certification as a Level I lead auditor.

g. Contractor - Midway Industrial Contractor, Inc.

(1) The certification record for the QC inspector qualifications reviewed did not indicate the activities certified to perform.

h. Contractor - Pittsburgh Testing Laboratory

(1) The certification record for one of the three (3) QC/QA inspector qualification records reviewed did not have an evaluation of prior work experience.

Based on a sample review of CECo audits conducted in the area of training qualification and certification for the period 1979-1981 it was determined that a program exists to routinely review the acceptability of QA/QC personnel. It was noted that many audit findings were identified and resulted in notable improvements of contractor adherence to ANSI N45.2.6-1978. During the meeting conducted April 9, 1982, CECo management committed to develop an alternate plan for certification of contractor QC inspectors when the recommendations of ANSI N45.2.6.-1978, Section 3.5 are not complied with. Additionally, a commitment was made to require each contractor to verify inspectors education and experience.

TABLE 1

Licensee and On-site Contractors

Organization	Services Performed	# Cract Workers	QA/QC Staff	QA/QC Organ. Indep.	Periodic Review of QA Program	QA/QC Supv. Pos. Des.
Commonwealth Edison	Licensee	N/A	16	Yes	Yes	Yes
Blount Brothers	Plant Structures	220	5	Yes	Yes	Yes
Ebasco Services	Inservice Inspection	10	2	Yes	Yes	Yes
Hatfield Electric Company	Electrical Installation	555	83	No	Yes	No
Hunter Corp.	Piping Systems	944	71	Yes	Yes	Yes
Johnson Controls	HVAC Controls	47	2	(2)	Yes	Yes
Midway Indust.	Field Finish	10	2	Yes	Yes	Yes
NPCO	Mechanical Erector	10	2	Yes	Yes	Yes
Nuclear P.S.	Mechanical Design	*96	1	Yes	Yes	Yes
Pittsburgh Test Lab	Testing	#28	1	Yes	Yes	Yes
Powers-Anco-Pope	Instrumentation	135	11	No	Yes	Yes
Reliable Sheet Metal	HVAC	37	2	Yes	Yes	Yes
Sargent & Lundy	A. E. Field Group	*72	0	(1)	Yes	(1)
Westinghouse SAMU	Mechanical Design	*47	0	(1)	Yes	(1)

- Testers * - Engineers
(1) - Not reviewed (2) - Unresolved item

TABLE 2

QA/QC INSPECTOR INTERVIEW SUMMARY

Organization	Function	Total Inspectors	Inspectors Interviewed	%
EBASCO Services	Inservice Inspection	2	1	50
NISCO	Erect miscellaneous mechanical equipment, final setting and erection of NSSS equipment.	2	1	50
Reliable Sheetmetal	HVAC	2	1	50
Johnson Controls	HVAC Controls	2	1	50
Powers Azco Pope (PAP)	Instrumentation	11	4	36.36
Hunter Corporation	Piping System	71	7	9.86
Hatfield	Electrical Installation	83	9	10.84
Mount Brothers	Plant Structures	5	2	40
Midway	Field Finish Coating	2	1	50
Pittsburgh Testing Lab	Onsite NDT	28	3	10.71
TOTALS		208	30	14.42

TABLE

SUMMARY OF QUESTIONS ASKED

QC/QA INSPECTORS DURING INTERVIEWS

1. How long employed as an inspector onsite?

3 mo.	6 mo.	6 mo.-1 yr.
2	4	8

1-2 yr.	2-3 yr.	4 yr.
7	4	5

2. Prior inspection experience?

Yes	No
14	16

3. What discipline(s)?

Nuclear	Non-Nuclear
8	6

	Yes	No	Qualified	Implemented Qualified Answer
4. Is there a sense of intimidation based upon the need/requirement to keep up with construction?		29	1	
5. Is there a reluctance to make adverse findings if they will impact on the construction or audit schedule?		29	1	
6. Is it routine for QC inspectors to be working frequent and/or excessive overtime?	19	9	2	
7. Do the inspectors feel that their particular section is adequately staffed?	19	2	9	
8. Do they feel the required inspections are being conducted promptly?	18	2	10	
9. Do the QC inspectors have stop work and/or stop process authority?	13	3	14	
Have they ever used this authority?	13	9		8
If so do they feel they were supported or will have the support of management in the event of a stop work?	19	1	3	7

		Yes	No	Qualified	Implemented Qualified Answer
10.	Do the inspectors feel the training they have been provided is adequate?	24	1	5	
11.	Do situations arise where the lack of a QC inspector causes construction activities to come to a stop?	1	27	2	
12.	Are the QC inspectors provided adequate check lists for all activities they are inspecting or are they sometimes using vague guidelines?	15		15	
13.	Do they feel that they have an avenue to management if they come across a problem?	28		2	
	Do they feel management will get involved or just pay lip service?	27		3	

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

Binder
Attachment D

November 5, 1982

Mr. James G. Keppler, Regional Administrator
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Byron Station Units 1 and 2
I&E Inspection Report Nos.
50-454/82-05 and 50-455/82-04

References (a): June 24, 1982 letter from C. E. Norelius to Cordell Reed.

(b): July 30, 1982 letter from W. L. Stiede to J. G. Keppler.

(c): September 22, 1982 letter from C. E. Norelius to Cordell Reed.

(d): August 17, 1981 letter from L. O. DelGeorge to D. G. Eisenhut.

Dear Mr. Keppler:

This is to provide additional information regarding corrective actions taken in response to violations at Byron Station identified in reference (a). This information supplements the responses provided in reference (b) and addresses the NRC comments contained in reference (c).

Our response to Violation 2 indicated that we would review the training/qualification/certification records of quality control inspectors including those of contractors who have completed their scope of work and no longer have personnel on site. This review is being undertaken for contractors performing safety-related work after March 16, 1981, the date on which Revision 16 was issued for the Commonwealth Edison CE-1-A topical report "Quality Assurance Program for Nuclear Generating Stations." As indicated in reference (d), that was the date on which we established ANSI N45.2.6-1978 as the basis for the qualification of our QA/QC personnel. The minimum features and methodologies to be verified in our review at Byron were established in a June 9, 1982 directive.

The objective of the review is to determine if the records demonstrate deficiencies in the inspector certification process employed. If the review establishes that records demonstrate compatibility with the minimum features and methodologies, the review report will document

acceptablity. If the review establishes that a deficiency exists which is one of format (i.e., the individual inspector's certification records lack documentation of education, experience, and training) the deficiency will be classified as insignificant, documentation will be established, and the review report will document acceptability. If the review establishes that a deficiency exists which is one of substance and essence (i.e., previous related experience indadequate, on-the-job training process, and capability demonstration process do not meet the presently established minimum features and methodologies), the deficiency will be classified as significant, and the review report will document unacceptability. If the inspector is still performing inspection functions he will be retrained/requalified/ recertified to present procedures.

When the review process establishes inspector certification is unacceptable a reinspection of the features inspected by the subject inspector for the first month after certification will be performed to establish acceptability of inspection. When inspections are found to have been performed unacceptably, additional sampling will be used to establish the scope of work needed to be reinspected. Reinspections for other causes will be considered when establishing the scope of further inspections. If the features inspected are no longer accessible for reinspection a review will be performed to detemine if overview inspections performed by the independent inspection contractor or the Commonwealh Edison Quality Assurance Department establish the acceptability of inspections. If no overview inspections establish the acceptability of inspections, an evaluation of testing performed or an evaluation of the inspection elements and attributes will be performed to determine if further corrective action is required.

Our review of qualification records is expected to be complete by December 31, 1982. Any required retraining/requalification/recertification is to be complete by February 1, 1983. The reinspections or additional review and evaluation of inspectors determined to be inadequately qualified and certified should be complete by March 1, 1983.

Also in responding to Violation 2 we indicated that the procedures of the various contractors were being review and revised as necessary to incorporate the minimum features and methodologies of ANSI N45.2.6-1978. That work was completed as of September 30, 1982. Additionally, all contractors performing safety-related work on-site are being requested to revise their quality assurance manuals to include a commitment to ANSI N45.2.6-1978. This is expected to be completed by February 15, 1983.

In response to Violation 3.c.a we indicated that the cable sidewall pressures were adequately considered in establishing the maximum cable pulling tensions. We have rereviewed the documents relating to cable pulling which were being used at the time of the inspection and now concur with the conclusion that sidewall pressure was not adequately addressed.

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

Binder
Attachment D

November 5, 1982

Mr. James G. Keppler, Regional Administrator
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
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Subject: Byron Station Units 1 and 2
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Our response to Violation 2 indicated that we would review the training/qualification/certification records of quality control inspectors including those of contractors who have completed their scope of work and no longer have personnel on site. This review is being undertaken for contractors performing safety-related work after March 16, 1981, the date on which Revision 16 was issued for the Commonwealth Edison CE-1-A topical report "Quality Assurance Program for Nuclear Generating Stations." As indicated in reference (d), that was the date on which we established ANSI N45.2.6-1978 as the basis for the qualification of our QA/QC personnel. The minimum features and methodologies to be verified in our review at Byron were established in a June 9, 1982 directive.

The objective of the review is to determine if the records demonstrate deficiencies in the inspector certification process employed. If the review establishes that records demonstrate compatibility with the minimum features and methodologies, the review report will document

acceptablity. If the review establishes that a deficiency exists which is one of format (i.e., the individual inspector's certification records lack documentation of education, experience, and training) the deficiency will be classified as insignificant, documentation will be established, and the review report will document acceptability. If the review establishes that a deficiency exists which is one of substance and essence (i.e., previous related experience indadequate, on-the-job training process, and capability demonstration process do not meet the presently established minimum features and methodologies), the deficiency will be classified as significant, and the review report will document unacceptability. If the inspector is still performing inspection functions he will be retrained/requalified/ recertified to present procedures.

When the review process establishes inspector certification is unacceptable a reinspection of the features inspected by the subject inspector for the first month after certification will be performed to establish acceptability of inspection. When inspections are found to have been performed unacceptably, additional sampling will be used to establish the scope of work needed to be reinspected. Reinspections for other causes will be considered when establishing the scope of further inspections. If the features inspected are no longer accessible for reinspection a review will be performed to detemine if overview inspections performed by the independent inspection contractor or the Commonwealh Edison Quality Assurance Department establish the acceptability of inspections. If no overview inspections establish the acceptability of inspections, an evaluation of testing performed or an evaluation of the inspection elements and attributes will be performed to determine if further corrective action is required.

Our review of qualification records is expected to be complete by December 31, 1982. Any required retraining/requalification/recertification is to be complete by February 1, 1983. The reinspections or additional review and evaluation of inspectors determined to be inadequately qualified and certified should be complete by March 1, 1983.

Also in responding to Violation 2 we indicated that the procedures of the various contractors were being review and revised as necessary to incorporate the minimum features and methodologies of ANSI N45.2.6-1978. That work was completed as of September 30, 1982. Additionally, all contractors performing safety-related work on-site are being requested to revise their quality assurance manuals to include a commitment to ANSI N45.2.6-1978. This is expected to be completed by February 15, 1983.

In response to Violation 3.c.a we indicated that the cable sidewall pressures were adequately considered in establishing the maximum cable pulling tensions. We have rereviewed the documents relating to cable pulling which were being used at the time of the inspection and now concur with the conclusion that sidewall pressure was not adequately addressed.

Subsequent to the inspection the architect-engineer specified allowable pulling tensions for cables in conduit which consider both tensile strength of the conductors and the sidewall pressure exerted on the cable. Methods were also established to determine the allowable pulling tension for multiple cable pulls in conduit and for cable pulls in conduit with non-standard radius bends. To verify that the sidewall pressure was not exceeded for cable installed prior to these revisions the cable pull reports are being reviewed. If it is found that the allowable sidewall pressure has been exceeded appropriate corrective action will be specified with the advice of the cable manufacturer. This review is expected to be complete by January 31, 1983.

To assure correct pulling tension limits are used in the future the electrical contractor's procedure will be revised to specify the manner in which the allowable pulling tnesion is to be determined for all cable pulled through conduit. The revised procedure is to be fully implemented by December 17, 1982.

In responding to Violation 7 we described our practices for control of documents specifying and documenting welding activities. These specific construction activities have undergone the survey for implementation requirements of the ASME Boiler and Pressure Vessel Code Section III and Certificates of Authorization have been granted. We believe that the welding is being adequately controlled in a manner which satisfies the Code. By letter dated October 4, 1982 we have submitted to ASME a formal inquiry which should resolve this matter. A response is expected by March 1, 1983.

Please direct further questions regarding these matters to this office.

Very truly yours,

Wayne L. Stiede

Wayne L. Stiede
Assistant Vice-President

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5381N

Binder
Attachment E

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

JUN 6 1984

-7

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the routine safety inspection conducted by Messrs. R. S. Love and E. Christnot of this office on April 24-27, April 30-May 4, and May 10-11, 1984, of activities at Byron Station authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131 and to the discussion of our findings with Messrs. R. Tuetken and R. B. Klingler and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as specified in the enclosed Appendix. A written response is required.

As a result of this inspection, it is our understanding that you will conduct a reinspection of all electrical conductor butt splices at Byron Station, Units 1 and 2, as outlined in your letter of May 17, 1984, D. Farrar to James G. Keppler.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosure(s), and your response to this letter will be placed in the Public Document Room.

The responses directed by this letter (and the accompanying Notice) are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

R. L. Spessard

R. L. Spessard, Director
Division of Engineering

Enclosures:
1. Appendix, Notice of Voilation
2. Inspection Reports No. 50-454/84-27 and No. 50-455/84-19

cc w/encls:
D. L. Farrar, Director of Nuclear Licensing
V. I. Schlosser, Project Manager
Gunner Sorensen, Site Project Superintendent
R. E. Querio, Station Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII Braidwood
Phyllis Dunton, Attorney General's Office, Environmental Control Division
Ms. Jane M. Whicher
Diane Chavez, DAARE/SAFE
R. Rawson, ELD

Appendix

NOTICE OF VIOLATION

Commonwealth Edison Company

Docket No. 50-454
Docket No. 50-455

As a result of the inspection conducted on April 24-27, April 30-May 4, and May 10 and 11, 1984, and in accordance with the General Policy and Procedures for NRC Enforcement Actions, (10 CFR Part 2, Appendix C), the following violations were identified:

1. 10 CFR 50, Appendix B, Criterion V, as implemented by Commonwealth Edison Company Topical Report (CE 1-A), Section 5, requires that activities affecting quality be prescribed by documented instructions or procedures.

   Contrary to the above, the licensee failed to assure that the requirements of S&L Drawing 6E-0-3237 B, February 1983 Revision, Note 47, were translated into instructions or procedures. Note 47 requires the electrical contractor to inspect for cable tray separation and add cable tray covers when the minimum separation requirements have been violated. This is exemplified by the fact that 124 units of safety-related cable tray has been installed since February 1983 and this tray has not been inspected for separation requirements. Additional details are discussed in Paragraph 2.d of Inspection Report 454/84-27; 455/84-19(DE).

   This is a Severity Level V violation (Supplement II).

2. 10 CFR 50, Appendix B, Criterion XVI, as implemented by Commonwealth Edison Company Topical Report (CE 1-A), Section 16, requires that measures be established to assure that conditions adverse to quality such as nonconformances are promptly identified and corrected.

   Contrary to the above, the licensee failed to assure that nonconforming cable tray hangers were identified and corrected. This is exemplified by the fact that as a result of this NRC inspection, 345 previously accepted cable tray hangers were reinspected and 119 were found defective and 19 were indeterminate because they were inaccessible for reinspection. A contributing factor to this item is that CECo Quality Assurance failed to determine the effectiveness of the electrical contractor's cable tray hanger reinspection program (Reference - HECo NCR 407R). Additional details are discussed in Paragraph 2.c of Inspection Report 454/84-27; 455/84-19(DE).

   This is a Severity Level IV violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

JUN 6 1984

Dated

R. L. Spessard

R. L. Spessard, Director
Division of Engineering

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

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

Approved By: C. C. Williams, Chief C.C. Williams 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).

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 HECo 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 HECo 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 CECo letter, dated Spetember 22, 1982, HECo 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 HECo. 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. HECo 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 25, 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 H143, 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 noncomplaicance 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" horziontal 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 verfied 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-0-32378, February 1983 revision, to prevent recurrance of cable tray separation violations. During a review of Drawing 6E-0-32378, Revision L, it was observed that Note 47 directed the electrical contractor, HECo, 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 HECo 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 CECo Project Electrical Supervisor, CECo Electrical QA Engineer, CECo Electrical Field Engineer, HECo QA/QC Manager, and HECo Project Engineer, it appeared that these personnel were not aware of the requirement of Note 47 on Drawing 6E-0-32378 until it was brought to their attention by the Region III inspectors. It was also learned that HECo 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: HECo NCR 975, dated May 4, 1984), and 41 reports were submitted for Unit 2 (Reference: HECo 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 actior, 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 programhad 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 CECo. 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 occured 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 19, 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):

Report No.	Cable No.	No. Rejects	Remarks
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	1CS030	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 coper at Splice-replaced
	10G157	1	Butt splice replaced
	10G158	1	Cut insulation-repaired with shrink-fit material
	10G163	1	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 doucmented 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:

CITR No.	Cable No.	No. of Splices	Remarks
119	1MS529	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	1SI529	1	Replaced butt splice
11859	1SI523	1	Replaced butt splice
11858	1VA043	1	Replaced butt splice
11857	1VA102	1	Replaced butt splice
10898	1NR229	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 randomally selected were for Byron Statior Unit 1. In the 34 reports reviewed, it appeared that there were five defective butt splices and six examples of damaged/cut conductor insultation identified.

To determine if all QC termination inspectors were documenting butt splices on CIRTs, the CECo Electricl 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 Reigon 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.

Binder
Attachment F

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

JAN [illegible] 1984

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the special inspection conducted by Messrs. D. W. Hayes and K. A. Connaughton on various dates between August 1983 and January 1984, into allegations concerning construction activities at the Byron Station, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131 and to the discussion of our inspection findings on January 18, 1984, with Mr. R. Tuetken.

The enclosed copy of our inspection report identifies the allegations inspected and documents the status of other allegations that had not been resolved at the close of the Byron Unit 1 Operating License (OL) Hearings in August 1983. The report also summarizes the Region III inspections as of November 22, 1983 relative to the Commonwealth Edison Company reinspection program implemented in response to noncompliance item 82-05-19.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

L-17

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

R C Knop

R. C. Knop, Chief
Projects Branch 1

Enclosure: Inspection Reports
No. 50-454/84-02(DPRP);
No. 50-455/84-02(DPRP)

cc w/encl:
D. L. Farrar, Director
of Nuclear Licensing
V. I. Schlosser, Project Manager
Gunner Sorensen, Site Project
Superintendent
R. E. Querio, Station
Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII
Braidwood
Phyllis Dunton, Attorney
General's Office, Environmental
Control Division
Ms. Jane M. Whicher
Diane Chavez, DAARE/SAFE
Mitzi A. Young, ELD

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/84-02(DPRP); 50-455/84-02(DPRP)

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, IL

Inspection Conducted: Various dates between August 2, 1983, and January 18, 1984

Inspectors: D. W. Hayes — 1/27/84 Date

K. A. Connaughton — 1/27/84 Date

Approved By: R. C. Knop, Chief
Projects Branch 1 — 1/31/84 Date

Inspection Summary

Inspection on various dates between August 2, 1983 and January 18, 1984 (Reports No. 50-454/84-02(DPRP); 50-455/84-02(DPRP))

Areas Inspected: Special inspection into allegations concerning construction activities. The report also documents the status of other allegations that had not been resolved at the close of the Byron Unit 1 Operating License Hearing in August 1983. Report also summarizes RIII inspections as of November 22, 1983 into the CECo reinspection program. The inspection involved a total of 48 inspector-hours onsite by two NRC inspectors including 18 inspector-hours onsite during offshifts.

Results: No items of noncompliance with NRC regulations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

R. Tuetken, Assistant Construction Superintendent
M. Stanish, QA Superintendent
R. Klingler, QC Supervisor
R. L. Byers, Project Construction Engineer

Hatfield Electric Company (HECo)

T. Hill, Quality Assurance Manager
Greg Cason, QC Inspector, Level II

The inspector also contacted and interviewed other licensee and contractor employees.

2. Introduction

At the close of the Byron OL Hearings on August 12, 1983, into Contention 1, quality assurance/quality control, two main issues remained that had not been fully addressed. These issues were:

- 31 allegations concerning construction activities of the Hatfield Electric Company

- Commonwealth Edison Company's construction reinspection program implemented in response to Region III inspection finding 82-05-19.

The purpose of this report is to briefly summarize the status of these items and provide the inspection report references where details are documented. The report also addresses five allegations not previously documented. Two of the five are part of the original 31 allegations. The remaining two were received during or subsequent to the close of the Hearings on August 12, 1983.

3. Allegations

a. Allegation

Alleger advised that a DR had been written for excessive amounts of dirt and debris on top of motor control centers. For the previously cited reasons, the DR was refused, wasn't voided, was destroyed and the DR number reissued. Similarly, another DR was written for a linear crack in a steel beam. This DR cannot be found and the number has been reissued.

Finding

The portion of the allegation concerning housekeeping was addressed in NRC Inspection Report No. 50-454/82-17; 50-455/82-12 (Page 7 Item C). The text of the DR (Deficiency Report) in the Hatfield DR log book did not match the text of the DR of the same number provided by the alleger. However, the allegation could not be proved or disproved because DR forms are easily available to inspectors and were not pre-numbered and the Hatfield DR log at that time was a loose-leaf type (subsequently the log was changed to a bound type). The housekeeping problem documented on the DR provided by the alleger had been corrected as verified by the NRC inspector.

The DR concerning a linear crack in a steel beam had not been destroyed and the number reissued as alleged. A review of the DR, other records, and discussions with cognizant personnel established the following:

- The beam was number 6AB186, located underside of elevation 426 foot framing in the Unit 1 Auxiliary Building and is shown on S&L Drawing S-1293. The beam is 36 inches wide by 182 pounds (W36 x 182) and from standard tables the flange would be 1 3/16 inches thick and the web 3/4 inches thick.

- The linear indication was not a hairline crack but rather was a 4 inch long scratch, apparently caused by a tool used to remove fireproofing material. The indication (scratch) was less than 1/32 inch deep. (The fireproofing material was removed to install an additional support.)

- The DR was forwarded by Hatfield Electric Company to a CECo engineer who in turn forwarded it to Blount Brothers Corporation (BBC) for resolution. (BBC has responsibility for structural steel installations in the Auxiliary Building.)

- The indication was repaired by grinding to remove any abrupt changes in contour in accordance with BBC Procedure No. 11 Paragraph 9.0. Weld repair was not required since the depression did not extend below the rolled surface by more than 1/16 inch limit specified by the procedure.

- The beam repair was inspected and the DR closed out by BBC quality assurance on August 24, 1982.

- The Hatfield computer DR record printout and the engineering log showed the DR as closed. The Hatfield DR log book showed the DR as still open, apparently due to an oversight.

Conclusion

This allegation was not substantiated and no further action is planned by Region III.

b. Allegation

Quality Control inspectors are being pressured to have all hangers inspected by January 31, 1983.

Findings

The inspector tried first to establish whether or not January 31, 1983 had ever been established by Hatfield Electric Company (HECo) as a projected completion date for hanger inspections. While the inspector did not find documentation which established this date as a tentative completion date, the inspector did determine, by document review and interview of the individual employed as QA/QC Manager for HECo at the time, that the Applicant had, on several occasions requested reports on the status of hanger inspections required to be completed prior to Unit 1 fuel load and projections, based on committed manpower and best estimates of QC inspector productivity, of hanger inspection completion. For example, a letter dated June 2, 1982 from HECo's QA/QC Manager to the Applicant's Project Construction Lead Electrical Engineer documented such a projection and estimated hanger inspection completion by October 1, 1982. The former HECo QA/QC Manager indicated that he held weekly meetings with lead QC inspectors to discuss inspection program status, any problems encountered by inspectors, and productivity of inspection personnel. During these meetings, it was not uncommon to reference these projected completion dates for hanger inspections as goals that, in order to achieve, required continued accountability, on the part of Lead Inspectors, for the productivity of individual inspectors under their supervision. The alleger implied, but did not directly state, that QC inspections were being compromised by the establishment of these goals for completion of hanger inspections. The alleger did not

provide any examples of inadequate inspections resulting from these projections of hanger inspection completion dates. If January 31, 1983, had been established as a projected completion date for hanger inspections. The projection was far from accurate. Not only were initial hanger inspections incomplete as of that date, a very large number of additional hanger inspections were required by the reinspection program established by the Applicant in response to noncompliance 454/82-05-19; 455/82-04-19.

Conclusion

The establishment of a projected date for completing hanger inspections was substantiated. Meeting this goal assumed a minimum level of QC inspector productivity. That this goal resulted in inadequate QC inspections could not be substantiated.

c. Allegation

Carpenters and ironworkers at Byron are coming to work under influence of marijuana. Received August 10, 1983.

Findings

Discussions with the alleger indicated that the information was provided by a friend who did not want to be identified. The alleger stated that a carpenter who constructed forms for concrete walls in 1977 at the Byron Site told the friend that people were coming to work under the influence of marijuana and were also using it at the site. The friend also told the alleger that some ironworkers have come to work recently who were stoned on marijuana.

The alleger was informed that because of the general nature of the allegations it would be very difficult to investigate. The alleger committed to obtain and provide more specific information and was told to call collect either the NRC Region III Office or the NRC Byron Site Office. No specific information was provided. The alleger was last contacted on December 27, 1983, but still could not provide additional or specific information as to worker names, dates of occurrence, equipment identification or building locations. The alleger was again asked to call collect to the Region III or Byron Site NRC Offices if further information was received.

The alleger was informed that in-process and completed safety-related work is inspected by quality control inspectors to assure deficiencies are identified and corrected. Further, that the licensee, his agents and the NRC audit, on a sampling basis, quality control inspector activities and the adequacy of completed work.

While some drug and alcohol use occurs in every segment of society, their use is very difficult to detect and control. The licensee has taken steps as discussed below to minimize the effects.

Commonwealth Edison Company and contractor supervision as well as NRC inspectors are routinely alert to use of drugs or alcohol on the Byron Site as well as to persons who exhibit aberrant behavior of any kind. Per discussions with Commonwealth Edison personnel, workers using alcohol on the Byron Site have been caught and discharged from the job. On one occasion a worker was caught using marijuana onsite and was discharged and arrested.

Conclusion

This allegation could not be substantiated. No evidence was found, during special and routine NRC inspections, to indicate safety-related work was not being properly performed due to drug or alcohol use or that deficiencies, that may have been caused by a worker under the influence, were not identified and corrected. No further action on this matter is planned by Region III.

d. Allegation

Welders at Byron smoke pot and drink beer on the job.
Received August 12, 1983.

Finding

The alleger could not provide specific information and declined to identify the source of information. The alleger was asked to call the Region III or Byron Site NRC Office if additional or specific information was obtained. The alleger was last contacted on December 27, 1983 and did not provide any further information. The alleger was again requested to notify the Region III or Byron Site NRC Office should additional information be obtained.

This allegation was investigated in conjunction with the allegation documented in Paragraph 3.c above, and basically the same discussion was held and the same information provided to each alleger.

Conclusion

This allegation could not be substantiated. No further action on this matter is planned by Region III.

e. Allegation

Unistrut hanger members are being welded to plates with wedge anchors installed. Wedge anchors are thereby being subjected to excessive heat and stress.

Finding

This allegation could not be substantiated and is considered closed. Details of the resolution are contained in NRC Inspection Report No. 50-454/83-39; 50-455/83-29 on Pages 51 and 52, Item 1.

f. Allegation

The electrical area at Byron Station is going to be another Zimmer.

Finding

This allegation, which was originally documented as a comment, does not provide any specifics and is of a highly subjective nature. This matter is addressed in NRC Inspection Report No. 50-454/83-41; 50-455/83-31 on Page 5, Item d and is considered closed.

g. Allegation

Cable pan covers are removed and reinstalled without QC inspection as required for initial installation.

Finding

At the time the allegation was received, permanent cable pan covers had not been installed. This problem was identified by the NRC inspector prior to receipt of the allegation and is documented in Inspection Report No. 50-454/82-05; 50-455/82-04 as open item 454/82-05-15; 455/82-04-15. This open item was subsequently resolved in Inspection Report No. 50-454/83-16 (page 4).

h. Allegation

PTL (Pittsburgh Testing Lab) inspectors detailed to HECo (Hatfield Electric Co.) were told not to discuss problems with PTL supervisors.

Finding

This allegation is addressed in NRC Inspection Report No. 50-454/83-41; 50-455/83-31 (Page 4 Item b). PTL inspectors, detailed to HECo, report administratively to supervision at PTL and functionally to supervision at HECo. Although the allegation may be true it is not considered significant because methods of escalating inspector concerns are prescribed in writing and all inspectors including those detailed to HECo are given indoctrination training which includes a presentation on these avenues for having their concerns resolved.

i. Allegation

Hatfield Electric has an extensive training and retraining program which "doesn't accomplish anything." In December 1981, Hatfield only had four inspectors, but now has 85. The program has not been able to handle and adequately qualify the number of new inspectors.

Finding

This allegation is addressed in Inspection Report No. 50-454/82-17; 50-455/82-12 on Pages 6 and 7, Item (4). At that time the inspector determined that training and requalification of Hatfield QC inspectors was being closely monitored by the licensee. The item was left open pending further evaluation as to the effectiveness of the training. Followup and closeout of the allegation is documented in Inspection Report No. 50-454/83-37 (Page 7 bottom of paragraph closing unresolved item 50-454/82-17-07; 50-455/82-12-07). The allegation was not considered substantiated.

j. Allegation

Weld undercut is a widespread and serious problem.

Finding

The resolution of this allegation is discussed in Inspection Report No. 50-454/83-39; 50-455/83-29 on Pages 41 and 42, Item 7.a (hereafter this report is referred to by 83-39). The allegation could not be substantiated and is considered closed.

k. Allegation

Some hangers do not have weld travelers for the aux. steel.

Finding

This allegation is addressed in Inspection Report No. 83-39 on Pages 42 and 43, Item 7.b. The allegation is true; however, the problem was independently identified by the Hatfield quality program and corrective action initiated. This matter remains open pending completion of the correction action and evaluation by the NRC inspector. The tracking number is 454/83-39-01; 455/83-29-01.

l. Allegation

A large number of welds performed in 1979 and 1980 that were accepted as satisfactory in reality do not meet AWS requirements (40%) due to procedural deficiencies (i.e. lack of; QC hold points for preheat verification, temperature stick logs, etc.).

Finding

Resolution of this allegation is documented in Inspection Report No. 83-39; on Pages 43 and 44, Item 7.c. The allegation could not be substantiated and is considered closed.

m. Allegation

For certain hangers covered with fireproofing insulation and for which weld travelers were missing, the insulation was removed and welds reinspected. A reject rate of approximately 90% has been established for these welds.

Finding

Resolution of this allegation is documented in Inspection Report No. 83-39; on Page 44, Item 7.d. A reject rate of approximately 90% could not be substantiated.

n. Allegation

A "Unit Surveillance Walkdown" of a system (not specified) performed by Pittsburgh Testing Labs and CECo resulted in a 38% weld rejection rate.

Finding

The resolution of this allegation is documented in Inspection Report No. 83-39 on Pages 44, 45, 46 and 47, Item 7.e. The allegation although substantiated was made after the reinspection program had started. This allegation is considered closed.

o. Allegation

In Drawing Area 03051 or 13051 (426' level) 64 hangers were to be checked. Of the 36 or 37 hangers with all welds accessible, 14 had bad connections. The inaccessible welds had to be accepted on the strength of the weld cards. Authorization to remove insulation to inspect welds was denied.

Finding

This allegation is addressed in Inspection Report No. 83-39 on Page 47, Item 7.f. The allegation was substantiated in part and is considered closed.

p. Allegation

Panels in Unit 1 containment supplied by Systems Controls Corporation have welds that are not to code (AWS) in that they are undersized (3/8" vs 5/8").

Finding

The resolution of this allegation is documented in Inspection Report No. 83-39 on Pages 47 and 48, Item 7.g. The 3/8 vs 5/8 inch undersized welds could not be substantiated. This report indicates that the only welding Hatfield performed on the panels was the termination of the electrical connections. Further review subsequent to the inspection indicate that this statement is incorrect in that Hatfield did weld some braces in panels supplied by System Control Corporation. This item is reopened pending further review. The tracking number is 50-454/84-02-04; 50-455/84-02-04.

q. Allegation

Some welds that have been covered with fireproofing are only tackwelded. When found, a traveler is written without a Discrepancy Report being written.

Finding

Resolution of this allegation is documented in Inspection Report No. 83-39 on Pages 48 and 49, Item 7.h. The allegation concerns incomplete welds being covered by fireproofing insulation. Since welding was not completed, weld travelers indicating weld completion and QC inspection did not exist. Had the welds been previously accepted, a Discrepancy Report as indicated by the alleger should have been written but this was not the case. This allegation although true in part (i.e. two welds were found tackwelded) is not considered significant and is closed.

r. Allegation

An inspection by alleger revealed a weld not to plan. The welder indicated on the traveler was neither onsite, nor issued weld rod on the date indicated on the traveler. A person asked alleger to change the date on the traveler. Alleger stated that he would not.

Finding

This allegation is addressed in Inspection Report No. 83-39 on Pages 49 and 50, Item 7.i. The allegation could not be substantiated and was considered closed in the referenced report. However, further review indicates additional information is available and further inspection is needed to fully resolve this item. The item is thus reopened and will be tracked as Item No. 50-454/84-02-01; 50-455/84-02-01.

s. Allegation

"General surveillance of this project illustrates that approximately 90% of the 'B' welds on DV-164's are 1/8" undersize where tube steel has been used. In most cases this represents a 40% decrease in size and 55% in strength."

Finding

Resolution of this allegation is documented in Inspection Report No. 83-39 on Page 50, Item 7.j. The report states that the allegation could not be substantiated. Technically this is correct but the fact that 2 of 18 "B" welds were identified as undersized on DV-162's rather than DV-164's as alleged indicates the allegation has some validity. This item is thus reopened pending further review and verification of corrective action. (454/84-02-02; 455/84-02-02)

t. Allegation

The disposition on a DR was false. The report was written for lack of welding pre-heat. The inspector observed the process throughout, but the dispositioning engineer took the word of the welding foreman, who claimed pre-heat had been done. The report claimed the weld was removed, but it wasn't.

Finding

This allegation could not be substantiated and is considered closed. Details of the resolution are contained in NRC Inspection Report No. 50-454/83-39; 50-455/83-29 on Page 50, Item k. At the NRC inspector's request the weld was magnetic particle tested and found acceptable. The inspector determined that the weld met all code requirements and there was no visible signs of damage to the structural member.

u. Allegation

Allegation: Corrective action is often untimely. Resolution of discrepancies may take up to four months. This may preclude the Discrepancy Report originator from reviewing the resolution for acceptability.

Finding

This allegation is addressed in Inspection Report No. 50-454/83-41; 50-455/83-31 on Pages 4 and 5, Item 6.c. Timeliness of corrective action is a concern as discussed in the referenced report. The alleger's concern that the originator may not have the opportunity to verify corrective action does not have potential safety significance. As long as the condition requiring corrective action is adequately documented (as required) and the individual accepting the resolution is qualified, it is not mandatory that the originator review the resolution for acceptability. No further action in regard to this allegation is planned.

v. Allegation

Some electricians have told me (alleger) that they have overstressed cables when pulling, even to the point of breaking the cable. The alleger later (on January 10, 1983) provided the last name of an individual he said witnessed the overstressing of cables during cable pulling.

Finding

On August 8, 1983, the individual whose name was provided by the alleger and one other member of a cable pulling crew were interviewed. Both stated that they knew of only one instance where a cable was overstressed to the breaking point and that was an instrument cable. The broken instrument cable was replaced and both felt the occurrence had been documented.

The electrical craftsman whose name was provided by the alleger stated that most electrical cables were hand pulled and he did not feel that overstressing had been a problem. He added that the only cases he could recall where tension greater than specified occurred was when cables were pulled back from conduit after the pulling compound (lubricant) had set up.

During an inspection conducted on September 22-25, 1981, the NRC Region III elecrical inspector did identify that Hatfield Procedure No. 10, Revision 10, Issue 2 (Class 1E Cable Installation) did not address how it would be verified that the maximum cable pulling tension had not been exceeded when small cables and/or instrument cables were pulled. (See Inspection Report No. 50-454/81-16; 50-455/81-12, Pages 4 and 5, Item 1.c). Subsequently S&L Drawings 6E-0-3000B Sheets 1 through 5 and Hatfield Procedure No. 10 were revised to address the required precautions to be taken when small cables are pulled (see Inspection Report No. 50-454/83-16, Page 3, unresolved item 50-454/81-16-03).

During the construction team inspection conducted at Byron Station March 29-31, April 1, 2, 5-9, 12-14, and May 11, 1982, and documented in NRC Inspection Report No. 50-454/82-05; 50-455/82-04, an item of noncompliance was issued relative to failure of Hatfield procedures to contain electrical cable rework instructions and requirements to calculate cable sidewall pressure prior to pulling. (See Page 4 of the Notice of Violation, Item 3.c, identified in report as noncompliance item No.50-454/82-05-09c, 50-455/82-04-09c). CECo's initial response to this item contained in CECo's letter W. L. Stiede to J. G. Keppler dated July 30, 1982 was rejected. (See NRC letter C. E. Norelius to Cordell Reed dated September 22, 1981, Page 2.) CECo subsequently committed to take appropriate corrective action and this item was closed in NRC Inspection Report No. 50-454/83-16, Page 3.

The following documents a brief review of the development of HECo Procedure No. 10 (Class 1E Cable Installation).

- Revision 3 Issue 3 (Approved by Sargent and Lundy on September 7, 1979, implementation date not determined)

  Procedure did not require cable tension measurements for either machine pulled or hand pulled. Information was provided on maximum tension by cable type and minimum bend radius. Neither Procedure 10 or the S&L drawings addressed factor for sidewall pressure.

- Revision 4 Issue 1 (issued August 5, 1980, S&L approval or implementation date not determined).

  No new requirements relative to measuring cable tension. Additional clarification provided on calculating cable tension.

- Revision 10 Issue 2 (implemented September 24, 1981).

  Requirement made for measuring cable tension for all machine pulls. QC inspectors required to monitor and record installed tension measurements for machine pulled cable. QC monitoring of tension for hand pulled cables was optional.

- Revision 14 (implemented February 15, 1982).

  Made cable tension measurements manditory for all pulls machine or hand. QC inspector still not required to monitor or record tension for hand pulled cables.

- Revision 15 Issue 2 (implemented August 7, 1982).

  Section added to address cable rework. Original QA/QC requirements apply to cable rework.

  S&L Drawing 6E-0-3000B Rev. D, dated November 5, 1982, issued to include sidewall pressure factor in calculating maximum cable pulling tension.

- Revision 16 (implemented December 17, 1982).

  QC inspectors required to monitor and record installed tension for all cable pulls.

Hatfield Procedure No. 10 Revision 16 and subsequent approved revisions presently requires the following relative to cable pulling tensions:

- The maximum recommended cable pulling tensions will be determined by Hatfield Engineering Department in accordance with the criteria on S&L Drawing 6E-0-3000B unless otherwise approved by CECo.

- The recommended maximum pulling tension based on the minimum radius allowed for the size of conduit installed (and S&L Drawing 6E-0-3000B) will be documented on Form HP-105 and provided to the Hatfield QC Department.

- The QC inspector will monitor (with a dynamometer) and record the installed tensions for all machine and hand pulls. All information will be entered on Form HP-105.

- If the installation tension exceeds the maximum recommended tension, the pull is completed and the maximum installation tension is documented on Form HP-105 and a HECo Discrepancy Report (DR) is issued.

- HECo Engineering reviews the DR and recalculates the maximum allowable pulling tension based on the "as built" configuration of the conduit rather than the minimum (the actual bend radius is generally larger than the minimum allowed).

- If the actual pulling tension exceeds the recalculated maximum then a nonconformance report (NCR) is issued and sent to CECo/S&L for resolution.

A cursory review of the NCR log for the period February 24, 1982 through January 12, 1984 indicated that at least 25 NCRs concerning over tensioning of cables had occurred. Fourteen of these were still open as of January 14, 1984. Most of the NCRs had been issued in 1983 subsequent to receipt of the allegation.

The DR log was also reviewed but did not contain enough detail to identify a DR concerning cable over tensioning.

Discussions with cognizant Hatfield QC personnel indicated that the number of over tensioned cables was not unusual considering the several thousand cables being installed and that when over tensioning did occur it was documented and properly resolved.

Documentation relative to the broken instrument cable was not located but only a cursory review was performed.

This item remains open pending further and more detailed review of the records, discussions with other QC inspectors and electrical craftsmen and verification of corrective action on: (1) cables identified on DRs and NCRs as over tensioned, and (2) cables installed prior to when installed tension measurements were required. (50-454/84-02-03; 50-455/84-02-03)

w. Allegation

Alleger claimed to have reviewed the qualification records of the Hatfield and Pittsburgh Testing electrical inspectors. Alleger considered only about six of eight Level II inspectors to be qualified for the position they hold. As an example, the lead inspectors had background in civil, not electrical, inspection.

Finding

This allegation is true but the item was previously identified during the team inspection at Byron Station and is being tracked as an item of noncompliance, No. 454/82-05-19; 455/82-05-19. Also see NRC Inspection Report No. 50-454/82-17; 50-455/82-12, Item 3.b.(1) on Pages 4 and 5.

Twenty-three (23) of the 31 allegations still unresolved at the close of the Byron OL Hearing were assigned to NRC Region III for resolution. Inspection into 2 of those 23 has not been completed, thus no information as to these can be provided at this time.

4. Allegations Investigated by OI (Office of Investigation)

Eight of the 31 allegations received but not resolved at the close of the Hearings on August 12, 1983 had been referred to OI because they involved possible wrongdoing.

OI has completed their investigation into these allegations but results have not been released as of January 13, 1984. Per discussions with the Region III Director of OI on January 4, 1984, the final draft of their report has been completed and is under review by OI management.

5. Summary of NRC Followup Inspections Concerning Noncompliance 454/82-05-19; 455/82-04-19, "Inadequate Training and Improper Certification of Contractor QC Inspectors"

a. Background

The reinspection program was implemented to determine the validity of inspections performed by quality control inspectors whose qualifications were in question because of deficiencies identified in the Byron Station contractor's evaluation and certification of quality control inspectors. The initial deficiencies in certifying quality control (QC) inspectors were identified during an NRC inspection documented in Report Nos. 50-454/82-05 and 50-455/82-04.

The reinspection program was defined in a letter dated February 23, 1983, from Mr. W. L. Stiede, Assistant Vice President, Commonwealth Edison Company to Mr. J. G. Keppler, NRC Region III Administrator. Basically, the program consisted of the following:

For six of the eight contractors every fifth inspector (20%) was selected from a chronological listing based on the date of certification of each QC inspector certified since the beginning of the project. Further a minimum of three additional inspectors for each contractor was selected by the NRC Senior Resident Inspector. Each individual inspection performed during the first 90 days by the selected contractor inspectors were reinspected where accessible.

For the remaining two contractors, each individual inspection performed during the first 90 days of each QC inspector (100%) certified since the beginning of the project was reinspected where accessible.

Inaccessible inspections were defined as those which would require dismantling to gain access (e.g. embedded or buried in concrete, internal alignments, etc.) or where the process was an event which could not be recreated. Fireproofing, insulation, etc. did not make the item inaccessible and was removed where necessary to conduct the inspection.

Provisions were contained in the program to make another selection if all or most of an inspector's inspections were inaccessible.

Provisions also existed in the program to increase the sample size, both as to the number of inspections made by a selected inspector or the number of inspectors selected to have their initial work reinspected, if an unacceptable number of rejectable defects were identified during the reinspections.

b. Inspection Report Nos. 50-454/83-26; 50-455/83-19 (Inspection Conducted June 7-10, 1983)

This report documented a special inspection conducted on the overall status of the reinspection program. In particular, the inspectors examined each contractor to determine approximate percentages of all inspectors whose first 90 days were initially subjected to reinspection, actual numbers of inspectors included for initial reinspection population and approximate percentages of initially required reinspections completed to date. The inspectors examined in more detail, the program status for four key contractors; Hatfield Electric, Hunter Corporation, Johnson Controls Incorporated and Pittsburgh Testing Laboratory. For these contractors, the inspection report detailed functional areas being reinspected, attributes included in each functional area and, a summary of reinspection results, accumulated from the beginning of the program up until the time of the NRC inspection. The results were obtained directly from the contractors and had not yet been subjected to review by the independent Level III inspector as provided for in the program.

It was determined during this inspection that, to date, CECo Quality Assurance had not yet conducted any audits of reinspection program implementation, though CECo QA personnel did state that such audits were planned. This matter was documented as Unresolved Item 50-454/83-26-01; 50-455/83-19-01 pending NRC review of future CEco QA activity in this area.

c. Inspection Report No. 50-454/83-37 (Inspection Conducted on August 8-12, 16-19, and September 7-9, 1983

This inspection consisted of a review of reinspection program results accumulated from the beginning of the program up until August 15, 1983 for two Byron Site contractors; Powers-Asco-Pope and Hatfield Electric Company. The inspection report documents reinspection results obtained directly from the contractors and not yet subjected to independent, third party, Level III inspector review. The results are presented by inspector, attributes inspected, total number of inspections for each attribute and, number of rejects for each attribute. In addition, the report provides a breakdown of rejected items including, for each attribute reinspected, a description of the specific basis for rejection and the number of items rejected on each specific basis. A similar breakdown of items rejected based upon visual weld re-examinations was not provided in this report but was included in NRC Inspection Report Nos. 50-454/83-39; 50-455/83-29, discussed below.

d. Inspection Report No. 50-454/83-38; 50-455/83-28 (Inspection Conducted on August 3-4, 8, 1983)

This inspection report documents concerns identified by NRC inspectors concerning Hatfield Electric Company quality control inspection documentation utilized to identify items previously inspected by inspectors selected for reinspection. Hatfield Electric Company's documentation system did not readily lend itself to sorting inspection reports by QC inspector nor were superseded inspection reports so identified. As a result, the NRC inspectors were concerned that items identified for reinspection may have been subject to rework, modification or removal since originally inspected by the selected inspector. In such cases the item would not be representative of the selected inspector's work. This concern was identified to the Applicant in a meeting held on August 4, 1983. The Applicant agreed to review the matter and establish measures, as necessary, to assure that reinspection of Hatfield Electric Company work would encompass only those items which would be representative of the selected inspector's work. Followup on this matter will be included in the NRC Region III's review and evaluation of the reinspection program.

e. Inspection Report Nos. 50-454/83-39; 50-455/83-29 (Inspection Conducted on August 8-12, 15-19, 22-23, 29, September 2, 8-9, 12-15, 22, 26-28, November 16-17 and 22, 1983)

This inspection of the Applicant's reinspection program, by far the most comprehensive performed by NRC Region III to date, was performed after the vast majority of required reinspections

were completed. The report provided an overview of the program including analysis, by contractors, of: the quantity of inspectors whose work was reinspected versus the total number of individuals employed as inspectors over the time period in which work subject to reinspection was performed; the quantity of items reinspected; the number of inspectors qualified in a given area versus the number of inspectors in that area whose work was reinspected and; inspector performance based upon initial reinspection of subsequent work required based upon the results of reinspection of the first 90 days work and, any required reinspection of work performed by inspectors not originally selected but added to the population due to previous reinspection results.

Following the overview described above, the report documents review of inspector certification records for Midway Industrial Contractor, Inc., whose work was not subject to reinspection due to unrecreatability of inspection attributes or inaccessibility for reinspection.

The next section of the report documents review of weld inspector certification packages and weld reinspection results, including independent visual examination of numerous reinspected welds by an NRC inspector. The contractors included in this review were: Hatfield Electric Company, Hunter Corporation, Nuclear Installation Services Company, Pittsburgh Testing Laboratory, Powers-Azco-Pope, Johnson Controls Incorporated, Blount Brothers Corporation and, Reliable Sheet Metal Works Incorporated. Review of what the Applicant determined to be the 100 "worst case" welds identified by reinspection, the disposition of welding discrepancies identified by reinspection and NRC inspector observations concerning the performance and results of weld re-examinations for all contractors were documented and included in this section of the report.

The last section of the report dealing with the reinspection program concerns review of safety-related component handling, installation, and protection. A summary of reinspection results by inspection type (documentation, hardware, welding and bolt torque) is provided for three contractors, Hunter Corporation, Nuclear Installation Services Company and Johnson Controls Incorporated.

f. Additional NRC Review Performed or Planned

NRC Region III Staff reviewed the Applicant's Preliminary Report on the reinspection program results submitted October 28, 1983.

As a result of this review the Applicant was notified by telephone on November 10, 1983 and subsequently by letter dated November 18, 1983 that the following comments be incorporated into the final report:

(1) The report should be drafted in accordance with the original program. Specifically, the tables and conclusions based on those tables should be based on the findings of the Level II examiner or the independent Level III examiner. Use of a CECo Level III examiner to change the results of the independent Level III findings is not in accordance with the original program.

(2) Provide tabulation of the results of inspection attributes (weld overlap, undercut, etc.) in order to determine the need if any, for further inspections. This tabulation could be made available to our inspectors, and need not be in the report, but as a minimum, the conclusions you have reached regarding the tabulations should be included in the report.

(3) Review different inspection activities and determine if certain areas such as final hanger inspections warrant further review based on reject rates.

As a result of incorporating comment 1 in the evaluation of reinspection results, the Applicant determined the need for additional reinspections. Subsequently, the Applicant submitted his final report dated January 12, 1984 which included the results of these additional reinspections with the exception of reinspections of one Hatfield Electric Company visual weld inspector's work. The Applicant will provide these results in a future supplement to the final report.

The NRC Region III staff will review the final report to determine whether a need for further reinspection or other corrective action in response to Noncompliance 454/82-05-19; 455/82-04-19 is warranted. Region III inspectors will also perform additional hardware inspections to verify reinspection program results and as part of the NRC's routine inspection program.

6. Exit Meeting

The inspection findings were discussed with Mr. R. Tuetken on January 18, 1984.

Binder
Attachment G

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAR 10 1984

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the special safety inspection conducted by Mr. R. S. Love of this office on January 23-27, 1984, of activities at Byron Station authorized by NRC Construction Permit No. CPPR-130 and No. CPPR-131 and to the discussion of our findings with Mr. G. Sorensen and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in noncompliance with NRC requirements, as specified in the enclosed Appendix. A written response is required.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosure(s), and your response to this letter will be placed in the Public Document Room.

The responses directed by this letter (and the accompanying Notice) are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

W. S. Little, Chief
Engineering Branch 2

Enclosures:
1. Appendix, Notice of Violation
2. Inspection Reports No. 50-454/84-09(DE) and No. 50-455/84-07(DE)

cc w/encls:
D. L. Farrar, Director of Nuclear Licensing
V. I. Schlosser, Project Manager
Gunner Sorensen, Site Project Superintendent
R. E. Querio, Station Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII Braidwood
Phyllis Dunton, Attorney General's Office, Environmental Control Division
Ms. Jane M. Whicher
Diane Chavez, DAARE/SAFE

Appendix

NOTICE OF VIOLATION

Commonwealth Edison Company

Docket No. 50-454

As a result of the special safety inspection conducted on January 23-27, 1984, and in accordance with the NRC Enforcement Policy, 47 FR 9987 (March 9, 1982), the following violation was identified:

10 CFR 50, Appendix B, Criterion XVI, as implemented by CECo Topical Report CE-1-A, Section 16, requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected.

Contrary to the above, the failure of Hatfield Electric Company to provide an adequate response on DR 3382 has resulted in 12 safety-related electrical cables being installed in Byron Station, Unit 1, whose quality is indeterminate in that one or more of these cables was overstressed during the attempted pull-back of cable 1VA709.

This is a Severity Level IV violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

3/19/84
Dated

W. S. Little, Chief
Engineering Branch 2

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/84-09(DE); 50-455/84-07(DE)

Docket Nos. 50-454; 50-455 Licenses No. CPPR-130; CPPR-131

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

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: January 23-27, 1984

Inspector: R. S. Love

3/15/84
Date

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

3/15/84
Date

Inspection Summary

Inspection on January 23-27, 1984 (Reports No. 50-454/84-09(DE); 50-455/84-07(DE))
Areas Inspected: Review of licensee action on previously identified items. Followup on an allegation that safety-related electrical cables had been over-tensioned during installation. This allegation was substantiated by the review of records and personnel interviews. This inspection involved a total of 40 inspector-hours by one NRC inspector.
Results: In the areas inspected, one item of noncompliance (inadequate disposition on a Deviation Report - Paragraph 3.c) was identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company

*G. Sorensen, Construction Superintendent
*K. J. Hansing, Quality Assurance Superintendent
*J. O. Binder, Project Electrical Supervisor
*E. L. Martin, Quality Assurance Supervisor
*M. Dellabetta, Quality Assurance Engineer
*E. Sager, PCD Electrical Engineer
*J. W. Rappeport, Quality Assurance Engineer
R. B. Klingler, Project Quality Control Supervisor
M. E. Lohmann, Assistant Construction Superintendent

Hatfield Electric Company (HECo)

D. L. Heider, QA/QC Manager

The inspector also contacted and interviewed other licensee and contractor personnel during this report period.

*Denotes those present at the exit interview conducted on January 27, 1984.

2. Action on Previously Identified Items

a. (Closed) Open Item (50-454/82-17-03; 50-455/82-12-03): This item pertained to the conflict between the SAR commitment to the 1972 edition of the AWS D1.1 Code and the implementation of the 1975 edition by the electrical contractor. SAR Amendment 44, dated December 1983, revised Table 3.8-2 to delete Code edition. Effective Code edition will be determined by the date of the applicable contracts.

b. (Closed) Open Item (50-454/83-16-03): This item pertained to the damaged cable documented on NCR 597 and the misrouted cables caused by improper labeling of conduits. The damaged cable was replaced and FCR F-22863 was issued to show as-built conditions for conduit markings and cable routing.

c. (Open) 10 CFR 50.55(e) Report (50-454/83-11-EE; 50-455/83-11-EE): After completion of the Hot Functional Testing at Byron Station Unit 1, the covering on the Anaconda Type NWC flexible conduit utilized inside the containment was observed to be split open on several installations. All liquid tight flexible conduits inside Unit 1 and Unit 2 containments are being covered with Okonite T-35 jacket tape. This tape is qualified for containment environment. As of the date of this inspection, Unit 1 is approximately 95% complete. This item must be closed for the applicable unit prior to loading fuel.

3. Follow-up on Allegations

The Region III office received an allegation that some safety-related electrical cables had been overstressed during installation at the Byron Station. As noted below, this allegation was substantiated. Reference: Open Item 454/84-02-03; 455/84-02-03.

Background - Electrical cables may be overstressed by exceeding the maximum pulling tension or sidewall pressure during installation or re-work activities. The information required to calculate these maximum values are normally provided by the cable manufacturer for the various types of cable provided.

a. A review of CECo nonconformance reports (NCRs) indicated that the following NCRs were prepared to document potential electrical cable overstressing:

- F539, dated April 2, 1981. During the installation of safety-related cables 1DC030 and 1DC089 (type 1/c-350 MCM) a pulling guide with a 9" radius was utilized. Installation tension was 2800#. Per project drawings, a pulling guide with a mimimum of a 18" radius should have been used during the installation activities. Using a 9" radius pulling guide, the maximum pulling tension should have been limited to 375# so as not to exceed the maximum cable sidewall pressure. The subject cables were replaced and the NCR was closed on September 7, 1982.

- F679, dated October 30, 1981. During the installation of safety-related cable 2SX098 (type 3/c #4/0) a pulling guide with a 6" radius was utilized and cable installation tension was not measured. Per the approved disposition, a High Potential (Hi-Pot) Test at 17 kV for 5 minutes and an Insulation Resistance Test at 2.5 kV dc were satisfactorily performed on the subject cable. NCR was closed on March 9, 1982.

- F747, dated November 16, 1982. Was prepared to document that the cable pulling tension criteria delineated in ECN 2579, dated May 19, 1982 and ECN 3015, dated October 13, 1982, was not implemented by the electrical contractor, HECo, until October 27, 1982. Between May 19, 1982 and November 4, 1982, 133 cables were installed in conduit where the tension was measured. Utilizing the criteria contained in ECNs 2579 and 3015, these cable pulls were analyzed by Sargent and Lundy. Upon completion of the analysis, it appeared that 17 of these cables may have been overstressed. All of the applicable data, including sketches of the routing, for these 17 cables was forwarded to the cable manufacturer, Okonite Company, for their analysis. The Okonite analysis indicated that the 17 cables were acceptable as installed. The Region III inspector reviewed the Okonite analysis and found it acceptable. The NCR was closed on November 10, 1983. This item is also documented on HECo NCR 482.

- F756, dated December 23, 1982. During the installation of safety-related cables 1FW217 (12/c #14), 1FW262 (2/c #14), 1FW346 (2/c #14), 1FW458 (2/c #14), 1FW510 (2/c #14), 1FW561 (2/c #14), 1MS282 (12/c #14), 1MS283 (12/c #14), 1MS325 (2/c #14), 1SD054 (7/c #14), 1SD058 (7/c #14), and 1SD062 (7/c #14) it appeared that the cables had been overstressed. The actual pulling tension was 610#. Utilizing the equation Ta = 0.6 x n x Tcs, the maximum allowable tension would be approximately 475#, where: Ta = allowable tension in pounds; n = number of cables in the pull; Tcs = maximum pulling tension of the smallest cable in the pull (2/c #14 = 66#); and 0.6 = additional safety factor. Utilizing equation Ta = 0.008 x cm x n x 0.7, as provided by Okonite, the allowable tension would be approximately 1590#. Equation Ta = 0.008 x cm x n is found in IEEE Standard 422-1977 and the safety factor of 0.7 was provided by Okonite. Based on the above information, the subject cables were accepted as installed. Sidewall pressure was not a factor. NCR was closed on July 20, 1983. This item is also documented in HECo NCR 511.

- F775, dated January 24, 1983. During the installation of safety-related cables: 1AP183 (HECo NCR 556); 1AP073, 1AP320, 1AP322 (HECo NCR 557); 1AP072, 1AP319, 1AP321 (HECo NCR 558); 2SX138, 2SX139, 2SX140, 2SX149, 2SX153 (HECo NCR 559); 2AP179, 2AP300, 2AP401, 2SX079, 2VX044, 2DC072 (HECo NCR 560); 1VC028 (HECo NCR 561); 1IP005, 1IP006 (HECo NCR 562); 1IP033, 1IP034 (HECo NCR 563); 1VA580, 1VA581 (HECo NCR 564); 1VA580, 1VA581 (HECo NCR 565); 1VA558, 1VA559, 1VA560 (HECo NCR 566) and 1VA374, 1VA375, 1VA548 (HECo NCR 567) it appeared that the cables had been overstressed. Based on the revised criteria for calculating maximum allowable pulling tension, all cables except 1AP183 were accepted as installed. Cable 1AP183 was Hi-Potted at 29.5 kV dc for 5 minutes and was found satisfactory for its intended use. NCR was closed on November 10, 1983.

- F799, dated March 14, 1983. During installation of safety-related cable 2EF096 (4/c #14), the cable was overstressed. Actual pulling tension was 145# and the maximum allowable pulling tension was 132#. Okonite performed an evaluation of this cable and found it acceptable as installed. NCR was closed on December 18, 1983. This item is also documented on HECo NCR 579 and Discrepancy Report (DR) 1777.

- F800, dated March 14, 1983. During installation of safety-related cable 2VA319 (4/c #14), the cable was overstressed. Actual pulling tension was 140# and the maximum allowable pulling tension was 132#. Okonite performed an evaluation of this cable and found it acceptable as installed. NCR was closed on December 13, 1983. This item is also documented on HECo NCR 580 and DR 1800.

- F802, dated March 23, 1983. During pull back of safety-related cable 1AF279 (2/c #14), it appeared that the cable was overstressed. Actual pulling tension was 40# and utilizing the

revised criteria, the maximum allowable pulling tension is 66#. The cable was accepted as installed, (HECo NCR 586 and DR 1835). During installation of safety-related cables 1DG189 (24/c #20) and 1DG187 (2/c #16), it appeared that these cables were overstressed. Actual pulling tension was 71# and utilizing the revised criteria, the maximum allowable pulling tension is approximately 250#. These cables were accepted as installed. This NCR was closed on June 28, 1983, (HECo NCR 588 and DR 1857).

- F809, dated April 15, 1983. During rework (pullback) of safety-related cables 1VD119 (2/c #14), 1VD120 (2/c #14), and DG042 (2/c #10), the cables were overstressed. For cable 1DG042, the maximum allowable pulling tension is 166# and the actual tension was 195#. Cable 1DG042 was replaced. For cables 1VD119 and 1VD120, the maximum allowable pulling tension is 105.6# and the actual tension was 110#. These cables were accepted as installed based on an evaluation by Okonite. NCR was closed on January 9, 1983. (HECo NCR 599).

- F821, dated May 20, 1983. During installation of safety-related cable 1VA709 (2/c #16), the cable was overstressed. The maximum allowable pulling tension is 58# and the actual tension was 120#. The cable was replaced and the NCR closed October 14, 1983, (HECo NCR 605 and DR 2075).

- F827, dated July 8, 1983. During installation of safety-related cable 2VA707 (2/c #16), the cable was overstressed. The maximum allowable pulling tension is 58# and the actual tension was 180#. The cable was replaced and NCR closed on October 28, 1983. (HECo NCR 642 and DR 2458).

- F837, dated August 5, 1983. During installation of safety-related cables 2VA786 (2 x 1/c #14), 1VA784 (2/c #14), and 1VA756 (2/c #14), the cables were overstressed. The maximum allowable pulling tension for each cable is 66#. The actual pulling tension for each cable was 115#, 92/120#, and 100# respectfully. Cable 1VA784 was overstressed (92/120#) in two portions of the pull. As of January 26, 1984, this NCR was still open. These items are documented on HECo NCRs 658 (2VA786), 660 (1VA784), 662 (1VA784) and 666 (1VA756).

- F838, dated August 5, 1983. During installation of safety-related cables 1RC650 (16/c #16), 1RC651, 1RC652, 1RC653, 1RC654, 1RC655, 1RC656, 1RC657, and 1RC658 (1RC651-1RC658 all 3/c #16), the cables were overstressed. The combined maximum pulling tension for these cables is 354# and the actual tension was 440#, (HECo NCRs 649 and 650). During installation of safety-related cables 1AR025 (2/c#16) and 1AR160 (2/c #16), the cables were overstressed. The combined maximum pulling tension for these cables is 116# and the actual tension was 260#. As of January 26, 1984, this NCR was still open.

- F839, dated August 8, 1983. During rework (pull back) of safety-related cable 1CV029 (4/c #14), the cable was overstressed. The maximum allowable pulling tension is 132# and the actual tension was 145#. Based on an evaluation by Okonite, the calbe was acceptable for re-installation. NCR was closed on January 13, 1984. (HECo NCR 673 and DR 2787).

- F844, dated August 22, 1983. During rework (pull back) of safety-related cables 1FW020 (2/c #16), 1RC395 (2/c #16), and 1RC400 (2/c #16), the cables were apparently overstressed. The maximum allowable pulling tension was calculated to be 139# and the actual tension was 175#. Based on the criteria supplied by Eaton, cable manufacturer, the maximum allowable pulling tension for these cables is 176.4#. The cables were acceptable for re-installation. NCR was closed on November 17, 1983. (HECo NCR 681).

- F845, dated August 20, 1983. During installation of safety-related cables 1AP149 (3/c #500 MCM) and 1AP152 (3/c #500 MCM), the cables were overstressed. The maximum allowable pulling tension due to sidewall pressure limitations is 3000#. The actual pulling tension for cable 1AP149 was 5400# and 5754# for cable 1AP152. As of January 24, 1984, this NCR was still open, (HECo NCR 687).

- F865, dated November 17, 1983. During installation of safety-related cable 2VA787 (2/c #14), the cable was overstressed. The maximum allowable pulling tension is 66# and the actual tension was 115#. As of January 24, 1984, this NCR was still open (HECo NCR 769 and DR 3596).

- F864, dated November 17, 1983. During installation of safety-related cable 2DG105 (4/c #14), the cable was overstressed. The maximum allowable pulling tension is 132# and the actual tension was 310#. As of January 24, 1984, this NCR was still open (HECo NCR 765 and DR 3523).

- F865, dated December 2, 1983. During installation of safety-related cables 1VA755 (2/c #14) and 1VA795 (2/c #14), the cables were apparently overstressed. The maximum allowable pulling tension is 132# and the actual pulling tension was 138#. As of January 24, 1984, this NCR was still open, (HECo NCR 733 and DR 3687).

Pending a review of CECo NCRs F837, F838, F839, F845, F863, F864, and F865 for proper closure, this item is unresolved (50-454/84-09-01; 50-455/84-07-01).

b. A review of HECo NCRs 1-450 and the NCR log for NCRs 451-839 indicated that the following NCRs were prepared to document potential overstressing of electrical cables:

Note: Where the nonconformance is described on a CECo NCR, only the status of the HECo NCR and a reference to the CECo NCR will be provided.

- 483, Opened October 27, 1982. Closed November 29, 1983.
  Reference: CECo NCR F747.

- 511, Opened December 2. 1982. Closed January 13, 1983.
  Reference: CECo NCR F756.

- 556, Opened January 24, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 557, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 558, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 559, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 560, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 561, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 562, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 563, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 564, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 565, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 566, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 567, Opened January 25, 1983. Closed January 21, 1984.
  Reference: CECo NCR F775.

- 586, Opened March 17, 1983. Closed September 6, 1983.
  Reference: CECo NCR F802 and HECo DR 1835.

- 588, Opened March 18, 1983. Closed September 6, 1983.
  Reference: CECo NCR F802 and HECo DR 1857.

- 579, Opened March 11, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F799 and HECo DR 1777.

- 580, Opened March 11, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F800 and HECo DR 1800.

- 642, Opened July 5, 1983. Closed January 25, 1984. Reference: CECo NCR F827 and HECo DR 2458.

- 605, Opened May 12, 1983. Closed October 17, 1983. Reference: CECo NCR F821 and HECo DR 2075.

- 599, Opened April 12, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F809.

- 687, Opened August 12, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F845.

- 681, Opened August 11, 1983. Closed January 25, 1984. Reference: CECo NCR F844.

- 668, Opened August 1, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F838.

- 666, Opened July 26, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F837.

- 662, Opened July 21, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F837.

- 660, Opened July 21, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F837.

- 658, Opened July 20, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F837 and HECo DR 2714.

- 673, Opened August 5, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F839 and HECo DR 2787.

- 650, Opened July 18, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F838.

- 649, Opened July 18, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F838.

- 773, Opened November 17, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F865 and HECo DR 3687.

- 769, Opened November 9, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F863 and HECo DR 3596.

- 766, dated November 3, 1983. Cable 2DG070 (9/c #14) was pulled into a conduit without measuring the cable pull tension in

accordance with approved procedures. The cable was pulled back and re-pulled utilizing a dynamometer during the entire operation to measure cable pulling tension. The actual pulling tension was 40# and the allowable maximum pulling tension is 296#. Cable 2DG070 was accepted as installed. This NCR was closed on November 10, 1983. Reference: HECo DR 3518.

- 765, Opened November 3, 1983. As of January 25, 1984, this NCR was still open. Reference: CECo NCR F864 and HECo DR 3523.

- 113, dated June 16, 1980. During installation, cable 1SI523 (2/c #14) was hand pulled through conduit containing approximately 350° of bends. Conduit runs are normally limited to 270° of bends between pulling points. The maximum allowable pulling tension for 2/c #14 cable is 66#. The calculated pulling tension for this installation was 25.655#. The Region III inspector reviewed the calculations and they appeared to be adequate. This NCR was closed on May 21, 1981.

- 109, dated April 26, 1980. During installation, cables 1SX067 (3/c #10) and 1SX043 (12/c #14) were hand pulled through conduit containing more than 270° of bends. The maximum allowable pulling tension for these cables was 645# The calculated pulling tension for this installation was 132#. Based on the calculations the cables were accepted as installed. This NCR was closed on May 21, 1981.

c. The Region III inspector selected the HECo DRs prepared during the 3rd quarter of 1983 for review. DRs 2468 through 3362 were prepared during this time frame. Due to the method of filing, the inspector reviewed DRs 2400 through 3400. With respect to possible overstressing of safety-related cables during installation or re-work, all DRs, except number 3382, were subsequently documented on NCRs and are discussed in paragraphs a and b above. Following are the Region III observations as relating to DR 3382.

During pull back of safety-related cable 1VA709 (2/c #16) from 2 1/2" conduit COA7464 (Reference: CECo NCR F821), the other 12 cables remaining in the conduit were overstressed. Based on interviews with HECo craft, engineering and QC personnel, CECo engineering personnel and the review of applicable documentation, following is a sequence of events as understood by the Region III inspector:

(1) During the initial installation of cable 1VA709, the cable was overstressed. The maximum allowable pulling tension for this type of cable is 58.8# and the actual pulling tension was 120#. This fact was documented on HECo DR 2075, HECo NCR 605, and CECo NCR F821. The disposition on the CECo NCR was to replace the cable.

(2) On or about October 4, 1983, while attempting to remove cable 1VA709 from conduit COA7464, pulling tensions of 250#, 450#, 140# and 500# were exerted on cable 1VA709. At that point in

time, the decision was made to abandon that portion of cable 1VA709 contained within the conduit. A new cable 1VA709 was installed and the applicable HECo and CECo NCRs were closed. HECo QC inspector prepared DR 3382, dated October 4, 1983, to document that the remaining cables (1VA182, 1VA185, 1VA707, 1VA712, 1VA714, 1VA716, 1VA720, 1VA721, 1VA722, 1VA723, 1VA818, and 1VA819) may have been overstressed during the attempted removal of cable 1VA709. All cables contained within conduit COA 7464 were 2/c #16 with an individual maximum pulling tension of 58.8#.

(3) During the HECo engineer's evaluation of DR 3382, the engineer erroneously assumed that the cable pulling crew was attempting to remove all of the cables in conduit COA7464 when the pulling tensions of 250#, 450#, 140# and 500# were reached. Using the above assumption, the HECo engineer calculated the maximum allowable pulling tension for all the cables as 557#. Based on the engineer's calculations, the cables were accepted as installed and the DR was closed on October 10, 1983. In that the description of the discrepancy as noted on the subject DR did not contain all of the facts, the inspector can understand how the engineer made an incorrect assumption. It would appear that the engineer failed to gather all the facts prior to providing a resolution on the DR.

(4) The failure to provide an adequate response on DR 3382 has resulted in 12 safety-related cables (1VA182, 1VA185, 1VA707, 1VA71, 1VA714, 1VA716, 1VA720, 1VA721, 1VA722, 1VA723, 1VA818, and 1VA819) whose quality is indeterminate in that one or more of these cables was overstressed during the attempted pull-back of cable 1VA709. The individual maximum cable pulling tension for these cables is 58.8# and the actual measured pulling tension was 500#. Subsequent to the inspectors findings, HECo prepared NCR 841, dated January 27, 1984, to document the overstressed cables.

The licensee was informed that failure to assure that conditions adverse to quality are promptly identified and corrected is an item of noncompliance in accordance with Criterion XVI of 10 CFR 50, Appendix B (454/84-09-02).

d. During the Byron team inspection (IE Inspection Report No. 50-454/82-05 and 50-455/82-04) it was observed that the HECo procedures did not contain an electrical cable rework procedure nor the requirements to calculate electrical cable sidewall pressures prior to pulling cable. This information became part of the Byron, Unit 1, ASLB hearings conducted in Rockford, IL during August 1983. During these hearings, the licensee stated that cable-pull reports for cables already installed are being reviewed against the current criteria and any needed corrective action will be taken with the advice of the cable manufacturer and that all cables, regardless of when installed, will meet the current criteria.

In accordance with Sargent and Lundy (T. R. Eisenbart) letter to Commonwealth Edison Company (J. T. Westermeier) dated June 23, 1983, S&L performed an analysis of all safety-related cables pulled into conduit prior to December 1982. These cables pulled into approximately 2600 conduits and required analysis. Per the S&L letter, one of the following methods was utilized in performing the analysis:

(1) Calculations for an assumed worst case conduit configuration containing a worst cable configuration.

(2) Calculations for an assumed worst case conduit configuration containing the actual cable configuration.

(3) Calculations for the actual conduit configuration containing the actual cable configuration.

S&L's review identified three conduits that required additional analysis by the cable manufacturer. Cable pulling information for these conduits was forwarded to Okonite Company, cable manufacturer, by S&L letter dated June 22, 1983, for their use in performing the detailed analysis.

In accordance with S&L (T. R. Eisenbart) letter to CECo (J. T. Westermeier) dated December 12, 1983, all safety-related cables pulled into conduit prior to December 1982 were acceptable. This acceptability is based on analysis performed by S&L and the Okonite Company's letter of October 11, 1983, and subsequent discussions with HECo to determine the actual direction of cable pulls into the three conduits analyzed by Okonite. Cable pulled into cable tray was not considered a potential problem by S&L since the cable information drawings addressed cable side-wall pressure by specifying minimum cable pulling guide radii, and in addition, the majority of cables pulled in tray were hand pulled.

The Region III inspector observed that the analytical method would not provide 100% assurance that all safety-related cables installed prior to December 1982 had not been overstressed. However, the analysis plus the various tests performed prior to reactor operations does provide a reasonable assurance that all the safety-related cables will perform their intended function. Pending a review of the analysis performed by S&L, this item remains open. Reference: Open Item 454/84-02-03; 455/84-02-03.

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviation. An unresolved item disclosed during this inspection is discussed in Paragraph 3.2 of this report.

5. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on January 27, 1984. The inspector summarized the scope and findings of the inspection. The licensee acknowledged this information.

FILE 13700.07

Binder
Attachment H,

FORM # RP-61
REV. # 11
DATE 10-9-82

HATFIELD ELECTRIC COMPANY

BYRON UNITS 1 & 2

DISCREPANCY REPORT

REPORT № 3382

I. TO: Ed Tovo
Reference(s): Q-3374 C0A7464 1VA182,186,702,712,714,716 720,721,722,723,818,819 2½" Cond.

FROM: Michael J Momaly

DATE: 10-4-83

SUBJECT: Suspected Damage To Cable

IDENTIFIED DURING ☐ Receiving ☒ Installation ☐ Surv./Storage ☒ QC Inspection ☐ Testing

DISCREPANCY: 1VA Cables in C0A7464 May Be Damaged Due To Trying To Remove Over Tensioned Cable 1VA709. Tension Reading On Dynamometer 350 lbs, 450 lbs – 190 lbs, 600 lbs. Cable 1VA709 Twisted Around Other Cables; Required To Answer CECO NCR #821

REFERENCE ONLY

SIGNED BY: Michael J Momaly

HECO ☐ Prod. ☐ Eng. ☒ QA/QC

II. RESOLUTION DATE: 10/7/83

[illegible] pull tension [illegible] reading in 557 lbs. Cable 1VA709 was [illegible] with new cable and old cable 1VA709 was cut off in conduit and abandoned.

SIGNED BY: [signature]

HECO ☐ Prod. ☒ Eng. ☐ QA/QC

III. RESOLUTION IMPLEMENTATION COMPLETED BY: [signature] DATE: 10/7/83

QA/QC VERIFICATION OF RESOLUTION COMPLETED BY: G. [signature] (Level II or higher) DATE: OCT 10 1983

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

Binder
Attachment I

April 25, 1984

Mr. James G. Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
799 Roosevelt Road - Region III
Glen Ellyn, IL 60137

Subject: Byron Generating Station Units 1 and 2
I&E Inspection Report Nos. 50-454/84-09
and 50-455/84-07

Reference (a): March 19, 1984 letter from W. S. Little
to Cordell Reed.

Dear Mr. Keppler:

Reference (a) provided the results of an inspection report at Byron Station by Mr. R. S. Love on January 23-27, 1984. During that inspection certain activities were found to be not in compliance with NRC regulations. Attachment A to this letter contains Commonwealth Edison's response to the Notice of Violation which was appended to reference (a).

Please address further questions regarding this matter to this office.

Very truly yours,

D. F. Farrar
Director of Nuclear Licensing

lm

Attachment A

8426N

ATTACHMENT A

Response to Notice of Violation

Violation

10 CFR 50,Appendix B, Criterion XVI, as implemented by CECo Topical Report CE-1-A, Section 16, requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected.

Contrary to the above, the failure of Hatfield Electric Company to provide an adequate response to DR 3382 has resulted in 12 safety-related electrical cables being installed in Byron Station, Unit 1, whose qulaity is indeterminate in that one or more of these cables was overstressed during the attempted pull-back of cable 1VA709.

Corrective Action Taken and Results Achieved

All thirteen safety-related cables in conduit COA7464 are being replaced. Contractor discrepancy reports for all other cables which were pulled out of conduit have been reviewed to confirm that this was an isolated incident.

Corrective Action Taken to Avoid Further Noncompliance

As described in Section 3.C of the inspection report, the possible overstressing of the twelve safety-related cables was not evaluated because insufficient information was the basis for disposition of Discrepancy Report DR 3382.

Commonwealth Edison has addressed the circumstances and events pertaining to this item of noncompliance in a letter to the contractor dated February 2, 1984. This letter emphasized the need for all personnel to clearly define problems so that when they are evaluated, the proper disposition can be given.

This letter also re-emphasized that cables should never be pulled unless the cable pulling crew and the QC personnel know what the allowable pulling tension is for the cable pull to be performed.

Additionally, when cables are to be pulled out of conduit, the allowable pulling tension should be the lesser of the two following tensions:

1. The calculated maximum pulling tension of the cable (or group of cables) being pulled out; or

2. The calculated maximum pulling tension of the single smallest size cable remaining in the conduit.

By utilizing the lesser of these two tensions, we can reasonably be assured that any cables remaining in the conduit will not be overtensioned.

Date When Full Compliance Will Be Achieved

The cables will be replaced by April 30, 1984. Training sessions were held with cable pulling crews on February 29, 1984 and March 7, 1984.

8426N

Commonwealth Edison
Byron Generating Station
P O Box 8
Byron, Illinois 61010

Binder
Attachment J

February 2, 198-

TO: Hatfield Electric Co.

ATTENTION: Mr. G. Vanderhei
Mr. E. Tovo
Mr. D. Heider

SUBJECT: Pulling Cable Out of Conduit

REFERENCES: HECo NCR 605, CECo NCR 821, HECo DR 3382 and HECo NCR 841

Hatfield NCR 605, dated May 11, 1983, was written to identify and document the overtensioning of cable 1VA709 during installation. The disposition of this NCR was to implement the corrective action provided upon resolution of Commonwealth Edison Company NCR 821, dated May 18, 1983.

Commonwealth Edison Company NCR 821 was dispositioned in August, 1983, with corrective action being to pullout cable 1VA709 and repull it with new cable. In the process of implementing this corrective action, 500 pounds of tension was applied to cable 1VA709 while trying to pull it out. DR 3382, dated October 4, 1983 was written to document this condition and identify that the remaining twelve (12) cables in the conduit may have been overtensioned due to this 500 pounds of tension being applied during the pullout of 1VA709. In fact, even with this 500 pounds of tension applied, a portion of 1VA709 could not be pulled out and had to be abandoned in the conduit. The new cable 1VA709 was pulled in without any problems.

DR 3382 was dispositioned by Hatfield's Engineering Department on October 7, 1983. The resolution was essentially that no problem existed as the calculated pulling tension for these cables was 557 pound which is greater than the 500 pounds that was applied during the pullout of 1VA709.

It was discovered during an NRC inspection that cable 1VA709 was individually pulled out of the conduit and as such was subjected to the full 500 pounds of tension. The question raised which cannot be answered is: "How many of the remaining cables in the conduit were subjected to this 500 pounds tension?" At Project Construction Department's request, Hatfield has written NCR 841, dated January 27, 1984 to document this condition.

This letter is being written to identify the problems associated with the above sequence of events so that Hatfield can take the necessary corrective actions required to ensure that they never happen again on this project.

First of all, cables should never be pulled unless the cable pulling crew and the QC personnel know what the allowable pulling tension is for the cable pull to be performed.

Second, when cables are to be pulled out of conduit. the allowable pulling tension for the pullout should be the lessor of the two following tensions:

1. The calculated maximum pulling tension of the cable (or group of cables) being pulled out, or

2. The calculated maximum pulling tension of the single smallest size cable remaining in the conduit.

By utilizing the lessor of these two tensions, we can reasonably be assured that any cables remaining in the conduit will not be damaged as a result of overtensioning. These tensions should be reviewed for the particular job in question and if it is apparent that the cable(s) cannot be pulled out due to this constraint, then Project Construction Department should be notified.

The fact that QC initiated DR 3382 to identify and track the potential overtensioning of the additional cables was fine, except that the description of the deficiency did not adequately address the problem. The DR doesn't specifically state that cable 1VA709 was being pulled out individually and, due to it being twisted around the remaining cable in the conduit, it was impossible to determine if the 500 pounds tension was applied to just one of the remaining cables or all of them.

It must be emphasized to all personnel that when a problem is being identified, it must clearly identify exactly what the problem is. In the case of DR 3382, Hatfield Engineering's resolution indicated that there was no problem based on the pulling tension calculation for the remaining twelve cables in the conduit. This would not have happened if the deficiency would have been clearly described.

Please conduct a training session addressing the problems identified in this letter for all production and QA/QC personnel involved with cable pulling and cable pulling rework.

If you have any questions, please contact me.

Very truly yours,

James O. Binder
Project Electrical Supervisor
Byron Station

JB/rc

cc: K. Hansing
E. Sager
File F2790.19.1

mgc20-7

BY MS. GIBBS:

Q Mr. Treece, would you state your name for the record, please?

A (Witness Treece) Bobby G. Treece.

Q By whom are you employed, Mr. Treece?

A Sargent & Lundy.

Q What is your current title?

A Senior Electrical Project Engineer for the Byron project.

Q Do you have in front of you a document entitled "Summary of Testimony of Bobby G. Treece on Issues V and VI, Cable Overtensioning as Limited by the Licensing Board's Order of June 8, 1984," and a document entitled "Direct Testimony, Bobby G. Treece, on Issues V and VI, Cable Overtensioning as Limited by the Licensing Board's Order of June 8, 1984" and certain attachments thereto?

A I do.

Q Do you have any changes or corrections you'd like to make to this testimony at this time?

A Yes, I have two typographical corrections.

Q Which page is the first correction on?

A Page 7 of the direct testimony.

Q What is the change?

A In the first line, the sentence reads, "...as

mgc20-8

such, then do not establish...." The word "then" should be "they."

Q What is the other change?

A It's at the bottom of page 11, at the very end of the last sentence, the reference to pages E-14 and E-15 should be D-14 and D-15.

Q With the changes that you have just made, is this testimony true and correct, to the best of your knowledge and belief?

A Yes, it is.

Q did you prepare this testimony?

A Yes, with the help of counsel.

MS. GIBBS: At this time, Judge Smith, I would like to give a copy of Mr. Treece's testimony, incorporating the changes that he has just made, and ask that this testimony be received into evidence and be incorporated into the record as if read.

JUDGE SMITH: Are there objections?

MR. CASSEL: No objection, Judge.

MR. LEWIS: No objection.

JUDGE SMITH: The testimony is received.

(The prepared testimony of Mr. Bobby G. Treece follows.)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. STN 50-454 OL
	)	STN 50-455 OL
COMMONWEALTH EDISON COMPANY	)	
	)	
(Bryon Nuclear Power Station, Units 1 and 2)	)	

SUMMARY OF TESTIMONY OF BOBBY G. TREECE ON ISSUES 5 AND 6 (CABLE OVERTENSIONING) AS LIMITED BY THE LICENSING BOARD'S ORDER OF JUNE 8, 1984

I. Bobby G. Treece of Sargent & Lundy is the Senior Electrical Project Engineer for Byron Station.

II. All of the safety-related cables which were installed in conduit prior to the December, 1982, implementation of the electrical contractor's revised cable installation procedure will perform their intended functions.

A. This conclusion is borne out by the analysis performed by Sargent & Lundy.

B. This analysis comprised the following steps:

1. Available cable pull reports for cables pulled in conduit before December, 1982, were reviewed. Many of the cables covered by these reports were found to be acceptable.

2. For those cable pull reports in which the allowable pulling tensions had been exceeded,

based upon the general pull criteria, the details of the cable pulls were forwarded to the cable manufacturers for the performance of a specific analysis to determine the acceptability of the cable pulls.

3. All of these cable pulls were found to be acceptable, based upon the manufacturers' specific analysis.

4. Sargent & Lundy then analyzed approximately 2600 conduits, which included all safety related cables pulled in conduit prior to December, 1982.

5. The safety-related cables in all but three of the approximately 2600 conduits analyzed were found to be acceptable.

6. The details of these three conduits were forwarded to the cable manufacturer for the performance of a specific analysis. Based upon the cable manufacturer's analysis, these cables were found to be acceptable.

C. The NRC accepted this analysis and concluded that there was a reasonable assurance that the safety-related cables installed in conduit prior to December, 1982, would perform their intended functions.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. STN 50-454 OL
	)	STN 50-455 OL
COMMONWEALTH EDISON COMPANY	)	
	)	
(Bryon Nuclear Power Station, Units 1 and 2)	)	

DIRECT TESTIMONY OF
BOBBY G. TREECE
ON ISSUES 5 AND 6
(CABLE OVERTENSIONING),
AS LIMITED BY THE LICENSING BOARD'S
ORDER OF JUNE 8, 1984

Q-1. Please state your name.

A-1. Bobby G. Treece.

Q-2. What is your residence address?

A-2. My residence address is 807 South We-Go Trail, Mt. Prospect, Illinois 60056.

Q-3. By whom are you employed and in what capacity?

A-3. I am employed by Sargent & Lundy. My position is Associate and Senior Electrical Project Engineer for Byron and Braidwood Stations.

Q-4. Please describe your educational background.

A-4. I received a Bachelor of Science degree in electrical engineering from the University of Arkansas in 1948.

I am licensed as a professional engineer in the states of Arkansas, Florida and Illinois.

Q-5. Please describe your employment experience.

A-5. I went to work for Ebasco Services in 1948 as a cadet engineer. In 1951, I joined Sargent & Lundy as an Electrical Engineer. In 1963, I became an Electrical Project Engineer and was promoted to Senior Electrical Project Engineer in 1968, the position which I hold today. During this period, I have been responsible for the engineering and design of the electrical aspects of numerous power plants, both fossil and nuclear. In addition to Byron Station, I have performed electrical engineering work for the Dresden, Zion and Braidwood Nuclear Stations.

Q-6. Please describe your duties as Senior Electrical Project Engineer for Byron Station.

A-6. I have principal responsibility for the electrical engineering and design for the Byron project. My duties include the division of work among the Electrical Project Engineers and Electrical Engineers assigned to the Byron project team. I supervise and review the work performed by these engineers and provide the interface between the Electrical Department of Sargent & Lundy and personnel at Commonwealth Edison with respect to Byron Station.

Q-7. Please describe the scope of your testimony.

A-7. My testimony is in response to Issues 5 and 6, relating to potential cable overtensioning, or over-stressing, at Byron Station, as those issues have been limited by the Licensing Board's Order of June 8, 1984. This testimony is intended to supplement the testimony of James O. Binder, of Commonwealth Edison Company, which also relates to potential cable overtensioning. Specifically, my testimony will describe the analysis performed by Sargent & Lundy of all of the safety-related electrical cables installed in conduit at Byron Station prior to December, 1982. The purpose of that analysis was to determine whether or not any of those cables had been rendered unacceptable due to overtensioning. I will describe how the analysis came to be done, the methodology used in performing the analysis, the results of the analysis, and the conclusions which were drawn from it. The attachments to my testimony consist of various letters and an NRC Inspection Report which pertain to this matter. I am familiar with the contents of all of these attachments to the extent that they pertain to the cable overtensioning matter.

Q-8. Did Sargent & Lundy perform an analysis of all of the safety-related electrical cables installed in conduit at Byron Station prior to December, 1982, to determine whether any of those cables had been rendered unacceptable due to overtensioning?

A-8. Yes.

Q-9. Is electrical cable installed only in conduit?

A-9. No. Electrical cable may also be installed in cable trays.

Q-10. Why did the analysis performed by Sargent & Lundy not consider cable installed in cable trays?

A-10. Potential overtensioning of cable installed in trays was not considered to be a problem and thus was not included in the analysis performed by Sargent & Lundy because the majority of these cables are laid in trays by hand. The possibility of exerting too much tension during such cable installations is small. For the remainder of the pulls through trays, the contractor uses pulling guides, or sheaves, for turning the cable around bends in the tray. For a given pulling tension, these guides reduce the sidewall pressure experienced by a cable below that for a conduit of the same radius. Sargent & Lundy's installation drawing addressed cable sidewall pressure by specifying minimum cable pulling guide radii.

Q-11. Please explain why Sargent & Lundy performed an analysis of all of the safety-related electrical cables installed in conduit at Byron Station prior to December, 1982, with respect to potential overtensioning.

A-11. As previously described in the testimony of Mr. Binder, an NRC inspection in the Spring of 1982 identified as

an item of noncompliance the fact that the cable installation procedure used by the electrical contractor, Hatfield Electric, did not address the requirements to calculate allowable cable pulling tensions. Commonwealth Edison's response to this item was to revise the cable installation procedure so as to address the subjects of concern to the NRC. In addition, Commonwealth Edison committed to take appropriate action to ensure that all safety-related cables installed prior to the implementation of the revised procedure in December, 1982, would perform their intended functions. This was to be accomplished by a review of cable pull reports and the performance of additional analysis by Sargent & Lundy.

Q-12. Did you review cable pull reports covering all safety-related cables pulled in conduit prior to December, 1982?

A-12. No. Cable pull reports do not exist for all such cables.

Q-13. Why do they not exist?

A-13. Originally, the electrical contractor's cable installation procedure did not require that cable pull reports be prepared for all safety-related cable installations.

Q-14. Please describe the review of cable pull reports performed by Sargent & Lundy.

A-14. Sargent & Lundy began by reviewing the available cable pull reports for cables pulled in conduit before the revised

cable installation procedure was implemented in December, 1982. In addition, Sargent & Lundy reviewed the cable pull reports attached to Commonwealth Edison Nonconformance Report (NCR) F-747. For each cable covered by a cable pull report, Sargent & Lundy calculated the allowable pulling tension, using criteria supplied by the cable manufacturer, and compared that tension to the tension which had been documented on the cable pull report. This review revealed that 25 of the cable pulls covered by the cable pull reports exceeded the allowable pulling tensions. Of these 25 cases, five cable pulls exceeded the allowable pulling tension determined by tensile strength, 16 cable pulls exceeded the pulling tension determined by sidewall pressure and four cases exceeded the allowable pulling tension determined by both tensile strength and sidewall pressure. For these 25 cable pulls, it was determined that additional analysis was required before it could be concluded whether the monitored pulling tensions were acceptable.

Q-15. How could additional analysis demonstrate that the pulling tensions recorded in the 25 cases mentioned in Answer 14, above, were acceptable?

A-15. The cable pulling criteria as provided to Sargent & Lundy by each cable manufacturer are <u>general</u> pull

criteria. As such, they do not establish the maximum tension which the cable can withstand without damage. The general criteria thus include a margin of conservatism. Sargent & Lundy, using these general criteria from each manufacturer, develops composite criteria applicable to all cables installed in Byron Station. Because these composite criteria are based upon the most stringent of the cable manufacturers' general criteria, they provide an additional margin of conservatism for some types of cables. Sargent & Lundy's analysis of the cable pull reports was based upon each cable manufacturer's general pull criteria. However, due to the manufacturer's margin of conservatism inherent in the general pull criteria, the manufacturer can perform a specific analysis to determine the acceptability of a particular cable pull.

Q-16. What was done regarding the 25 cable pulls in which the allowable pulling tension was exceeded?

A-16. Details of these specific cable pulls were forwarded to the cable manufacturers by Sargent & Lundy with a request that they perform a specific analysis of each cable pull. Based on the cable manufacturers' review, all 25 of these suspect cable pulls were found to be acceptable. See Attachment A (letter from Sargent & Lundy to Commonwealth Edison dated January 26, 1983) and Attachment B (letter from Sargent & Lundy to Commonwealth Edison dated December 12, 1983).

Q-17. How did Sargent & Lundy determine whether any of the safety-related cables for which cable pull reports did not exist had been rendered unacceptable by overtensioning?

A-17. Sargent & Lundy performed additional analysis to determine the acceptability of these safety-related cables.

Q-18. Please describe this analysis.

A-18. As a basis for this analysis, Sargent & Lundy obtained a listing from Commonwealth Edison of all safety-related cables pulled in conduit prior to December, 1982. This listing identified the cable number, conduit number and conduit length for approximately 2600 conduits, and included those cables for which cable pull reports did not exist as well as those cables which were covered by cable pull reports. All 2600 conduits were analyzed by Sargent & Lundy and each cable pull was dispositioned by one of the following three methods:

Method 1. Sargent & Lundy determined the critical (maximum) conduit length for each conduit size assuming a worst case conduit configuration and a worst case cable configuration. If the actual length of the conduit run did not exceed the calculated critical length, it was concluded that the cables in that conduit had not been overtensioned. If the actual length of the conduit run exceeded the calculated critical length, that conduit run was subjected to further analysis using Method 2, below.

Method 2. Sargent & Lundy determined the critical (maximum) conduit length for each conduit size assuming a worst case conduit configuration and the actual installed cable configuration. If the actual length of the conduit did not exceed the calculated critical length, it was concluded that the cables in that conduit had not been overtensioned. If the actual length of the conduit run exceeded the calculated critical length, that conduit run was subjected to further analysis using Method 3, below.

Method 3. For the remaining conduits, Sargent & Lundy calculated the expected pulling tension for the actual installed conduit configuration containing the actual installed cable configuration. This expected pulling tension was then compared to the allowable pulling tension as determined by the manufacturer's general criteria. If the expected pulling tension (as calculated) did not exceed the allowable pulling tension, it was concluded that the cables in that conduit had not been overtensioned. If the expected pulling tension (as calculated) exceeded the allowable pulling tension, details of the cable installation were forwarded to the manufacturer with a request that a specific analysis be performed.

Out of the approximately 2600 conduit runs analysed using the method(s) described above, only three conduits were identified for which a specific analysis by the manufacturer was required to determine the acceptability of the cables. See Attachment C (letter from Sargent & Lundy to

Commonwealth Edison dated June 23, 1983). Based upon the specific analysis performed by the cable manufacturer, the cables pulled in these three conduits were determined to be acceptable. See Attachment B (letter from Sargent & Lundy to Commonwealth Edison dated December 12, 1983).

Q-19. What conclusion did Sargent & Lundy reach regarding whether any of the safety-related cables installed in conduit at Byron Station before December, 1982, had been rendered unacceptable due to overtensioning?

A-19. Sargent & Lundy concluded that none of the safety-related cables pulled in conduit prior to December, 1982, was unacceptable; that is, their ability to perform their intended functions had not been impaired by overtensioning.

Q-20. Please describe the basis for that conclusion.

A-20. That conclusion is based upon Sargent & Lundy's analysis of the safety-related cables installed in approximately 2600 conduits. This analysis included cables for which cable pull reports were and were not available. Most of the safety-related cables involved were determined to be acceptable based upon Sargent & Lundy's analysis, which indicated that the expected pulling tensions (as calculated) did not exceed the allowable pulling tensions for these cables. For the remaining safety-

related cables, although the allowable pulling tensions as determined by the manufacturer's general criteria had been exceeded, a specific analysis performed by the manufacturer demonstrated that the cables will perform their intended functions. Thus, those cables were also found to be acceptable.

Q-21. Did the NRC accept this analysis of safety-related cables pulled in conduit prior to December, 1982?

A-21. The NRC accepted this analysis in Inspection Report 50-454/84-27; 50-455/84-19, which is Attachment D to my testimony. The NRC inspector concluded that there was a reasonable assurance that the safety-related cables would perform their intended functions. See Attachment D at pages D-14 to D-15.

TREECE ATTACHMENT A

SARGENT & LUNDY
ENGINEERS
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603
(312) 269-2000
TWX 910-221-2807

January 26, 1983
Project Nos. 4391/2 &
4683/4

Commonwealth Edison Company
Byron/Braidwood Stations - Units 1 & 2

Cable Pull Criteria

Mr. J. T. Westermeier
Project Engineer
Commonwealth Edison Company
P.O. Box 767
Chicago, IL 60690

Dear Mr. Westermeier:

In response to the NRC's findings concerning the Contractor's Cable Pulling Procedures (Byron IE Inspection Reports Nos. 50-454/82-05 and 50-455/82-04), Commonwealth Edison Company's (CECo) letter dated November 5, 1982, stated that cable pull reports would be reviewed to verify that the allowable sidewall pressure was not exceeded for cables installed prior to the implementation of the revised Contractor's Cable Pulling Procedures. The expected date for completion of the review was January 31, 1983. As a basis for this review, Sargent & Lundy received 44 cable pull reports (listed in Attachment A) from Byron Station Construction. This summarizes the results of Sargent & Lundy's review of these cable pull reports.

The cable pull reports were reviewed against the Electrical Installation (EI) drawings to identify the conduit containing the referenced cables. This identification was required to define the factors necessary to calculate the allowable sidewall pressure pulling tension (i.e. conduits smallest bend radius). For 29 of the cable pull reports received, the conduit containing the referenced cables was identified. These 29 cable pull reports covered 35 cable pulls for 54 safety-related cables. For the remaining 15 reports, the review of the electrical installation drawing did not reveal any conduit containing only the referenced cables.

To increase the data base for this review effort, Sargent & Lundy also used the cable pulling information included in Non-Conformance Report (NCR) F-747. This data covered 136 cable pulls for 159 safety-related cables. This NCR had been written for cables pulled following the issuance of ECN's 2579 and 3015 but prior to implementation of the revised Contractor's Cable Pulling Procedures.

Sargent & Lundy's review of the above referenced data revealed that 17 of the 35 cable pulls covered by the cable pull reports, and 8 of the 136 cable pulls covered by the NCR, potentially exceed the allowable pulling tensions (reference Attachment B). In these 25 cases potentially exceeding the allowable pulling tension, five cable pulls exceeded the allowable tensile strength pulling tension, 16 cases exceeded the allowable sidewall pressure tension, and four cases exceeded both the tensile strength and the sidewall pressure pulling tension. Additional analysis is required before it can be determined whether the monitored pulling tensions are acceptable. For example, conversations with Okonite Company indicate that for certain cable configurations the .6 multiplying factor can be increased to .8. Also, for cases where the allowable sidewall pressure pulling tension has been exceeded the location of the bends in the conduit can result in additional relief. A list of the 17 cable pulls and associated cables covered by the cable pull reports requiring additional analysis have been given to Mr. J. O. Binder for his use in preparing an NCR.

Sargent & Lundy will continue work in this area to provide calculations and/or analysis to address the safety-related cables pulled in conduit prior to the implementation of the revised Contractor's Cable Pulling Procedures for which pull reports do not exist.

If you have any questions, please contact me.

Yours very truly,

T. R. EISENBART

T. R. Eisenbart
Electrical Engineer

TRE:sh
In duplicate
Enclosure
Copies:
G. Sorensen/J. O. Binder (1/1)
D. L. Leone/W. C. Cleff (1/1)
R. J. Netzel (1/1)

SARGENT & LUNDY
ENGINEERS
CHICAGO

ATTACHMENT "A" to
Sargent & Lundy's
(T. R. Eisenbart)
letter dated
January 26, 1983

Commonwealth Edison Company
Byron/Braidwood Stations - Units 1 & 2
Project Nos. 4391/2 & 4683/4

CABLE PULL REPORTS SUBMITTED FOR REVIEW

PITTSBURGH TESTING LABORATORY REPORT NUMBERS

CP-40	CP-316
CP-80	CP-319
CP-81	CP-320
CP-90	CP-336
CP-91	CP-338
CP-109	CP-339
CP-124	CP-340
CP-218	CP-323
CP-250	CP-321
CP-251	CP-322
CP-293	CP-330
CP-294	CP-324
CP-298	CP-317
CP-299	CP-318
CP-300	CP-295
CP-308	CP-313
CP-309	CP-331
CP-311	CP-310
CP-312	CP-337
CP-314	CP-8
CP-315	CP-7
CP-219	CP-301
	CP-125

SARGENT & LUNDY
ENGINEERS
CHICAGO

ATTACHMENT "B" to
Sargent & Lundy's
(T. R. Eisenbart)
letter dated
January 26, 1983

Commonwealth Edison Company
Byron/Braidwood Stations - Units 1 & 2
Project Nos. 4391/2 & 4683/4

CABLE PULLS POTENTIALLY EXCEEDING ALLOWABLE PULLING TENSIONS

Cable Pull Report Numbers	Cable Numbers
CP-40	1AP183
CP-80	1AP073, 1AP320, 1AP322
CP-81	1AP072, 1AP319, 1AP321
CP-90	2SX138, 2SX140, 2SX153, 2SX258, 2SX100, 2SX110, 2SX260, 2SX139, 2SX149, 2SX157, 2SX137, 2SX102, 2SX112, 2DC073
CP-91	2AP179, 2AP182, 2AP300, 2AP401
CP-218	1VC028
CP-250	1IP005, 1IP006
CP-251	1IP033, 1IP034
CP-315	1VA578, 1VA579
CP-316	1VA580, 1VA581
CP-319	1VA558, 1VA559, 1VA560
CP-320	1VA374, 1VA376, 1VA548, 1VA549

December 12, 1983
Project Nos. 4391/2-00

Commonwealth Edison Company
Byron Station - Units 1 & 2

Byron-IE Inspection Report
Nos. 50-454/82-05 and 50-455/82-04

Cable Pull Criteria

Reference: (a) Letter dated January 26, 1983, S&L (TRE) to CECo (JTW)
(b) Letter dated June 23, 1983, S&L (TRE) to CECo (JTW)
(c) Letter dated June 22, 1983, S&L (JFC) to Okonite (CD)

Mr. J. T. Westermeier
Project Engineer
Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

Dear Mr. Westermeier:

Reference (a) summarized the results of an S&L review of cable pull reports obtained from Byron Station. Reference (b) summarized the results of an S&L analysis of safety-related cable pulls (in conduit), prior to the implementation of a revised pulling procedure, for which cable pull reports did not exist. As noted in Reference (b), three of the conduits required further analysis by the cable manufacturer. Reference (c) transmitted the necessary cable pull information to the Okonite Company and requested their analysis of same.

Based on Okonite Company's October 11, 1983 letter (copy attached) and subsequent discussions with Hatfield Electric Company (i.e., a review of Hatfield cable pull records to determine actual direction of pull), we have concluded that the cable pulled in these three conduits are acceptable. The finding in this letter, together with References (a) and (b), complete the S&L review of the subject IE Inspection Reports.

S&L FILE

Based on our findings, we recommend that you supplement your previous responses to the NRC as follows:

As discussed in Commonwealth Edison Company's (CECo) November 5, 1982 and January 24, 1983 letters, CECo concurs with the NRC findings relative to the contractor's cable pulling procedures not addressing cable side-wall pressure criteria. As indicated in CECo's November 5, 1982 letter, revised design documents were issued (May 19, 1982) which specified the allowable cable pulling tensions for cables in conduit, considering both the conductor tensile strength and the cable side-wall pressure criteria. The contractor's cable pulling procedures have also been revised accordingly. Cable pulled in tray was not considered a potential problem since the architect-engineer's cable information drawing addressed cable side-wall pressure by specifying minimum cable pulling guide radii. In addition, the majority of cable pulled in tray was hand pulled.

In order to verify the acceptability of cables installed prior to the issuance of revised procedure, the architect-engineer (a) reviewed cable pull reports, where available, and (b) performed generic analyses/calculations, where cable pull reports were not available.

The architect-engineer's review of the cable pull reports identified several cable installations in which the recorded pulling tension exceeded the allowable pulling tension, as determined from cable manufacturer's general pull criteria. Each of these cable pulls was identified and a Non-Conformance Report was issued by CECo to track their resolution. The architect-engineer forwarded the details of these specific cable pulls to the cable manufacturer with a request that the manufacturer perform a specific analysis to determine the acceptability of each cable pull. Based on the cable manufacturers review, all of these suspect cable pulls were found to be acceptable.

Where cable pull reports did not exist, the architect-engineer performed an analysis, utilizing one of the following (generic or specific, as appropriate) calculations to determine the acceptability of each cable installation:

(1) Calculation for an assumed worst case conduit configuration containing the worst case cable configuration.

(2) Calculation for an assumed worst case conduit configuration containing the actual cable configuration.

(3) Calculation utilizing the actual conduit configuration containing the actual cable configuration.

This analysis identified several cable installations which could not be verified acceptable, based on the cable manufacturer's general pull criteria. The details of each such cable installation were forwarded to the cable manufacturer, with a request that the manufacturer perform a specific analysis to determine acceptability of each cable pull. Based on the cable manufacturer's review, all of these suspect cable pulls were found to be acceptable.

The cable pull reports, analyses, calculations, and other supporting documentation used in responding to these inspection reports are available for NRC review.

If you have any questions, please call me.

Yours very truly,

T. R. EISENBART

T. R. Eisenbart
Electrical Engineer

TRE:daa
In duplicate
Enclosures
Copies:
D. L. Leone/W. C. Cleff (1/1)
R. J. Netzel (1/0)

THE OKONITE COMPANY

1515 Centre Circle
Post Office Box 626
Downers Grove Illinois 60515
312 [illegible]

October 11, 1983

SARGENT & LUNDY
EPED
OCT 13 1983
RECEIVED

Mr. J. F. Clancy, E.E.
Sargent & Lundy
Mail Code 25D15
55 East Monroe
Chicago, Illinois 60603

Subject: Commonwealth Edison Company
Byron/Braidwood Stations-Units 1 & 2
Cable Pull Criteria
S&L Spec. F/L-2823 & 2951
CECo P.O. Nos. 203603, 203609, 207113 & 207114

Dear Mr. Clancy:

In response to your letter dated June [illegible], 1983 please be advised of the following as you requested.

Attached are calculations for the cable pulls for the drawings submitted by you. Pulling from 1VB261A to Gear in one continuous length provides excessively high pulling tension and sidewall pressures. This is caused by the excessive number of offsets located in this run. The total tension calculates out to 52,000 lbs. in this direction. The coefficient of friction actual was probably lower than 0.35 but in any case the allowable tension and sidewall pressures were exceeded by the wide margin. These calculations appear on pages 1 and 2 of the attached sheets.

If cable had been pulled from the gear to 1VB261A, they would have reduced the total tension down to approximately 16,000 lbs. and a maximum sidewall pressure of 3826 lbs./ft. These values although extremely high are well below the pull in the other direction. It would have been helpful if the pulling crew had used a dynamometer to give us an idea what the actual tension was, but it is assumed they did not.

If the cable was pulled from 1VB261A to gear it should be replaced because of the very high pulling tension and sidewall pressure that would have been experienced.

The cable is okay for use if it was pulled from the gear to 1JB261A since the calculations show pulling tension and sidewall pressure to be acceptable.

Please call if we can be of further service.

Very truly yours,

THE OKONITE COMPANY

Charles L. Doerr
District Manager

CLD/cmj

By L.J. Kelly Date 9/27/83 Sheet 1 of 4

Chkd. By _____ Date _____ Inquiry F.O. No. _____

Client/Project SACRAMENTO MUD LUNDY / COMMONWEALTH EDISON

Specification No. Rev./Date _____

Subject PULLING TENSION CALCULATION FOR JACK CLANCY

CABLES - 3 x 1/C 750MCM, .140" OKOBOND, SHIELDED, OKOLON-5.2KV

CABLE WT 1/C = 3.25 LBS/FT

CABLE O.D. - 1/C = 1.65"

MAXIMUM TENSION = .008 x 3 x CMA = 18,000 LBS (ABSOLUTE)

FRICTION = 0.35 (LUBRICATED) CONDUIT SIZE = 5" = 5.047" I.D.

WT. CORR. FACTOR (C) = $1 + \frac{1}{3}\left[\frac{1.65}{5.047-1.65}\right]^2 = 1 + .315 = 1.315$

CABLE WT x NO. OF CONDS x FRICTION x WT COEF FACTOR = WT FACTOR

3.25 x 3 x 0.35 x 1.315 = 4.5 LBS/FT

WT FACTOR = 4.5 LBS PER FT

(cf) FACTOR = 1.315 x 0.35 = 0.46 (e^{cfa} CALCULATIONS)

15B261A TO 15° BEND = 11 FT x 4.5 LBS/FT = 49 LBS

AROUND 15° BEND = $49 e^{cfa} = 49 e^{(.46)(.24)} = 49 e^{(.12)} = 49(1.13) = 55$ LBS

15° BEND TO 15° BEND = 2.5 FT x 4.5 LBS/FT = 11 LBS + 55 LBS = 66 LBS

AROUND SECOND 15° BEND = 66 LBS x 1.13 = 76 LBS.

15° BEND TO 44° BEND = 49 FT x 4.5 LBS/FT = 220 LBS + 76 LBS = 296 LBS

AROUND 44° BEND = $296 \times e^{(.46)(.727)} = 296$ LBS x 1.424 = 422 LBS

44° BEND TO 44° BEND = 5 FT x 4.5 LBS/FT = 23 LBS + 422 LBS = 445 LBS.

AROUND 44° BEND = 445 x 1.424 = 634 LBS

44° BEND TO 26° BEND = 65 FT x 4.5 LBS/FT = 293 LBS + 634 LBS = 927 LBS.

AROUND 26° BEND = 927 LBS x 1.232 = 1142 LBS.

26° BEND TO 26° BEND = 2 FT x 4.5 LBS/FT = 9 LBS + 1142 LBS = 1151 LBS

AROUND 26° BEND = 1151 LBS x 1.232 = 1418 LBS.

26° BEND TO 32° BEND = 20 x 4.5 = 90 LBS + 1418 LBS = 1508 LBS

AROUND 32° BEND = 1508 LBS x 1.292 = 1950 LBS.

32° BEND TO 32° BEND = 2 x 4.5 = 9 LBS + 1950 LBS = 1959 LBS.

AROUND 32° BEND = 1.292 x 1959 LBS = 2533 LBS.

32° BEND TO 15B262 = 60 FT x 4.5 LBS/FT = 270 LBS + 2533 LBS = 2803 LBS.

TENSION AROUND LAST 32° BEND = $\frac{2533 \text{ LBS}}{3.42 \text{ FT RADIUS}}$ = 740 LBS/FT

740 LBS/FT OK SINCE BELOW 1000 LBS/FT MAX.

B-6

15B261A TO 15B262 - PULL OK MAX TENSION = 2803 LBS

MAX SIDEWALL PRESSURE = 740 LBS/FT

E/CRO

ENGINEERING CALCULATION

By L.J. Kelly Date 9/27/82 Sheet 2 of 4

Chkd. By ______ Date ________ Inquiry/P.O. No. ________

Client Project: Sargent and Lundy / Commonwealth Edison

Specification No. Rev. Date

Subject: Pulling Tension Calculation for Jack Clancy

1JB262 TO 47° BEND = 10 FT X 4.5 = 45 LBS + 2803 = 2848 LBS.

AROUND 47° BEND = 2848 LBS X 1.46 = 4158 LBS

SIDEWALL PRESSURE = $\frac{4158}{3.5}$ = 1188 LBS/FT EXCEEDS 1000 LBS/FT

47° BEND TO 43° BEND = 11 X 4.5 = 50 LBS + 4158 = 4208 LBS

AROUND 43° BEND = 4208 X 1.412 = 5942 LBS

SIDEWALL PRESSURE = $\frac{5942}{3.67}$ = 1620 LBS/FT EXCEEDS 1000 LBS/FT

43° BEND TO 90° BEND = 2 X 4.5 = 9 LBS + 5942 LBS = 5951 LBS

AROUND 90° BEND = 5951 LBS X 2.05 = 12,200 LBS

SIDEWALL PRESSURE = $\frac{12200 \text{ LBS}}{3 \text{ FT}}$ = 4067 LBS/FT EXCEEDS 1000 LBS/FT

90° BEND TO 22° BEND = 22 X 4.5 = 99 LBS + 12200 = 12,299 LBS

AROUND 22° BEND = 12,299 X 1.193 = 14,670 LBS

SIDEWALL PRESSURE = $\frac{14,670}{3}$ = 4890 LBS/FT EXCEEDS 1000 LBS/FT

22° BEND TO 22° BEND = 3 X 4.5 = 14 LBS + 14,670 LBS = 14,684 LBS.

AROUND 22° BEND = 14,684 X 1.193 = 17,518 LBS

SIDEWALL PRESSURE = $\frac{17,518 \text{ LBS}}{3.5}$ = 5000 LBS/FT EXCEEDS 1000 LBS/FT

22° BEND TO 45° BEND = 31 FT X 4.5 = 140 LBS + 17,518 = 17,658 LBS.

AROUND 45° BEND = 17,658 X 1.44 = 25,428 LBS

SIDEWALL PRESSURE = $\frac{25428}{3.[illegible]}$ = [illegible]824 LBS/FT EXCEEDS 1000 LBS/FT

45° BEND TO 90° BEND = 9 X [illegible] = [illegible]0.5 X 25,428 LBS = 25,469 [illegible]

AROUND 90° BEND = 25,469 X 2.05 = 52,211 LBS

SIDEWALL PRESSURE = 52,211/3.33 = 15,676 LBS/FT

BREAKING STRENGTH #3 (750 MCM ALUMINUM) 63,000 LBS.

B-7

E-680

By L.J. Kau Date 9/22/83 Sheet 4 of 4

Chkd. By ______ Date ______ Inquiry/F.O. No. ______

Client/Project Sargent & Lundy / Commonwealth Edison

Specification No., Rev./Date ______

Subject Pulling Tension Calculation for Jack Cerny

AROUND 15° BEND = 12,392 x 1.13 = 14,002 LBS
SIDEWALL = 14,002/4.76 = 2941 LB/FT EXCEEDS 1000

15° BEND TO 15° BEND = 11 LBS + 14002 = 14013 LBS
AROUND 15° BEND = 14013 X 1.13 = 15,834 LBS
SIDEWALL = 15,834/4.76 = 3326 LBS/FT EXCEEDS 1000
15° BEND TO 1JB261A = 49 LBS + 15,834 LBS = 15,893 LBS

TOTAL TENSION GEAR TOWARD 1JB261A = 15,893 LBS
WORST SIDEWALL PRESSURE = 3326 LBS/FT

E:680

SARGENT & LUNDY
ENGINEERS
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603
TELEPHONE 312-269-2000

June 23, 1983
Project Nos. 4391/2 & 4683

Commonwealth Edison Company
Byron/Braidwood Stations - Units 1 & 2

Cable Pull Criteria

Mr. J. T. Westermeier
Project Engineer
Commonwealth Edison Company
P.O. Box 767
Chicago, IL 60690

Dear Mr. Westermeier:

This letter supplements my January 26, 1983, letter concerning an initial response to the NRC findings regarding the Contractor's Cable Pulling Procedures (Byron IE Inspection Report Nos. 50-454/82-05 and 50-455/82-04). That letter summarized Sargent & Lundy's (S&L) review of cable pull reports obtained from Byron Station Construction. In addition to a review of cable pull reports, an analysis was required to address safety-related cable pulls in conduit prior to implementation of the revised Contractor's Cable Pulling Procedures for which pull reports did not exist. This letter summarizes the result of this additional analysis.

As a basis for this additional analysis, S&L received a listing of all safety-related cables pulled in conduit prior to December, 1982, from Byron Station Construction. This listing identified approximately 2600 conduits requiring analysis. S&L has completed the analysis for these conduits by utilizing one of the following methods:

1. Calculations for an assumed worst case conduit configuration containing a worst cable configuration.

2. Calculations for an assumed worst case conduit configuration containing the actual cable configuration.

3. Calculations for the actual conduit configuration containing the actual cable configuration.

S&L's review identified three conduits that require additional analysis by the cable manufacturer. Cable pulling information for these conduits has been forwarded to Okonite Company, by S&L letter dated June 22, 1983, copy enclosed, for their use in performing a

detailed analysis. We will advise you of their findings at a later date. S&L's analysis concludes that the remaining conduits/ cable pulls are acceptable.

The results of this analysis and the supporting calculations are presently being put together into an auditable format. We expect to complete this effort by July 22, 1983.

If you have any questions, please contact me.

Yours very truly,

T. R. EISENBART

T. R. Eisenbart
Electrical Engineer

TRE:dw
In duplicate
Enclosure
Copies:
G. Sorensen/J. O. Binder (1/1)
D. L. Leone/W. C. Cleff (1/1)
R. J. Netzel (1/1)

SARGENT & LUNDY
ENGINEERS
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603
(312) 269-2000
TWX 810-221-2807

June 22, 1983
Project Nos. 4391/2 &
4683/4

Commonwealth Edison Company
Byron/Braidwood Stations - Units 1 & 2

Cable Pull Criteria
S&L Specifications F/L-2823 & F/L-2851
CECo P.O. Nos. 203608, 203609, 207113 & 207114

Mr. C. L. Doerr
The Okonite Company
1515 Centre Circle
Downers Grove, Illinois 60515

Dear Mr. Doerr:

Enclosed are copies of two sketches covering three separate cable installations at Byron Station. Records of the tensions experienced during the cable pulls are not available, and the acceptance of these installations is dependent upon the acceptance of calculated pulling tensions.

These sketches are being sent to you for your analysis and comment, because our preliminary calculations for these installations indicate that the maximum allowable pulling tensions for the installed cables, based on Okonite's cable pulling criteria, may have been exceeded.

Will you please analyze these cable installations and give us your recommendation covering the disposition of the installed cables.

If you have any questions about the installations shown on the sketches, please contact us.

Yours very truly,

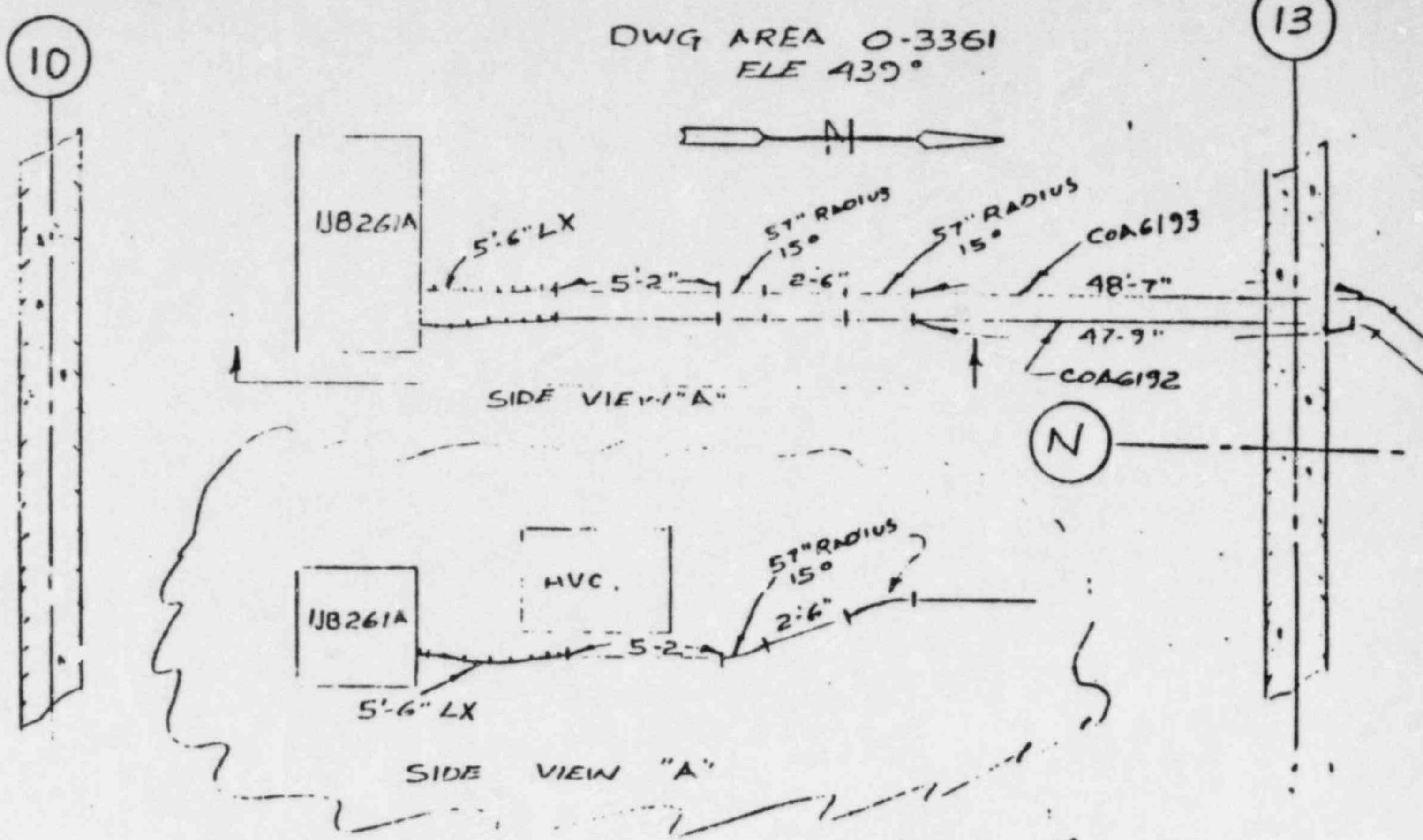
J. F. Clancy

J. F. Clancy
Electrical Engineer

JFC:dmm
In duplicate
Enclosure
Copies:
J. T. Westermeier (1/1)
G. Sorensen (1/1)
D. L. Leone/M. C. Cliff (1/1)

COPY

SKETCH S-C-1



J. Durnell
LEVEL II QC

June 15-83

PAGE 1 OF 4

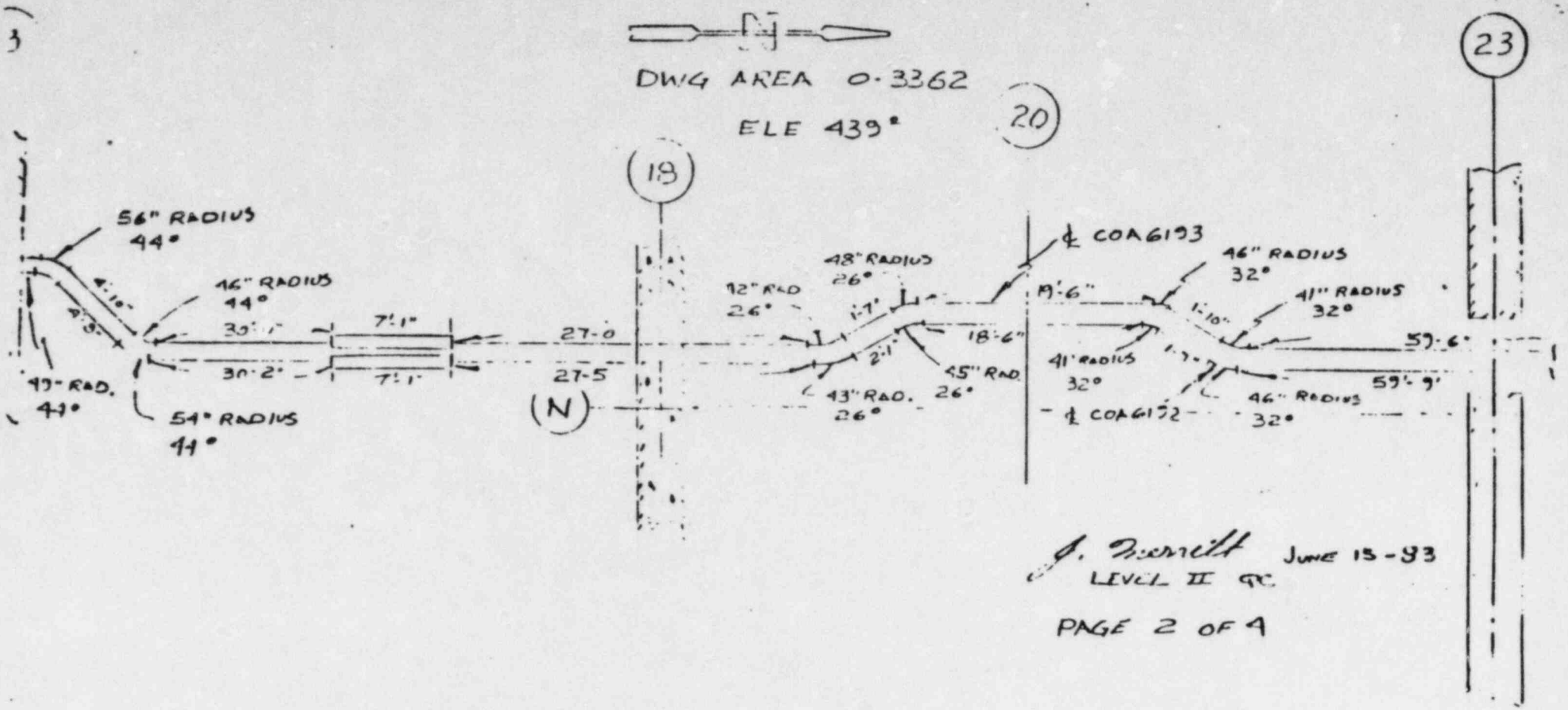
Direction Of Pull ——→ (Starts At 1JB261A)

Installed Cables: 3-1/c 750 KcMIL, 5KV (Both Conduits)

Pulling Eye Used - Our C[illegible], Fill, [illegible] Sleeve Not Utilized.

Cable Pulled From 1JB261A To 1JB[illegible] For Conduit C[illegible]

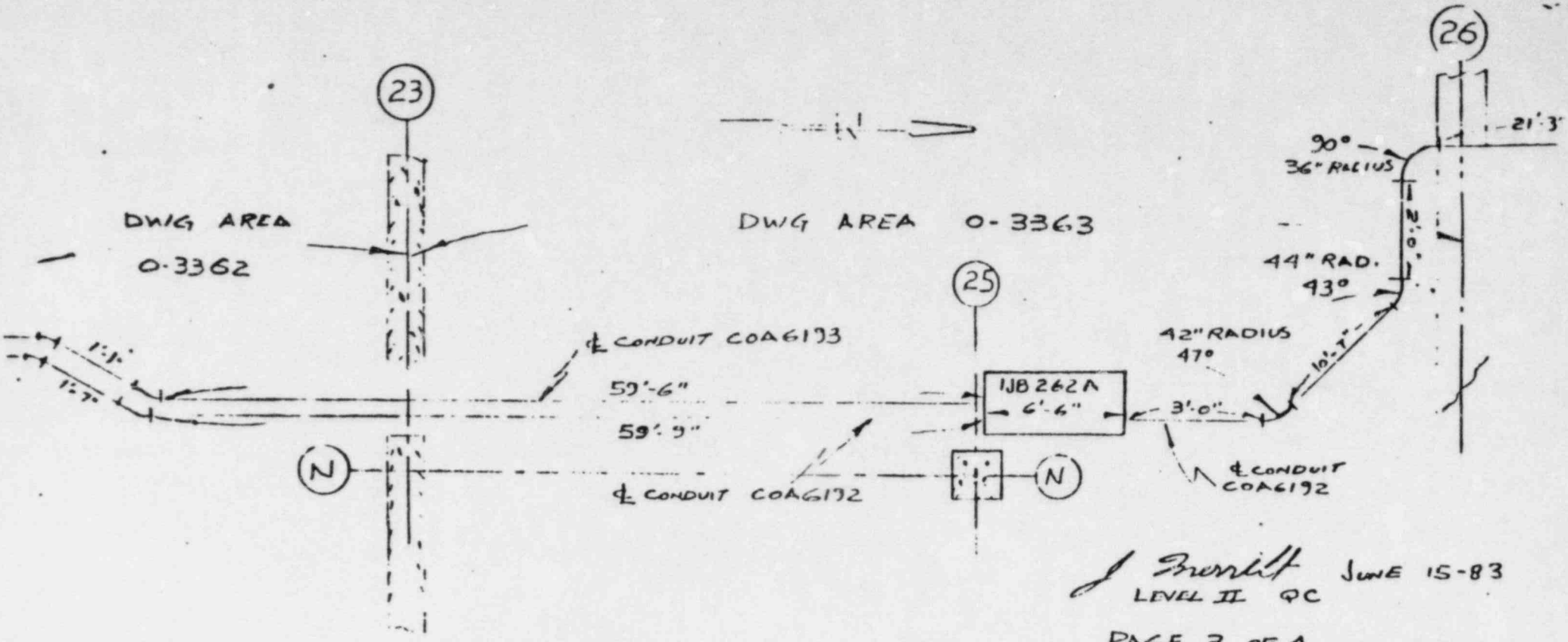
Cable Pulled From 1JB261A To [illegible]



J. Bennett JUNE 15-93
LEVEL II QC

PAGE 2 OF 4

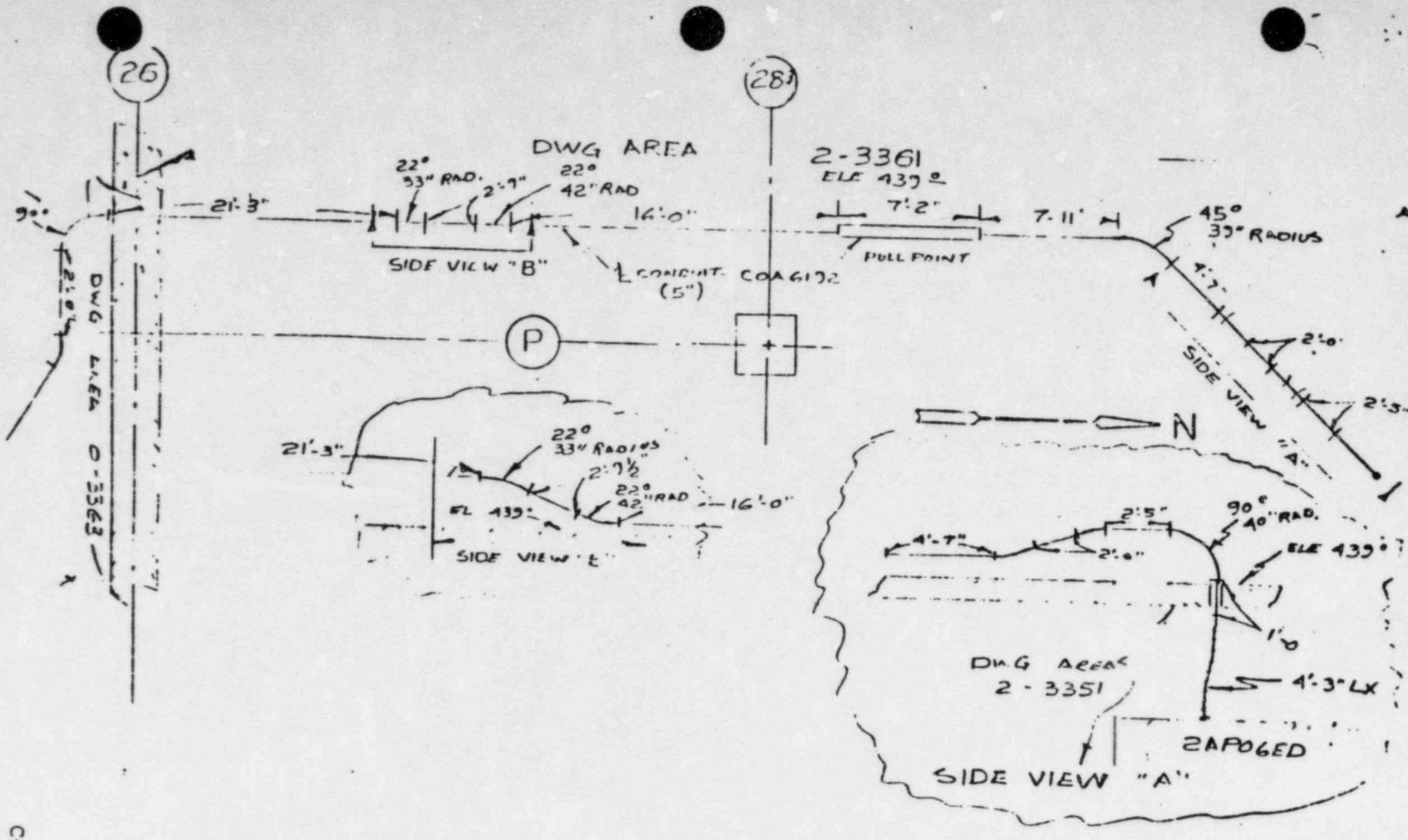
C-5



J Bronkhorst JUNE 15-83
LEVEL II QC

PAGE 3 OF 4

C-6



C-7

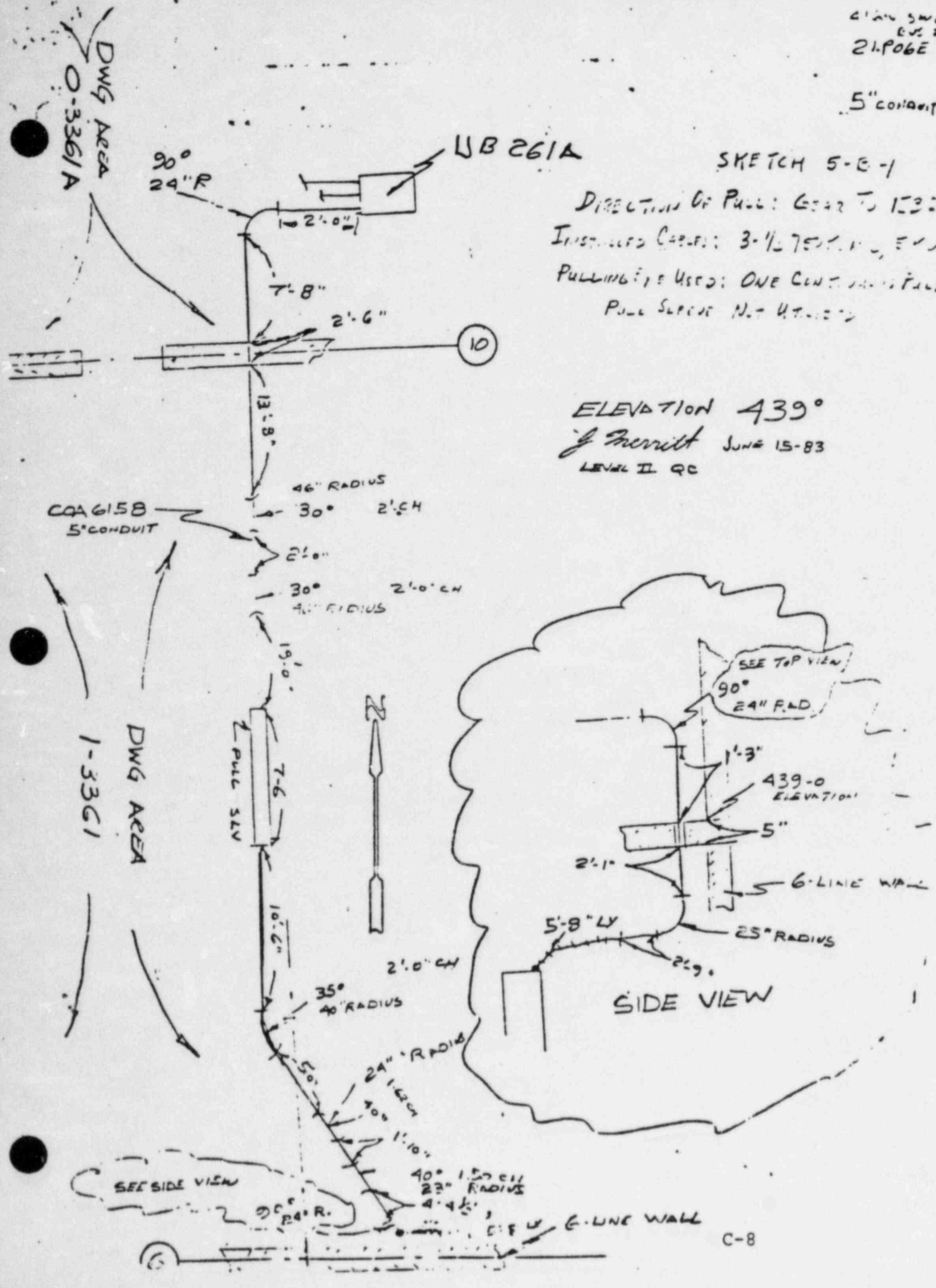
J Prewett June 15-93
LEVEL II QC

PAGE 4 OF 4

21.P06E

5" CONDUIT

SKETCH 5-B-1



ELEVATION 439°

J Merritt JUNE 15-83

LEVEL II QC

C-8

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

Treece
Attachment D

JUN 6 1984

JUN -7 RECD

Docket No. 50-454
Docket No. 50-455

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the routine safety inspection conducted by Messrs. R. S. Love and E. Christnot of this office on April 24-27, April 30-May 4, and May 10-11, 1984, of activities at Byron Station authorized by NRC Construction Permits No. CPPR-130 and No. CPPR-131 and to the discussion of our findings with Messrs. R. Tuetken and R. B. Klingler and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as specified in the enclosed Appendix. A written response is required.

As a result of this inspection, it is our understanding that you will conduct a reinspection of all electrical conductor butt splices at Byron Station, Units 1 and 2, as outlined in your letter of May 17, 1984, D. Farrar to James G. Keppler.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure(s) will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1). If we do not hear from you in this regard within the specified periods noted above, a copy of this letter, the enclosure(s), and your response to this letter will be placed in the Public Document Room.

The responses directed by this letter (and the accompanying Notice) are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

R. L. Spessard

R. L. Spessard, Director
Division of Engineering

Enclosures:
1. Appendix, Notice of Voilation
2. Inspection Reports No. 50-454/84-27 and No. 50-455/84-19

cc w/encls:
D. L. Farrar, Director of Nuclear Licensing
V. I. Schlosser, Project Manager
Gunner Sorensen, Site Project Superintendent
R. E. Querio, Station Superintendent
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII Byron
Resident Inspector, RIII Braidwood
Phyllis Dunton, Attorney General's Office, Environmental Control Division
Ms. Jane M. Whicher
Diane Chavez, DAARE/SAFE
R. Rawson, ELD

Appendix

NOTICE OF VIOLATION

Commonwealth Edison Company

Docket No. 50-454
Docket No. 50-455

As a result of the inspection conducted on April 24-27, April 30-May 4, and May 10 and 11, 1984, and in accordance with the General Policy and Procedures for NRC Enforcement Actions, (10 CFR Part 2, Appendix C), the following violations were identified:

1. 10 CFR 50, Appendix B, Criterion V, as implemented by Commonwealth Edison Company Topical Report (CE 1-A), Section 5, requires that activities affecting quality be prescribed by documented instructions or procedures.

   Contrary to the above, the licensee failed to assure that the requirements of S&L Drawing 6E-0-3237 B, February 1983 Revision, Note 47, were translated into instructions or procedures. Note 47 requires the electrical contractor to inspect for cable tray separation and add cable tray covers when the minimum separation requirements have been violated. This is exemplified by the fact that 124 units of safety-related cable tray has been installed since February 1983 and this tray has not been inspected for separation requirements. Additional details are discussed in Paragraph 2.d of Inspection Report 454/84-27; 455/84-19(DE).

   This is a Severity Level V violation (Supplement II).

2. 10 CFR 50, Appendix B, Criterion XVI, as implemented by Commonwealth Edison Company Topical Report (CE 1-A), Section 16, requires that measures be established to assure that conditions adverse to quality such as nonconformances are promptly identified and corrected.

   Contrary to the above, the licensee failed to assure that nonconforming cable tray hangers were identified and corrected. This is exemplified by the fact that as a result of this NRC inspection, 345 previously accepted cable tray hangers were reinspected and 119 were found defective and 19 were indeterminate because they were inaccessible for reinspection. A contributing factor to this item is that CECo Quality Assurance failed to determine the effectiveness of the electrical contractor's cable tray hanger reinspection program (Reference - HECo NCR 407R). Additional details are discussed in Paragraph 2.c of Inspection Report 454/84-27; 455/84-19(DE).

   This is a Severity Level IV violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

JUN 5 '84
Dated

R. L. Spessard
R. L. Spessard, Director
Division of Engineering

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

E. Christnot E. Christnot 6/6/84
Date

Approved By: C. C. Williams, Chief C. C. Williams 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).

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 HECo 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 HECo 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 CECo letter, dated Spetember 22, 1982, HECo 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 HECo. 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. HECo 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 HC05, 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 H143, 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 HC08, 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 noncomplaicance 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" horziontal 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 verfied 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-0-32378, February 1983 revision, to prevent recurrance of cable tray separation violations. During a review of Drawing 6E-0-32378, Revision L, it was observed that Note 47 directed the electrical contractor, HECo, 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 HECo 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 CECo Project Electrical Supervisor, CECo Electrical QA Engineer, CECo Electrical Field Engineer, HECo QA/QC Manager, and HECo Project Engineer, it appeared that these personnel were not aware of the requirement of Note 47 on Drawing 6E-0-32378 until it was brought to their attention by the Region III inspectors. It was also learned that HECo 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: HECo NCR 975, dated May 4, 1984), and 41 reports were submitted for Unit 2 (Reference: HECo 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 programhad 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 CECo. 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 occured 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 19, 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):

Report No.	Cable No.	No. Rejects	Remarks
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	1RH055	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 5928	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 coper at Splice-replaced
	10G157	1	Butt splice replaced
	10G158	1	Cut insulation-repaired with shrink-fit material
	10G163	1	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 doucmented 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:

CITR No.	Cable No.	No. of Splices	Remarks
119	1MS529	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	1NR229	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 randomally 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 insultation identified.

To determine if all QC termination inspectors were documenting butt splices on CIRTs, the CECo Electricl 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 Reigon 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.

mgc20-9

MS. GIBBS: For the benefit of those persons sitting in the audience who haven't seen the direct testimony, I will give a brief synopsis of what is covered by it.

Mr. Binder's testimony talks about the general subject of cable overtensioning, which concerns the amount of tension exerted on a cable when it is pulled into conduit. He discusses certain items of noncompliance and open items which the NRC identified in this area and describes how those items are resolved. He references an analysis of cables pulled in conduit at Byron Station that is performed by Sargent & Lundy, and Mr. Binder concludes that all of the safety-related cable installed in conduit at Byron Station are acceptable and have not been rendered unable to perform their intended functions due to cable overtensioning.

Mr. Treece's testimony describes an analysis of cables, safety-related cables pulled in conduit at Byron Station, and his testimony describes this analysis and describes his conclusion that those cables have not been rendered unable to perform their intended functions due to cable overtensioning.

The panel is now available for cross-examination.

MR. CASSEL: I have just a few questions for the panel. Either one of you may answer, as you see fit.

End20

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CROSS-EXAMINATION

BY MR. CASSEL:

Q In Mr. Treece's testimony it refers to -- and I mention Mr. Treece's testimony, but again whoever is the appropriate person to respond -- there is an indication of Sargent & Lundy having analyzed approximately 2600 conduits which had been pulled in order to determine whether they were adequate to perform their intended functions.

Did the analysis which Sargent & Lundy performed consider the issue of elongation of the insulation of the cable, as opposed to elongation of the conductor in determining the suitability of the cable?

A (Witness Treece) There was no specific reference made to elongation in jacket material. However, the insulation and jacket material is a flexible material and the elongation of the copper conductor is a primary structural member that is stressed, and certainly the insulation and jacket material would give in the same manner that the structural material gives.

MR. CASSEL: I am not going to ask that this be marked with a number until we get a little further down the road, Judge.

(Document distributed to Board and Parties.)

BY MR. CASSEL:

Q Mr. Treece and Mr. Binder, I will now show you and

mm2 your counsel a document and I will ask you to refer to a specific page of it.

For the record, the document which I have just tendered you purports to be a report from the U. S. Nuclear Regulatory Commission Region 3, Report Nos. 50-454/84-27(DE) and 50-455/84-19(DE), concerning an inspection at Byron during April and May of 1984.

MS. GIBBS: Your Honor, if I may interject, the document which Intervenors' counsel has just passed out is attached to Mr. Binder's testimony. It is attachment E.

I believe it is also attachment D to Mr. Treece's testimony.

The only thing that is different is the cover letter and notice of violation are missing. But every page that he has given out is already an attachment. It starts at page E-5 of the attachment to Mr. Binder's testimony.

MR. CASSEL: That is E-5 of the attachment to Mr. Binder's testimony?

MS. GIBBS: And D-5 of the attachment to Mr. Treece's testimony.

MR. CASSEL: Then I won't have to take the risk of having anything marked as an exhibit, because it is already in the record and I didn't object.

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BY MR. CASSEL:

Q Turning to page 12 -- is the right characterization Exhibit E to Mr. Treece's testimony?

A (Witness Treece) D.

Q D to Mr. Treece's testimony.

JUDGE SMITH: It is Attachment D.

BY MR. CASSEL:

Q Attachment D to your testimony.

MS. GIBBS: I think it is page 17 of our exhibit.

BY MR. CASSEL:

Q It is page 17 of your exhibit, page 12 of the original document, paragraph 3.

MS. GIBSS: Excuse me, that is page D-16.

BY MR. CASSEL:

Q Page D-16 of Attachment D to Mr. Treece's prefiled testimony. It is also page 12 of the document which I passed out.

Now, on that page the top half of the page is headed with the number 3.

If you would take a moment Mr. Treece, and also Mr. Binder, to review this paragraph 3, and then let me know when you have had a chance to look at it. Then I have a question or two.

A (Witness Treece) I'm ready.

Q If I understand this correctly it refers to some

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direct current control power cable failures, and as a result of that, a sample -- in Paragraph 3 d., it indicates that a sample of the cables was pulled and tested by the manufacturer and it was found that the sample failed a production test which it had passed prior to shipment.

And the paragraph that I am interested in is the one numbered e., where it says -- apparently I guess this is the statement of the NRC Staff, and correct me if I am wrong on that, "the probable failure to pass the test was due to elongation of the cable insulation."

Does that indicate, Mr. Treece,that there is sometimes a potential problem with elongation of the insulation in the cable as opposed to conductor that should have been considered by Sargent & Lundy in its safety analysis?

MS. GIBBS: I object, your Honor, on the grounds that the paragraph to which Intervenors' counsel has cited is not a paragraph that we have discussed in our testimony, and it does not have anything to do with the cable overtensioning issue. And I would suggest that questioning on the attachment should be limited to the portions that have to do with the direct testimony of the witnesses on the panel.

JUDGE SMITH: I think Ms. Gibbs, we will have a somewhat greater burden if this elongation of the cable insulation matter is not an issue, even though it is

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associated with the cable pull report, why is it bound to your testimony?

MS. GIBBS: Your Honor, the attachments to the testimony are, in large part inspection reports from the NRC. They deal with dozens, perhaps hundreds of items that are inspected by the NRC during their various inspections. A few of those pertain to cable overtensioning, and therefore he referenced them in testimony. Rather than just picking out individual pages which wouldn't make any sense, we decided to attach the entire inspection report to his testimony. But there are thousands of issues in here that have nothing to do with the testimony of Mr. Treece or Mr. Binder.

JUDGE SMITH: We will overrule your objection for now. And you are free to renew it if further examination demonstrates that your observation is correct.

MS. GIBBS: Thank you.

MR. CASSEL: I don't recall. I suppose I did have a question because there was an objection.

BY MR. CASSEL:

Q Do you recall the question, Mr. Treece?

A (Witness Treece) I don't recall the exact wording. I would like for you to repeat it.

Q The question really gets to the effect -- and maybe this isn't relevant to the problem that you analyzed in your safety analyses and maybe it is, I simply don't know.

mm6

I would like you to explain to us if you think it is.

It appears here that there was a failure to pass the test because of the elongation of the insulation as opposed to the conductor. Does that suggest that some consideration of the elongation of the insulation should have been included in Sargent & Lundy's analysis of the 2600 conduits?

A I don't think it does suggest that, but I guess I would have to say from the beginning that I suspect that these are the NRC inspector's summary of what he read from from the cable manufacturer's evaluation of the cable failure. These are not Sargent & Lundy words, I think they are NRC Region 3 inspector's words, and summarize what he read in a cable manufacturer's evaluation.

I might suggest that elongation of cable insulation could result from many causes other than cable pulling.

Q Could it also result from cable pulling?

A I don't believe that it could result directly from cable pulling. It could result from pressures exerted on jackets and insulation during cable pulling. There could have been gouges or some type of cuts injected into this cable during the pull that could have caused the elongation.

Q During your analysis of the 2600 conduits that you did review, did your analysis take into account the possibility that there were pressures placed on the

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insulation during the cable pulling?

A Yes, sir.

Q It did take that into account?

A Yes, sir.

Q How did it take that into account?

A Something called sidewall pressure. It is a pressure exerted on the cable jacket when it is pulled around a bend in a conduit or around a sheave, which is a sort of pulley.

Q Are you suggesting that sidewall pressure is the same thing as elongation of cable insulation? I thought they were two different things.

A I am suggesting sidewall pressure can cause elongation of cable insulation.

Q But other than sidewall pressure, you do not believe that elongation of cable insulation can be a problem which arises during the process of cable pulling?

A Not over and above what we considered in our analysis, which as I explained is based upon pulling tensions allowable based on the strength of the copper and on sidewall pressure.

end T21

Q Mr. Binder, is there anything you would want to add to that answer?

A (Witness Binder) No.

Q Again, my question is addressed to the panel. Can you define the term portion as it applies to cables of the sort that were analyzed by Sargent & Lundy at Byron?

A (Witness Treece) I cannot.

A (Witness Binder) Nor can I.

Q And you are not familiar with any studies of torsion as a separate problem, potentially resulting in either the conductor or the insulator?

A (Witness Treece) No, sir. I am not.

Q I take it then, just to complete the record, that torsion specifically was not expressly considered in Sargent & Lundy's analysis of these 2600 cables?

MS. GIBBS: Objection, the witnesses have both said they don't even know what that term means in relation to cable tension.

MR. CASSEL: I think that means the answer will be yes. I just want to be clear.

WITNESS BINDER: I think to properly answer the question we need to know how you're defining torsion to evaluate whether or not it was used in Sargent & Lundy's evaluation. It's a term that apparently Bob and I -- Mr. Treece and myself are unaware of, as it relates to cable pulling

Perhaps if you define it Bob could determine whether or not it was taken into account in the analysis.

JUDGE SMITH: Gentlemen, you ought to be aware when your lawyer objections you should hold your answer until we have a chance to rule on it.

WITNESS BINDER: Sorry.

JUDGE SMITH: Don't be sorry to me. You have to explain to her.

(Laughter.)

MS. GIBBS: Was there a ruling on my objection.

JUDGE SMITH: Well, it's moot. The answer is there. So for that reason your objection is overruled.

BY MR. CASSEL:

Q It is my understanding, which is far from scientific, torsion refers to twisting of the cable as opposed to simple pulling. With that explanation, twisting -- which might have independent effects referred to as the effects of torsion on the cable -- was that considered in the safety analysis of these 2600 conduits?

A (Witness Treece) Not as a separate entity. I would suspect that it may well be a factor that contributes to the establishment of the allowable pulling tensions, as given to Sargent & Lundy by the cable manufacturer.

Q Do either of you know whether torsion or twisting is something which routinely occurs when cable is pulled at

the site for the purpose it's used at Byron?

A (Witness Binder) I would say it's a normal occurrence. When you're pulling cables and conduits, it's been my experience that it's a normal occurrence.

MR. CASSEL: I have no further questions, Judge.

MR. LEWIS: The Staff has no questions of this panel.

JUDGE SMITH: This is testimony that could almost have been stipulated, it seems to me.

EXAMINATION BY THE BOARD

BY JUDGE COLE:

Q I have one question gentlemen.

On page 11 of your testimony, Mr. Binder, in response to question 20, as to the disposition of NCRs pertaining to potential cable overtensioning, you list three ways in which a cable was determined to be acceptable. One by analysis by the manufacturer; another by analysis by Sargent & Lundy; and a third category, the one which I have a question about, was by testing. Some were determined to be acceptable by testing, as recommended by the cable manufacturer.

In reading Mr. Treece's testimony, I see no reference to -- or I didn't find it in his testimony -- any reference to those that were determined to be acceptable by testing. Could you -- am I missing something?

A (Witness Binder) Yes, sir. I think you may be. The specific analysis that was done by S&L was for cables that were identified, that were installed prior to implementation of sidewall calculations at the site. The specific analyses done here were for specific cables identified on individual NCRs for which cable-pulling tensions were available and the date it was given to S&L for analysis on an individual NCR basis.

Some of those NCRs were determined acceptable based on S&L's evaluation. Some had to be further analyzed by the manufacturer. And in some cases, the manufacturer recommended field testing be performed on the cables to determine their acceptability for installation.

Q And was some field testing actually done?

A Yes, sir.

Q And is it so that that is not included in Mr. Treece's testimony? Is that correct, Mr. Treece?

A (Witness Treece) That's right.

Q And why would that not have been included in your testimony?

A I believe that these NCRs that Mr. Binder is referring to are outside the scope of the pre-19 -- December '82 cables.

A (Witness Binder) No, somewhere in there,but they were individually identified previously on specific NCRs.

Your Honor, if you will turn to Attachment G of my testimony, page G-6 as an example.

Q Okay. I have G-6.

A Excuse me one minute, Your Honor.

(Pause.)

MS. GIBBS: Your Honor, if I might add something that might clarify the situation. I believe in Mr. Treece's testimony, he states that Sargent & Lundy reviewed NCR F 747 in connection with their cable pull analysis. If you will look at the attachment which Mr. Binder referred to, you'll see that testing was recommended, for example, in NCR F 679, whichwas a different NCR, not reviewed by Sargent & Lundy in connection with their analysis.

And therefore, there was no reference to testing in his testimony.

WITNESS BINDER: That's what I was looking for.

JUDGE COLE: That satisfies me, thank you. I wondered if I was missing something. Thank you.

BY JUDGE CALLIHAN:

Q Mr. Treece, page 5 of your testimony addresses apparently a deficiency by Hatfield Electric. And it says -- the testimony says, in the third line "Hatfield did not address the requirements to calculate allowable cable pulling tension."

A (Witness Treece) Excuse me, Your Honor. Where are you?

Q Page 5, top of the page, third line.

A Go ahead. I'm sorry. I'm with you.

Q I thought the manufacturer gave the allowable cable pulling tensions. What was Hatfield expected to calculate?

A Your Honor, the manufacturer gives the allowable cable pulling tensions for each individual cable, okay? When a cable is installed in a conduit it may be combined with several other cables of either the same size or of different sizes. When the contractor pulls that combination of cables, he has to arrive at the total allowable tension for the combination, as opposed to the individual.

And it is not simply the arithmetic sum of the allowable pulling tensions for the individual cables. So what we do is give the contractor the formula to calculate the allowable total tension to be applied to the combination.

Q In general, is that allowable pullable tension greater or less than the manufacturer's specifications?

A It is less, in that you sum up the allowable tensions for each of the individual cables and multiply it by a discounting number, like 8/10ths of the sum. Do you follow me? So that the total allowable tension for a combination is less than the arithmetic sum of the individual allowables.

Q And you somehow hope that the pull is distributed

among the cables?

A Yes, it's distributed but the derating is to account for the fact that it may not be equally distributed.

Q Does one ever pull single cables?

A Yes, sir.

Q In a group? Suppose your specifications for your contract says that you have got to have six number 10 wire, such and such insulation.

A In a conduit?

Q Do you always feed the six in and pull them as a group, or do you ever pull them separately?

A I'll let Mr. Binder answer that.

A (Witness Binder) I think if I understand, Your Honor, you are asking if cables for a given conduit run that may contain more tha n one cable, are the cables always pulled at the same time, or are they pulled on occasion individually?

Q Are they pulled as a group or are they ever pulled separately?

A Sometimes they are pulled separately.

Q You spoke of cable run. So had I thought about it. Give me an order, I mean order of magnitude. One foot, ten feet, hundred feet. What are the length of the cable pulls that you're talking about?

A The average length of conduit for a cable pull is

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probably on the order of 20 feet or so, on the average.

Q That's the distance between boxes?

A Yes, sir.

end22

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Q There is reference, Mr. Treece, in your pages 6 and 7, to , quote, "general pull criteria," unquote, and something else that I associate with a specific analysis toward the end of your question, A.15.

Can you clarify or educate me, as the case might be, what are the general pull criteria, and then what are the composite criteria?

A (Witness Treece) Well, Your Honor, as I mentioned before, we get the allowable pulling tensions from the manufacturer for each different type and size and cable.

Q If it were pulled alone?

A Yes, sir. And we get that from each different cable manufacturer, of which there is more than one. The allowable pulling tensions for multiple pulls are not -- each manufacturer is not necessarily consistent with the derating or discounting that I mentioned to you before. One manufacturer may tell you that it's okay to sum up arithmetically the allowable tensions of each individual cable for the total allowable. The next manufacturer may tell you to discount it by 20 percent for the allowable total.

What we do in our general criteria that we issue to the contractor is use the most stringent of all of the allowables as given to us by the various

mgc23-2

manufacturers. In the example I gave you, we would use 80 percent.

Q Now are these specifications, or is this specification by a particular manufacturer related to a particular type of cable type of insulation and so forth, a general pull criteria that you note on the bottom of page 6?

A I may not have understood your question correctly. That is the way we convey to the electrical contractor the allowable pulling tensions that he is to use.

Now when we talk about a specific criteria or a specific analysis, I believe in my testimony we are talking about an analysis by the manufacturer, and that difference between general and specific alludes to the conservatism that the manufacturer puts in the numbers he gives Sargent & Lundy as to allowable tensions. He puts a conservative margin. He doesn't give us the ultimate, maximum pulling tension for each cable. And that is the reason for those cables that we were not able to justify using the general criteria, that we sent those to the manufacturer so that he could give them further analysis using his own allowables.

Q Does, in general, the specific analysis demand a lesser pulling force than the application of the general

mgc23-3

criteria?

A No, I would say it's the other way around, Your Honor, that the cable manufacturer has a specific analysis which would use a higher allowable tension, and therefore would be able to justify that higher actual tension.

Q Do you know what factors allow this higher -- or what properties or what characteristics of insulation and whatnot allows this greater pulling force?

A I don't think it's a characteristic of the cable, Your Honor. I think it is simply that he establishes what he thinks is the maximum it should be subjected to, and he discounts that number before he issues it to a user. It's a margin that he builds into the number he gives to Sargent & Lundy.

Q So this is sort of on a case-by-case -- special case basis, then?

A It's only on a case-by-case basis that we submit them to the manufacturer. If we're not able to justify it on a general criteria basis, then we submit it to the manufacturer for his analysis using his allowables.

Q Thank you.

Mr. Binder, would you comment a bit on the nonstandard radius bends? This is on page 7. You make mention of nonstandard radius bends. I presume this is

mgc23-4

the radius of the conduit? It's on about the middle of the page in your Answer 16.

A (Witness Binder) Yes, sir, you are correct. That is the radius of bend of conduit. They have specifications that have been established from manufacturers' criteria where they have established what they call standard radius bends. A certain size conduit will have a certain radius for a normal bend.

They also have established what they call minimum bend or the maximum -- the minimum amount of radius that can be used to bend that conduit without -- I assume without potentially causing any rippling of the pipe or anything that might be detrimental to a cable installed in that conduit. That is what we refer to as nonstandard radius bends.

Q Is this a function of a conduit -- I beg your pardon -- a function of the conductor and the insulation ovality and that sort of thing?

A I would assume it's a function of the size of the conduit.

Q And that is made to prevent ovality?

A I'm sure that's one consideration.

Q On page 11, your Answer No. 20, reference is made to the acceptability of installed cables, and you speak of acceptability being determined by analyses, and

mgc23-5

further on, "Some were determined" -- "Some acceptabilities were determined by testing as recommended by the cable manufacturer."

What sort of testing was that?

A Sir, the manufacturer would specify a megger test and/or a high potential test be made on the cable to determine the integrity of the insulation on the cable.

Q After installation?

A Yes, sir.

Q Say that again please?

A A megger test and/or a high potential test.

Q After installation?

A Yes, sir, after the cable has been installed.

MS. GIBBS: Mr. Bender, perhaps you can describe those two tests for the record.

WITNESS BINDER: Yes.

A megger test is -- I'm at a loss for words. It's a check of the insulation resistance of the cable, and a high potential test is the application of high voltage to the insulation of the cable to determine its withstandability of that voltage.

BY JUDGE CALLIHAN:

Q For sparkover?

A Yes. That's a field indication which demonstrates the ability of the insulation to withstand the specified

mgc23-6

voltage.

Q I guess what I spoke to earlier was prompted by the infamous 13 cable deal on page 13, and here was a matter of whether the pull was distributed, uniformly or non-uniformly distributed among the 13 cables -- 12 after you pulled one of them out.

Is the conclusion one gets from this long discussion that you really didn't now, so you gave up and replaced all of them? Is that what you were forced to do in this case?

A Yes, sir, that is correct. We were unable to determine, since the cables were encased in the conduit, you could not determine whether or not the applied tension had been applied to a single cable or all the remaining twelve cables in the conduit.

Q In your Answer 26 on page 14, which I guess led finally to this complete replacement, but I did have on question on paragraph 3 of that answer.

NBU

"The verification of the resolution of deviation reports" so-and-so "was not completed by the same QC inspector who has witnessed the problem and written the deviation report."

Now the next sentence says, "This inspector..." Which one is this?

A The second QC inspector or the QC inspector that

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finally closed the report.

Q So he was -- it was -- this inspector didn't write the original DR?

A Correct. The inspector that did not write the original, describe the original problem, but who had evaluated the engineering resolution based on the first or the original QC inspector's written description of that.

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JUDGE CALLIHAN: That's all I have. Thank you very much.

JUDGE SMITH: Any questions on Board questions?

MR. CASSEL: One follow up point. It might be only a question or two.

CROSS ON BOARD EXAMINATION

BY MR. CASSEL:

Q I believe Judge Callihan asked you a question relating to the location of the cable pull boxes. Is the location of the cable pull boxes something which effects the capability of the cable, its ability to withstand stress?

A (Witness Binder) If I understand the question, it's whether or not the location of a pull box affects the ability of the cable to withstand certain pressures?

Q Let me try to state it more precisely. Does not the location of the cable pull box affect the length of the cable, which is a factor in the ability of the cable to withstand stress?

A (Witness Treece) The pull box that you refer to is a box that is installed in the conduit to permit the contractor to make short pulls instead of having to pull the total length of the conduit, so you can break his pull up into individual short pulls, as opposed to one long pull. Now the location of that box doesn't affect the ability of the cable to perform its function. It does affect the

tension placed on the cable, if you compared the tension that would have to be placed on the cable without the box as what has to be placed on the cable with the box there. It permits them to make short easy pulls, as opposed to one long, tough pull.

Does that answer your question?

Q Yes. Is it desireable that the pull box be appropriately located?

MS. GIBBS: What does appropriately mean?

BY MR. CASSEL: Located in such a way as -- I'm probably not going to state this well, so with reference to the answer you just gave, if you can help me out I'd appreciate it.

Is the location of the cable pullboxes something that matters to the cable? You can't just distribute them randomly at any location? Do they need to be at particular intervals, or at particular locations?

WITNESS BINDER: I would say they're not required to be in any particular location, unless they would be so specified on the drawing.

MR. CASSEL: I think we're having a failure of counsel here, to sufficiently appreciate the technical issue. But let me ask a couple of additional questions that may get there a different way.

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BY MR. CASSEL:

Q Sargent & Lundy has, does it not, conduit and miscellaneous electrical equipment installation specifications that are applicable to Byron. Isn't that correct?

A (Witness Treece) I don't recognize that name. Will you be a little more specific?

JUDGE SMITH: Are you still going to the location of the cable pullboxes?

MR. CASSEL: Yes, this is going to the location of the cable pullboxes.

JUDGE SMITH: That seems like such a simple matter. There should be a more direct way to get to it.

BY MR. CASSEL:

Q Let me try to get there directly. It seems to be, in the installation specifications for conduit applicable to Byron, a statement -- I believe that's a Sargent & Lundy document -- that the electrical installation drawings will not show the pullboxes that are required in a conduit run. It shall be the electrical installation contractor's responsibility to locate and install the pullboxes necessary for proper cable pulling operations to prevent exceeding maximum cable pulling tension for sidewall pressure or other damage to the cable.

I can show you the document or we can take the time -- do you want to see a copy of this?

MR. MILLER: Yes.

(Document handed to parties and witnesses.)

JUDGE SMITH: Is the issue whether pullboxes must be appropriately spaced to avoid overtensioning or is the issue how is that location -- or who determines where the location is?

MR. CASSEL: Both and they are interrelated.

WITNESS BINDER: Let me try and give you an answer here. In relation to the way I think you phrased the first question, you were talking about a specific location for the pullbox. There is a requirement that the electrical contractor for a conduit run that may be in excess of 270 degrees have a total of 270 degrees of bend, in excess of 270 degrees of bends, that the contractor locate a pullbox somewhere in between the terminus points of that conduit so that any individual pull will have less than 270 degrees of bends.

MS. GIBBS: If I may interject, the document Intervenor's counsel has given to the witness has a legend on it which states "Use not permitted for Seismic Category I installations, as defined in NRC Regulation" such and such.

The witness's testimony is restricted to safety related cables. Therefore, I don't believe that this document has any bearing upon what these gentlemen are testifying on.

MR. CASSEL: I'm not offering the document for anything in the document, but only to assist the witness in understanding the question that I'm attempting to ask, about safety related cable.

MS. GIBBS: You referred to the document in this question.

JUDGE SMITH: I think that somewhere at the very beginning of this whole line there was a disconnect between counsel and the witnesses. He is simply, I think, trying to pursue the point that pullboxes have to be located wherever they are needed to avoid overtensioning. And that -- is that what it is?

MR. CASSEL: Yes, sir.

JUDGE SMITH: And that has been your point all along. And your answer has been well, they've got to be located where the drawings say they are. Well, that was one answer you gave. And then -- now I think that the description that he just read to you, notwithstanding the fact that it's a safety related -- it's not a safety related document -- describes the function that he is seeking for you to confirm.

WITNESS BINDER: I think to clear it up, Your honor, the original question asked, if they had to be located in specific locations.

JUDGE SMITH: You misunderstood, I think, his

question.

WITNESS BINDER: I think that's what I misunderstood. Pullboxes or pull points are located as deemed necessary by the contractor to limit the amount of tension for any given conduit cable pull. But they are not specifically located in the manner that they will be necessarily detailed on the installation drawing, to say install a pullbox or a pull point at this specific location.

BY MR. CASSEL:

Q Would it not reduce the risk of cable overtensioning for appropriate locations or ranges of locations of the pullboxes to be identified on the installation drawings, rather than leaving that up to the contractor who, as we all know, does not always perform perfectly?

MS. GIBBS: I object to that question, Your Honor.

JUDGE SMITH: Do you want to reconsider that?

MR. CASSEL: I'll withdraw the last clause. I'm just trying to point out the reason for suggesting that you would be reducing the risk by putting them on the drawings.

JUDGE SMITH: Do you agree that if the location of pullboxes were mandated by drawings, rather than left to the judgment of the contractor, it would reduce the risk of overtensioning?

WITNESS TREECE: Your Honor, it is not left to the

judgment of the contractor. The problem, as counsel pointed out, is he is referring to a document that is used for non-safety --

JUDGE SMITH: I believe you can disregard that document.

WITNESS TREECE: The drawings, I believe, are very specific in telling the contractor that he must install pullboxes in locations sufficient that no run will have more than 270 degrees of bend in the pull.

Now to answer your question, it doesn't make any difference where, in that run, he puts the pull box, so long as he does not exceed 270 degrees between pullboxes. Does that answer it?

MR. CASSEL: That answers the question.

No further questions, Your Honor.

JUDGE SMITH: Do you have redirect?

MS. GIBBS: I have no redirect, Your Honor.

JUDGE SMITH: No further questions?

Thank you, gentlemen.

(Witnesses excused.)

MR. MILLER: Further on the tour for tomorrow.

JUDGE SMITH: Must this be on the record?

MR. MILLER: No.

JUDGE SMITH: Is there anything else that has to be on the record?

Just one thing. Would it be more helpful to the parties that come from out of town if we met at 10 o'clock on Monday, rather than 9:00? Does that make a difference between a difficult morning or perhaps coming over the night before?

MR. GALLO: I would appreciate that, Your Honor.

JUDGE SMITH: Okay.

MR. CASSEL: That would be helpful.

JUDGE SMITH: 10 o'clock. All right, let's meet at 10 on Monday.

(Whereupon, at 5:05 p.m., the hearing was recessed to resume at 10:00 a.m. on Monday, July 30, 1984)

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the NRC COMMISSION

In the matter of: Commonwealth Edison Company
(Byron Nuclear Power Station Units 1 & 2)

Date of Proceeding: Friday, July 27, 1984

Place of Proceeding: Rockford, Illinois

were held as herein appears, and that this is the original transcript for the file of the Commission.

Mimie Meltzer
Official Reporter - Typed

Mimie Meltzer
Official Reporter - Signature