

**Nuclear Design Information Transmittal**

<input checked="" type="checkbox"/> Safety-Related <input type="checkbox"/> Non-Safety-Related <input type="checkbox"/> Regulatory Related	Originating Organization: <input type="checkbox"/> ComEd <input checked="" type="checkbox"/> Other (specify) <u>Sargent &amp; Lundy</u>	NDIT No. <u>BB-EXT-1293</u>
Station: <u>Braidwood</u> Unit: <u>2</u> Design Change Authority No.: <u>N/A</u> System Designation: <u>RB</u>		Page <u>1</u> of <u>1</u> To: <u>D. Christiana-BRW</u>
<b>Subject:</b> <u>Unit 2 Containment Tendon H4ED</u>		
<u>R. Montgomery</u> Preparer	<u>Project Engineer</u> Position	<u>R. Montgomery</u> Preparer's Signature
		<u>7/10/97</u> Date
<u>D. C. Patel</u> Reviewer	<u>Project Manager</u> Position	<u>D. Patel</u> Reviewer's Signature
		<u>7/10/97</u> Date
<b>Status of Information:</b> <input checked="" type="checkbox"/> Approved for Use <input type="checkbox"/> Unverified <input type="checkbox"/> Engineering Judgement		
Method and Schedule of Verification for Unverified NDITs: <u>N/A</u>		
<b>Description of Information:</b> Sargent & Lundy (S&L) has evaluated the Unit 2 containment structure assuming that all unseated wires in Tendon H4ED are broken. Our evaluation, which is documented in the attached Calculation 5.2.2-E 97-067, Revision 0, has shown that the containment structure is adequate and that stress levels remain below the allowables.		
<b>Purpose of Issuance:</b> <i>To document the results of S&amp;L's evaluation of the Unit 2 containment structure due to broken/unseated wires found in Tendon H4ED during the recent "water tendon" inspection.</i>		
<b>Source of Information:</b> Calculation #5.2.2-BRW-97-0667, Revision 0		
<b>Distribution:</b>		
Site E&C Library	(1/1)	D. L. Leone/J. Bojan/J. Saltarelli (EM)
T. Johnson	(1/0)	D. C. Patel (EM)
J. Panfil	(1/0)	P. H. Kirsch/File 4.2 (Original)
B/B File 1.0	(1/1)	
Project No.: <u>9.150-063</u>		
File No.: <u>1.0</u> Chron No.: _____		

n:\npd\rdm\ndit1293.doc

9707250147 970718  
PDR ADOCK 05000457  
S PDR

COMMONWEALTH EDISON COMPANY  
Calculation Title Page

Exhibit C  
NEP-12-02  
Revision 4

Calculation No.: 5.2.2-BRW-97-0667	Page No.: 1
<input checked="" type="checkbox"/> Safety Related <input type="checkbox"/> Regulatory Related <input type="checkbox"/> Non-Safety Related	
Calculation Title: Evaluate Tendon H&ED For Broken/Unseated Wires	
Station/Unit: 2	System Abbreviation: RB
Equipment No. (if appl.):	Project No. (if appl.) 905U-63
Rev.: 0 Status: Approved QA Serial No. or Chron No.	Date:
Prepared by: R. Nampuramali <i>R. Nampuramali</i>	Date: 7/9/97
Revision Summary: Original Issue Added pages 1 thru 8 Attachment A, pages A1 thru A9 Attachment B, pages B1 and B2 Attachment C, pages C1 and C2	
Electronic Calculation Data Files Revised: (Name ext/size/date/hour: min/verification method/remarks)	
Do any assumptions in this calculation require later verification? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Reviewed by: M. Valathuri <i>M. Valathuri</i>	Date: 7/9/97
Review Method: Detailed	Comments (C, NC or CI): NC
Approved by: R. Montgomery <i>R. Montgomery</i>	Date: 7/10/97

COMMONWEALTH EDISON COMPANY  
CALCULATION REVISION PAGE

CALCULATION NO. 5.2.2-BRW-97-0667			PAGE NO.: 2
REV: 0	STATUS:	QA SERIAL NO. OR CHRON NO.	DATE:
PREPARED BY:	_____		DATE:
REVISION SUMMARY:			
CALCULATION FILES REVISED: (Name ext/size/date/hour: min/verification method/remarks)			
DO ANY ASSUMPTIONS IN THIS CALCULATION REQUIRE LATER VERIFICATION <input type="checkbox"/> YES <input type="checkbox"/> NO			
REVIEWED BY:	_____		DATE:
REVIEW METHOD:	COMMENTS (C, NC or CI):		
APPROVED BY:	_____		DATE:
<hr/>			
REV:	STATUS:	QA SERIAL NO. OR CHRON NO.	DATE:
PREPARED BY:	_____		DATE:
REVISION SUMMARY:			
CALCULATION FILES REVISED: (Name ext/size/date/hour: min/verification method/remarks)			
DO ANY ASSUMPTIONS IN THIS CALCULATION REQUIRE LATER VERIFICATION: <input type="checkbox"/> YES <input type="checkbox"/> NO			
REVIEWED BY:	_____		DATE:
REVIEW METHOD:	COMMENTS (C, NC or CI):		
APPROVED BY	_____		DATE:

COMMONWEALTH EDISON COMPANY  
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DESCRIPTION Unit 2 Tendon H4ED Broken Wires	PAGE NO.	SUB-PAGE N
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## COMMONWEALTH EDISON COMPANY

CALCULATION NO. : 5.2.2-BRW-97-0567 PROJECT NO. 9050-63 PAGE NO. 4

### I. PURPOSE/OBJECTIVE:

To evaluate the effects of the Hoop Tendon H4ED broken/unseated wires on the Braidwood Unit 2 Containment Post-Tensioning System and hence the load carrying capacity of the containment structure.

The number of protruding (unseated) wires at the shop end/D Buttrass (Reference 2) and at the field end/E Buttrass (Reference 3) of Tendon H4ED increased during the current, July 1997 inspection from the installed condition, as reported in NSCI NCR #209 and ComEd NCR #435 (Reference 1).

### II. METHODOLOGY/ACCEPTANCE CRITERIA:

1. The total number of defective wires in Tendon H4ED (Shop + Field Ends) will be evaluated against the defective wire tendon previously evaluated in Reference 1(f).
2. Critical hoop reinforcing steel stress, considering two (2) adjacent tendons will be evaluated for the increased unseated wires based on Calculation 5.2.2.9, pages 120 and 121 (Reference 4)

### III. ASSUMPTIONS:

None

### IV. REFERENCES/DESIGN INPUT:

1. Historical data on (BRW) Unit 2 Tendon H4ED, transmitted by Tim Johnson, ComEd Braidwood Station, July 2, 1997 containing the following (Attachment A):
  - a) Anchorage Inspection Sheet, PSC Procedure SQ 8.0 for shop end
  - b) Original Stressing Card
  - c) NSCI NCR #209
  - d) Closure of ComEd NCR #435
  - e) NCR #435
  - f) S&L Evaluation Letter to ComEd for NCRs L-403, L-421, and L-435, April 28, 1983
2. NC/CA Report for Tendon H4ED, Shop End/D Buttrass, dated 7-3-97 (Attachment B)

REVISION NO.: 0

## COMMONWEALTH EDISON COMPANY

CALCULATION NO. : 5.2.2-BRW-97-0667	PROJECT NO. 9050-63	PAGE NO. 5
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3. NC/CA Report for Tendon H4ED, Field End/E Buttress, dated 7-8-97 (Attachment C)
4. Byron/Braidwood Calculation No. 5.2.2, Section 9, pages 108A, Rev. 8 and 109 thru 123, Rev. 7. Excessive Defective Wires in Tendons (NCR L-403, L-421, and L-435)

### V. CALCULATION:

1. Defective wires at installation per original stressing card, Reference 1(b) and NCR #435, Reference 1(e) for Tendon H4ED.

Shop End	8	(4 Broken, 4 Unseated)
Field End	<u>7</u>	(3 Broken, 4 Unseated)
Total	<u>15</u>	

- Defective Wires as of 7-1-97 and 7-8-97 Inspections:

Shop End	11	(unseated wires) - Reference 2
Field End	<u>9</u>	(8 unseated, 1 missing buttonhead) - Reference 3
Current Total	<u>20</u>	

- 1983 Evaluation for Tendon 51FE (NCR # L-403) in Reference 1(f)

Number Of Defective Wires Found Acceptable = 22 > 20 for H4ED

∴ 20 Defective Wire Condition For H4ED Is Acceptable

(If Concrete Reinforcing Steel Stress Is Within Allowables Per Step 2.)

2. Critical Rebar Stress

Critical Hoop Rebar Stress at 20 Ft. above basemat is due to average prestressing force on containment concrete section considering adjacent hoop tendon rings 32.5 (Reference 4, page 121).

Increase in defectives wires for H4ED = 20 - 15 = 5

$$\text{Average Decrease in Prestress} = \left(\frac{1}{8}\right)(931.69)\left(\frac{5}{170-15}\right) = 4.85^k$$

$$= 4.85 / 1.375 \text{ (Effective Tendon Spacing)} K / F$$

$$= 3.53 K / FT$$

$$= 4 K / Ft, \text{ Conservative}$$

REVISION NO.: 0
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## COMMONWEALTH EDISON COMPANY

CALCULATION NO. : 5.2.2-BRW-97-0667      PROJECT NO. 9050-83      PAGE NO. 6/Final

This decrease in prestress shall be compensated by an increase in rebar stress under design loads.

$$\text{Hoop Reinforcement, } A_s = 2.54 \text{ in}^2 / \text{Ft}$$

$$\therefore \text{Increase in Hoop Rebar Stress} = 4^k / 2.54 = 1.58 \text{ ksi}$$

$$\text{Design Maximum Rebar Stress} = 46.29 \text{ ksi}$$

$$\text{Net Rebar Stress} = 46.29 + 1.58 = 47.87 \text{ ksi} < 54 \text{ ksi (Fs)}$$

$\therefore$  Defective Wires in Tendon H4ED Do Not Cause Overstress in the Reinforcing Steel.

### VI. SUMMARY AND CONCLUSION

Based on the evaluation, the 1983 Evaluation/Disposition of NCRs in Reference 1 (f) is still valid. The defective wire condition noted on the shop and field end anchor heads of Tendon H4ED is acceptable and no further corrective action is required. However, it is recommended that continuity tests be performed on the protruding wires and the actual condition of the wires (protruding, broken, missing buttonheads, etc.) be recorded.

n:\npd\rdm\brw7667.DOC

REVISION NO.: 0

CURRENT INSPECTION SHOP ENDS 1/2 TENDON (BRADWOOD) AED

PSC PROCEDURE SQ 8.0 ANCHORAGE INSPECTION DATA SHEET 8.0 JUNE 19, 1992 Page 1 of 1 Revision 0

ATTACHMENT A PROJECT No. 9050-63 CALC. No. 522-BRW-97-062 REV 0 DATE PAGE A1 OF 9

ANCHORAGE INSPECTION DOCUMENTATION

PROJECT BRADWOOD ANCHORAGE INSPECTION SURVEILLANCE NO. 1997 YEAR 1997

TENDON NO. 14 ED TENDON END/BUTTRESS NO. SHOP 10 UNIT UNIT 2

(8.3.5) ANCHORHEAD I.D. ST 211 BUSHING I.D. TTR 15 Q.C. Signoff

(8.1) CORROSION INSPECTION (For Corrosion Levels & Condition refer to Proc. SQ 8.1)

(8.1.1) Buttonheads	Condition	<u>A</u>		
(8.1.2) Anchorage Head	Level	<u>1</u>	(8.2) Cracks	<u>SLIGHT</u>
(8.1.2) Bushing	Level	<u>2</u>	(8.2) Cracks	<u>REPAIR</u>
(8.1.2) Shims	Level	<u>1</u>	(8.2) Cracks	<u>REPAIR</u>
(8.1.2) Bearing Plate	Level	<u>2</u>	(8.2) Cracks	<u>NEAR</u>
SQ 10.1 (8.1.2) Coating	- Complete	<u>all</u>	Incomplete	<u>all</u>
SQ 10.1 (8.2.1) Wire	- Condition	<u>all</u>	Coating Complete	<u>all</u>
			Incomplete	<u>all</u>

(8.3) BUTTONHEAD INSPECTION

(8.3.4) BUTTONHEAD DATA

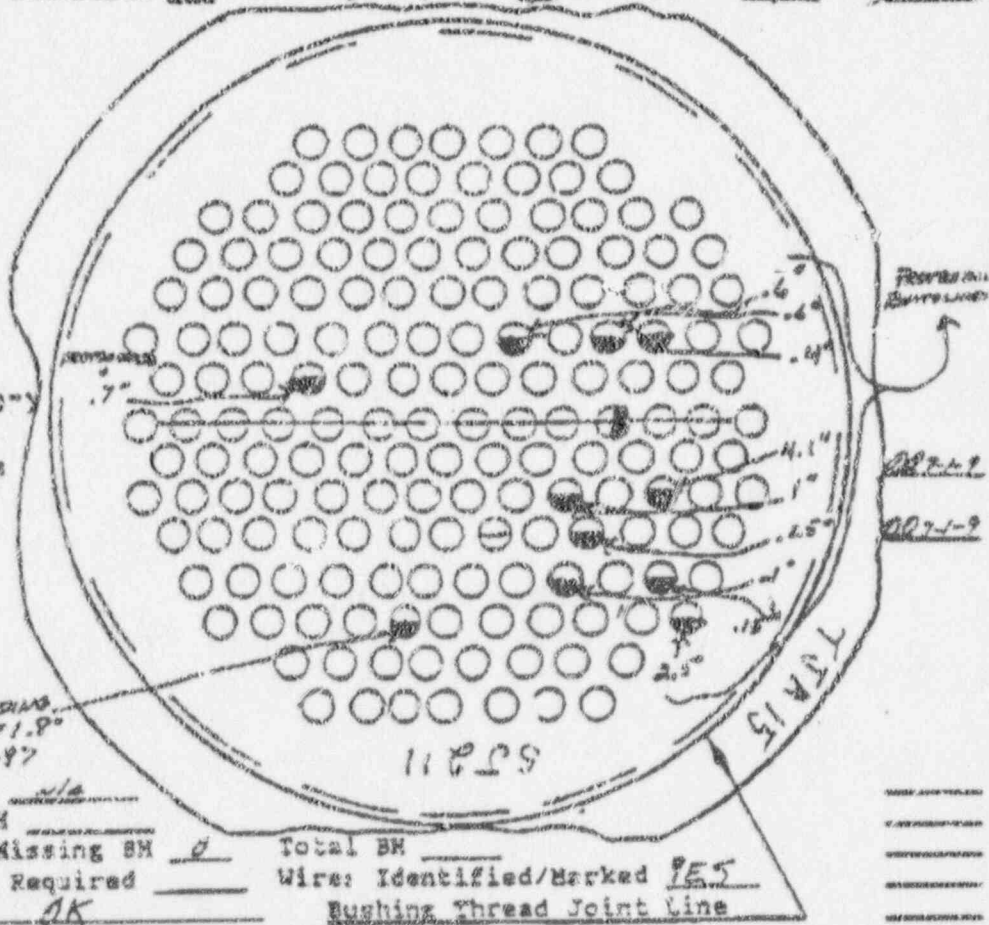
- Discontinuous-Removed
- Removed for Testing
- Previously Missing
- Protruding
- Broken/Missing
- Offsize (Malformed)
- B = Bisecting Crack
- A = 45° Angle Slip
- X = Cracked (over 0.120")
- S = Slip (over 0.005")
- K = Intersecting Cracks

(8.3.5) Locate Anchorage Heat Code on Sketch

(8.3.6) Offsize Totals

B = all  
 A = all  
 X = all  
 S = all  
 K = all

PROTRUDING 1.8" 7-1-97



(8.3.7.2) Buttonheads Found all  
 (8.3.7.3) Total Effective BH \_\_\_\_\_  
 (8.4.1) Protruding BH \_\_\_\_\_ Missing BH 0 Total BH \_\_\_\_\_  
 (8.4.1.2.1) Continuity Test Required \_\_\_\_\_ Wire: Identified/Marked YES  
 (8.5.1) SHIM GAPS: AS FOUND OK Bushing Thread Joint Line  
 AS LEFT OK  
 (9.0) Reporting:  Accept  Unacceptable  Engineer Notified. NCR NO. \_\_\_\_\_

Q.C. Review \_\_\_\_\_ Level \_\_\_\_\_ Date \_\_\_\_\_

Title \_\_\_\_\_



ORIGINAL STRESSING CARD

ATTACHMENT A  
 PROJECT No. 9050-63  
 CALC. No. S-23-BRW.97.0667  
 REV. 0 DATE \_\_\_\_\_  
 PAGE A2 OF \_\_\_\_\_

TENDON STRESSING CARD

Inryco 339.727  
 In Ryco Steel Company

DATE 11-10-82

TENDON LOCATION H 4 ED JOB NO. 417-782 JOB Baldwin Unit #1

DO NOT EXCEED 80% OF ULT  
1600 KIPS 4800 PSI

WIRES INSPECTED FOR RUST AND CORROSION  
 AS PER PROCEDURE Y.B. REV. 7 CRITERIA A  
 WHICH ACCEPTABLE

JACKING GAUGE NO. 8191 JACK NO. 8795  
ACCIDUS GAUGE NO. BRG1007  
 END SE END ED

READING PSI ELONGATION PSI ELONGATION

1. CALCULATED ELONGATION OVER	1300	PSI	<u>8.30</u>		<u>8.30</u>
2. PRIOR TO STRESSING			<u>1300</u>	<u>5.60</u>	<u>1300</u> <u>5.50</u>
3. OVERSTRESS	<u>4800</u>	PSI	<u>4800</u>	<u>14.20</u>	<u>4800</u> <u>14.00</u>
4. TOTAL MEASURED ELONGATION OVER		PSI		<u>8.60</u>	<u>8.50</u>
5. LOCKOFF	<u>4190</u>	PSI TO <u>4399</u>	PSI <u>4350</u>		<u>4320</u>

6. NO. OF SHIMS		SHIMS	<u>4"</u>	SHIMS	<u>1"</u>
REMARKS	<u>coupling gap under 3/8" ACCEPTABLE</u>		<u>4"</u>		<u>2"</u>
	<u>shim gaps + packs ACCEPTABLE</u>		<u>4"</u>		<u>2"</u>

\* 4 BROKEN WIRES; 4 UNSATED WIRES (SHOP)  
 \* 3 BROKEN WIRES; 4 UNSATED WIRES (FD.)  
SHIMHEAD ST211 TWO STAGE STRESS FLD. HEAD TAK 2 BUSHING TJA 15  
 \* SEQUENCE 209  
 FOREMAN D. Ral BRG. PLATE LD 3 BRG. PLATE LT 102  
 Q.C. INSPECTOR Jim Chalkley DATE 11-10-82 TENDON END PROTECTED ✓ TENDON END PROTECTED ✓

FORM 780.81-80 MAR 79 INRYCO, INC.

27228.23

NAPOLEON  
NSC

Original Lost, this is a  
Duplicate copy.  
NAPOLEON STEEL CONTRACTORS, INC.

JEM 6/21/83  
ATTACHMENT A

NON-COMFORMANCE REPORT  
NUMBER 209

PROJECT No. 9050-63  
CALC. No. 522-BW-97-467  
REV. 0 DATE  
PAGE A3 OF

DATE: 11-10-82

SUPPLIER: NA

LOCATION: Containment II, Horizontal Tendon 4 ED

DISCREPANCY: After stressing operations on 11-10-82, Tendon 4 ED had a total of fifteen (15) defective wires. <sup>Fixed Cord 3 Broken 9 4 unmarked steel wires</sup> Shop End 4 Broken 1 unmarked wire

REASON FOR DISCREPANCY: As per NSCI O.C. procedure, TD section 4.9 an NSCI nonconformance is required for tendon with more than 3 defective wires

ACTION TAKEN: C. G. G. CECD PCO notified on 11-10-82 with this nonconformance

ACTION TAKEN TO PREVENT RE-OCCURRENCE: Design engineers to review defective wire totals and inform CECD if further action is required

QUALITY CONTROL INSPECTOR INITIATING ACTION: Jim Chelley

FINAL DISPOSITION: Transmitted to SCL by Carrier

See Ceo file # 435 for discrepancy 11/10/82

CECD PROJ. SUPV.	R. Brown 11/11/82	ACCEPTED ✓	REJECTED
CECD U.A. SUPV.	H.B. Johnson 11/22/82	ACCEPTED ✓	REJECTED
NSCI O.C. MGR.	C.L. Zarda 6/20/83	ACCEPTED ✓	REJECTED

NSCI PROJ. MGR. ACCEPTED REJECTED

NON-COMFORMANCE REPORT CLOSED C.L. Zarda DATE 6/22/83

CORRECTIVE ACTION COMPLETED C.L. Zarda 6/22/83

- cc T. Perola NSCI
- D. Rayton NSCI
- V. Szwed NSCI
- W. Burns CECD Q.A.

DATE May 20, 1983

RED # 8744

*ATTACHMENT A-*

PROJECT No.	<u>905-63</u>
CALC. No.	<u>5-22-BRW-97-0661</u>
REV.	<u>0</u> DATE _____
PAGE	<u>AS</u> OF _____

TO: Mr. E. Coward ✓

SUBJECT: Non-Conformance Report Braidwood Station

In accordance with Quality Assurance Procedure #16-2, NCR # 435 is being transmitted for completion of final disposition.

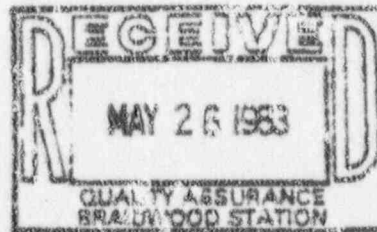
Completion by May 27, 1983 would be appreciated.

*J.C. Zimmerman*  
 \_\_\_\_\_  
 J. R. Sommerfield  
 Q. A. Superintendent  
 Braidwood Station

TRB/JEM/riv (00127)

CC: Q. A. File/52.1

*WJ/TJ*  
 CC/5/25  
 RL/5/25  
 QA



*JTB*  
~~657~~

DATE November 17, 1982

BRD# 7549

ATTACHMENT A

PROJECT No.	<u>950-63</u>
CALC. No.	<u>522-BRW-97-0467</u>
REV.	<u>0</u> DATE _____
PAGE	<u>A6</u> OF _____

TO: Mr. J. T. Westemeier

SUBJECT: Non-Conformance Reports  
Braidwood Station  
S & L Specification # L-2722B

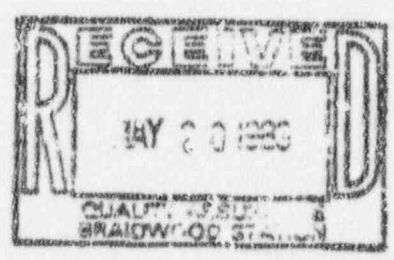
In accordance with Quality Assurance Procedure #15-1, copies of NCR # 435 are being transmitted for review, information and resolution, if needed.

Resolution of NCR by December 1, 1982 would be appreciated.

*T. R. Sommerfield* 12/1/82  
T. R. Sommerfield  
Q. A. Superintendent  
Braidwood Station

TRE/SCH/WEB/mc (0012F)

CC: J. T. Westemeier  
W. C. Cleff  
R. Cosaro  
M. A. Stanish  
Q. A. File/52.1  
Contractor, if applicable Napoleon



NONCONFORMANCE REPORT FOR CONSTRUCTION AND TEST

COMMUNITY EDGES

Station or Site Location BRAND

REV. 293  
PAGE 4

1. DESCRIPTION OF ITEM (EQUIPMENT, MATERIAL, COMPONENT, PART)

WIRE TENSIONING

1. TYPE AND USE

WIT 2 HIGHWAY TENSION

2. CATEGORY

- DEFECT  DAMAGE  UNLAW CONDITION
- FAILURE  PRE-NONCONFORMANCE  DOCUMENTATION

3. DESCRIPTION OF NONCONFORMANCE

Tension 13RD had 4 defective wires  
Tension 25E had 12 defective wires  
And tension 4RD had 15 defective wires  
After stream - see NSCI X-03 206  
208, 209

11. ILM NO./PST NO., U.S. NO., SOLAR NO.  
N/A

12. MANUFACTURER/SUPPLIER  
USCI

13. OBSERVED BY  
 SUPPLY INSPECTION  US-UNION
- CONSTRUCTION  TEST

11. ILM NO. & P.S.T. ITEM NO.	12. ILM LAB NO.	13. WORK REQUEST NO.	
<u>209915</u>	<u>82/ST AC</u>		
14. NONCOMPLIANCE	NAME	DESIGNATION	DATE
NONCOMPLIANCE OBSERVED BY	<u>USCI</u>	<u>QC</u>	<u>11/16</u>
NONCOMPLIANCE VERIFIED BY	<u>PL</u>	<u>PCO</u>	<u>11/16</u>
DATE OF TEST	<u>11/16/82</u>	<u>QA</u>	<u>11/17</u>
DATE OF TEST	<u>11/16/82</u>	<u>PCO</u>	<u>11/17</u>

10a. WORK LIMITATIONS:  WORK CAN PROCEED  WORK CANNOT PROCEED  OTHER LIMITATIONS

EXPLAIN WORK LIMITATIONS:

11. CAUSE OF NONCONFORMANCE

OVER STRESS OF MATERIAL WIRE DUE TO TENSION FORCE  
AND POOR ANCHORING LENGTH  
(PROTUSION)

100% TO THE REPORT	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
100% TO THE DRAWING	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
DATE	DATE
DESIGNATION	DESIGNATION
FOR SIGNATURE	FOR SIGNATURE

12. ACTION REQUIRED TO CORRECT THE NONCONFORMANCE

S/L to ANALYZE ACCEPTABILITY \* TENSIONING RESISTED  
OVER-STRESS FORCE W/O EXCEEDING ALLOWABLE ELONGATION. HENCE  
NEW-DEFECTIVE WIRES HAVE NOT BEEN DAMAGED / S/L LTR (4-28-83) ATT'D/WFS

13. CORRECTIVE ACTION REQUIRED TO PREVENT REOCCURRENCE OF NONCONFORMANCE (WRITE N/A IF NOT KNOWN)

N/A

14. REVIEW AND APPROVAL

REVIEWED BY J.T. McFarland 5-17-83  
ENGINEERING PROJECT ENGINEER DATE  
APPROVED BY J.P. Connor 5/18/83  
CONSTRUCTION SUPERVISOR DATE

15. DISCUSSION OF ACTION TAKEN TO CORRECT THE NONCONFORMANCE

None taken per S/L letter 4/28/83

16. DESCRIPTION OF CORRECTIVE ACTION INITIATED TO PREVENT REOCCURRENCE

None - Done and complete

ATTACHMENT A

PROJECT NO. 9050-1062  
CALC. NO. 522304-97-067  
REV. 0 DATE \_\_\_\_\_  
PAGE A7 OF \_\_\_\_\_

17. SIGNATURES

PL PCO STG/S  
DATE

18. DISPOSITION AND ACTION APPROVED BY

R. Connor StG/S  
STATION CONSTRUCTION FORCE ENGINEER DATE

19. CORRECTIVE ACTIONING IN REVIEW

- C.A. NOT REQUIRED  C.A. ADEQUATE  ADEQUATE C.A. REQUIRED

JEM 6/10/83  
T.R. Linnemann  
DATE

**SARGENT & LUNDY  
ENGINEERS**

FOUNDED 1881  
55 EAST MONROE STREET  
CHICAGO, ILLINOIS 60603  
(312) 599-8000  
TWX 910-721-2507

ATTACHMENT A

PROJECT No.	9050-63
CALC. No.	522-BRW-97-0467
REV.	0
DATE	
PAGE	AS
OF	

April 28, 1983  
Project No. 4684  
File 1.1/5.14.6

Commonwealth Edison Company  
Braidwood Station - Unit 2

Commonwealth Edison Company  
Nonconformance Reports L-403, L-421 & L-435  
Specification L-2722

Mr. J. T. Westermeier  
Commonwealth Edison Company  
35 FN West  
First National Bank Building

Dear Mr. Westermeier:

As you requested we have reviewed Commonwealth Edison Company Nonconformance Reports L-403, L-421 and L-435 for Braidwood Unit 2. These nonconformances concern defective wires in tendons which exceeded the limits given in Specification L-2722. The specification allows three broken and/or unseated wires for each individual tendon and 2% defective wires for 10 consecutive tendons.

Nonconformance Report L-403 is the worse case covered in these three nonconformance reports wherein 22 defective wires exist in tendon 51FE. We have performed a re-analysis of the containment considering adjacent tendons and actual initial tendon forces. We have found that the defective wires do not cause an overstress in the hoop reinforcing steel. However, the defective wires reduce the ultimate capacity of the containment structure by approximately 1 to 2%. We consider this to be a significant reduction.

The non-defective wires in these tendons were stressed beyond the specified ACI 318 allowables; 0.8 Fpu at overstress and 0.7 Fpu at release, due to the presence of defective wires. At the overstress level the non-defective wires of tendon 51FE were stressed to about 90% of their ultimate tensile strength. The overstress force is the largest force that will be applied to the tendon under the design loads. Due to the fact that the tendon resisted this force at stressing without exceeding allowable elongation, we believe the non-defective wires have not been damaged.

SARGENT & LUNDY  
ENGINEERS  
CHICAGO

Commonwealth Edison Company  
Mr. J. T. Westerneier


April 28, 1963  
Page 2

ATTACHMENT A

PROJECT No.	9050-63
CALC. No.	S22-BEL97-06
REV.	0
DATE	
PAGE	A9
OF	FILE 42

Based upon this review, no further corrective action is required and the tendons with defective wires are considered acceptable.

Yours very truly,

  
R. J. Netzel  
Senior Structural Project Engineer

RJN:kv  
Enclosure - All Recipients  
Copies:  
R. Cosaro  
T. R. Sommerfield  
D. L. Leone/W. C. Cleff  
E. G. Trece  
M. Camba  
R. Hooks/D. C. Patel  
S. Putman  
T. J. Ryan/G. Willman

NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM

PSC

Process  
Improvement  
Department

OLD TAG NO. N/A

NC/CA NO. \_\_\_\_\_

NONCONFORMANCE: On PSC Procedure 588.0 Assessment Inspection - Technical HVED Sampling D.R. of

General: On 11/17/97, the PSC Procedure 588.0 Assessment Inspection was conducted. The following items were noted:  
1. The PSC Procedure 588.0 Assessment Inspection was conducted on 11/17/97. The following items were noted:  
2. The PSC Procedure 588.0 Assessment Inspection was conducted on 11/17/97. The following items were noted:

APPARENT CAUSE KNOWN  YES  NO - If yes, describe: Unknown

RECOMMENDED CORRECTIVE ACTION: Cancel/Adjust 1.0 PSC Procedure 588.0 ATTACHMENT B

PROJECT No. 305D-63  
CALC. No. 582-BRW-77-0647  
REV 0 DATE \_\_\_\_\_  
PAGE B1 OF \_\_\_\_\_

Any nonconforming item to be repaired shall have an approved repair procedure.  
CORRECTIVE ACTION TO PREVENT REOCCURENCE: Cancel/Adjust 1.0 PSC Procedure 588.0

Initiator: Daniel O'Brien Title: QA H. NEREDSON, Sr. W Date: 7-3-97  
SIGNIFICANT CONDITION:  YES  NO - If yes, refer QAM Section & Criteria XV.

APPROVAL COMMENTS: \_\_\_\_\_

PSC APPROVAL SIGN & DATE: Daniel O'Brien 7-3-97  
QA H. NEREDSON, Sr. W PER PSC OWNER. DO 7-3-97  
Engineering Paul Smith, PSC OWNER. DO 7-3-97

OWNER/AGENT APPROVAL REQUIRED  YES  NO  
Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
QA Signature: \_\_\_\_\_ Date: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

DISTRIBUTION

DISPOSITION COMPLETED

- QA Section
- QE Section
- Engineering
- Vice President
- Contr. Mgmt.
- Owner/Agent

Vendor  \_\_\_\_\_

Signed \_\_\_\_\_  
Title \_\_\_\_\_  
Date \_\_\_\_\_



PROJECT No. 9050-63  
 CALC. No. 522-BW-97-0667  
 REV. 0 DATE \_\_\_\_\_  
 PAGE B2 OF Final

ANCHORAGE INSPECTION DOCUMENTATION

PROJECT BRIDGE REPAIR SURVEILLANCE NO. 1997 YEAR 1997  
BR970050744 01

TENDON NO. H4 ED TENDON END/BUTTRESS NO. SHOP 10 UNIT 2

(8.3.5) ANCHORHEAD I.D. SJ 211 BUSHING I.D. TJA 15 Q.C. Signoff

(8.1) CORROSION INSPECTION (For Corrosion Levels & Condition refer to Proc. SQ 8.1)

(8.1.1) Buttonheads	Condition	<u>1</u>	(8.2) Cracks	<u>NONE</u>	<u>02-1-97</u>
(8.1.2) Anchorage Head	Level	<u>1</u>	(3.2) Cracks	<u>NONE</u>	
(8.1.2) Bushing	Level	<u>1</u>	(8.2) Cracks	<u>NONE</u>	
(8.1.3) Shims	Level	<u>1</u>	(8.2) Cracks	<u>NONE</u>	
(8.1.2) Bearing Plate	Level	<u>2</u>	(8.2) Cracks	<u>NONE</u>	<u>02-1-97</u>
SQ 10.1 (8.1.2) Coating	Complete	<u>all</u>	Incomplete	<u>all</u>	Lgth. of Air Pocket <u>all</u> <u>02-1-97</u>
SQ 10.2 (8.2.3) Wire	Condition	<u>all</u>	Coating Complete	<u>all</u>	Incomplete <u>all</u> <u>02-1-97</u>

(8.3) BUTTONHEAD INSPECTION

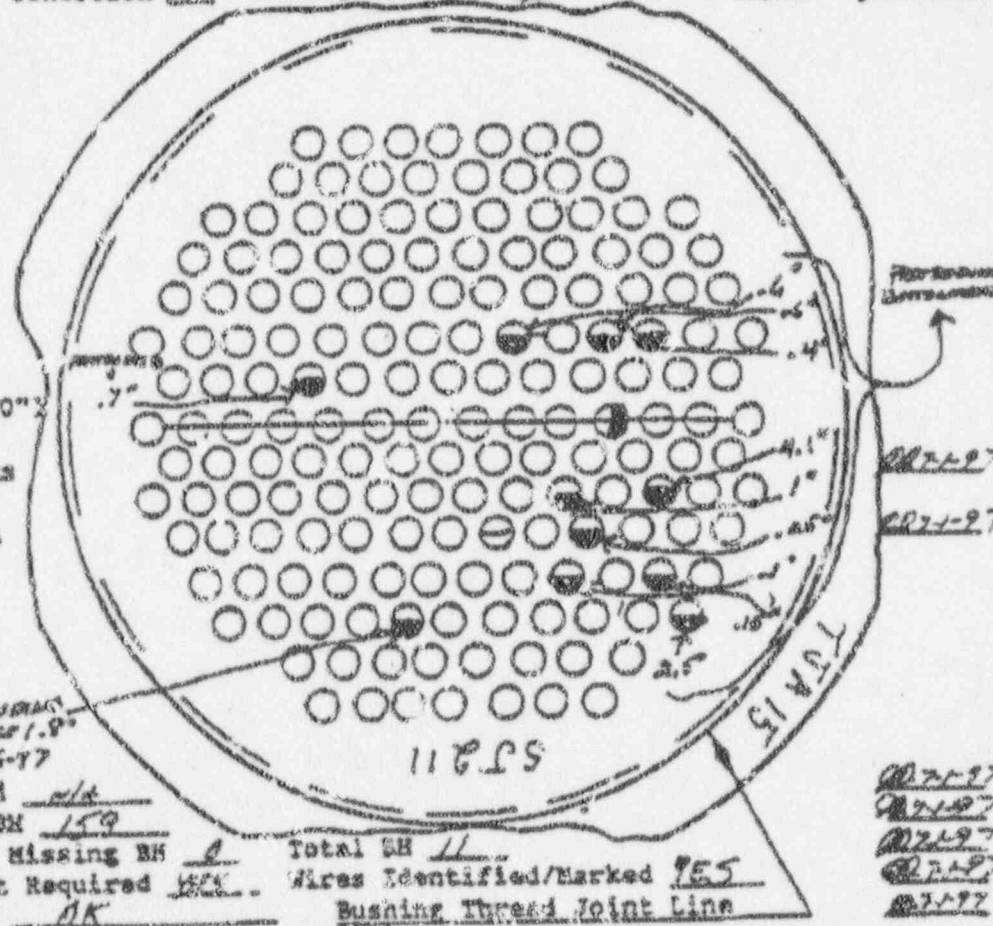
(8.3.4) BUTTONHEAD DATA

- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Offsize (Malformed)
- B = Bisecting Crack
- L = 45° Angle Slip
- K = Cracked (over 0.120")
- S = Slip (over 0.005")
- X = Intersecting Cracks

(8.3.5) Locate Anchorage Heat Code on Sketch

(8.3.6) Offsize Totals

B = all  
 A = all  
 K = all  
 S = all  
 X = all



(8.3.7.2) Buttonheads Found all  
 (8.3.7.3) Total Effective BH 159  
 (8.6.1) Protruding BH 11 Missing BH 0 Total BH 11  
 (8.4.1.2.1) Continuity Test Required NONE Wires Identified/Marked YES  
 (8.5.1) SHIM GAPS: AS FOUND OK Bushing Thread Joint Line OK

(9.0) Reporting:  Accept  Unacceptable  Engineer Notified. NCR NO. BR97/11-001 02-1-97

Q.C. Review \_\_\_\_\_ Level \_\_\_\_\_ Date \_\_\_\_\_  
 Title \_\_\_\_\_

NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM

PSC

Process  
Improvement  
Corporation

HOLD TAG NO. N/A

NC/CA NO. KA52/611-005

NONCONFORMANCE: Per PSC Procedure SQ8.0 Announce Inspection - Tendon #4 ED Field / E Butt

Grout was removed and replaced with repair grout. Upon inspection 8 protruding wires and 1 missing  
wire were observed. Potentially fire hazards came from the socket at .1" to the socket at 8.2".  
Insulation card about 1/2" thick, 1/2" wide and 3 broken. 4 wires protruding from field and  
grout was broken and revealed and no monitoring was found.

ATTACHMENT C

PROJECT No. 9050-63

CALC. No. 5-22-BRW-97-06

APPARENT CAUSE KNOWN  YES  NO - If yes, describe: UNKNOWN

REV. 0 DATE \_\_\_\_\_

PAGE 1 OF \_\_\_\_\_

RECOMMENDED CORRECTIVE ACTION: Change/Agmt to Review and Evaluate

Any nonconforming item to be repaired shall have an approved repair procedure.

CORRECTIVE ACTION TO PREVENT RECURRENCE: Change/Agmt to Review and Evaluate

Initiator Jason O'Shea Title Lead Inspector Date 7-8-97

SIGNIFICANT CONDITION:  YES  NO - If yes, refer QAM Section 4 Criteria IV.

APPROVAL COMMENTS:

PSC APPROVAL SIGN & DATE	<u>QC [Signature]</u> 7-8-97	QA <u>X. HENDRICKSON</u> 707 PINE CHURCH, RD. 7-8-97	Engineering FALL ST/17th, 707 PINE CHURCH RD. 7-8-97
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OWNER/AGENT APPROVAL REQUIRED  YES  NO  
Engineer \_\_\_\_\_ Date \_\_\_\_\_ QA \_\_\_\_\_ Date \_\_\_\_\_

COMMENTS:

DISTRIBUTION

- QA Section
- Vice President
- QE Section
- Contr. Mgmt.
- Engineering
- Owner/Agent
- Vendor
- [Signature]

DISPOSITION COMPLETED

Signed \_\_\_\_\_  
Title \_\_\_\_\_  
Date \_\_\_\_\_

PROJECT No. 9050-63  
 CALC. No. 522-BEW-97-066  
 REV. 0 DATE \_\_\_\_\_  
 PAGE C2 OF FINAL

ANCHORAGE INSPECTION DOCUMENTATION

PROJECT BRAIDWOOD WATER INSPECTION SURVEILLANCE NO. 1997 YEAR 97  
 TENDON NO. H4ED TENDON END/BUTTRESS NO. FOUR/LEFT UNIT 2

(8.3.5) ANCHORHEAD I.D. TAK 2 BUSHING I.D. N/A Q.C. Signoff \_\_\_\_\_

(8.1) CORROSION INSPECTION (For Corrosion Levels & Condition refer to Proc. SQ 8.1)

(8.1.1) Buttonheads	Condition	<u>A</u>	(8.2) Cracks	<u>NONE</u>	<u>10-7-97</u>
(8.1.2) Anchorage Head	Level	<u>2</u>	(8.2) Cracks	<u>N/A</u>	
(8.1.2) Bushing	Level	<u>N/A</u>	(8.2) Cracks	<u>N/A</u>	
(8.1.2) Shims	Level	<u>2</u>	(8.2) Cracks	<u>NONE</u>	
(8.1.2) Bearing Plate	Level	<u>1</u>	(8.2) Cracks	<u>NONE</u>	<u>10-7-97</u>
SQ 10.1 (8.1.2) Coating	- Complete	<u>N/A</u>	Incomplete	<u>N/A</u>	Lgth. of Air Pocket <u>N/A</u>
SQ 10.1 (8.2.1) Wire	- Condition	<u>N/A</u>	Coating Complete	<u>N/A</u>	Incomplete <u>N/A</u>

(8.3) BUTTONHEAD INSPECTION

(8.3.4) BUTTONHEAD DATA

- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Offsize (Malformed)
- B = Bisecting Crack
- A = 45° Angle Slip
- K = Cracked (over 0.120")
- S = Slip (over 0.005")
- X = Intersecting Cracks

(8.3.5) Locate Anchorage Heat Code on Sketch

(8.3.6) Offsize Totals

B = N/A  
 A = N/A  
 K = N/A  
 S = N/A  
 X = N/A

(8.3.7.2) Buttonheads Found 0

(8.3.7.3) Total Effective BH 4

(8.4.1) Protruding BH 8 Missing BH 1

Total BH 9  
 Wires Identified/Marked YES

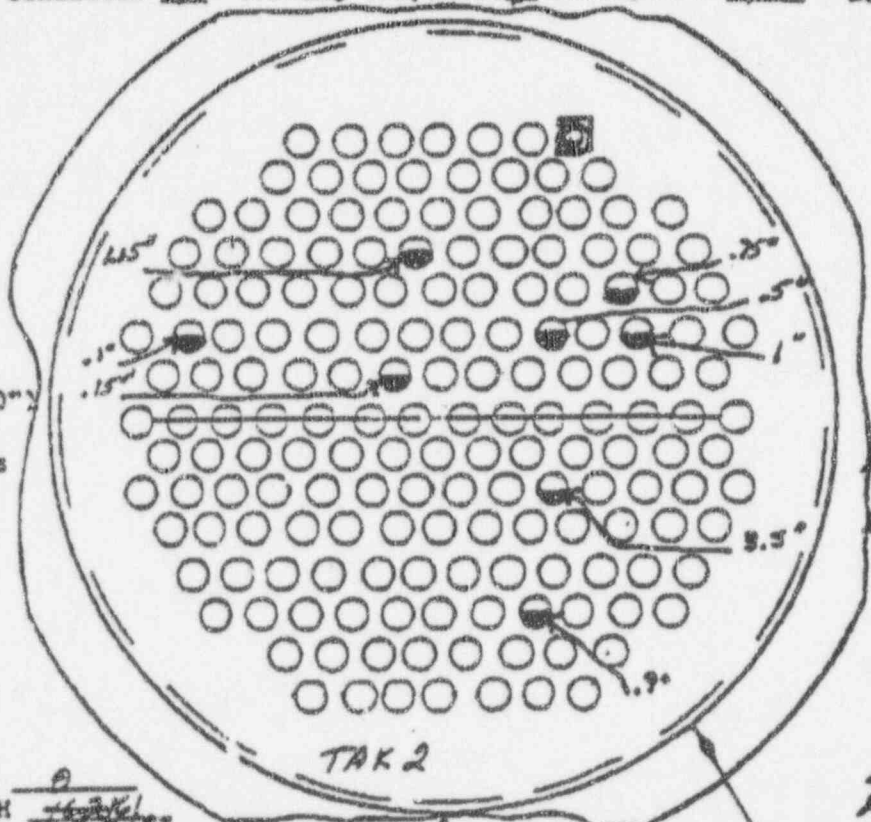
(8.4.1.2.1) Continuity Test Required YES

Bushing Thread Joint Line \_\_\_\_\_

(8.5.1) SHIM GAPS: AS FOUND 1/8

AS LEFT 0.0

(9.0) Reporting:  Accept  Unacceptable  Engineer Notified NCR NO. \_\_\_\_\_



Q.C. Review \_\_\_\_\_ Level \_\_\_\_\_ Date \_\_\_\_\_

Title \_\_\_\_\_