January 10, 1985

Docket No. 50-325

LICENSEE: Carolina Power & Light Company (CP&L)

FACILITY: Brunswick Steam Electric Plant, Unit 1 (Unit 1)

SUBJECT: SUMMARY OF MEETING HELD ON DECEMBER 4, 1984 TO DISCUSS UNIT 1 INTERGRANULAR STRESS CORROSION CRACKING (IGSCC) INSPECTION

Background

By letters dated April 2, and October 9, 1984 CP&L provided a basis for continued operation, committed to do additional IGSCC inspection and provided plans for a special outage to begin about November 1, 1984. The inspection was completed during the last week of November and preparations were made for a CP&L presentation of the results in conference calls during that week. CP&L prepared a draft report based on the staff requests which was the agenda for the meeting. Attendees are given in Enclosure 1.

Summary

CP&L made a presentation of the inspection results according to the outline given in Enclosure 2. CP&L presented the Summary and Conclusions, the Inspection Scope and Results and the Inspection Technique and Inspector Qualification (Enclosure 3). NUTECH (the CP&L contractor) presented the Fracture Mechanics Analysis and Repair Design.

Briefly, the inspection was a 100% inspection of the Class I susceptible welds according to Generic Letter 84-11 dated April 19, 1984. The summary description of the indications and the disposition of each is given in Table 1 of Enclosure 2.

There was a question and discussion period during which all questions were answered.

Conclusion

CP&L will present the information presented in the meeting in final form for docketing. The staff will evaluate the information and based on a satisfactory evaluation of the data, prepare a letter to permit operation

of the plant until March 31, 1985. CP&L will provide plans for future IGSCC inspections of Unit 1, 30 days prior to the next shutdown.

/s/ Marshall Grotenhuis

Marshall Grotenhuis, Project Manager
Operating Reactors Branch #2
Division of Licensing

Enclosures:
As stated

cc w/enclosures:
See next page

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ENCLOSURE 1

ATTENDANCE LIST FOR

MEETING HELD ON DECEMBER 4, 1984

Name	Affiliation
M. Grotenhuis	NRC/ORB#2
W. S. Hazelton	NRC/MTEB
C. Y. Cheng	NRC/MTEB
J. L. Coby	NRC/Region II
M. R. Hum	NRC/MTEB
Carl. R. Osman	CP&L
Larry Wheatley	CP&L
Rick Frohnsrath	CP&L
Norm Edwards	NUTECH
Hal Gustin	NUTECH
John Titrington	CP&L
Ben Parks, Jr.	CP&L
R. Fasnacht	CP&L
W. R. Murray	CP&L
D. B. Vassallo	NRC/ORB#2
W. Koo	NRC/MTEB
P. Tremblay	NRC/ORAB
H. F. Conrad	NRC/MTEB

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT

UNIT 1

IGSCC INSPECTIONS AND REPAIR PROGRAM

OCTOBER-NOVEMBER 1984

PRESENTATION OUTLINE

I. SUMMARY AND CONCLUSIONS

II. INSPECTION SCOPE AND RESULTS

III. INSPECTION TECHNIQUE AND INSPECTOR QUALIFICATION

IV. FRACTURE MECHANICS ANALYSES (NUTECH)

V. REPAIR DESIGNS (NUTECH)

SUMMARY AND CONCLUSIONS

- ALL CLASS I SUSCEPTIBLE WELDS WERE INSPECTED
- INSPECTIONS WERE DONE WITH APPROVED TECHNIQUES AND QUALIFIED PERSONNEL
- RECIRCULATION PIPING HAD NO MAJOR CRACKS
- CONSERVATIVE ANALYSIS WAS DONE TO DETERMINE NECESSITY FOR IMMEDIATE REPAIR
- OVERLAY REPAIRS WERE MADE WITH CONSERVATIVE DESIGNS AND ACCEPTED TECHNIQUE
- PROPOSED PERIOD OF OPERATION IS SHORT--LESS THAN FOUR MONTHS
- STRINGENT DRYWELL LEAK DETECTION LIMITS WILL BE CONTINUED

BRUNSWICK UNIT 1 CAN BE SAFELY OPERATED UNTIL NEXT REFUELING OUTAGE

INSPECTION SCOPE

- 125 WELDS INSPECTED
- 98 - REACTOR RECIRCULATION
- 5 - RESIDUAL HEAT REMOVAL
- 22 - REACTOR WATER CLEANUP
- CORE SPRAY PIPING IS CARBON STEEL
- ALL CLASS I NONCONFORMING (CARBON CONTENT > 0.04%) STAINLESS STEEL PIPING 4" OR LARGER

FULL SCOPE INSPECTION:
ALL SUSCEPTIBLE WELDS

INSPECTION TECHNIQUE AND INSPECTOR QUALIFICATION

- Master-Slave Arrangement
- Evaluators Are EPRI-Qualified for Crack Detection
- Scanners Demonstrate Proficiency on Cracked Pipe Specimen or Have Been EPRI-Qualified
- Sizing Performed by EPRI-Qualified Level III Inspectors

TABLE 1

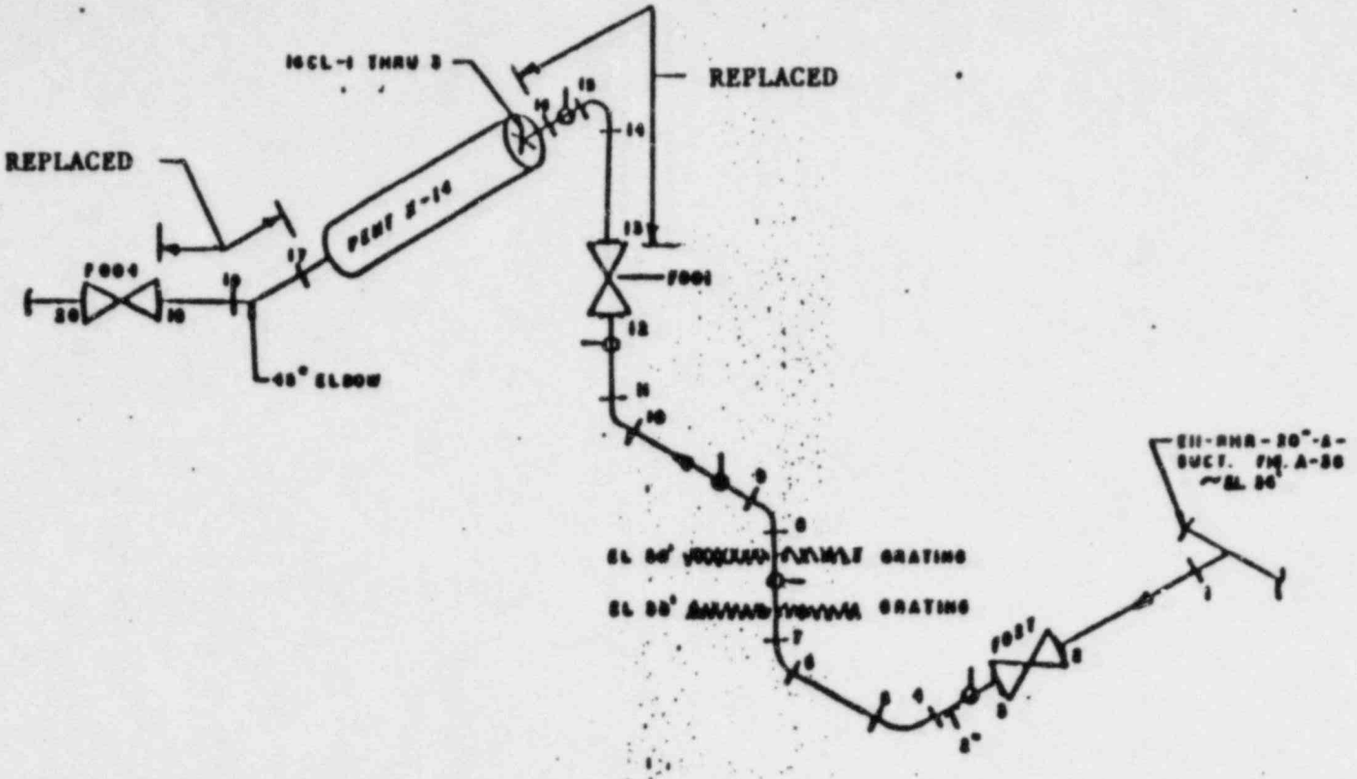
BRUNSWICK UNIT 1 IGSCC INDICATION SUMMARY

WELD NO.	ORIENTATION	LENGTH	THROUGH-WALL DEPTH	LOCATION FROM REF.	SIDE OF WELD	DISPOSITION
1-G31-RWCU-6"-4	Circumferential	1.25"	10 Percent	13.1"	Elbow	Repair
1-G31-RWCU-6"-6	Circumferential	2.75"	31 Percent	14.0"	Elbow	Repair
1-G31-RWCU-6"-7	Circumferential	3.0"	81 Percent	16.5"	Elbow	Repair
1-G31-RWCU-6"-8	Circumferential	1.125"	23 Percent	6.25"	Pipe	Repair
	Circumferential	1.125"	19 Percent	4.875"	Elbow	Repair
1-G31-RWCU-6"-10	Circumferential	2.75"	14 Percent	8.25"	Elbow	Repair
1-G31-RWCU-6"-14	Circumferential	4.25"	24 Percent	8.0"	Pipe	Replaced
	Circumferential	5.0"	27 Percent	14.0"	Elbow	Replaced
1-G31-RWCU-6"-16	Circumferential	2.375"	16 Percent	13.0"	Upstream Pipe	Replaced
1-G31-RWCU-6"-17	Circumferential/Axial	1.1"	35 Percent	0.6"	Elbow	Replaced
	Circumferential	1.0"	40 Percent	13.0"	Elbow	Replaced
1-G31-RWCU-6"-19	Circumferential	0.4"	12 Percent	17.4"	Elbow	Replaced
	Circumferential	0.375"	18 Percent	15.7"	Elbow	Replaced
1-B32-RECIRC-12"-AR-A4	Circumferential	1.6"	19 Percent	30.2"	Pipe	Repair
1-B32-RECIRC-12"-AR-B2	Circumferential	2.0"	20 Percent	25.5"	Pipe	Repair
1-B32-RECIRC-12"-AR-B4	Circumferential	1.0"	45 Percent	34.75"	Pipe	Repair
1-B32-RECIRC-12"-BR-F4	Circumferential	0.5"	23 Percent	3.0"	Pipe	Repair
	Circumferential	4.0"	9 Percent	20.0"	Pipe	Repair
1-B32-RECIRC-28"-B-12	Circumferential	2.5"	10 Percent	23.0"	Pipe	Flawed Pipe Analysis
1-G31-RWCU-PENETR-X14	Circumferential	2.0"	N/A	0	Pipe	Repair
	Circumferential	5.5"	N/A	0	Pipe	Repair
1-B32-RECIRC-4"-A10	Pinhole Leak	0.06" Round	100 Percent	0.5" From TDC	Weldolet	Repair

THROUGH-WALL DEFECTS

- WELD NUMBER 1-G31-RWCU-7
  - 3/4" LONG CIRCUMFERENTIAL FLAW FOUND PRIOR TO REPAIR--NOT COINCIDENT WITH ANY INDICATIONS
  - 3 BLOWOUTS FOUND DURING OVERLAY--NOT COINCIDENT WITH ANY INDICATIONS
- WELD NUMBER 1-G31-RWCU-10
  - ONE BLOWOUT FOUND DURING OVERLAY
  - NO RECORDABLE INDICATIONS IN COINCIDENT LOCATION
- WELD NUMBER 1-B32-RECIRC-4" A-10
  - LEAKING PINHOLE DEFECT
  - LOCATED ON WELDOLET - INACCESSIBLE FOR UT
  - REPAIRED WITH CONSERVATIVE WELD OVERLAY

FIGURE 1



WELD No. 1 (SYSTEM) 031-RWCU (LINE) 8"-SUCTION (WELD I.D.) 1 THRU 88

A-46

SITE	LINE	MATERIAL	NOMINAL THICKNESS	NOMINAL DIAMETER	CALIBRATION STANDARD	B & R REF. DWG.	DATE
BRUNSWICK 1	8" SUCTION	SS	0.438"	8"	1-8	B & R FSM 409	6-8-76

RWCU SUCTION LINE SHOWING REPLACED PORTION

PERSONNEL EXPOSURE

INSPECTIONS ONLY	28 MAN-REM
INSULATION REMOVAL AND REPLACEMENT AND SCAFFOLDING	30 MAN-REM
SHIELDING	20 MAN-REM
OVERLAYS AND SPOOL REPLACEMENT	133 MAN-REM
TOTAL	211 MAN-REM

ENCLOSURE 3

BRUNSWICK STEAM ELECTRIC PLANT

UNIT 1

IGSCC FLAW EVALUATION

ANALYSIS AND REPAIR

NUTECH

DECEMBER 4, 1984

ANALYSIS AND REPAIR

- FLAW DISPOSITION
- WELD OVERLAY DESIGN AND ANALYSIS
- RWCU INLAY DESIGN
- FLAWED PIPE ANALYSIS
- SUMMARY

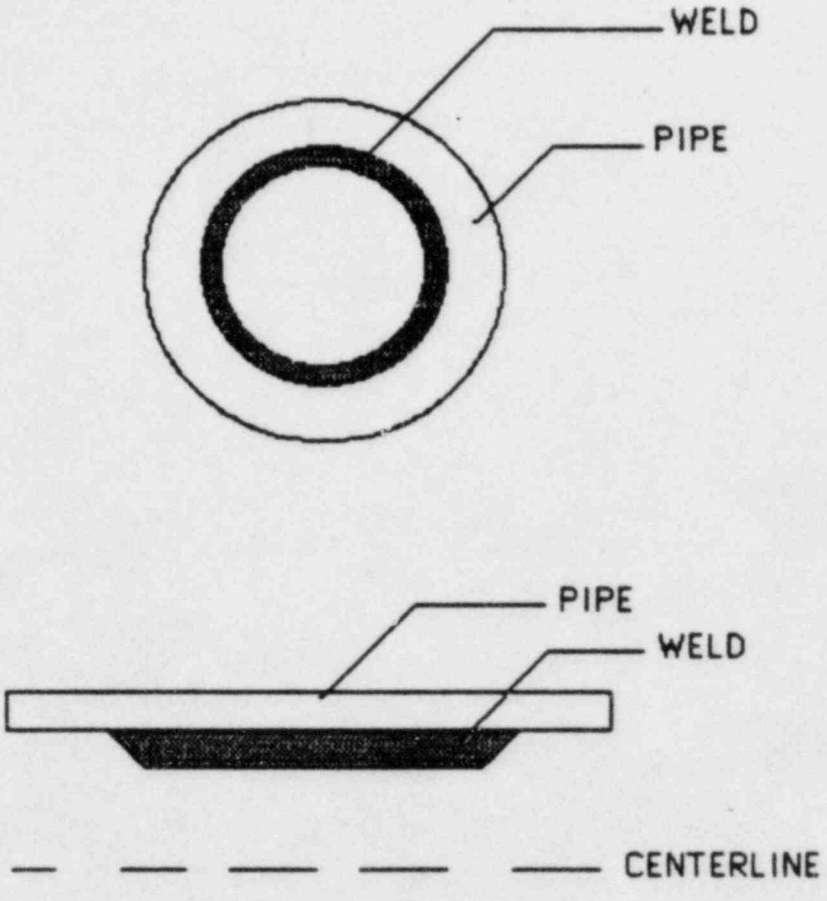
WELD OVERLAY REPAIR

- OVERLAYS DESIGNED IN ACCORDANCE WITH NRC GENERIC LETTER 84-11 .
- OVERLAY THICKNESS SELECTED TO MEET IWB-3640 ALLOWABLE
- NO CREDIT TAKEN FOR FIRST LAYER
- CIRCUMFERENTIAL FLAWS ASSUMED THROUGH-WALL FOR OBSERVED LENGTH FOR PIPE DIAMETERS $\leq$ 12"
- CIRCUMFERENTIAL FLAWS IN LARGE PIPE EVALUATED IN ACCORDANCE WITH NRC LETTER 84-11 (ONLY 1 CASE)
- EFFECTS OF WELD SHRINKAGE ON BRUNSWICK SYSTEMS TO BE EVALUATED
- WELD OVERLAYS WILL BE DEMONSTRATED TO MEET DESIGN REQUIREMENTS OF SECTION III AND XI

BRUNSWICK 1 FLAW DESCRIPTIONS AND OVERLAY DESIGNS

WELD #	FLAW DESCRIPTION	OVERLAY DESIGN T	L/2
12-BR-F4	23% X 0.5" CIRC, PIPE SIDE 9% X 4.0" CIRC, PIPE SIDE	0.19	1.5*
RWCU-6"-8	23% X 1.125" CIRC, PIPE SIDE 19% X 1.125" CIRC, ELBOW SIDE	0.185	1.25
RWCU-6"-6	31% X 2.75" CIRC, ELBOW SIDE	0.18	1.25
6"-SUCT-10	14% X 2.75" CIRC, ELBOW SIDE	0.17	1.25
12AR-A4	19% X 1.6" CIRC, PIPE SIDE	0.19	1.5*
12AR-B4	45% X 1.0" CIRC, PIPE SIDE	0.19	1.5*
12AR-B2	20% X 2.0" CIRC, PIPE SIDE	0.19	1.5
6"-SUCT-7	81% X 3.0" CIRC, ELBOW SIDE	0.17	1.25
6"-SUCT-4	10% X 1.25" CIRC, ELBOW SIDE	0.16	1.25
X-14 PENETRATION PIPE WELD	5½" LONG CIRC, PIPE SIDE 2" LONG CIRC, PIPE SIDE	0.25 MIN	1.5
4A-10	ASSUMPTIONS: AXIAL ½" X 100% OR CIRC. 2" X 100% WELDOLET SIDE	0.125	1.0
28"-B12	10% X 2.5" CIRC	N/A	N/A

* PUP PIECE SIDE - L/2 VARIES, 1.5" MAX.



patent applied for

SCHEMATIC DIAGRAM OF RWCU WELD INLAY

FLAWED PIPE ANALYSIS

- END OF CYCLE DEPTH COMPARED TO 2/3 OF IWB-3640 ALLOWABLE
- CONSERVATIVE CRACK GROWTH ASSUMPTIONS
- CONSERVATIVE RESIDUAL STRESS DISTRIBUTIONS
- ONLY ONE FLAW EVALUATED WITHOUT REPAIR TO DATE

SUMMARY

- ALL CODE AND REGULATORY REQUIREMENTS WILL BE MET BY BRUNSWICK OVERLAY REPAIRS

- EFFECTS OF REPAIRS ON OVERALL SYSTEM WILL BE CONSIDERED

- FLAWED PIPE ANALYSIS DONE IN A CONSERVATIVE MANNER