



Carolina Power & Light Company

SERIAL: NLS-90-183

SEP 14 1990

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2
DOCKET NO. 50-324/LICENSE NO. DPR-62
PERFORMANCE OF NONDESTRUCTIVE EXAMINATION OF
FEEDWATER NOZZLES AND SAFE ENDS DURING THE
1989/1990 MAINTENANCE/REFUELING OUTAGE

Gentlemen:

Pursuant to NRC NUREG-0619, subsection 4.4.3.1(2), Carolina Power & Light Company (CP&L) hereby submits the enclosed information concerning the non-destructive examination of the feedwater nozzles and safe ends performed during the 1989/1990 maintenance/refueling outage at Brunswick Steam Electric Plant Unit 2.

Should you have any questions on this matter, please contact Mr. M. R. Oates at (919) 546-6063.

Yours very truly,

M.R. Oates for L.I. Loflin

L. I. Loflin
Manager
Nuclear Licensing Section

DBB/ecc (808BNP)

Enclosure

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BRUNSWICK STEAM ELECTRIC PLANT - UNIT 2
NRC DOCKET 50-324
OPERATING LICENSE NO. DPR-62
PERFORMANCE OF NONDESTRUCTIVE EXAMINATION
OF FEEDWATER NOZZLES AND SAFE ENDS DURING
THE 1989/1990 MAINTENANCE/REFUELING OUTAGE

The following information is provided in accordance with NRC NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," and pertains to the nondestructive examination (NDE) of feedwater nozzles and safe ends performed at Brunswick Steam Electric Plant (BSEP) Unit 2 during the 1989/1990 maintenance/refueling outage.

I. STARTUP/SHUTDOWN CYCLES EXPERIENCED

When BSEP Unit 2 was shut down in September 1989 for maintenance and refueling, 175 startup/shutdown cycles had been experienced. This quantity included five startup/shutdown cycles since the previous inspection.

II. NONDESTRUCTIVE EXAMINATION RESULTS

The attached table provides a summary of the examination results for the feedwater nozzles and safe end examinations conducted at BSEP during the 1989/1990 maintenance/refueling outage. No recordable indications or evidence of cracking were noted for the feedwater nozzles and safe ends. Cracking has been observed around the feedwater sparger flow holes. These, however, have been evaluated as acceptable for another operating cycle.

III. NONDESTRUCTIVE EXAMINATION METHODS

The NDE methods employed for the examination of the subject components during the Unit 2 1989/1990 maintenance/refueling outage was manual ultrasonics. Ultrasonic examinations were performed from the nozzle outside diameter using special contoured transducer wedges designed specifically for zones 1, 2, and 3 at BSEP (see attached excerpt from General Electric procedure GE-UT-303). The ultrasonic examinations employed angle beam shear wave techniques as recommended by General Electric Company. The routine liquid penetrant testing of the FW nozzle blend radii is scheduled for the next refueling outage in accordance with Table II of NUREG-0619. A liquid penetrant test was, however, performed on the feedwater sparger flow holes to confirm visually identified indications. The results were compared to previous refueling outage examination results. No significant growth was noted.

IV. SYSTEM MODIFICATIONS AFFECTING FEEDWATER FLOW AND/OR TEMPERATURE

The feedwater Startup Level Control Valve (SULCV) and the 4A high pressure feedwater heater were replaced during the Brunswick 2 Cycle 8 Refueling Outage. Since the unit initially came on line, various feedwater heater tubes have been plugged as routine maintenance. Replacement of the SULCV will result in improved

feedwater flow control, i.e., fewer flow fluctuations during low power operation. Plugging of the feedwater heater tubes reduces the efficiency of the feedwater heaters and therefore reduces final feedwater temperatures. The 4A feedwater heater was replaced due to the high number of plugged tubes. This replacement will increase final feedwater temperature. Additionally, a new feedwater temperature monitoring system has been installed in Unit 2. The system employs RTDs installed in the feedwater piping downstream of the RWCU and HPCI injection points. The system provides a permanent record of final feedwater temperature via a strip chart recorder.

V. ON-LINE LEAKAGE MONITORING

No on-line leakage monitoring system for the detection of feedwater leakage past the feedwater thermal sleeves has been installed at Brunswick.

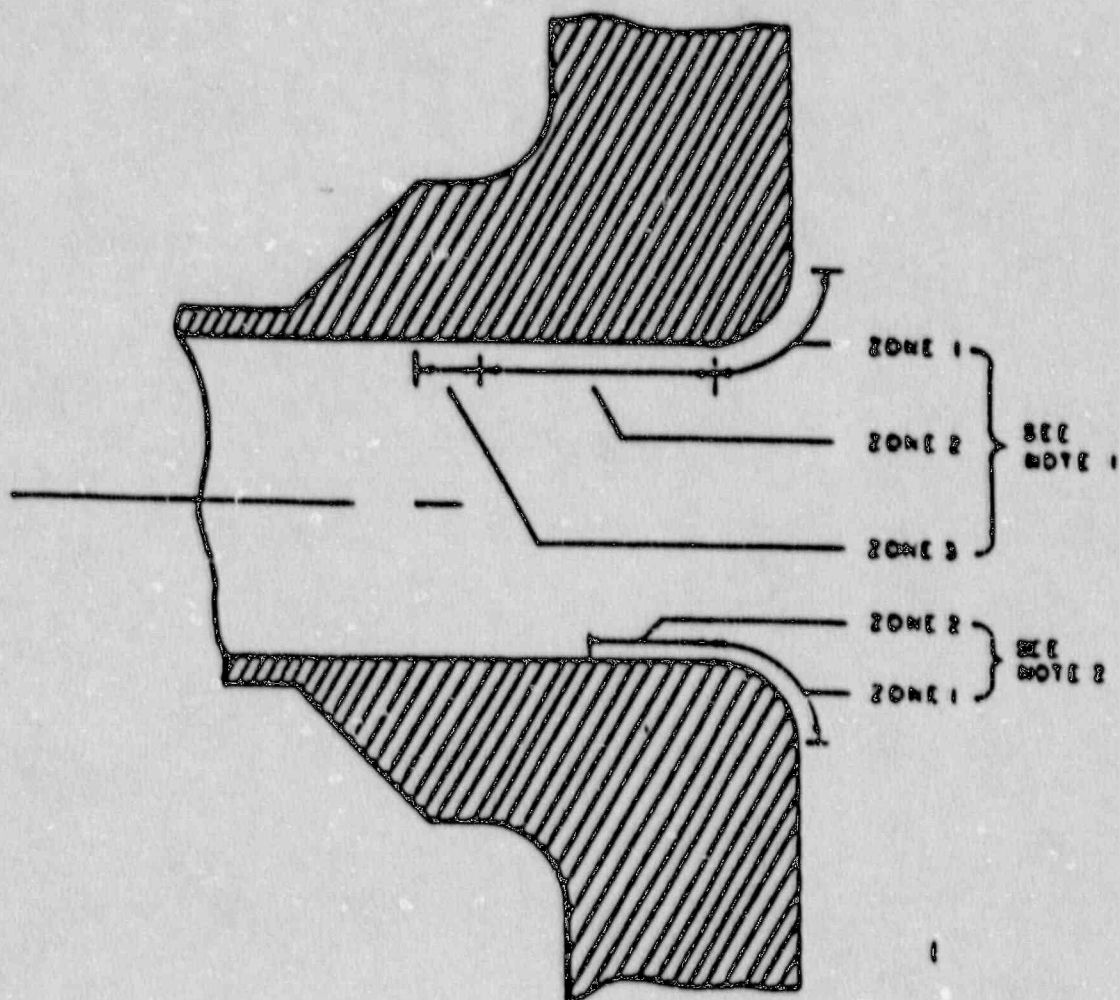
BRUNSWICK UNIT 2 FEEDWATER NOZZLE AND SAFE END
 NONDESTRUCTIVE EXAMINATION RESULTS SUMMARY
 1989/1990 MAINTENANCE/REFUELING OUTAGE

COMPONENT IDENTIFICATION	EXAMINATION TECHNIQUE	PROCEDURE USED	EXAMINATION RESULTS
N4A, B, C, D Feedwater Spargers	Visual and LP around flow holes	PT-90.1, Rev. 8 GE-PT-100, Rev. 0	Cracking exists around sparger flow holes. The cracking was evaluated as acceptable for another operating cycle (ref. GE Report No. RDE 42-1289 - Rev. 1)
N4A, B, C, D Inner Blend Radii	UT	GE-UT-303, Rev. 0	No recordable indications.
2B21-N4A-SE (Feedwater Safe End @ 45 ⁰)	UT	GE-UT-101, Rev. 0	One indication recorded. Indication was evaluated to be geometric in nature due to the sound beam entering the thermal sleeve through a water interface. This indication exhibits no apparent change from previous outages.
2B21-N4B-SE, 2B21-N4C-SE, 2B21-N4D-SE (Feedwater Safe Ends @ 135 ⁰ , 225 ⁰ , and 315 ⁰ respectively)	UT	GE-UT-101, Rev. 0	One indication associated with thermal sleeve geometry seen below recordable levels during the previous outage was also seen this outage below recordable levels.



GE Nuclear Energy

NO: GE-UT-903 REV. 0 PAGE 18 OF 36
TITLE: PROCEDURE FOR MANUAL ULTRASONIC
EXAMINATION OF NOZZLE INNER RADIUS
GREATER THAN 10" DIAMETER

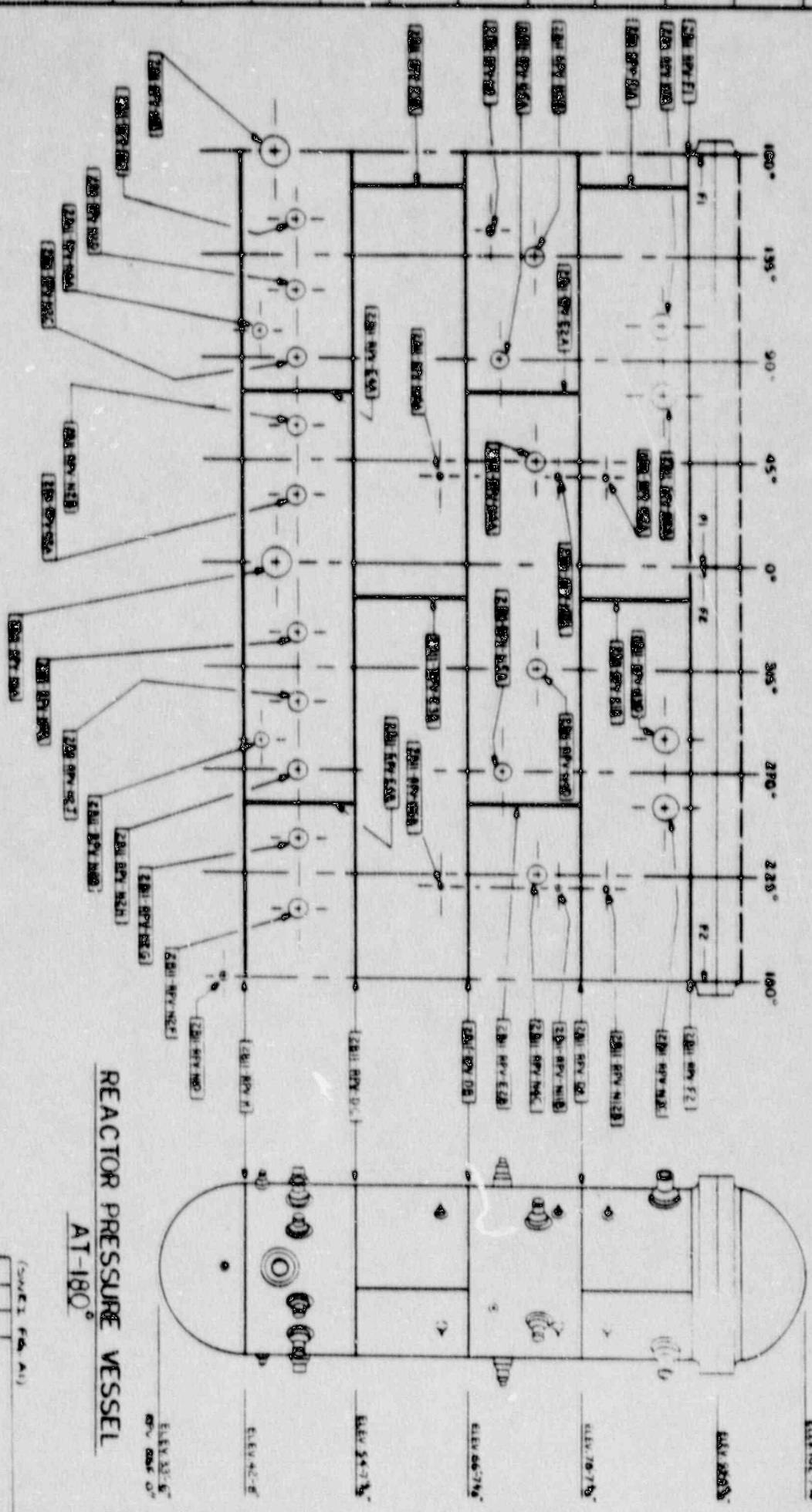
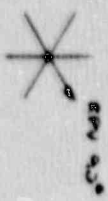


NOZZLE EXAMINATION ZONES

NOTES

- 1 FEEDWATER NOZZLES REQUIRE ZONES 1, 2, 3 PER NUREG 0610
- 2 ALL OTHER NOZZLES EXCEPT FEEDWATER REQUIRE ONLY ZONES 1 & 2

FIGURE 1



REACTOR PRESSURE VESSEL
AT-180°

(SCALE FOR AT)

NO	DATE BY	REVISION

CAROLINA POWER & LIGHT CO
MEMBER STEEL FAB CO

DESIGN: 5881
CHECKED: [Signature]
DATE: 11/15/58
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SHEET 1 OF 1

ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED
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