CP&L

Carolina Power & Light Company

SERIAL: LAP-83-319

July 14, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. D. B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-324
LICENSE NO. DPR-62
IE BULLETIN NO. 83-02
RECIRCULATION SYSTEM STRESS CORROSION CRACKING
JUSTIFICATION FOR CONTINUED OPERATION

Dear Mr. Vassallo:

Carolina Power & Light Company (CP&L) received, by letter dated March 4, 1983, the NRC IE Bulletin No. 83-02, "Stress Corrosion Cracking in Large-Diameter Stainless Steel Recirculation System Piping at BWR Plants". This recent discovery of pipe cracking in BWR Recirculation System welds has raised questions concerning the safe continued operation of Brunswick Steam Electric Plant Unit No. 2 (Brunswick-2).

Brunswick-2 is presently scheduled to shutdown for an extended maintenance outage in November 1983. The ultrasonic testing inspection and a system leak test performed on Brunswick-2 in February 1983 and the relatively minor findings on Brunswick-1 indicate that there is no immediate concern on Brunswick-2 which justifies an immediate shutdown. Therefore, CP&L believes that the continued operation of Brunswick-2 until the November 1983 maintenance outage is justified. Enclosed is a discussion of the basis for CP&L's conclusions.

If you have any questions concerning this submittal, please contact our staff.

Yours very truly,

P. W. Howe

P. W. Howe
Vice President
Brunswick Nuclear Project

WRM/pgp (7421WRM)
Enclosure

cc: Mr. D. O. Myers (NRC-BSEP)
Mr. J. P. O'Reilly (NRC-RII)
Mr. S. D. MacKay (NRC)

A001
1/1

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

RECIRCULATION SYSTEM STRESS CORROSION CRACKING
JUSTIFICATION FOR CONTINUED OPERATION
BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 2

The recent discovery of extensive pipe cracking in BWR Reactor Recirculation System welds has raised questions regarding the safety of continued operation of BSEP Unit No. 2. However, Ultrasonic Testing (UT) inspection and a system leak test performed in February 1983 and the relatively minor findings in Unit No. 1 indicate there is no immediate concern on Unit No. 2 that justifies an immediate shutdown. Additionally, the proposed inspection requirements have been partially fulfilled on Unit No. 2 using approved methods.

A total of 12 joints in the Unit No. 2 Reactor Recirculation System were inspected by UT in February 1983. These inspections were done with methods conforming to IEB 83-02. Eight jet pump inlet riser to safe-end welds and four 4-inch bypass line welds were inspected. Recent and historical industry experience and the results of Unit No. 1 inspections indicate that the joints examined have a high probability of cracking before other joints. All of the 12-inch joints had a carbon content of 0.075%; no weld in the system has a higher content. The 4-inch joints had a carbon content of 0.071%. The welds examined include the joint with the highest carbon content and highest Stress Rule Index (SRI) in the system. Of the twelve welds examined, ten have SRIs greater than 1.2 and three have SRIs greater than 1.5.

In addition to the UT inspections, a leak test was also performed in February on Unit No. 2. During this test, liquid penetrant developer was applied to all 12-inch joints (40) to ensure that even minute cracks characteristic of Intergranular Stress Corrosion Cracking (IGSCC) would be detected. During this test, the recirculation pump was running to pressurize the 12-inch piping.

The Unit No. 1 examinations, which were completed in January, revealed a relatively minor extent of cracking compared to other plants. A total of 36 welds were inspected, and the sample was in compliance with IEB 83-02. Two very short, tight through-wall cracks were found on 12-inch lines, and two short axial cracks, 11% and 5% of the wall thickness, were found on one of the 28-inch pump discharge line welds. Cracks of this type are not a significant safety concern because they do not reduce the section properties of the pipe, and they are certain to leak before they grow to any size of concern.

The Brunswick units have two design features that reduce susceptibility to IGSCC. The Residual Heat Removal System piping is carbon steel (except for a short section where the suction line connects to the Recirculation System), and thus is not susceptible to IGSCC. Also, the Reactor Recirculation System discharge manifold end caps are deeper than those at other plants, resulting in lower residual stresses. Neither the Recirculation System nor the Residual Heat Removal System has a history of vibration.

In conclusion, there is no immediate need to perform inspections on Unit No. 2 recirculation piping. The most susceptible welds were inspected in February 1983 using the best available techniques, and a leak test done at that time verified their integrity. Extensive inspections performed on Unit No. 1 revealed relatively minor cracking. Finally, a large body of analytical and experimental work and industry experience support that intergranular stress corrosion cracks will grow to through wall and leak before affecting structural load carrying capability of the piping.