CP&L
Carolina Power & Light Company

SERIAL: NLS-84-431

OCT 01 1984

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 NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
ACTIONS IN RESPONSE TO GE SERVICE INFORMATION LETTER (SIL 402)
CONTAINMENT INERTING

Dear Mr. Vassallo:

SUMMARY

The purpose of this letter is to provide a response to verbal questions from members of your staff concerning Carolina Power & Light Company's (CP&L) implementation of the recommendations of General Electric Service Information Letter (SIL) No. 402 for the Brunswick Steam Electric Plant, Units 1 and 2.

DISCUSSION

On February 3, 1984, the NRC issued IE Bulletin (IEB) No. 84-01, Cracks In Boiling Water Reactor Mark I Containment Vent Headers in response to a through-wall crack being found in the torus vent header of Hatch Unit 2. Only those plants that were currently in cold shutdown were requested to formally respond to this IE Bulletin.

Subsequently, GE SIL No. 402 was issued on February 14, 1984. This letter provided five recommendations for action by those BWRs that use liquid-nitrogen-based inerting systems. At the time SIL 402 was issued, CP&L reviewed the recommendations made for their applicability to the Brunswick Plant. A summary of the recommendations and the results of Company's review are provided in Attachment 1 of this letter.

CONCLUSION

The Company has taken positive steps to evaluate and implement, where appropriate, the recommendations of GE SIL No. 402 for our Brunswick Plant.

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If you have any further questions concerning this subject, please contact Mr. S. R. Zimmerman at (919) 836-6242.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

WRM/cfr (669MAT)

Attachment

cc: Mr. D. O. Myers (NRC-BNP)
Mr. J. P. O'Reilly (NRC-RII)
Mr. M. Grotenhuis (NRC)

ATTACHMENT 1

SUMMARY OF THE RECOMMENDATIONS
OF GE SERVICE INFORMATION LETTER NO. 402

RECOMMENDATION 1: Evaluate Inerting System Design

Evaluate the design of the nitrogen inerting system. Investigate the potential for introducting cold (less than 40°F) nitrogen and the orientation of the nitrogen port relative to the vent header, downcomers or other equipment in the wetwell and drywell which may be in the path of the injected nitrogen. Assure that the temperature monitoring device, the low temperature shutoff valve, and overall system design are adequate to prevent the injection of cold nitrogen into the containment.

CAROLINA POWER & LIGHT COMPANY'S RESPONSE

The design of the Brunswick nitrogen inerting system will prevent the injection of cold nitrogen into the primary containment. The inerting system contains a steam fired vaporizer and a low temperature shut-off valve whose function is to stop flow from the vaporizer when the nitrogen outlet temperature from the vaporizer falls below 50°F. There is approximately 300 feet of 8-inch diameter pipe which runs from the vaporizer to the reactor building. After the line penetrates the reactor building, the line enlarges to a 20-inch diameter. There is a low point in the nitrogen line before it reaches the reactor building. This low point will tend to trap any liquid nitrogen in the unlikely event it should pass the vaporizer. The 20-inch nitrogen line for the torus is located at azimuth 135 degrees and elevation 1 foot 6 inches. The injection line penetrates horizontally and is approximately 11 feet from the vent header. The 18-inch diameter drywell injection port is located at azimuth 175 degrees and elevation 23 feet 6 inches. The structure closest to this penetration is the residual heat removal shutdown cooling line. This line is approximately 3 feet horizontally from the injection port and is covered with 2 to 3 inches of mirror insulation. A heating-ventilation-air conditioning (HVAC) return air duct runs along the grating and is approximately 5 feet below the injection port. Any cold (liquid or gaseous) nitrogen coming from either the drywell or torus injection port should not come into contact with any safety-related equipment. The probability of any liquid nitrogen reaching either the drywell or torus is negligible for the reason stated later in this response.

A plant modification (PM 78-003) is being implemented to install a control valve on the vaporizer discharge to control the nitrogen temperature between 90 and 120°F. At 120°F, the valve will be full open (4000 scfm). At 90°F, the valve will limit flow to 1000 scfm.

The low temperature shut-off valve is presently inoperable, but is being evaluated as to return it to operability. Due to operating procedures, however, manual valve HV-44 will be closed at 90°F to stop nitrogen flow to the vaporizer by the operator stationed at the vaporizer.

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RECOMMENDATION 2: Evaluate Inerting System Operation

Review the operating experience of the inerting system to assure that the vaporizer, the low temperature shutoff valve, and the temperature indicators have functioned properly. Evaluate the plant calibration, maintenance, and operating procedures for the inerting system. Assure that cold nitrogen injection would be detected and prevented.

CAROLINA POWER & LIGHT COMPANY'S RESPONSE

In the past, the Brunswick Plant has had problems with liquid nitrogen passing the vaporizer. This liquid nitrogen collected in a low point in the pipe outside the reactor building and caused failures of the pipe due to the combined thermal stresses and rapid expansion of the nitrogen upon vaporization. These failures occurred over a hundred feet from primary containment. In response to these events, which last occurred in 1982, the operating procedure for inerting and the setpoint for the low temperature shut-off valve have been revised. The low temperature shut-off valve is now set to close at 50°F vaporizer discharge temperature. The operating procedure for inerting now requires that steam be introduced to the vaporizer before nitrogen. The procedure also requires that during inerting an operator must remain at the vaporizer and stop flow to the vaporizer if the discharge temperature of the nitrogen falls below 90°F. There is local temperature indication at the vaporizer. During inerting there is a frost line on the vaporizer which is indicative of discharge temperature. As the frost line rises above the midpoint, liquid nitrogen is released to the discharge.

RECOMMENDATION 3: Test for Drywell/Wetwell Bypass Leakage

Perform a bypass leakage test as soon as convenient to confirm the integrity of the vent system. This test should be conducted during plant operation following normal plant procedures. If no procedures exist, the following is a general guide for preparing your procedure: pressurize the drywell to approximately 0.75 psi above the wetwell pressure, maintain this drywell pressure and measure the pressure buildup in the wetwell. Any bypass leak area can then be calculated (and is limited by Technical Specifications on many plants) from the wetwell pressure and the drywell-wetwell pressure difference. This will provide an indication that the vent system integrity is intact and that no gross failure exists.

CAROLINA POWER & LIGHT COMPANY'S RESPONSE:

Immediately following the discovery of the torus vent header crack in the Hatch Plant, an on-line drywell/torus bypass leakage test on each Brunswick unit was conducted. However, the test was not performed as described in GE SIL No. 402 because the Brunswick Plant has only wide-range torus pressure indication which would not detect a small change in torus pressure. The test used consists of pressurizing the drywell to approximately 1 psig and observing the pressure decay over a one-hour period. Both Brunswick units have been tested with very good results. Brunswick-1 showed a pressure decay of 0.05 psig; Brunswick-2 showed a pressure decay of 0.06 psig. A pressure decay of less than one half the initial test pressure (1 psig) was judged to be acceptable.

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RECOMMENDATION 4: Inspect Nitrogen Injection Line

Conduct an ultrasonic test (UT) as soon as convenient of all accessible welds in the nitrogen injection line from the last isolation valve to the wetwell and drywell penetrations. Also UT the containment penetrations and the containment shell within 6 inches of the penetration. An ultrasonic test is recommended because cracks would be most likely to initiate on the inside of the pipe or on the side of the metal in contact with cold nitrogen.

CAROLINA POWER & LIGHT COMPANY'S RESPONSE:

It is believed that ultrasonic testing of the nitrogen injection lines is unwarranted for the Brunswick Plant. This conclusion is based on the following reasons:

1. In order for liquid nitrogen to reach either drywell, the liquid nitrogen would have to make a vertical climb of approximately 37 feet in 20-inch piping. At a flow of 4000 scfm, this is not practical.

2. There is 269 feet of horizontal 8-inch pipe prior to any tap-off to Brunswick-1. This run includes 2-foot rise, an 8-foot drop, and a 1.5-foot rise. The pipe reaches a minimum of 4 feet below ground. At this depth, the ground maintains nearly a constant temperature year round. This is the furthest point at which any damage has occurred.

3. There is a section of pipe 101 feet long that is 1.5 feet lower than the rest of the piping. This section tends to trap any liquid nitrogen that gets past the vaporizer. This is where most damage has occurred.

4. Since the Brunswick-1 tap-off is on the bottom of the 8-inch pipe, most of the liquid nitrogen that reaches this point will flow into the tap-off.

5. Any liquid nitrogen which may get past the Brunswick-1 tap must then make a 4.5-foot vertical climb, followed by a 2-foot vertical climb. The section of piping with these two inclines is in the pipe tunnel and reactor building and is approximately 70-feet long. The temperatures seen here would also help to vaporize any remaining liquid.

6. If any liquid were to get into the Brunswick-1 line, it would have to make a 1 foot 3 inch rise and then a 5 foot 6 inch rise. The pipe with the 1 foot 3 inch rise is in the pipe tunnel. The other rise is in the reactor building. This section also includes a 150-foot section of horizontal pipe. The runs of pipe in the pipe tunnel and the reactor building would tend to vaporize the liquid if it were to make it that far. Also, the 5 foot 6 inch rise would tend to trap any remaining liquid that passed the 1 foot 3 inch rise.

7. The piping discussed is outside the last isolation valve.

8. With the attention given the vaporizer discharge temperature by the auxiliary operator stationed at the vaporizer, it is believed that only a small amount of liquid, if any, would exit the vaporizer. Operating procedures require this temperature (90°F) to be maintained.

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RECOMMENDATION 5: Inspect Containment

During the next planned outage, perform a visual inspection of the vent header, downcomers, and other equipment in the containment which might be expected to be affected by the injection of cold nitrogen. The vent header should be inspected on the outside and the inside. Also inspect the containment shell or steel liner for at least 6 inches around the nitrogen penetration.

CAROLINA POWER & LIGHT COMPANY'S RESPONSE:

A special procedure (SP 84-0014) now exists for the inspection of the torus and drywell in areas adjacent to the nitrogen injection ports. Inspections of both Brunswick-1 and Brunswick-2 have been performed and no problems were observed in the vent header or in the configuration of the nitrogen discharge into the torus.

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