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ACCESSION NBR:8810040192 DOC.DATE: 88/09/28 NOTARIZED: YES DOCKET #
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SUBJECT: Responds to NRC Bulletin 88-008, "Thermal Stresses in Piping Connected to RCS."

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

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
RESPONSE TO NRC BULLETIN 88-08

Gentlemen:

Carolina Power & Light Company hereby submits information requested by NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant Systems," for the Shearon Harris Nuclear Power Plant (SHNPP). This bulletin requested that licensees review their reactor coolant systems to identify any connected, unisolable piping that could be subjected to temperature distributions, which would result in unacceptable thermal stresses, and take action, where such piping is identified, to ensure that piping will not be subjected to unacceptable thermal stresses. The SHNPP responses to the specific actions requested by this bulletin are attached.

If you have any questions concerning this response or require additional information, please contact Mr. L. I. Loflin.

Yours very truly,

M. A. McDuffie

JHE/dtw (5468JHE)

Attachments

cc: Mr. W. H. Bradford
Mr. B. C. Buckley
Dr. J. Nelson Grace

M. A. McDuffie, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

Ruby R. Morgan
Notary (Seal)

My commission expires: 11/27/89

RUBY R. MORGAN NOTARY PUBLIC WAKE COUNTY, N.C.

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ACTION 1

Review systems connected to the RCS to determine whether unisolable sections of piping connected to the RCS can be subjected to stresses from temperature stratification or temperature oscillations that could be induced by leaking valves and that were not evaluated in the design analysis of the piping. For those addressees who determine that there are no unisolable sections of piping that can be subjected to such stresses, no additional actions are requested except for the report required below.

SHNPP RESPONSE

Carolina Power & Light Company has completed a review of unisolable sections of piping connected to the RCS at SHNPP and identified those lines susceptible to a thermal cycling phenomenon. The criteria used in selecting these lines were: (1) operating pressure greater than RCS pressure, (2) fluid temperature lower than RCS temperature, (3) number of isolation valves, and (4) piping geometry. The identified lines are:

1. SIS Cold Leg Injection Lines (3)
2. SIS Hot Leg Injection Lines (3)
3. Auxiliary Charging Line
4. Normal Charging Line

The two Pressurizer Spray lines and the CVCS Auxiliary Spray line meet the criteria for temperature, pressure, and isolation, but were eliminated from consideration based on piping geometries which do not support thermal stratification cycling. Specifically, the check valve in the Auxiliary Spray line nearest the RCS piping is located in a vertical run of pipe. Leakage through the check valve will not result in stratification or cycling since the cooler water leaking by the check valve will collect above the valve and mix with the warmer water already above the valve. Also, the bypass lines provided around the Pressurizer Spray block valves are positioned to pass a small amount of flow into the Pressurizer Spray piping. The two Pressurizer Spray lines also have vertical runs of piping which will promote mixing of the hot and cold water in the pipe.

The Pressurizer surge line, though not specifically identified in addressing this bulletin, is being reviewed separately in conjunction with the Westinghouse Owners' Group.

ACTION 2

For any unisolable sections of piping connected to the RCS that may have been subjected to excessive thermal stresses, examine nondestructively the welds, heat-affected zones, and high stress locations, including geometric discontinuities, in that piping to provide assurance that there are no existing flaws.

SHNPP RESPONSE

The lines identified in Action #1 were reviewed to identify those areas which were to be examined. Considered in that review were several factors including plant operating data, normal system lineups, and stress distributions in the lines as given in the Class 1 Piping Calculation Reports. Based on this information, the lines recommended for examination were the three cold leg injection lines and the auxiliary charging line. Leakage across a block valve to the cold leg header was identified by plant personnel. Further, these are higher stressed lines per the Class 1 Piping Calculations. Therefore, these lines were considered worst case. For each of the lines, the weld at the check valve outlet and the weld at the inlet of the elbow downstream of the check valve were examined. Additionally, a base metal examination was performed on the first 90° elbows downstream of the last check valves in the three cold leg injection lines. Examination techniques complied with the guidance provided in Supplement 2 to NRC Bulletin 88-08. All of the identified welds were examined by both PT (Penetrant Test) and UT (Ultrasonic Test)/Volumetric techniques. No unacceptable indications were identified. The three elbows were examined by UT/Volumetric techniques. No unacceptable indications were found.

With respect to the remaining lines identified in Action #1, CP&L believes additional considerations justify foregoing examinations at this time. For the SIS hot leg injection lines, temperature data taken by plant personnel prior to plant shutdown confirm no leakage through the block valves upstream of the check valves in the injection lines. Therefore, no mechanism exists to initiate thermal cycling in these lines. The normal charging line has been the charging line in use since plant start-up and, thus, has not been subject to the leakage problem which causes stratification/cycling.

ACTION 3

Plan and implement a program to provide continuing assurance that unisolable sections of all piping connected to the RCS will not be subjected to combined cyclic and static thermal and other stresses that could cause fatigue failure during the remaining life of the unit. This assurance may be provided by (1) redesigning and modifying these sections of piping to withstand combined stresses caused by various loads including temporal and spatial distributions of temperature resulting from leakage across valve seats, (2) instrumenting this piping to detect adverse temperature distributions and establishing appropriate limits on temperature distributions, or (3) providing means for ensuring that pressure upstream from block valves which might leak is monitored and does not exceed RCS pressure.

SHNPP RESPONSE

In accordance with Action #3 of the bulletin, CP&L is planning a program to provide continuing assurance that unisolable sections of piping connected to the RCS will not be subjected to combined stresses that could cause fatigue failure. The program will encompass the SIS cold leg injection lines, hot leg injection lines, and the auxiliary charging line. The normal charging line is excluded because it is a normally operating line with continuous fluid flow. The program will be implemented during the next refueling outage, currently scheduled for late 1989.

In addition to the requirements of the bulletin, the following additional actions have been taken:

1) The piping configuration for the Boron Injection Tank (BIT) bypass line at SHNPP is similar to that of Farley. Since BIT deletion was licensed for SHNPP, this bypass line may be eliminated. Therefore, in addition to these actions required by the bulletin during the 1988 Refueling Outage, the one-inch BIT bypass line (and associated valving) was removed.

2) During start-up recovery from the 1988 Refueling Outage, the safety injection lines with single block valves will be tested to ensure no abnormal leakage exists. If such leakage is observed, action will be taken to ensure this leakage does not result in excessive thermal stress to the downstream piping.