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SUBJECT: Forwards response to NRC 971215 RAI re plant response to GL 96-06, "Assurance of Equipment Operability & Containment Integrity During Design Basis Accident Conditions." With eleven oversize design configuration drawings.

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TITLE: GL 96-06, "Assurance of Equip Oprblty & Contain.Integ. during Design

NOTES:Application for permit renewal filed. 05000400

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SEP 2 8 1998

SERIAL: HNP-98-097

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 REQUEST FOR ADDITIONAL INFORMATION
REGARDING GENERIC LETTER 96-06 RESPONSE (TAC NO. M96818)

Dear Sir or Madam:

By letter dated December 15, 1997, the NRC requested that Carolina Power & Light Company (CP&L) respond to a request for additional information regarding the Harris Nuclear Plant (HNP) response to Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions." This letter requested that the information be provided within 30 days of the end of the next refueling outage. The next HNP refueling outage is currently scheduled to commence October 24, 1998.

A written response providing the requested information is enclosed. Questions regarding this matter may be referred to Mr. J. H. Eads at (919) 362-2646.

Sincerely,

James Scarola

AEC/aec

Enclosures (2)

c: (w/o Enclosure 2)
Mr. J. B. Brady (NRC Senior Resident Inspector, HNP)
Mr. L. A. Reyes (NRC Regional Administrator, Region II)

(w/ Enclosure 2)
Mr. S. C. Flanders (NRR Project Manager, HNP)

A072

Drawings located in Central Files

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING GENERIC LETTER 96-06 RESPONSE (TAC NO. M96818)

Requested Information:

In your January 28, 1997 submittal, you identified six pipes penetrating the containment and susceptible to thermally induced pressurization which would not overpressurize based on an evaluation of the containment valves. You also identified two additional pipe lines, associated with penetration M-74 and M-91, for which evaluation would be performed later. For all of these lines, final engineering analysis would be provided by the end of the next refueling outage. For these eight pipe lines please provide:

1. Summaries of your evaluations describing the methods of analysis, assumptions used in the analysis, and results of the analysis.

2. Fabrication drawings of the piping sections evaluated.

3. Discuss how the criteria used for the evaluations meet the licensing basis criteria for the Shearon Harris facility.

4. Provide the completion schedule for any required modifications.

Response 1:

Containment penetrations M-42, M-74, M-76B, M-78B, M-78C, M-78D and M-88 would not overpressurize based on evaluations of the containment valve configurations and review of allowable stresses associated with these penetrations. Penetration M-91 required a modification to prevent the possibility for overpressurization. Summaries of the evaluations for each of the penetrations are provided below. For each of these penetrations, the maximum component temperature used in the evaluations for both Loss of Coolant Accident (LOCA) and Main Steam Line Break (MSLB) scenarios is 260 °F. The containment isolation valves are assumed to be leak tight unless otherwise noted. This is conservative with respect to overpressurization since leakage would tend to relieve pressure in the penetrations. The temperature increase in the containment and Reactor Auxiliary Building (RAB) is used to establish the final temperature and pressure in each of the penetrations being reviewed. The pressure in the penetration is then used to evaluate the stress in the penetration. The applied stress is compared to the faulted allowable stress to determine acceptability.

Penetration M-42 (Reactor Coolant Drain Tank Pump Discharge; 3"): This penetration has a spring-to-close diaphragm valve outside and a spring-to-close globe valve inside that isolate the penetration. The normal flow path is from inside containment through the penetration. Pressure increase in the penetration would tend to seat the globe valve. Calculations show the maximum acceptable pressure for the piping in this penetration to be 9220 psi. Based on input from the diaphragm vendor, the maximum design pressure for the diaphragm valve is 300 psig at 150 °F. As pressure increases above this maximum design pressure, the valve would relieve by one of three relief mechanisms. In the first relief scenario, the diaphragm valve could open slightly as line pressure increases above that required to open the valve (403 psig), which is well below the pressure allowed for pipe stress. The containment isolation function of the penetration would not be degraded in this case since the leakage of the isolated fluid from the penetration does not create a leak path from inside containment to outside containment. The second relief possibility is leakage between the valve body and the diaphragm which forms the gasket between the valve body and the bonnet. Since the diaphragm is a soft material compared to the valve and pipe, this is the most likely leak path. This leakage would not degrade the containment isolation function since the leakage of the isolated fluid from the penetration does not create a leak path from inside containment to the outside. The third relief mechanism would be a rupture of the valve diaphragm. A rupture would relieve the excess pressure into the valve bonnet. The bonnet provides a secondary pressure boundary which would contain the leak. Rupturing the diaphragm and leakage into the valve bonnet does not prevent the valve from performing its containment isolation function. Any of these three relief mechanisms would prevent the penetration from overpressurizing while still maintaining the containment isolation function. Therefore, this penetration is considered acceptable.

Penetration M-74 (Containment Sump Pump Discharge; 3"): The potential for overpressurization of this penetration exists when the line is operating and the isolation valves get an isolation signal. The initial line pressure is assumed to be the normal operating pressure of 45 psig. The isolation valves are assumed to be leak tight, and it is conservatively assumed that the heat transfer coefficient is equal on both sides of the penetration. The maximum pressure during the accident conditions has been calculated to be 5212 psig. Since this is above the design pressure rating of 60 psig for the piping, a stress analysis review was conducted. This review determined the resulting stresses are within the faulted allowable limits. Therefore, this penetration is considered acceptable.

Penetration M-76B (Accumulator to Refueling Water Storage Tank; 3/4"): The potential for overpressurization of this penetration exists when the line is isolated (its normal configuration). The initial line pressure is assumed to be 0 psig since it is used for testing and pressure is bled off the line after testing. The isolation valves are assumed to be leak tight, and it is conservatively assumed that the heat transfer coefficient is equal on both sides of the penetration. The maximum pressure during the accident conditions has been calculated to be 9890 psig. Since this is above the design pressure rating of 2485 psig for the piping, a stress analysis review was conducted. This evaluation determined the resulting stresses are within the faulted allowable limits for the piping. Therefore, this penetration is considered acceptable.

Penetrations M-78B (Pressurizer Liquid Sample; 3/8"), 78C (Pressurizer Steam Sample; 3/8"): Solenoid operated Target Rock globe valves isolate these penetrations. Normal flow is from inside containment through the penetrations with flow over the valve seats. Pressure under the seat of the inside valve will tend to open it. The main disc will lift when the back pressure (under the seat) generates sufficient opening force to balance the sum of the closing forces. Using vendor data, the pressure to open the valve is calculated to be 2878 psig. The leak path would be out of the penetration into the piping in containment. The containment isolation function would not be degraded since the leakage of the isolated fluid from the penetrations does not create a leak path from inside containment to the outside. Since the pressure to open the valves is above the design pressure of 2485 psig for the piping, stress analyses reviews were conducted. These evaluations determined the resulting stresses are within the faulted allowable limits for the piping. Therefore, these penetrations are considered acceptable.

<u>Penetration M-78D (Accumulator Sample; 3/8")</u>: Solenoid operated Target Rock globe valves isolate this penetration. Normal flow is from outside containment through the penetration with flow over the valve seats. Pressure under the seat of the inside valve will tend to open it. The main disc will lift when the back pressure (under the seat) generates sufficient opening force to balance the sum of the closing forces. Using vendor data, the pressure to open the valve is calculated to be 666.5 psig. The leak path would be out of the penetration into the piping in containment. The containment isolation function would not be degraded since the leakage of the isolated fluid from the penetration does not create a leak path from inside containment to the outside. Since the pressure to open the valve is less than the design pressure of 700 psig for the piping, no further review is required. Therefore, this penetration is considered acceptable.

<u>Penetration M-88 (Liquid Sample Return from Post-Accident Sampling Skid; 1")</u>: Solenoid operated Target Rock globe valves isolate this penetration. Normal flow is from outside containment through the penetration with flow over the valve seats. Pressure under the seat of the outside valve will tend to open it. The main disc will lift when the back pressure (under the seat) generates sufficient opening force to balance the sum of the closing forces. Using vendor data, the pressure to open the valve is calculated to be124 psig. The leak path would be out of the penetration away from containment. The containment isolation function would not be degraded since the leakage of the isolated fluid from the penetration does not create a leak path from inside containment to the outside. Since the pressure to open the valve is above the design pressure of 100 psig for the piping, a stress analysis review was conducted. This evaluation determined the resulting stresses are within the faulted allowable limits for the piping. Therefore, this penetration is considered acceptable.

<u>Penetration M-91 (Containment Fan Coil Service Water Outlet; 12")</u>: The potential for overpressurization of this penetration exists when the line is operating and the isolation valves get an isolation signal. The initial line pressure is assumed to be the normal operating pressure of 100 psig. The isolation valves are assumed to be leak tight, and it is conservatively assumed that the heat transfer coefficient is equal on both sides of the penetration. The maximum pressure during the accident conditions has been calculated to be 8996 psig. Since this penetration could overpressurize if exposed to 8996 psig, a modification was required to prevent the possibility for overpressurization. The modification was implemented by adding a relief valve to the piping for the penetration. The relief valve set pressure is 300 psig, which is above the system design pressure of 225 psig. Since the relief valve set pressure is above the design pressure, a stress

analysis was conducted. This evaluation determined the resulting stresses are within the faulted allowable limits for the piping. Therefore, with the addition of the modification, this penetration is considered acceptable.

Response 2:

Enclosure 2 contains the design configuration drawings of the piping sections for the containment penetrations evaluated in Response 1. The drawings listed below are included in Enclosure 2.

Penetration	Inside Containment Drawing	Outside Containment Drawing
M-42	CAR-2165-G-129, Rev. 11	CAR-2165-G-182, Rev. 10
M-74	CAR-2165-G-180 S01, Rev. 14	CAR-2165-G-181, Rev. 10
M-76B	CAR-2165-G-154, Rev. 15	CAR-2165-G-152, Rev. 21
M-78B	CAR-2166-G-551 S02, Rev. 0	CAR-2166-G-551 S01, Rev. 9
M-78C	same as Penetration M-78B	same as Penetration M-78B
M-78D	same as Penetration M-78B	same as Penetration M-78B
M-88	CAR-2165-G-180 S02, Rev. 11	CAR-2165-G-125 S01, Rev. 12
M-91	CAR-2165-G-095, Rev. 10	CAR-2165-G-099, Rev. 15

Response 3:

The penetrations were analyzed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, 1974 Edition, Subsection NC-3652. Section 3.9 of the HNP Final Safety Analysis Report (FSAR) states, "The design rules and associated design stress limits applied in the design of ASME Code Class 2 and 3 components are in accordance with the ASME Code, Section III, Subsections NC and ND, respectively." For those penetrations discussed in this report that could experience pressures greater than the respective design ratings, or where the pressure required to open the isolation valves is greater than the respective design ratings, stress analysis reviews were conducted. If the resultant stresses were evaluated to be less than the ASME Code faulted allowables (for accident conditions), then the piping penetrations were dispositioned as acceptable. The loading conditions which are required to be analyzed are defined in Section 3.9 of the HNP FSAR.

Response 4:

Only one modification was required for the eight containment penetrations described in this report. A relief valve was added to penetration M-91 in May 1997. That modification is discussed in Response 1. No further modifications are required.

ENCLOSURE 2 TO SERIAL: HNP-98-097

DESIGN CONFIGURATION DRAWINGS