March 9, 2001

Mr. James Scarola, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Code: Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: EVALUATION OF RELIEF REQUEST CS-ROJ11 RELATED TO INSERVICE TESTING OF SERIES CHECK VALVES - SHEARON HARRIS NUCLEAR POWER PLANT (TAC NO. MB0792)

Dear Mr. Scarola:

By letter dated December 14, 2000, you submitted relief request CS-ROJ11 for relief from certain requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Code, Section XI for the Harris Nuclear Plant (HNP). Specifically, you requested relief from performing individual bi-directional inservice testing of series check valves located in the Chemical Volume Control System.

The staff has reviewed and evaluated relief request CS-ROJ11 as documented in the enclosed Safety Evaluation. The staff has determined that compliance with the existing requirement would result in hardship or unusual difficulty without a compensating increase in the level of safety. Accordingly, the request for relief is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year inspection interval.

Sincerely,

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Safety Evaluation

cc: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST CS-ROJ11 RELATED TO INSERVICE TESTING

OF SERIES CHECK VALVES

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

DOCKET NO. 50-400

1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations*, (10 CFR) Section 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements that are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

In a letter dated December 14, 2000, Carolina Power & Light Company, licensee for the Shearon Harris Nuclear Power Plant (HNP), submitted relief request CS-ROJ11 for the second 10-year interval of the IST program.

The second 10-year IST interval for HNP began February 2, 1998, and is scheduled to end May 1, 2007. The IST program was developed in accordance with the requirements of the 1989 Edition of the ASME Code by implementation of the 1987 ASME/ANSI *Operations and Maintenance (OM) Standards* Part 1, Part 6, and Part 10 (OM-1, OM-6, and OM-10) for IST of safety and relief devices, pumps, and valves.

The NRC's findings with respect to authorizing the alternative and granting or denying the IST program relief request are given below.

2.0 RELIEF REQUEST CS-ROJ11

Relief is requested from the requirements of OM-10, paragraph 4.3.2.2(a), which states that each check valve shall be exercised in a way that verifies obturator travel to its required position. An alternative is proposed to test pairs of check valves in series using a test method that will verify that the pairs of valves are capable of closing as a unit. The check valves for which relief is requested are located in the Chemical Volume Control System (CVCS).

2.1 Licensee's Basis for Requesting Relief

The licensee states:

> NUREG 1482, Guidelines for Inservice Testing at Nuclear Power Plants, Section 4.1.1, describes plants having piping configurations which include two check valves in series with no provision (such as intermediate test taps) for verifying that each valve can close. Additionally, the section's *NRC Recommendation* states "If the licensee has no practical means for verifying the ability of each valve in a series to close, it may review the plant safety analysis to determine if both valves are required to function. If only one of the two valves is credited in the safety analysis (that is, if one valve could be removed without creating an unreviewed safety question or creating a conflict with regulatory or license requirements), then verification that the pair of valves is capable of closing is acceptable for IST. If relief is requested on this basis, both series check valves must be included in the IST program and be subject to equivalent quality assurance criteria."
>
> NUREG 1482 Section 4.1.1 lists several *conditions* that must be satisfied in order to test Series Check Valves. These *conditions* are 1) no practical means for verifying the ability of each valve in a series to close (piping configuration), 2) a review of the plant safety analysis to determine that both valves are not required to function, 3) Series Check Valves must be included in the IST program, and 4) valves are subject to equivalent quality assurance criteria.
>
> *Condition1*
> Piping designs associated with Chemical Volume and Control System Seal Injection To Reactor Coolant Pump [RCP] In-Series Check Valves have no provisions (such as intermediate taps) for verifying that each valve can close. Piping designs associated with Chemical Volume and Control System Alternate Charging, Normal Charging, and Pressurizer Auxiliary Spray Injection In-Series Check Valves do have an intermediate tap between the two check valves. However, HNP has determined that these taps are not adequate for testing the valves individually. A combination of the surveillance test methodology, questionable results, and possible plant impacts provided the basis for this determination. The factors include:
>
> > The surveillance test requires a refueling outage. These valves are comprised of either simple swing or spring assist check valves each mounted horizontally. Back pressure is provided only by the refueling cavity level. The static head pressure is minimal due to plant piping configuration. To pressurize the second valve away from the refueling cavity, a pressurized fluid below that being exerted by cavity static head pressure on the first valve would have to be introduced through the tap between the two valves. This pressure would be low (~5psi).

> The fluid introduced by the test methodology described above would introduce diluted water or air into the Reactor Coolant System [RCS]. Diluted water would be required to be of the same borated dilution level as the cavity to prevent RCS dilution. To prevent any thermal cyclic issues, the water introduced by the surveillance test would be required to be equal to that of the piping system under test.
>
> The set-up required to perform this test would involve elevated radiation fields, which conflicts with the effort to reduce radiography used as the current test method. The increased burden (i.e., the extensive test set-up and additional actions to prevent these unwanted test issues) is not justified by a compensating increase in level of quality and safety.

There are provisions for verifying that at least one of the valves in each pair of the subject in-series check valves is closed. These provisions are located upstream of the subject check valves.

Condition 2
The following plant document excerpts support the plant safety analysis requirement that both valves are not required to function.

> HNP Final Safety Analysis Report Figure 3.6.1-1, Loss Of Reactor Coolant Accident Boundary Limits, establishes the Case III (incoming lines) accident boundary as the second of two check valves in series. This figure also has a note “The Reactor Coolant Pump No. 1 seal is assumed to be equivalent to the first valve.” In the case of the Seal Injection RCP check valves, this note adds additional credence to testing the valves as a unit. The seal acts as an additional restriction similar to the function provided by the check valves.
>
> Westinghouse Systems Standard Design Criteria SS 1.19, Revision 0, March 1978, Criteria For Protection Against Dynamic Effects Resulting From Pipe Rupture, Section 2 - Reactor Coolant System Branch Pipe Rupture, Section 2-2-1, Loss of Reactor Coolant Accident Boundary Limits states “In particular, a loss of reactor coolant is assumed to occur for a pipe break down to the restraint of the normally open automatic isolation valve (case II) on outgoing lines and down to the second check valve (case III) on incoming lines. A pipe break beyond the restraint or second check valve will not result in an uncontrolled loss of reactor coolant if either of the two valves in the line close.” Section 2-2-1 further states “This criterion takes credit for only one of the two valves performing its intended function.”

Condition 3
The subject twelve valves are included in the HNP IST Program Plan HNP-IST-002-2nd Interval.

Condition 4
The subject twelve valves are ASME Class 1 valves, which are subject to the plant quality assurance criteria.

Eight of the subject valves have welded bonnets that do not support disassembly. Valve 1CS-497 has a cap welded over the bonnet, thus, making disassembly difficult. Valves 1CS-483, 1CS-486, and 1CS-00 have a bolted bonnet. Valve disassembly would pose workers to additional hazards both in the industrial safety and radiological areas while also creating schedule hardships.

During the last Refueling Outage (RFO9), these valves' closed positions were verified by the use of radiography with satisfactory results. Operational surveillance tests were conducted to verify valve stroke close requirements. The use of radiography poses workers to high radiation fields and this activity has routinely resulted in 0.5 to 1.0 Rem of radiation dose. Large scale radiography increases the risk of boundary violations and associated hazards due to the Containment Building layout. Additionally, schedule hardships are incurred due to the sizable radiography boundaries, which will halt other work activities in the area.

2.2 Alternative Testing

The licensee proposes:

Upon approval of this Relief Request (CS-ROJ11), HNP will test the subject check valves using a test method which will verify that the pair of valves is capable of closing as a unit. This methodology is as specified by NUREG-1482. Additional actions would be imposed if testing identified that the closure capability of the pair of valves is questionable. If so, both valves would be declared inoperable and corrective actions taken for both valves, as necessary, before being returned to service.

2.3 Evaluation

The licensee requests relief from the requirements of OM-10, paragraph 4.3.2.2(a), which states that each check valve shall be exercised in a way that verifies obturator travel to its required position. The 12 valves for which the licensee requests relief are the CVCS seal injection to RCP in-series check valves and the CVCS alternate charging, normal charging, and pressurizer auxiliary spray injection in-series check valves. The valves include 1CS-348, 1CS-349 (seal injection for RCP 1A), 1CS-389, 1CS-390 (seal injection for RCP 1B), 1CS-430, 1CS-431 (seal injection for RCP 1C), 1CS-486, 1CS-483 (RCS alternate charging line), 1CS-500, 1CS-497 (RCS normal charging line), and 1CS-491, 1CS-488 (RCS pressurizer auxiliary spray injection line). As an alternative to the Code-required testing, the licensee proposes to test pairs of check valves in series using a test method that will verify that the pairs of valves are capable of closing as a unit.

Closure verification for series check valves without intermediate test connections is addressed in NUREG-1482, Section 4.1.1. The staff recommends that licensees, with no practical means for verifying the ability of each valve in a series to close, review the plant safety analysis to determine if both valves are required to function. If only one of the two valves is credited in the safety analysis, then verification that the pair of valves is capable of closing is acceptable for IST. If relief is requested on this basis, both series check valves should be included in the IST program and be subject to equivalent quality assurance criteria. Testing is required during each quarter or at an extended interval in accordance with the Code. No additional testing need be performed unless the licensee finds indication that the closure capability of the pair of

valves is questionable. If so, both valves should be declared inoperable and corrective actions taken for both valves, as necessary, before being returned to service.

For some of the valves (CVCS alternate charging, normal charging, and pressurizer auxiliary spray injection in-series check valves), the licensee states that intermediate test connections exist, but that concerns over RCS dilution, thermal cycling, extensive test set-up, and elevated radiation fields make using these test connections a hardship. Although practical, the licensee has determined that these intermediate test connections are not adequate for individually testing the valves.

The licensee also states that the plant safety analysis does not require that both valves in the series function. All 12 valves are included in the IST program and are subject to the plant quality assurance criteria. For these reasons, the licensee's proposed alternative meets the guidance in NUREG-1482 for testing series valves as a pair and, therefore, provides reasonable assurance of the valves' operational readiness.

The 1998 Edition of the OM Code, ISTC-5223, includes requirements for testing series valves in pair. The Code states:

> If two check valves are in a series configuration without provisions to verify individual reverse flow closure (e.g., keepfill pressurization valves) and the plant safety analysis assumes closure of either valve (but not both), the valve pair may be operationally tested closed as a unit.

The licensee's proposed alternative is also consistent with the1998 Edition of the Code.

3.0 CONCLUSION

The proposed alternative described in CS-ROJ11 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year interval. Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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Date: March 9, 2001

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