UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 21, 2009

Chris L. Burton, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 – RELIEF REQUEST I3R-04 FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING SYSTEM PRESSURE TESTING OF CLASS 1 SYSTEMS (TAC NO. MD8744)

Dear Mr. Burton:

By letter dated April 29, 2008, Carolina Power and Light Company (the licensee), now doing business as Progress Energy Carolinas, Inc., submitted Relief Request (RR) I3R-04, pertaining to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirements on system pressure testing of Class 1 systems for the third 10-year inservice inspection (ISI) interval at the Shearon Harris Nuclear Power Plant, Unit 1.

The requested relief pertains to the boundary subject to test pressurization during performance of a system leakage test conducted at or near the end of an inspection interval. In lieu of the ASME Code requirement that the test extend to all Class 1 pressure retaining components within the system boundary, the licensee proposed an alternative to pressurize only up to the inboard isolation valves of several systems that would exclude a small segment of the Class 1 pressure boundary from attaining test pressure. However, a visual examination during pressurization would include all components within the system boundary.

Based on the information provided in RR I3R-04, the U.S. Nuclear Regulatory Commission (NRC) staff concluded that compliance with the ASME Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. In addition, the NRC staff finds that the licensee's proposed alternative continues to provide reasonable assurance of structural integrity and is, therefore, acceptable.

Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, Part 50.55a(a)(3)(ii), the NRC authorizes the ISI program alternatives proposed in RR I3R-04 for the third 10-year ISI interval at the Shearon Harris Nuclear Power Plant, Unit 1.

The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Marlayna Vaaler at (301) 415-3178.

Sincerely,

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via ListServ

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

RELIEF REQUEST I3R-04 REGARDING SYSTEM PRESSURE TEST OF CLASS 1 SYSTEMS

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated April 29, 2008, Carolina Power and Light Company (the licensee), now doing business as Progress Energy Carolinas, Inc., submitted Relief Request (RR) I3R-04, pertaining to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements on system pressure testing of Class 1 systems for the third 10-year inservice inspection (ISI) interval at the Shearon Harris Nuclear Power Plant, Unit 1 (HNP).

The requested relief pertains to the boundary subject to test pressurization during performance of a system leakage test, conducted at or near the end of inspection interval, in accordance with the ASME Code, Section XI, for the Class 1 portions of the safety injection (SI) system, pressurizer spray, residual heat removal (RHR) system, and various specified drains, vent, test and fill lines in the reactor coolant system (RCS). The attached Table 1 identifies the specific Class 1 pressure retaining components that are associated with the requested relief.

In lieu of the ASME Code requirement that the test extend to all Class 1 pressure retaining components within the system boundary, the licensee proposed an alternative to pressurize only up to the inboard isolation valves of the affected systems, which would exclude a small segment of the Class 1 pressure boundary from attaining the ASME Code-required test pressure. However, a visual examination during pressurization would include all components within the system boundary.

The U.S. Nuclear Regulatory Commission (NRC) staff evaluated the licensee's request for relief and the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(a)(3)(ii), in order to determine that compliance with the ASME Code requirement would result in hardship without a compensating increase in the level of quality and safety.

2.0 REGULATORY REQUIREMENTS

The requirements of 10 CFR 50.55a(g) specify that inservice inspection of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the Director of the

Office of Nuclear Reactor Regulation (NRR), if an applicant demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4)(i), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed in paragraph (b) of the section. The ISI Code of Record for the third 10-year inservice inspection interval at HNP is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

3.1 System/Component(s) for Which Relief is Requested

All ASME Code Class 1 components within the system pressure boundary between isolation valves as identified in Table 1 of this safety evaluation.

3.2 ASME Code Requirements

Table IWB-2500-1, Examination Category B-P, Item Number B15.10, requires that all Class 1 pressure retaining components be subject to a system leakage test with a VT-2 visual examination in accordance with IWB-5220. This pressure test is to be conducted prior to plant startup following each reactor refueling outage. The pressure retaining boundary for the test to be conducted at or near the end of each inspection interval shall be extended to all Class 1 pressure retaining components per IWB-5222(b).

3.3 Licensee's Request for Relief

The requested relief pertains to the boundary subject to test pressurization during performance of a system leakage test, conducted at or near the end of inspection interval, in accordance with the ASME Code, Section XI, for the Class 1 portions of the SI system, pressurizer spray, RHR system, and various specified drains, vent, test and fill lines in the RCS.

In lieu of the ASME Code requirement that the test extend to all Class 1 pressure retaining components within the system boundary, the licensee proposed that a system leakage test be conducted at or near the end of each inspection interval, prior to reactor startup. The segment of Class 1 piping between an inboard and an outboard isolation valve, including the valves in the system boundary for the RHR system, SI system, and RCS, will be visually examined for evidence of past leakage and/or leakage during the system leakage test conducted with the isolation valves in the position required for normal reactor startup.

3.4 Licensee's Basis for Requesting Relief

Normal reactor coolant pressure at 100 percent rated power for HNP is approximately 2235 pounds per square inch gauge (psig). The components and piping connected to the RCS, the SI system, and the RHR system, such as vents, drains, and instrument connections, for which relief is requested, are the portions of piping between an inboard and an outboard isolation valve, and include the valves themselves.

These segments of piping will not be pressurized to the ASME Code-required test pressure of 2235 psig during the system leakage test. The licensee stated that compliance with the requirements of the ASME Code by pressurizing to RCS pressure beyond the inboard isolation valve during performance of a system leakage test would result in hardship without a compensating increase in the level of quality and safety due to the following: 1) the special valve lineup required for the test adds unnecessary challenge to the system configuration; and 2) there are no test connections between the isolation valves. Consequently, a system pressure test conducted per the ASME Code requirements would require opening the first manual isolation valve to test the segment of piping up to the second isolation valve, thereby defeating the double isolation and reducing the margin of personnel safety for those performing the test.

The following specific lines are included in the request for relief:

1. Small Size Class 1 Vent, Drain, Test, and Fill Lines
2. Piping segments consisting of two 86 foot runs of 12 inch diameter piping between RHR inlet valves 1RH-39 and 40, and 1RH-1 and 2
3. Piping segments in the SI Loops Low Head Check Valves 1SI-250, 1SI-252, and 1SI-254, and upstream piping in each segment up to the second isolation valve
4. Piping segments in the SI Loops High Head Check Valves 1SI-81, 1SI-82, 1SI-83, 1SI-136, 1SI-137, and 1SI-138, and upstream piping in each segment up to the second isolation valve

In pressurizing the above piping segments, including the isolation valves, to the ASME Code-required test pressure, the licensee would be subject to hardship or unusual difficulty without a compensating increase in the level of quality and safety as stated below.

- The affected components are located inside containment. Tests performed inside the radiologically restricted area increase the total exposure to plant personnel while modifying and restoring system lineups, as well as increase the contamination of test equipment.

- Use of single valve isolation from systems with lower design pressures could result in over-pressurization of these lower pressure systems and cause damage to permanent plant equipment.

- Use of single valve isolation is a significant personnel safety hazard.

- There are no test connections for pressurizing the piping between the check valves in the RHR and the SI system, and thus, pressurization using an external source would require significant modification to the piping segments.

3.5 Licensee's Proposed Alternative

The Class 1 system pressure boundary during the end of interval system leakage test will be maintained in a normal, operational alignment with the items identified in Table 1 constituting exceptions to the ASME Code-required test boundary. However, the VT-2 visual examination will extend to all components within the Class 1 pressure boundary. Items listed in Table 1 will be visually examined for evidence of leakage during the system leakage testing without being pressurized to the ASME Code-required test pressure.

4.0 STAFF EVALUATION

The 2001 Edition through the 2003 Addenda to the ASME Code, Section XI, Table IWB-2500-1, Category B-P, Item B15.51, requires performance of a system leakage test for the Class 1 pressure retaining piping once per 10-year interval, to be conducted at or near the end of each inspection interval, prior to reactor startup. The system leakage test is required to be performed at a test pressure not less than the nominal operating pressure of the RCS corresponding to 100 percent rated reactor power and shall include all Class 1 components within the RCS boundary. However, in RR I3R-04, the licensee proposed an alternative to the boundary subject to test pressurization as required under the ASME Code, Section XI, for the RCS drains, vent, test and fill lines, and the piping segments of the SI and RHR systems between an inboard and an outboard isolation valve in the system boundary.

The piping configuration, as outlined, provides for double-isolation of the RCS. Under normal plant operating conditions, the subject pipe segments would see RCS temperature and pressure conditions only if leakage through the inboard isolation valve occurs. With the inboard isolation valve closed during the system leakage test as requested in RR I3R-04, the segment of piping between the inboard and outboard isolation valve would not be pressurized to the ASME Code-required test pressure during the system leakage test. To perform the ASME Code-required test, it would be necessary to manually open each inboard isolation valve in order to pressurize the corresponding pipe segment. Pressurization by this method would preclude double valve isolation of the RCS and may cause a safety concern for the personnel performing the examination. Alternatively, the line segments between the isolation valves could be separately pressurized to the required test pressure by a hydrostatic pump, but there are no test connections between the isolation valves to attach such a pump. In addition, the subject isolation valves are located inside containment, and any manual actuation (opening and closing) of these valves would subject plant personnel to undue radiation exposure during modification, examination, and restoration of system lineups.

The licensee proposed an alternative to conduct a visual leak examination (VT-2) of the isolated portions of the subject piping segments with the inboard and outboard isolation valves in the normally closed position. This visual examination would indicate any evidence of past leakage during the operating cycle, as well as any active leakage during the system leakage test if the inboard isolation valve leaks. The staff believes that the licensee's proposed alternative will continue to provide reasonable assurance of the structural integrity of the RCS drains, vent, test and fill lines, and the piping segments in the SI and RHR systems between the inboard and outboard isolation valves, including the isolation valves themselves, while maintaining personnel radiation exposure to as low as reasonably achievable.

Based on the considerations of personnel safety and radiation exposure, the NRC staff concurs with the licensee's finding that compliance with the ASME Code requirement for conducting a system leakage test would result in hardship for the facility. Furthermore, a compensating increase in the level of quality and safety would not be provided by performing the test in accordance with the ASME requirements as the alternative proposed by the licensee continues to fulfill the basis for conducting the system leakage test without endangering plant personnel.

5.0 CONCLUSION

Based on the NRC staff's evaluation, test pressurization to the ASME Code-required level corresponding to full RCS pressure during a system leakage test of the Class 1 pressure retaining components within the system boundary of the RCS would result in hardship to the licensee without a compensating increase in the level of quality and safety. In addition, the licensee's proposed alternative continues to provide reasonable assurance of structural integrity for the subject piping segments. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in RR I3R-04 is authorized for the third 10-year ISI interval at the Shearon Harris Nuclear Power Plant, Unit 1. The relief granted is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Prakash Patnaik

Date: January 21, 2009

RELIEF REQUEST I3R-04 TABLE 1

AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS
EXAMINATION CATEGORY B-P

Affected Line or Component	Pipe Diameter (in.)	Approx. Length	Boundary Exception(s)
Loop Drain Line Isolation Valve	2	≤ 1 ft.	Valve 1RC-7 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-8
Loop Drain Line Isolation Valve	2	≤ 1 ft.	Valve 1RC-16 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-17
Loop Drain Line Isolation Valve	2	≤ 1 ft.	Valve 1RC-28 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-29
Pressurizer PORV Vent Line on Primary Sample Path off Pressurizer	0.75	0.5 ft.	Valve 1RC-110 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-111
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-459	0.5	0.5 ft.	Valve 1RC-984 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-985
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-460	0.5	0.5 ft.	Valve 1RC-986 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-987
Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-461	0.5	0.5 ft.	Valve 1RC-988 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-989
CVCS Pressurizer Spray Downstream Check Valve and Test Connection Isolation Valve	2	≤ 1 ft.	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-491 and 1CS-488
	1	1.5 ft.	Valve 1CS-489 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-490

Attachment

Affected Line or Component	Pipe Diameter (in.)	Approx. Length	Boundary Exception(s)
Norm Charging Line Upstream Check Valve and Test Connection Isolation Valve	3	≤ 1 ft.	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-500 and 1CS-497
	1	1.5 ft.	Valve 1CS-498 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-499
Alt Charging Line Upstream Check Valve and Test Connection Isolation Valve	3	≤ 1 ft.	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-486 and 1CS-483
	1	1.5 ft.	Valve 1CS-484 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-485
Excess Letdown Upstream Isolation Valve	1	1.5 ft.	Valve 1CS-460 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-461
Between Accumulator 1A-SA Discharge Check Valve and SI to RCS Loop "A" Check Valve	12	26	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-249 and 1SI-250
	1	2	Valve 1SI-273 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-274
Between Accumulator 1B-SB Discharge Check Valve and SI to RCS Loop "B" Check Valve	12	28	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-251 and 1SI-252
	1	2	Valve 1SI-275 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-276
Between Accumulator 1C-SA Discharge Check Valve and SI to RCS Loop "C" Check Valve	12	26	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-253 and 1SI-254
	1	2	Valve 1SI-277 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-278
RCS Loop to RHR Pump "B" Isolation and Drain Line	12	86	Valves 1RH-39 and 1RH-40 remain closed to avoid over-pressurization of the RHR system
	1	2	Valve 1SI-41 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-42

Affected Line or Component	Pipe Diameter (in.)	Approx. Length	Boundary Exception(s)
RCS Loop to RHR Pump "A" Isolation and Drain Line	12	86	Valves 1RH-1 and 1RH-2 remain closed to avoid over-pressurization of the RHR system
	1	2	Valve 1RH-3 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RH-4
RCS Cold Leg Loop 1 SIS, Boron injection, and CVCS paths.	6	38	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-81, 1SI356, 1SI-8, and 1SI-7
	2	68	
	2	3	
	1	1.5	Valve 1SI-27 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-28
	1	1.5	Valve 1SI-79 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-80
Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 2.	6	33	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-82, 1SI357, 1SI-9, and 1SI-73
	2	83	
	2	7	
	1	1.5	Valve 1SI-33 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-34
	1	1.5	Valve 1SI-75 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-76
Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 3.	6	25.5	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-83, 1SI358, 1SI-10, and 1SI-74
	2	49.5	
	2	1.5	
	1	1.5	Valve 1SI-39 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-40
	1	1.5	Valve 1SI-77 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-78
Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 1.	6	43	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-136, 1SI-134, 1SI-104, and 1SI-127
	2	2.5	
	2	2.5	
	1	1.5	Valve 1SI-376 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-377

Affected Line or Component	Pipe Diameter (in.)	Approx. Length	Boundary Exception(s)
Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 2.	6	44.5	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-137, 1SI-135, 1SI-105, and 1SI-128
	2	2.5	
	2	2.5	
	1	1.5	Valve 1SI-132 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-133
Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 3.	6	1	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-138, 1SI-106, and 1SI-129
	2	42.5	
	2	1	
	2	1	
	1	1.5	Valve 1SI-130 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-131

The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Marlayna Vaaler at (301) 415-3178.

Sincerely,

/RA/

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via ListServ

DISTRIBUTION:

PUBLIC	LPL2-2 R/F	RidsNrrPMMVaaler	RidsNrrLACSola
RidsNrrDorlLpl2-2	RidsOgcRp	RidsAcrsAcnw_MailCTR	PPatnaik, NRR
RidsRgn2MailCenter (RMusser)		RidsNrrDciCsgb	

ADAMS Accession Number: ML083260136 NRR-028

OFFICE	LPL2-2/PM	LPL2-2/LA	CSGB/BC	OGC NLO	LPL2-2/BC
NAME	MVaaler	CSola	AHiser*	LStubin	TBoyce
DATE	12/12/08	11/28/08	12/08/08	01/06/09	01/21/09

* by memo **OFFICIAL RECORD COPY**