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AUTH.NAME AUTHOR AFFILIATION
KRICH,R.M. Carolina Power & Light Co.
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SUBJECT: Requests approva of proposed alternatives to certain ASME code requirements in accordance w/10CFR50.55a(a)(3)(ii).

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CP&L

10 CFR 50.55a

Carolina Power & Light Company
Robinson Nuclear Plant
PO Box 790
Hartsville SC 29551

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United States Nuclear Regulatory Commission
Attention: Document Control Desk
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
REQUEST FOR APPROVAL FOR PROPOSED ALTERNATIVES TO ASME CODE REQUIREMENTS

Gentlemen:

Carolina Power & Light (CP&L) Company requests approval of proposed alternatives to certain American Society of Mechanical Engineers (ASME) Code requirements, in accordance with 10 CFR 50.55a(a)(3)(ii) for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. On September 16, 1992, an NRC safety evaluation approved the use of non-intrusive methods as "other positive means" in accordance with the ASME Code, Section XI, IWV-3522, for the Safety Injection (SI) System check valves SI-875A, SI-875B, and SI-875C. Use of non-intrusive means was acceptable as part of a full stroke exercising program performed during refueling outages which must ensure verification of the check valve disk in full open position. However, the test methods employed as of that date involved verification of adequate flow through the valves to achieve full disk movement, rather than direct measurement of the disk in full open position. Because the CP&L program was not yet able to utilize non-intrusive methods to positively identify the check valve disk in full open position, CP&L committed in a letter to the NRC, dated September 20, 1993, to continue disassembly of valves SI-875A/B/C for future inspections.

Enclosure 1 provided by this letter describes the program for utilizing alternative methods to verify that valves SI-875A/B/C move to the full open position. The alternative methods include reliefs already granted for these valves regarding test frequency and method as follows:

- Valves will be exercised open with less than full flow at each refueling outage,
- Valves will be exercised closed and leak tested at cold shutdown, and

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- Reverse flow leak testing will continue to be performed at each cold shutdown.

Rather than disassemble a sample valve at each refueling outage under the current commitment, we propose to test all three valves at less than full flow at each refueling outage, and the valve disks will be verified open by non-intrusive means. If the valve disk can not be confirmed to be open, the valve will be disassembled.

The proposed alternatives involve inspections that are planned for Refueling Outage 16, currently scheduled to begin in April 1995, and the application of these alternatives is expected to enhance personnel safety, provide an opportunity to simplify the scheduling of the outage, significantly reduce personnel radiation exposure, and decrease the outage duration and cost, while providing an acceptable level of quality and safety. Approval of these proposed alternative methods is requested by January 1995 in order to support planning for the outage.

Questions regarding this matter may be referred to Mr. K. R. Jury at (803) 383-1363.

Very truly yours,

R. M. Krich
Manager - Regulatory Affairs

JSK/klg
Enclosure

c: Mr. S. D. Ebneter, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. W. T. Orders, USNRC Senior Resident Inspector, HBRSEP

ENCLOSURE 1
ALTERNATIVE METHODS FOR FULL FLOW TESTING OF SAFETY INJECTION SYSTEM VALVES SI-875A/B/C

A. INTRODUCTION

10 CFR 50.55a(a)(3) states that proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. Subparagraph (ii) states that the applicant shall demonstrate that compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensatory increase in the level of quality and safety. Alternative testing methods are being proposed for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Safety Injection (SI), Code Class I, Valves SI-875A, SI-875B, and SI-875C, Category A/C active 10 inch swing check valves. The function of these valves are to open to allow flow from the SI/Residual Heat Removal (RHR) Systems to the Reactor Coolant System (RCS) and to close to provide isolation integrity for the Reactor Coolant Pressure boundary. Section XI of the American Society of Mechanical Engineers (ASME) Code, as implemented by our Inservice Testing Program, requires check valves to be exercised to the positions in which they perform their safety function. ASME Code, Section XI, Paragraph IWV-3500 requires a "full flow" exercise in the forward flow direction. The ASME Code and Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs" acknowledge that full flow testing of a check valve may be impractical to perform for certain valves. The proposed alternative testing methods are designed to provide confirmation that the disk moves away from the seat to the full open position by positive means.

Carolina Power & Light (CP&L) Company has already received relief with respect to test frequency and method for these valves pursuant to 10 CFR 50.55a(g)(6)(i), by conforming to Position 2 to GL 89-04, which states in part that valve disassembly and inspection can be used as a positive means of determining that a valve's disk will full-stroke open, or of verifying closure capability.

B. BACKGROUND

On April 15, 1988, CP&L submitted the second ten-year interval Inservice Testing (IST) program and associated relief requests for HBRSEP covering the interval from March 7, 1981, to February 19, 1992. This program requested relief from full flow testing of the above subject check valves and proposed partial flow testing during outages, using flow from the RHR pumps. On July 9, 1991, the NRC provided a Safety Evaluation (SE) adopting the EG&G Technical Evaluation Report (TER) conclusions regarding that program. In the SE, interim relief for these valves was granted for a period of one year from the date of the SE or until the end of the next refueling outage following receipt of the SE, whichever was

later. Actions which were to be taken in the interim period were described in Appendix B of the TER attached to the 1991 SE, Anomaly 12. The TER in Anomaly 12 encouraged the investigation of non-intrusive diagnostic testing techniques to demonstrate that these valves swing fully open during testing.

On August 1, 1991, CP&L submitted the IST Program for the third ten-year interval at HBRSEP. In that program, relief from the test method and frequency requirements was requested for the above subject valves. On September 16, 1992, the NRC provided a SE adopting the EG&G TER conclusions regarding the third ten-year interval program. During the previous outage, CP&L had performed full stroke exercising of check valves SI-875A/B/C using ultrasonic non-intrusive techniques to verify adequate flow to allow disk movement during the flow test. The TER in Anomaly 13 stated that "...by the end of this period, the licensee should implement full-stroke testing with diagnostics, either each cold shutdown or each refueling outage, as practicable, or show that this alternative method is impracticable." In the SE, relief was granted pursuant to 10 CFR 50.55a(g)(6)(i) on test method and frequency to exercise the valves open with less than full flow at each refueling outages, and to exercise closed and leak test at each cold shutdown. Relief was granted based upon the verification of disk position in the full open position using non-intrusive techniques. However, the testing method actually used was clarified in a December 28, 1992, letter from CP&L to the NRC, that stated that ultrasonic testing was being used to "verify adequate flow to achieve full disk movement" rather than to verify the actual disk position. On September 20, 1993, CP&L committed to continue to provide for disassembly and inspection of the SI-875A/B/C valves in accordance with the guidance of GL 89-04, rather than use of non-intrusive testing.

The methods proposed in this letter are requested for approval as alternatives to CP&L commitments provided in the September 20, 1993 letter and to fully address Anomaly 13 in Appendix B to the TER for the third ten-year service period.

C. DESCRIPTION OF PROPOSED ALTERNATIVES

GL 89-04, Position 1 requires that a full stroke of a check valve to the open position may be verified by passing the maximum required accident condition flow through the valve, and that a valid full stroke exercise by flow requires that the flow through the valve be known. GL 89-04 states as follows.

"Full Flow testing of a check valve as described above may be impractical to perform for certain valves. It may be possible to qualify other techniques to confirm that the valve is exercised to the position required to perform its safety function. To substantiate the acceptability of any alternative technique for meeting the ASME Code requirements, the licensees must as a minimum address and document the following items in the IST program:

1. The impracticality of performing a full flow test,

2. A description of the alternative technique used and a summary of the procedures being followed,

3. A description of the method and results of the program,

4. A description of the instrumentation used and the maintenance and calibration of the instrumentation,

5. A description of the basis used to verify that the baseline data has been generated when the valve is known to be in good working order, such as recent inspection and maintenance of the valve internals, and

6. A description of the basis for the acceptance criteria for the alternative testing and a description of corrective actions to be taken if the acceptance criteria are not met."

The following information is provided to address each point of GL 89-04, Position 1.

1. Impracticality of Performing a Full-Flow Test

Valves SI-875A/B/C are installed in the SI accumulator header discharge piping. Establishing design accident flow test conditions through these valves would require a discharge of the respective SI Accumulator into the RCS at pressure less than approximately 650 psig. Testing in this manner is considered impractical and could result in damage to major plant equipment, and would reduce the level of safety for SI system response. The only full flow test path for exercising these valves is into the RCS. During cold shutdown, a full-stroke test exercise cannot be accomplished because it could lead to a low-temperature over-pressurization of the RCS due to the lack of expansion volume necessary to accommodate the large quantity of water which must be discharged into the RCS. Further, this flow path is not equipped with the flow rate instrumentation necessary to verify a full-stroke exercise of these check valves. Currently, relief is granted on test method and frequency from ASME Section XI to allow valves SI-875A/B/C to be disassembled and inspected on a sample basis to determine that the valve disks will fully stroke open, as permitted by GL 89-04, Position 2.

Due to the location and function of these valves, significant personnel hazards and shutdown risks are involved with disassembly of valves SI-875A/B/C in accordance with GL 89-04, Position 2. The disassembly of the valves incurs significant occupational dose exposure to plant personnel. The dose history for two previous outages accounted for a total of 7.45 man-Rem exposure during three separate valve disassembly inspections. Because the RCS must be drained down during disassembly, the core must be in mid-loop, or in the off-loaded condition, and the potential exists to prolong mid-loop operations or the off-loaded condition in the outage with this testing activity. Finally, the maintenance activity associated with disassembly of the valves increases the possibility of post-maintenance valve failure or leakage. Although such failures would be most likely detected by post-inspection testing, additional outage delays could be experienced.

2. Alternative Techniques Used and a Summary of the Procedures Being Followed

The proposed alternative test methods are to perform the forward flow exercise of all three check valves SI-875A/B/C, using any one of the following testing methods to verify full open position of the disk at refueling intervals:

1. Measuring the expected differential pressure of 1 to 2 psid across each valve at flow rates greater than or equal to 3,000 gallons per minute, or
2. Radiography of valve disk position, or
3. Non-intrusive testing/diagnostics.

The choice of the measurement technique for full open position will depend on when the testing is performed in relationship to the refueling outage schedule. All of the above alternative methods utilize testing of the valves at a nominal flow of 3000 gpm developed by the RHR pumps aligned to the SI pump/Accumulator discharge headers to the RCS cold legs. SI headers not associated with the valve being tested are isolated to ensure that the entire flow of 3000 gpm is experienced by the valve being tested. A design review was performed on SI-875A/B/C in accordance with the HBRSEP Check Valve Program. A calculation confirmed that with a nominal flow rate of 3,000 gallons per minute passing through the valves, the minimum flow velocity required to achieve full disk open conditions exceeds the manufacturer's minimum flow velocity by a margin of 77 percent.

When differential pressure measurement is used, differential pressure gauges will be installed on test connections across each valve to measure the differential pressure during the test, corresponding to a full open position of the check valve disk. When radiography is used, radiography will be performed on the valve to confirm full disk travel to the (back-stop) open position. The use of non-intrusive alternate techniques will be performed in accordance with established plant procedures.

3. Alternative Methods Qualification

Ultrasonic techniques were previously employed successfully in the 1992 refueling outage to verify flow through the valves. Another CP&L plant is utilizing a check valve test program that confirms check valve disk position via radiographic techniques.

4. Description, Maintenance and Calibration of the Instrumentation Used

Differential pressure instrumentation will calibrated in accordance with established plant procedures. Calibration accuracy will be +/- 2% at the pressure level of interest. Radiographic techniques, as determined by the CP&L Non-Destructive Examination Level III Inspector, will be utilized for performing check valve disk position verification.

5. Recent Inspection and Maintenance History.

The above listed valves were disassembled for the replacement of the valve disk hold-down studs during Refueling Outage 13 in 1989, based on a Westinghouse recommendation. Additionally, the valves were inspected internally, and minor maintenance was performed to the valve disk/seating areas. In accordance with the GL 89-04 guidelines, valve SI-875B was disassembled during Refueling Outage 15 and inspected. Minor maintenance was performed on the valve disk seating surfaces and the valve was reassembled.

6. Alternative Test Acceptance Criteria

Acceptance criteria for differential pressure measurement will be based on manufacturer's specifications for these check valves, to indicate full open position of the check valve disk. Radiography will be used to verify full open position of the check valve disk.

If the non-intrusive alternate technique cannot positively confirm full open position of the check valve other non-intrusive techniques will be employed until the disk position can be positively determined in the full open position. If none of the techniques are successful in positively determining a full open position, a sample valve will be disassembled in accordance with Position 2 of GL 89-04.

If the valve disk is demonstrated to be less than full open, the valve will be disassembled to perform any necessary maintenance. All three valves will be tested with non-intrusive techniques each refueling outage.