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 RECIPIENT NAME RECIPIENT AFFILIATION
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SUBJECT: Application for amend to License NPF-63, revising TS to support elimination of reactor coolant RTD bypass sys & substitution of RDTs mounted in termowells extend directly into RCS.

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Carolina Power & Light Company

P.O. Box 1551 • Raleigh, N.C. 27602

AUG 27 1993

SERIAL: HNP-93-838
10 CFR 50.90

H. W. HABERMEYER, JR.
Vice President
Nuclear Services Department

Letter Number: HO-930144

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
REQUEST FOR LICENSE AMENDMENT
RTD BYPASS MANIFOLD ELIMINATION

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Parts 50.90 and 2.101, Carolina Power & Light Company (CP&L) hereby requests a revision to the Technical Specifications (TS) for the Shearon Harris Nuclear Power Plant (SHNPP). The proposed changes will revise the Technical Specifications to support the elimination of the reactor coolant Resistance Temperature Detector (RTD) bypass system and the substitution of RTDs mounted in thermowells that extend directly into the RCS.

Enclosure 1 provides a detailed description of the proposed changes and the basis for the changes.

Enclosure 2 details, in accordance with 10 CFR 50.91(a), the basis for the Company's determination that the proposed changes do not involve a significant hazards consideration.

Enclosure 3 provides an environmental evaluation which demonstrates that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental assessment needs to be prepared in connection with the issuance of the amendment.

Enclosure 4 provides page change instructions for incorporating the proposed revisions.

Enclosure 5 provides the proposed Technical Specification pages.

In accordance with 10 CFR 50.91(b), CP&L is providing the State of North Carolina with a copy of the proposed license amendment.

The proposed Technical Specification changes are based on plant modifications that are scheduled to be implemented during the upcoming refueling outage. Therefore, CP&L requests that the proposed Technical Specification amendment be

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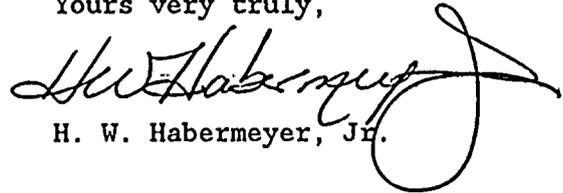


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approved by March 1, 1994 in order to support the refueling outage, currently scheduled for March 1994. In order to allow time for procedure revision and orderly incorporation into copies of the Technical Specifications, CP&L requests that the proposed amendment, once approved by the NRC, be issued such that implementation will occur within 60 days of issuance of the amendment.

Please refer any questions regarding this submittal to Mr. Lewis S. Rowell at (919) 362-2287.

Yours very truly,

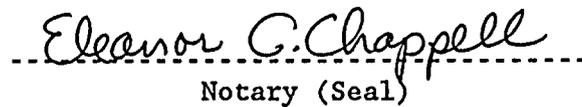

H. W. Habermeyer, Jr.

SDC/sdc

Enclosures:

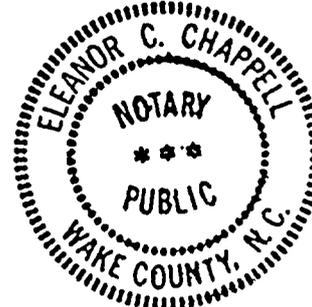
1. Basis for Change Request
2. 10 CFR 50.92 Evaluation
3. Environmental Considerations
4. Page Change Instructions
5. Technical Specification Pages

H. W. Habermeyer, Jr., 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.


Notary (Seal)

My commission expires: 2/6/96

cc: Mr. Dayne H. Brown
Mr. S. D. Ebnetter
Mr. N. B. Le
Mr. J. E. Tedrow





ENCLOSURE 1

SHEARON HARRIS NUCLEAR POWER PLANT
NRC DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
RTD BYPASS MANIFOLD ELIMINATION

BASIS FOR CHANGE REQUEST

Background

The Shearon Harris Nuclear Power Plant (SHNPP) utilizes a direct immersion bypass manifold system to collect a representative sample of the Reactor Coolant System (RCS) coolant flow for determining RCS hot leg and cold leg temperatures. SHNPP and industry experience has demonstrated that the Resistance Temperature Detector (RTD) Bypass System has two major drawbacks: valve leakage which has required forced outages, and elevated radiation doses. The system has historically required a large amount of maintenance (and plant shutdowns at some facilities) resulting primarily from valve body to bonnet leakage. The elevated radiation doses are the result of the bypass system's numerous valves and socket-welded pipes acting as crud traps. Man-rem is expended not only in maintaining and inspecting the RTD bypass system but in performing any work near the system such as steam generator and reactor coolant pump maintenance. Therefore, SHNPP proposes to remove the bypass manifold piping and valves, and as an alternative method use fast response RTDs mounted in thermowells welded directly in the RCS loop piping. In addition to the benefits of reduced maintenance and radiation exposure, the use of thermowells permits replacement of the RTDs without draining the RCS loops or the use of isolation valves since the thermowell maintains the RCS pressure boundary.

The SHNPP Technical Specifications refer to the RTD bypass loops in two locations:

- 1) Limiting Safety Systems Settings: Specification 2.2, Reactor Trip System Instrumentation Setpoints, Table 2.2-1 and the BASES for that section,
- 2) Instrumentation: Surveillance 4.3.1, Reactor Trip System Instrumentation, Table 4.3-1

Proposed Change

The proposed changes will revise the Technical Specifications to support the elimination of the reactor coolant RTD bypass system and the substitution of RTDs mounted in thermowells that extend directly into the RCS.

Basis

The Reactor Coolant System (RCS) hot leg and cold leg temperatures are used as input parameters to the reactor control and protection functions. It is important for reactor protection to have fast, accurate measurements of T-hot and T-cold, since they are used to generate reactor trips if the reactor core approaches a design limit. The original SHNPP design utilizes a direct immersion

bypass manifold system to collect a representative sample of the RCS coolant flow. Use of multiple flow scoops compensates for temperature layers (streaming) in the hot leg and allows a fast response to temperature changes. Each of the three RCS coolant loops has a hot leg and a cold leg bypass manifold. Each loop's hot leg bypass manifold is fed by three flow scoops that extend into the RCS hot leg flow stream. The flow from the three scoops is mixed and sent through the bypass manifold where the coolant temperature is measured by direct immersion RTDs. Each manifold contains a protection system RTD, a control system RTD and a spare RTD. The three RCS cold leg manifolds are similar except that there is a single tap that feeds each cold leg bypass manifold. The cold leg manifolds do not require flow scoops or multiple taps to ensure a representative coolant sample is obtained because temperatures in the cold leg are more uniform due to the mixing action of the RCS pumps. Once past the RTDs, the flow from the hot leg and cold leg bypass manifolds for each RCS coolant loop is combined, passes through a flow sensor and then returns to the RCS loop at the crossover leg. The resulting system consists of nearly 300 feet of reactor coolant pressure boundary piping, 51 associated valves, 114 hangers including 58 snubbers, 3 sets of flanges, and 6 RTD manifolds.

This revision of the Technical Specifications, and the associated plant modification, would remove the RTD bypass piping from all 3 RCS loops, weld thermowells into the main RCS pipe (three in each hot leg, one in each cold leg), and weld caps on the RTD bypass return lines. The hot leg thermowells will be mounted in the same scoops that fed the manifold piping thereby maintaining representative sampling (to compensate for hot leg streaming). A flow hole will be cut in each flow scoop so that the flow from the five inlet holes passes by the tip of the new thermowell. One thermowell/RTD will be used on each cold leg, in the same piping nozzle where the manifold return pipe was connected. Fast response RTDs will be placed in the thermowells, and will provide the same temperature measurements as did the RTDs in the bypass manifold (hot leg and cold leg temperature). The design of fast response thermowells/RTDs has improved to the point where they have response times sufficient to demonstrate reactor protection.

Since there will be three RTDs in the hot leg of each RCS loop, an average of the three RTDs will be used to generate the T-hot reading for each RCS loop. If one hot leg RTD fails in a loop, the second element of the dual element RTD may be used if available or a bias voltage may be used to substitute for the RTD. The bias voltage will be set to the same reading that the RTD produced at full power with the installed fuel assemblies. Bias voltage substitution can not be used unless the plant has achieved full power and RTD data associated with full power operating temperatures has been recorded for that specific fuel cycle.

The RCS loop T-hot and T-cold measurements are averaged to generate T-avg, and their difference is used to generate delta-T. Delta-T and T-avg are the signals actually used for reactor protection. This Technical Specification change request has no effect on the protection systems determination of T-avg or Delta-T.

The new thermowell/RTD system will comply with the environmental qualification requirements of 10 CFR 50.49. Testing has been done by the RTD manufacturer, Weed Instruments Inc., to qualify the RTDs under IEEE standards 344-1975 and 323-1983.

The thermowells will be welded and tested to conform to the requirements of ASME Section III, Class I, 1974; the Winter 1976 addendum; and ASME Section XI, Summer 1983. New wiring will be installed between the RTDs and the process cabinets, and will be Class 1E qualified. The changes made to the process cabinets to add the hot leg averaging circuitry will be Class 1E qualified.

In addition to the above changes, this modification will delete the hot leg and cold leg control system RTDs. A control T-avg and delta-T must be produced for the control systems such as rod control and steam dump control. These will now be derived from the protection T-avg and delta-T signals from all three loops by using a median signal select circuit with appropriate isolation. By this method, the failure of a single channel will not cause any control system response. This meets the requirements of IEEE Standard 279-1971.

The overall response time for the manifold RTD system is 6 seconds. The overall response time for the thermowell RTD system will also be 6 seconds, but the 6 seconds are distributed differently with respect to the time constants involved. The fast response thermowells/RTDs have an intrinsic response time that is slightly slower than that of the direct immersion RTDs. However this is compensated for by 1) the deletion of the transit time for the RCS water to travel through the bypass manifold piping to the immersion RTDs, and 2) a slight reduction of the available margin in the protection system electronic trip delay allocation. These revised time constants associated with the fast response thermowells/RTDs have been incorporated into the reload safety analysis for Cycle 6 operation, so there is no safety concern related to the change in the time constants. The response times are verified by actual plant tests prior to power operation. The loop current step response test will be used to verify the thermowell/RTD response time during each refueling outage pursuant to the proposed Technical Specifications.

The RTDs meet the same accuracy and drift requirements as the manifold RTDs. As with the current RTDs, accuracy will be verified by the RTD cross calibration procedure prior to power operation. The actual drift can not be checked until the next RTD cross calibration at the following refueling outage, but these same RTDs have been installed at H. B. Robinson Nuclear Plant since 1988 and have exhibited no drift problems. They are also used extensively in the nuclear industry with no significant problems reported.

The total instrument uncertainties associated with the RCS temperature measuring channels were verified to have no significant changes as a result of this plant modification and amendment request. All channel accuracies are within the total allowance specified in the Technical Specifications, with some margin remaining.

Conclusions

The proposed changes will provide the same RCS protection and control functions with the same overall response time as the current system, while at the same time providing additional protection to the control system from the effects of a failed RTD. Therefore, the proposed change does not adversely affect the design basis of the reactor protection system or the reactor coolant system.

ENCLOSURE 2

SHEARON HARRIS NUCLEAR POWER PLANT
NRC DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
RTD BYPASS MANIFOLD ELIMINATION

10 CFR 50.92 EVALUATION

The Commission has provided standards in 10 CFR 50.92(c) for determining whether a significant hazards consideration exists. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. Carolina Power & Light Company has reviewed this proposed license amendment request and determined that its adoption would not involve a significant hazards determination. The bases for this determination are as follows:

Proposed Change

The proposed changes will revise the Technical Specifications to support the elimination of the Reactor Coolant Resistance Temperature Detector (RTD) Bypass System and the substitution of RTDs mounted in thermowells that extend directly into the Reactor Coolant System.

Basis

This change does not involve a significant hazards consideration for the following reasons:

1. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change will not change the RCS temperature or temperature related setpoints. The new thermowell RTD system will supply the same temperature measurements as the manifold RTD system. Total response time for temperature related setpoints will remain unchanged. The Overtemperature Delta-T reactor trip and Overpower Delta-T reactor trip will function in the same manner to terminate DNB-related transients.

The process protection circuitry that is being modified will use the same style qualified printed circuit cards that have been used at SHNPP. The process control circuitry, with electronic isolation from the process protection circuitry, will use a Westinghouse designed and qualified circuit card to implement the median signal select function. The new thermowell RTD system will be more resistant to the effects of RTD failures because no operator action is necessary to defeat erroneous control T-avg and control Delta-T channel inputs, as is the case with the manifold RTD system. The thermowells that will be welded into the RCS are

similar to other thermowells that are already installed and will meet applicable ASME codes. The probability and consequences of thermowell failure or leakage are bounded by the analysis of the current system. The probability of leakage is reduced due to the elimination of significant footage of RCS pressure boundary piping and valves. Therefore, there will be no increase in the probability or consequences of an accident previously evaluated.

2. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The protection or control systems will not be significantly changed. A thermowell failure is similar to a bypass loop failure. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed amendment does not involve a significant reduction in the margin of safety.

This change does not affect any safety limit or limiting safety system setpoint or the total delay inherent in the temperature monitoring system. In addition, the total allowances specified in the Technical Specifications for instrument channel accuracies are being met. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

ENCLOSURE 3

SHEARON HARRIS NUCLEAR POWER PLANT
NRC DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
RTD BYPASS MANIFOLD ELIMINATION

ENVIRONMENTAL CONSIDERATIONS

10 CFR 51.22(c)(9) provides criterion for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration; (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (3) result in an increase in individual or cumulative occupational radiation exposure. Carolina Power & Light Company has reviewed this request and determined that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment. The basis for this determination follows:

Proposed Change

The proposed changes will revise the Technical Specifications to support the elimination of the Reactor Coolant Resistance Temperature Detector (RTD) Bypass System and the substitution of RTDs mounted in thermowells that extend directly into the Reactor Coolant System.

Basis

The change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) for the following reasons:

1. As demonstrated in Enclosure 2, the proposed amendment does not involve a significant hazards consideration.
2. The proposed amendment does not result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed change has no bearing on the type or quantities of radioisotope production, nor does it have any impact on potential release mechanisms. As such, the change can not affect the types or amounts of any effluents that may be released offsite.

3. The proposed amendment does not result in an increase in individual or cumulative occupational radiation exposure.

The proposed change will likely result in significant reductions in

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occupational exposure due to the elimination of crud traps and the reduced maintenance associated with elimination of the bypass manifolds. Therefore, the amendment has no adverse affect on either individual or cumulative occupational radiation exposure.

ENCLOSURE 4
SHEARON HARRIS NUCLEAR POWER PLANT
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PAGE CHANGE INSTRUCTIONS

<u>Removed Page</u>	<u>Inserted Page</u>
2-7	2-7
2-8	2-8
B 2-4	B 2-4
B 2-5	B 2-5
3/4 3-14a	3/4 3-14a