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SUBJECT: Provides suppl to 930827 TS change request for SHNPP,which allow replacement of RTD bypass sys w/thermowell-mounted RTDs in RCS piping.

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CP&L

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PO Box 165
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File: HO-940502
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SERIAL: HNP-94-002
10 CFR 50.90

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 - SUPPLEMENT

Gentlemen:

On August 27, 1993 Carolina Power & Light Co. (CP&L) submitted a Technical Specification Change Request for the Shearon Harris Nuclear Power Plant (SHNPP) that would allow the replacement of the RTD bypass system with thermowell-mounted RTDs in the Reactor Coolant System piping.

As a result of additional questions from the NRC staff, CP&L is herein submitting information regarding the design and use of thermowell-mounted RTDs. The additional information serves only to provide additional detail, therefore, the conclusions with respect to 10 CFR 50.92 remain valid, as stated in the August 27, 1993 letter. The supplemental information has been discussed with the NRC staff and is included as an enclosure to this letter.

Please refer any questions regarding this submittal to Mr. D. C. McCarthy at (919) 362-2100.

Yours very truly,

W. R. Robinson

SDC/sdc
Enclosure

W. R. Robinson, 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.

Darlene S. Yarborough
Notary (Seal)

My commission expires: 2-5-95

DARLENE S. YARBOROUGH
NOTARY PUBLIC
HARNETT COUNTY, NC

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

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Enclosure to NLS-94-002

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

Question 1: Are the RTDs located in the hot leg inside the scoops or because of interference are the RTDs located elsewhere? If so, comment on the accuracy of the readings.

Response: The hot leg RTDs will be mounted in the scoops currently utilized by the RTD Bypass System.

Question 2: Regarding RTD failure detection, explain how this is accomplished. If temperature differences are involved provide the temperature difference and also indicate if a deviation alarm is used. Also, are periodic channel checks used?

Response: RTD failures are detected using the deviation alarms on the main control board for delta-T and for T-avg. The delta-T indicators are channel checked on a shift basis (every 12 hours) as required by Technical Specifications.

Question 3: Discuss the procedure for performing a quality check of the RTD signal for the hot leg and also for the cold leg. When is the RTD considered to be inoperative? If an RTD is considered to be failed what is done? Is there a procedure for recording the past history of the RTD readings to use a bias? How is the average hot leg temperature arrived at when one of the three RTDs has failed? What happens if two RTDs have failed?

Response: An RTD will be considered inoperable if after the reciept of a deviation alarm investigation shows that the RTD is the source of the deviation. A quality check of the RTD signal can be performed using the plant computer to read individual RTDs, or by taking voltage readings in the process instrumentation cabinets. If an RTD is inoperable, the channel is placed in a tripped condition. Then, the spare element of the RTD is connected in place of the failed element, and the channel is tested and returned to service. If both elements in a thermowell have failed, a bias option can be used for the two remaining hot leg RTDs in each loop. The recommended procedure for recording the past history of the RTD readings and calculating a bias setting is in the plant modification package, and is the same as the procedure in use at our H.B. Robinson Steam Electric Plant, Unit 2 (HBR2). That procedure was approved by the NRC and can be found in WCAP-11889.

If two RTDs have failed in one hot leg, and no spare elements are available for use, the channel will remain in the tripped condition, and the Technical Specification action statements will be followed. The bias setting will not be used on two RTDs in the same hot leg. A bias setting will not be used for a cold leg RTD, since there is

only one cold leg RTD per loop.

Question 4: Regarding calibration of the RTDs, explain how you determine that there is no appreciable drift?

Response: The RTDs undergo the standard cross-calibration procedure during each refueling outage. The spare elements and the wide range RTDs are included. If the drift of any narrow range RTD exceeds a predetermined value, it is replaced. Since about 30 RTD sensors are included in the procedure, and they are not all from the same manufacturing lot, it is reasonable to assume that they are not all drifting in the same direction at the same rate.

Question 5: Provide information on how you will check at startup that the new thermowell RTD system gives reasonably equivalent accuracy to the RTD bypass system it replaces.

Response: CP&L realizes that the temperature indication may be impacted by this modification as well as changes to the core loading. Therefore, CP&L will use conservative OTΔT and OPΔT reactor trip setpoints during startup. (The setpoints will be restored to their normal values once reliable calorimetric data is obtained and temperature measurement system accuracies are confirmed.)

After plant startup and accurate measurement of full power delta-T, CP&L will compare the delta-T in each loop (normalized to full power) with the delta-T readings taken in previous cycles. There are measurement uncertainties with both the bypass manifold system and the thermowell system, and there may be some differences in temperature layers in the hot leg as a result of the fuel changes. Therefore, it is unlikely that the before and after readings will be exactly the same. However, significant differences will be evaluated to determine if there is an error in the new Thermowell RTD System. We are aware that some plants have experienced a slightly higher reading for T-hot after installing this modification. An increased indicated T-hot is not a safety concern since this change is in a conservative direction (although it may affect the calculated RCS flow rate using a primary side heat balance). HBR2 did not experience any difficulties in this area, and we do not anticipate any for the SHNPP.

Question 6: Are you using low leakage core loading? If so, does this increase the hot leg temperature streaming; how is this streaming accounted for in the flow measurement?

Response: SHNPP does use a type of low leakage core loading. We have no data on the effects on the hot leg temperature layers. However, we have not experienced any operational problems. There is an allowance for hot leg temperature streaming used in the uncertainty analysis for the RTDs. This also carries over into the uncertainty analysis for RCS flow, as measured by a primary heat balance. Our HBR2 plant

uses a similar type of core loading and has the thermowell RTD system installed. HBR2 has not experienced any operational problems due to this RTD design. Both HBR2 and SHNPP are 3-loop Westinghouse PWRs with similar designs. We do not anticipate having any operational problems at SHNPP.

Question 7: Do you have cold leg streaming? If so, how is this accounted for?

Response: We have no data on cold leg temperature streaming at SHNPP or HBR2. SHNPP has only one narrow range RTD for each cold leg. The mixing action of the RCP is usually effective at minimizing any temperature layers in the cold leg. We did receive a letter from Westinghouse (CQL-91-027, dated 5/2/91) advising us of the possibility of a temperature gradient in the RCS cold leg. In the letter, Westinghouse stated that the available data is from 4 loop plants and that the impact is small. The Westinghouse Owner's Group (WOG) participated in a meeting with the NRC to discuss temperature streaming on 9/17/91. Information provided to the NRC was documented in WCAP-12092. Our understanding of the consensus from that meeting is that if cold leg temperature streaming is found to be a problem at a plant, it should be considered in the plant specific analysis. The Harris plant has experienced no operational problems related to cold leg streaming. HBR2 has had the thermowell RTD system installed since 1989 (with a single narrow range RTD on the cold leg) and has experienced no operational problems related to cold leg temperature streaming.