10 CFR 50.90
10 CFR 50.91(a)(6)

Progress Energy

Serial: RNP-RA/03-0014

JAN 3 1 2003

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON
TECHNICAL SPECIFICATIONS CHANGE REGARDING INOPERABLE
ANALOG ROD POSITION INDICATION FOR CONTROL ROD H-10 (TAC NO. MB7265)

Ladies and Gentlemen:

By letter dated January 16, 2003, Carolina Power and Light (CP&L) Company submitted a request for an amendment to the Technical Specifications (TS) to allow the use of an alternate method of determining rod position for Control Rod H-10 for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. The proposed amendment would revise the applicable TS requirements for rod position monitoring during the current operating cycle (Cycle 22) to allow the use of an alternate method of determining rod position. The proposed amendment is needed due to an inoperable analog rod position indicator (ARPI) for Control Rod H-10.

A request for additional information (RAI) was received by a facsimile transmission on January 23, 2003, and was discussed in teleconference with the NRC staff on January 24, 2003. The purpose of this letter is to provide the HBRSEP, Unit No. 2, responses to the RAI.

Attachment I provides an Affirmation as required by 10 CFR 50.30(b).

Attachment II provides the responses to the RAI.

The response to the NRC RAI provides additional information that does not affect the basis or justification for the proposed TS change, including the evaluation of No Significant Hazards Consideration provided within the January 16, 2003, submittal.

If you have any questions concerning this matter, please contact Mr. C. T. Baucom.

Sincerely,

B. L. Fletcher III
Manager - Support Services - Nuclear

Progress Energy Carolinas, Inc.
3581 West Entrance Road
Hartsville, SC 29550

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CAC/cac

Attachments:

I. Affirmation
II. Response to Request for Additional Information on Technical Specifications Change Regarding Inoperable Analog Rod Position Indication for Control Rod H-10

c: Mr. H. J. Porter, Assistant Division Director, Division of Radioactive Waste Management (SC)
Mr. L. A. Reyes, NRC, Region II
Mr. C. Patel, NRC, NRR
NRC Resident Inspector, HBRSEP
Attorney General (SC)

AFFIRMATION

The information contained in letter RNP-RA/03-0014 is true and correct to the best of my information, knowledge and belief; and the sources of my information are officers, employees, contractors, and agents of Carolina Power and Light Company. I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 31 JAN. 2003

J. W. Moyer
Vice President, HBRSEP, Unit No. 2

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON TECHNICAL SPECIFICATIONS CHANGE REGARDING INOPERABLE ANALOG ROD POSITION INDICATION FOR CONTROL ROD H-10

Introduction

By letter dated January 16, 2003, Carolina Power and Light Company (CP&L) submitted a request for an amendment to the Technical Specifications (TS) to allow the use of an alternate method of determining rod position for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. The proposed amendment would revise the applicable TS requirements for rod position monitoring during the current operating cycle (Cycle 22) to allow the use of an alternate method of determining rod position. The proposed amendment is needed due to an inoperable analog rod position indicator (ARPI) for Control Rod H-10.

A request for additional information (RAI) was received by a facsimile transmission on January 23, 2003, and was discussed in teleconference with the NRC staff on January 24, 2003. The HBRSEP, Unit No. 2, responses to the RAI are provided below.

NRC Request for Additional Information

1. With the inoperable Analog Rod Position Indication (ARPI) for Control Rod H-10, the licensee is unable to continually monitor this rod's position; therefore, the potential exists for the rod to become stuck, without indication to the operators, during a transient which requires the reactor to scram. Since the licensee will be unable to immediately verify the position of this rod, they must assume that it will not drop into the core when demanded. This will affect the Shutdown Margin (SDM) calculation. The staff requests the licensee provide a copy of the revised SDM calculation and procedures to verify sufficient SDM will remain in the core with this one rod stuck in its fully withdrawn position.

Response

The effect of the inoperable ARPI for Control Rod H-10 was discussed in the license amendment request, dated January 16, 2003, as follows:

> "The inability to verify the insertion of Control Rod H-10 after a reactor trip or shutdown does not affect the ability to maintain the reactor safely shutdown. Existing plant procedures account for the situation where one or more control rods are not fully inserted or cannot be verified as fully inserted. Shutdown margin determinations would account for rods not fully inserted and direct an increase in soluble boron concentration to assure shutdown margins are maintained. Therefore, the inability to verify Control Rod H-10 as fully inserted would be accounted for in the shutdown margin determination, and the applicable safety margins would be maintained. Additionally, the Emergency Operating Procedures provide guidance for the situation where more than one control rod cannot be

verified as fully inserted. This is independent of the proposed TS change and would be applicable for any circumstance when more than one rod cannot be verified as fully inserted."

Fuel Management Procedure (FMP)-012, "Manual Determination of Shutdown Margin Boron Concentration," is used to calculate SDM, and provides instructions to compensate for one or more control rods declared inoperable. Based on the satisfactory completion of TS Surveillance Requirement (SR) 3.1.4.2 for Control Rod H-10, this rod remains operable and is expected to fully insert upon a reactor trip. SR 3.1.4.2 continues to be performed for the control rods. The Required Actions for inoperability of a control rod require verification of SDM and shutdown of the unit to MODE 3 within 6 hours. These Required Actions will become applicable if Control Rod H-10 fails to meet SR 3.1.4.2.

Since the ARPI for Control Rod H-10 has been declared inoperable, it is appropriate to assume that verification of full rod insertion following a reactor trip or shutdown will not be possible. Therefore, as a conservative compensatory measure for the inoperability of the ARPI for Control Rod H-10, the rod worth for Control Rod H-10 will not be included in the calculation of SDM. FMP-012 will be revised such that the worth for Control Rod H-10 is not included when the associated ARPI is not operable. This revision to FMP-012, which will be implemented prior to implementation of this license amendment, will be consistent with changes described for procedure 0-OP-028.2, in a letter dated August 14, 2002, on Docket No. 50-251, for Turkey Point Unit 4. Specifically, the SDM for HBRSEP, Unit No. 2, will be determined when the ARPI for Control Rod H-10 is inoperable, as follows:

- When calculating SDM in MODES 1 and 2, Control Rod H-10 will be considered fully withdrawn and not capable of providing a negative reactivity insertion following a reactor trip.

- When calculating SDM (and required boron concentrations) for MODES 3, 4, and 5, Control Rod H-10 will be assumed to be fully withdrawn following a reactor trip.

(As discussed during the January 24, 2003, conference call, the commitment to change procedure FMP-012 prior to implementation of the amendment would be sufficient for response to this request, in lieu of providing the revised procedure.)

NRC Request for Additional Information

2. The inoperable ARPI for this rod ensures that the operators will be unable to verify its position rapidly during normal, transient, or accident conditions. The combination of an inoperable APRI and the dependence on the alternate gripper coil monitoring equipment places increased dependence on proper operator training. Therefore, the licensee must provide a training activity plan for operations personnel regarding the plant conditions affected by the inoperable ARPI and the proposed alternate monitoring method.

Response

The following training activities associated with the inoperability of the ARPI for Control Rod H-10 will be performed for the implementation of this license amendment request:

- A "Night Order" will be issued to the operators, which provides information pertaining to this license amendment and the associated alternate monitoring instrumentation.
- "Real-Time Training" (RTT) detailing the changes to the TS and the associated alternate monitoring instrumentation will be issued and reviewed by the operations shift crew members. The RTT will include the information pertaining to the procedures that are affected and the changes to the SDM calculation methods.
- Additional training will be provided, based on changes to the status of the ARPI for Control Rod H-10 and the associated alternate monitoring instrumentation, on an "as needed" basis for any changes to the alternate monitoring instrumentation or any operating experience derived during the use of the alternate monitoring instrumentation.

NRC Request for Additional Information

3. The licensee's amendment proposes to operate the plant for the duration of Cycle 22 with the alternate monitoring equipment. The licensee must commit to correcting the ARPI fault on Control Rod H-10 if an unplanned outage, of sufficient duration prior to the end of Cycle 22, occurs which would permit plant staff to correct the problem without undue risk to personnel or equipment. The licensee should provide a detailed description of the limiting plant conditions (i.e., operating mode, equipment status, etc.) necessary to perform the ARPI repair maintenance. The description should include a justification for each condition.

Response

The plans for repair of the inoperable ARPI for Control Rod H-10 were discussed in the license amendment request, dated January 16, 2003, as follows:

> "Repair of the ARPI for Control Rod H-10 will be completed at the earliest opportunity. The repair will likely require the unit to be shutdown and placed in cold shutdown (MODE 5). The proposed alternative method of monitoring Control Rod H-10 provides assurance that the plant can be operated safely until the next shutdown of sufficient duration to effect repairs to the ARPI for Control Rod H-10."

The repairs to the ARPI for Control Rod H-10 will be completed if a planned or unplanned outage of sufficient duration occurs prior to the end of Cycle 22. Based on the information available, the most likely failure for this ARPI is either the connections and/or cable for the detector or the ARPI position detector.

If the failure is the connections and/or cable for the detector, it is possible that the repair could be completed during a MODE 3 shutdown of sufficient duration. Although, due to high ambient temperatures or inaccessibility of the connections and/or cable, cooldown to MODE 4 or 5 may be needed to perform this repair. The duration of outage for this repair is estimated as approximately 1 to 3 days, depending on the magnitude of Reactor Coolant System (RCS) cooldown required to perform the repair.

If the failure is the detector coil, it is likely that detector replacement would require shutdown to MODE 5, COLD SHUTDOWN. The duration of this type of shutdown is estimated as approximately 3 to 5 days.

Specifically, the plant condition changes required for each of these shutdown modes are described as follows:

- MODE 3 is called HOT STANDBY. It is defined as the reactor shutdown (i.e., $k_{eff} <$ 0.99) and average reactor coolant temperature >/= 350 degrees F. This condition is achieved by insertion of the control rods and plant cooldown, as necessary, to complete the repairs to the connections and/or cables for the Control Rod H-10 ARPI.
- MODE 4 is called HOT SHUTDOWN. It is defined as the reactor shutdown (i.e., $k_{eff} < 0.99$) and average reactor coolant temperature between 350 and 200 degrees F. This condition is achieved by insertion of the control rods and plant cooldown, as necessary, to complete the repairs to the connections and/or cables for the Control Rod H-10 ARPI. Cooldown in this temperature range normally requires the residual heat removal system to be placed in-service.
- MODE 5 is called COLD SHUTDOWN. It is defined as the reactor shutdown (i.e., $k_{eff} < 0.99$) and average reactor coolant temperature </= 200 degrees F. This condition is achieved by insertion of the control rods and plant cooldown, as necessary, to complete the repairs to the detector for the Control Rod H-10 ARPI. Cooldown in this temperature range requires the residual heat removal system to be placed in-service.

In the event of a planned or unplanned shutdown to MODE 3 or 4, the repair of the connections and/or cable for the Control Rod H-10 ARPI will be completed, as determined necessary at that time, if the repair can be performed without undue risk to the repair personnel due to ambient temperatures and projected radiation dose levels.

In the event of a planned or unplanned shutdown to MODE 5, the repair of the connections and/or cable and the detector for the Control Rod H-10 ARPI will be completed, as determined necessary at that time.

The plant maneuvers required to proceed to MODE 5, solely for the purpose of making repairs to the Control Rod H-10 ARPI, with a subsequent plant startup from COLD SHUTDOWN, would impose unnecessary thermal cycles and shutdown/startup related challenges to the primary and secondary plant systems.

NRC Request for Additional Information

4. The licensee has provided a brief description of the proposed alternate monitoring equipment. The licensee stated that the equipment will monitor the position of the gripper coils to identify any change in their state. A change in state would be an indication of movement in the control rod. The staff requests additional information regarding the parameters being monitored, the means for recording the data, who specifically will be required to review the data, and how changes in the state of the gripper coils will be identified by operations personnel.

Response

The parameter monitored will be the Rod Control Stationary Gripper Coil current. The control rods are held in place by energized stationary gripper coils when the rods are not fully inserted in the core. An energized gripper coil maintains the associated control rod in place and the control rod cannot move. The monitoring instrumentation will be connected to a test point built into the rod control system, which is a monitoring point for the stationary gripper coil current. The measurement of the stationary gripper coil current (measured as a voltage across a 0.0625 ohm resistor) will be recorded on a chart recorder, which will continuously printout the voltage level. The chart recorder will be attached to an uninterruptible power supply to ensure that it maintains operation and a voltmeter will be attached to allow the technician to monitor the signal while the chart paper is being replaced. A change in state of gripper coil parameters will be identified by a change in the voltage signal, as determined by review of the data displayed on the chart recorder. As stated in the January 16, 2003, license amendment request, if review of gripper coil parameters indicates that Control Rod H-10 may have moved, its position will be determined using the movable incore detector system in accordance with the conservative implementation of Required Action B.1 of Condition B. Therefore, a misalignment will be detected and appropriate actions taken as required by the TS. The personnel monitoring the chart recorder will be operations qualified personnel.

NRC Request for Additional Information

5. The licensee has concluded that the fault in the ARPI for Control Rod H-10 has occurred near the reactor vessel. The ARPI system provides input to alarms and additional instrumentation systems. The staff requests the licensee provide a one-line diagram of the ARPI system for Control Rod H-10. This diagram should identify the suspected fault location, the affected alarms, relays, or interlocks that receive input from the system, and a description of how the fault will affect their operation. For any affected alarms, relays, or interlocks, the staff requests the licensee describe compensatory measures that will be used to offset the loss of these features.

Response

A simplified diagram of the RPI channel is provided as Figure 1. The fault is believed to be in the cable connector at the top of the ARPI detector or in the ARPI detector itself. The affected alarms/functions are the rod bottom indicator for Control Rod H-10, the rod misalignment alarm for Control Rod H-10, and the rod drop alarm for Control Rod H-10. The January 16, 2003, license amendment request states the following:

> "A drop or unexpected substantial movement of Control Rod H-10 while the reactor is operating would be immediately detected by the excore neutron detector system. Other indications of the negative reactivity insertion associated with this condition would include power and temperature fluctuations that would be observable by the Reactor Operator. These diverse indications provide a means of determining that a rod drop or misalignment has occurred. Use of these diverse indications to detect a rod drop or unexpected substantial movement are available when an ARPI is not operable, and these indications are not affected by use of the proposed alternate method for verification of Control Rod H-10 position."

The HBRSEP, Unit No. 2, TS require that the position of a control rod with an inoperable ARPI be verified by the use of the movable incore detector system once per 8 hours, in accordance with TS 3.1.7, Required Action A.1. The proposed license amendment request provides an alternate means for accomplishing this required verification. The alarms/functions associated with the ARPI that are not available are not affected by the use of alternate means of verification. The proposed alternate monitoring method provides an additional method for detection of a possible deviation of Control Rod H-10 from the required position. No additional compensatory measures are required for the alarms/functions that are not available.

NRC Request for Additional Information

6. Since the failure of the ARPI for Control Rod H-10, the licensee has been complying with TS 3.1.7 Condition A, Required Action A.1 which requires it to "verify the position of the rods with inoperable position indicators by using movable incore detectors" once per 8 hours (approximately 90 times per month). The licensee has cited excessive wear on the movable incore detectors as a justification for monitoring of the gripper coil position. The licensee's justification implies a reduction in safety margin will occur from continued use incore movable detectors. The staff requests the licensee provide a detailed description of the potential consequences of continued use of the movable incore detectors. This should include, as appropriate, postulated failure methods, estimated fatigue times, and projected failure consequences. Additionally, the licensee should identify whether the projected failure methods and consequences are bounded by any existing transient or accident analyses.

Response

The wear on the incore detector system does not pose a reduction in the margin of safety for operation of HBRSEP, Unit No. 2. Excessive wear on the incore detector system could result in a loss of functionality of the system. This could lead to the inability to complete required surveillances, which in turn could lead to a required plant power reduction and/or shutdown. The manner in which this could occur, is described as follows:

The movable incore detector system is composed of five detector drive units, five 5-path rotary transfer devices, five 10-path rotary transfer devices, and 47 flux thimbles. The 5-path rotary transfer device allows its detector to map its own core locations or another detector's core locations, or to be placed in a shielded storage location. The 10-path rotary transfer device receives the detector from the 5-path device and allows it to access one of ten possible core locations. When a flux trace is taken by a detector, the drive unit pushes the detector through its 5-path rotary transfer device to the selected 10-path rotary transfer device and then through the 10-path to the selected core location. The signal obtained from the detector as it moves through the core is proportional to neutron flux distribution in the core.

Although estimated fatigue times are not available for this system, it is judged that repetitive use of the movable incore detector system every 8 hours to fulfill LCO 3.1.7, Required Action A.1, can lead to failures of the detectors, drive units, and transfer devices. If a detector fails, then another detector may be used to map its core locations with no loss of data. However, by using another detector to map both its own and the failed detector's core locations, the wear on the second detector is increased. If a drive unit failure causes a detector to become unmovable while inserted into a core location, then the ability to obtain data from the core locations associated with that detector is lost.

If a 5-path rotary transfer device fails, then another detector may be used to map its core locations with no loss of data. However, as with a failed detector, this results in increased wear on the second detector. If a 10-path rotary device fails, then the ability to obtain data from the core locations associated with that 10-path device is lost.

Only two 10-path devices have core locations that are close enough to the H-10 core location to provide information on the position of the control rod with the inoperable ARPI. Failure of these two 10-path devices could prevent the performance of LCO 3.1.7, Required Action A.1, which would require a power reduction to </= 50% in accordance with LCO 3.1.7, Required Action A.2.

The failure of a drive unit or 10-path rotary transfer device, with the corresponding loss of data from the associated core locations, would prevent the performance of core peaking factor and power distribution measurements every 31 EFPD as required by SR 3.2.1.1, 3.2.2.1, 3.2.3.3, 3.3.1.3, and 3.3.1.6. Failure to perform these core peaking factor and power distribution surveillances would require power reduction and shutdown in accordance with the applicable LCO Required Actions.

These failure modes and consequences are not affected by the proposed license amendment request for alternate monitoring of Control Rod H-10. Therefore, the failure modes and consequences described are bounded by the existing plant design and analyses.

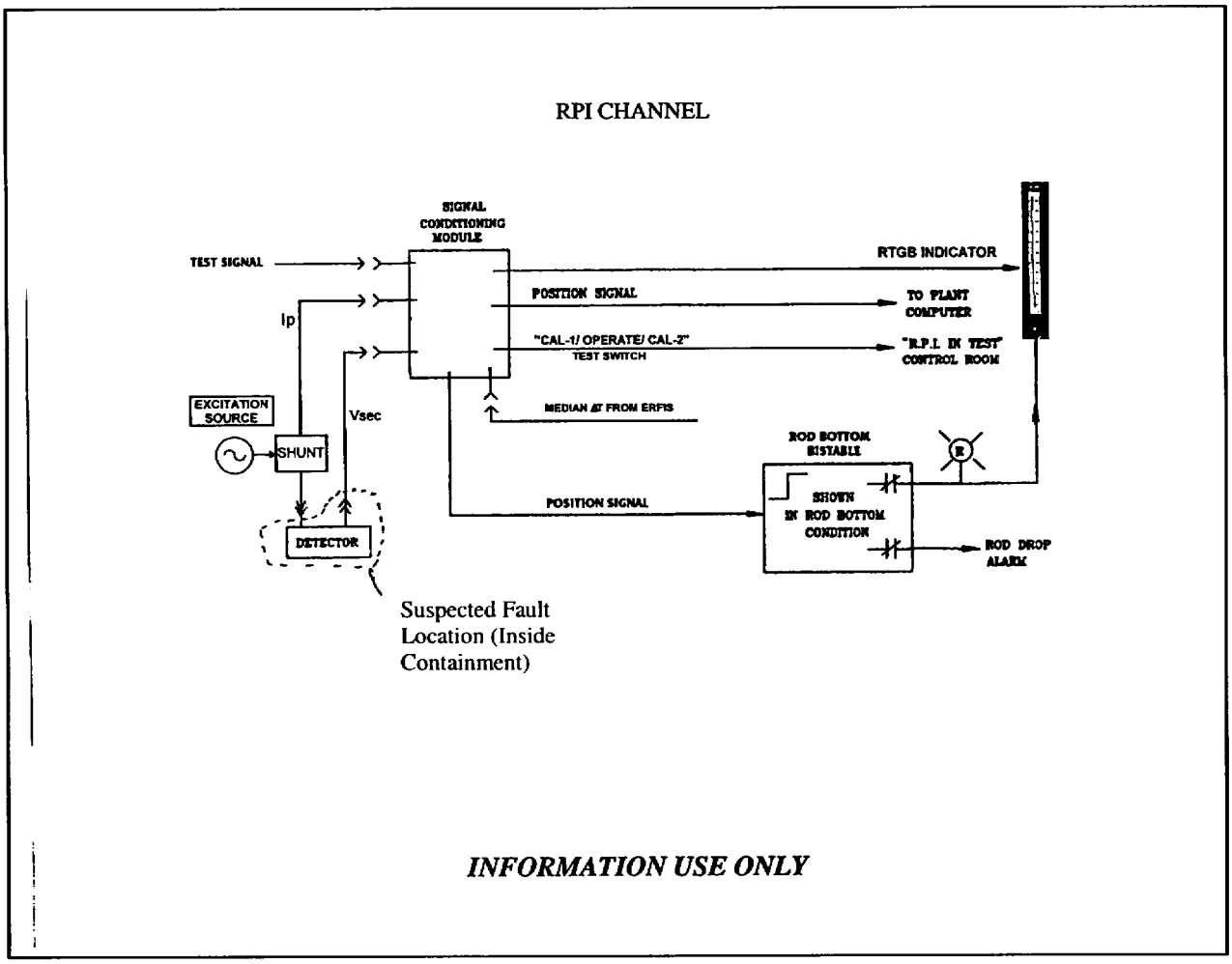

Figure 1. Simplified Diagram of ARPI Channel.