CP&L

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APR 2 0 2000

SERIAL: BSEP 00-0060

U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1
DOCKET NO. 50-325/LICENSE NO. DPR-71
SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT (TSC 00TSC06)
INSERTION SURVEILLANCE OF CONTROL ROD 26-47
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Gentlemen:

In a letter dated April 14, 2000 (i.e., Serial: BSEP 00-0059), Carolina Power & Light (CP&L) Company requested a revision to the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Unit No. 1. The proposed amendment modifies Surveillance Requirement (SR) 3.1.3.3 to allow verification of inward motion by partially inserting control rod 26-47 versus performing a full one notch insert. This revised acceptance criterion will be limited to control rod 26-47 and the current Unit No. 1 operating cycle (i.e., Cycle 13), after which the current one notch insertion requirement will be re-established.

The enclosure to this letter provides additional information regarding the ability of control rod 26-47 to insert, either manually or automatically. The information provided by this submittal does not change the intent or the justification for the requested amendment. CP&L has determined that this supplement does not affect the bases for concluding that the proposed amendment does not involve a Significant Hazards Consideration. As such, the 10 CFR 50.92 Evaluation, provided in the April 14, 2000, submittal remains valid.

Please refer any questions regarding this submittal to Mr. Warren J. Dorman, Manager - Regulatory Affairs, at (910) 457-2068.

Sincerely,

John S. Keenan

John S. Keenan

MAT/mat

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Enclosure:

Response To Request For Additional Information

John S. Keenan, 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, and agents of Carolina Power & Light Company.

Dean S. Mason
Notary (Seal)

My commission expires: 8/29/04

cc (with enclosures):

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ENCLOSURE

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1
DOCKET NO. 50-325/LICENSE NO. DPR-71
SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT
INSERTION SURVEILLANCE OF CONTROL ROD 26-47

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Request

Please provide additional information supporting the conclusion that control rod 26-47 remains capable of inserting.

Response

The control rod drive mechanism (CRDM) design and the operating history of control rod 26-47 provide assurance that control rod 26-47 remains capable of inserting, either manually or automatically.

Design

The CRDM is a double acting, mechanically latched, hydraulic cylinder that positions control blades. This mechanism, by design, is extremely reliable for inserting a control rod to the full in position (i.e., position 00). Incorporated in its design is a collet piston mechanism that ensures the control rod will not inadvertently withdraw by engaging the six collet fingers, mounted on the collet piston, in notches located at even positions on the index tube.

The collet fingers are normally cammed out of the way to allow rod withdrawal by moving the collet piston upward and allowing the fingers to cam into the upper guide cap (i.e., see Figure 1). The weight of the control rod blade and the index tube is approximately 280 pounds. The resulting friction between the index tube notch and the collet fingers is too great to permit the pressure force from the collet piston to extend the fingers. Therefore, in order to withdraw the control rod drive, the weight on the collet fingers must first be overcome. This is accomplished by first inserting the index tube a small distance (i.e., approximately 1 to 3 inches), prior to applying a withdraw signal. The withdraw signal then cams the collet fingers out due to the tapered surface of the upper guide cap. Water from the drive water header is then applied above the main drive piston. This water also actuates the collet piston, pushing it up, opposing the collet spring pressure. A pressure of 180 psi above reactor pressure is needed to counteract the collet spring pressure of 150 psi and maintain the collet fingers out of the way for the withdraw cycle.

Due to the tapered design of the index tube notches, the collet piston mechanism will not impede rod insertion. When inserting, the tapered index tube slips through the six collet fingers. To insert a control rod under normal conditions (i.e., see Figure 2), water from the Control Rod

Drive Hydraulic System drive water header enters via the drive insert line providing motive force below the main drive piston. At the same time, water from the drive is discharged to the exhaust water header via the drive withdraw line. Water flow is directed between the index tube and piston tube, through the buffer holes, down between the piston tube and indicator tube, and out through the withdraw line.

During a scram, accumulator pressure provides the motive force below the main drive piston. Just as in a normal insert sequence, water flow is directed between the index tube and piston tube, through the buffer holes, down between the piston tube and indicator tube, and out through the withdraw line. At the same time, water from the drive is discharged, through the open scram outlet valve, to the scram discharge volume. Depending on reactor pressure, the accumulator may be assisted by reactor vessel pressure acting on the drive. As water is forced from the accumulator, the accumulator discharge pressure falls below reactor vessel pressure. This action causes the ball check valve to shift its position, allowing reactor pressure to complete the scram stroke.

As described above, control rod insertion, either manually or automatically, does not require the CRDM to actively control the position of the collet fingers, as is the case with control rod withdraw. Rather, the tapered design of the index tube allows it to slip through the six collet fingers on an insert or scram signal.

Control Rod 26-47 Operating History

The drive for control rod 26-47 is a two year old, BWR-6 drive. It experienced no mechanical problems during the previous operating cycle. The insert and withdraw stall flows, which are used for performance trending, were at nominal design values (i.e., 2.1 gpm for withdrawal and 1.5 gpm for insertion) during the cycle. Scram times were comparable to the other 136 control rods. The control rod blade was replaced during the recent Unit No. 1 refueling outage, no other work was performed on either the control rod drive (CRD) or the hydraulic control unit (HCU). The drive was somewhat difficult to withdraw during the venting and timing process, requiring use of elevated drive pressure. Control rod 26-47 was then timed and friction tested satisfactorily. Use of elevated drive pressure was again necessary to fully withdraw control rod 26-47 during startup from the recent Unit No. 1 refueling outage.

Control rod 26-47 has been inserted two notches since startup from the Unit No. 1 refueling outage. During the performance of Surveillance Requirement 3.1.3.2, on March 28, 2000, the control rod notched in normally to position 46. However, it could not be withdrawn to position 48. During subsequent attempts to withdraw control rod 26-47, the control rod was inserted another notch, to position 44, its current position. Additionally, control rod 26-47 has continued to insert, during the brief insert signal supplied during withdraw attempts. Based on these two insertions and inward movement demonstrated during withdraw attempts, it is clear that there has been no degradation in the insertion capability of control rod 26-47.

As stated in the April 14, 2000, submittal, CP&L has concluded that the most likely cause of this issue is withdrawal cycle seal failure or collet piston ring fouling due to debris ingestion. This debris was most likely flushed from the bottom of the control blade guide tube during the

shutdown scram for the Unit No. 1 refuel outage or during control rod scram time testing. Reactor pressure provides some of the drive pressure to complete a scram, the reactor pressure is sufficient to flush the debris from the guide tube into the drive.

Debris ingestion can affect withdrawal capabilities in three ways.

1. Debris has entered the collet piston area, preventing collet piston movement.
2. The collet piston rings have debris, causing flow to bypass the collet piston.
3. Debris has entered the drive and has caused other seal damage to the extent that there is insufficient drive water flow to lift the collet piston.

The first two, jammed collet piston or collet piston ring debris ingestion, have no affect on the rod scramming. The scram flow is provided under the main drive piston area. The scram flow is totally independent of the collet piston, which is activated only on a withdraw cycle.

Sufficient seal damage to affect scram times would be readily observable during the proposed rod insertion testing. If such seal damage existed, elevated drive pressure would be required to insert the control rod. This is not the case for control rod 26-47, which has been inserted two notches and has continued to insert, during the brief insert signal supplied during withdraw attempts, at nominal drive pressure.

Based on the above operating history, it has been demonstrated that control rod 26-47 remains fully capable of inserting. Continued demonstration of the ability of control rod 26-47 to insert on a 31 day frequency will provide adequate assurance that this ability is maintained.

Figure 1
Control Rod Drive Mechanism (Withdraw Mode)

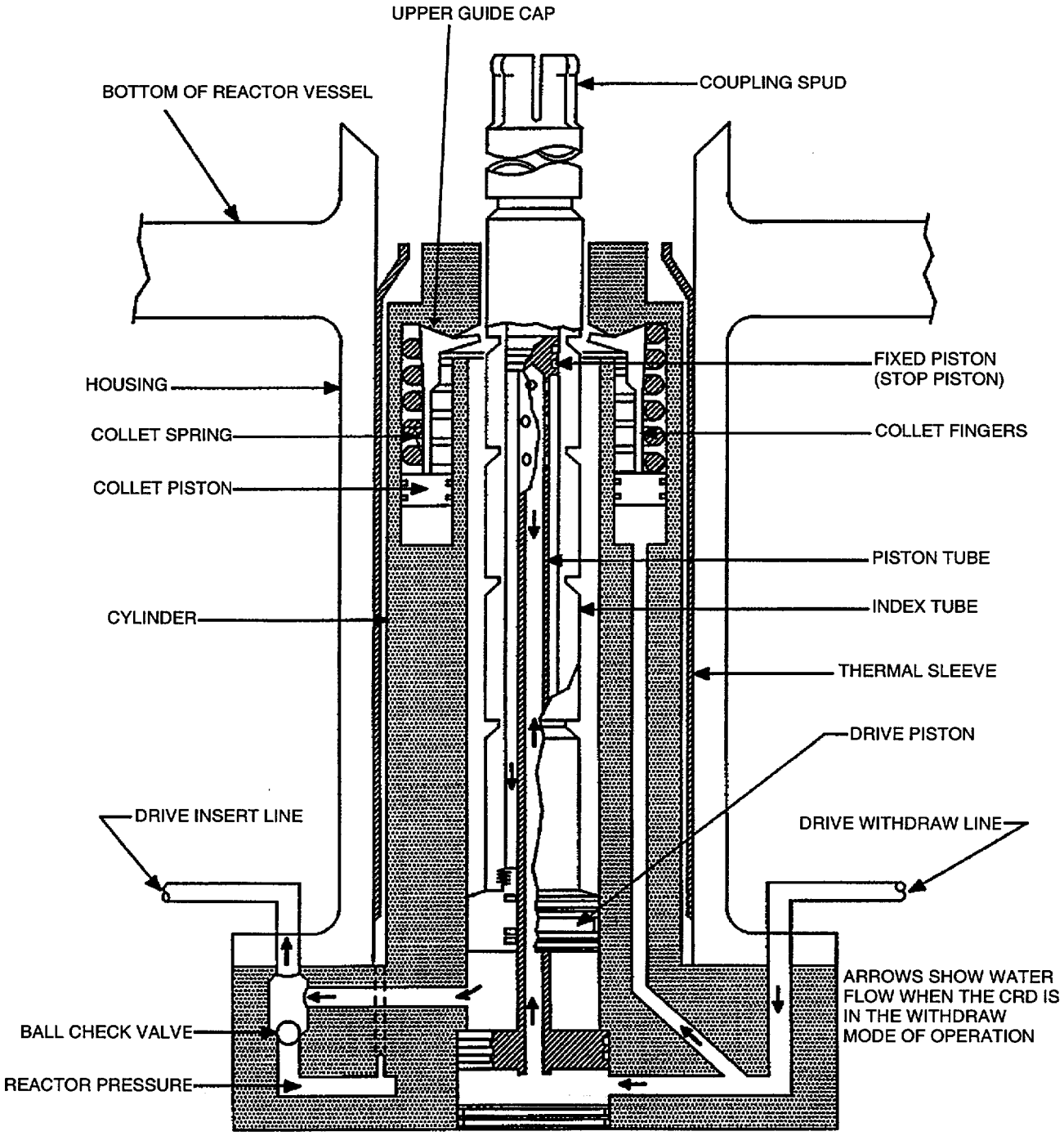

Figure 2
Control Rod Drive Mechanism (Insert Mode)