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April 14, 2000

SERIAL: BSEP 00-0059  
TSC 00TSC06

10 CFR 50.90

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

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

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Parts 50.90 and 2.101, Carolina Power & Light (CP&L) Company is requesting a revision to the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Unit No. 1. The proposed license amendment revises TS 3.1.3, "Control Rod Operability," for BSEP, Unit No. 1.

On March 28, 2000, it was determined that a problem had developed which has resulted in the inability to withdraw control rod 26-47. Control rod 26-47 is currently at position 44, with position 48 being fully withdrawn and position 00 being fully inserted. The control rod remains operable and is fully capable of being automatically or manually inserted. Due to the nature of the problem, the control rod cannot be repaired without removal of the reactor vessel head. As such, resolution of the issue is not feasible until the next Unit No. 1 refueling outage, currently scheduled to begin in March 2002.

Surveillance Requirement (SR) 3.1.3.3 requires that partially withdrawn control rods be inserted at least one notch, every 31 days. Due to the inability to withdraw control rod 26-47, performance of SR 3.1.3.3 will unnecessarily impact the control rod blade by increasing the rate of depletion of its neutron absorption capability as more of the blade will be exposed to the operating core. Evaluations indicate that continued notching of control rod 26-47, at the 31 day frequency, will cause the control rod blade to exceed its design life by November 2001. If pursued, additional analysis performed by the control rod blade manufacturer, may justify extension of the life of the control rod blade through the end of the current cycle. Currently this control rod is operable, will meet shutdown margin requirements, and will not result in thermal limits exceeding TS limits. However, continued notching of control rod 26-47 will unnecessarily deplete the neutron absorption capability of the control rod blade, present challenges for future

cycle designs, and will present an economic penalty on the cycle including the possibility of a mid-cycle outage to repair the control rod drive and replace the control rod blade if additional analysis cannot be performed to extend the blade life.

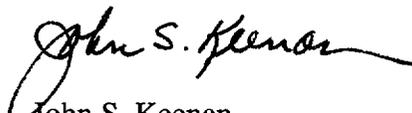
The proposed amendment modifies SR 3.1.3.3 to allow verification of inward motion by partially inserting control rod 26-47 versus performing a full one notch insert. This revised acceptance criterion will be limited to control rod 26-47 and the current Unit No. 1 operating cycle (i.e., Cycle 13), after which the current one notch requirement will be re-established. Verification of inward motion of control rod 26-47 will provide assurance that the control rod remains operable while avoiding the negative consequences of unnecessarily increasing the rate of depletion of its neutron absorption capability.

CP&L believes that the benefits derived from revising the acceptance criterion of SR 3.1.3.3 for control rod 26-47 outweigh any risks associated with the proposed change. The next performance of SR 3.1.3.3 for control rod 26-47 is scheduled for April 22, 2000, CP&L intends to perform this surveillance per the current requirements of SR 3.1.3.3. In order to minimize unnecessary control rod insertion, CP&L requests that the NRC issue the requested amendment no later than May 26, 2000. This will allow sufficient time to implement the amendment prior to expiration of the next surveillance interval on May 30, 2000 (i.e., 31 day frequency plus the 25 percent allowance of SR 3.0.3).

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

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

Sincerely,



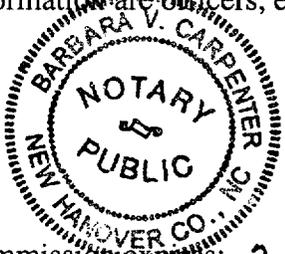
John S. Keenan

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Enclosures:

1. Basis for Change Request
2. 10 CFR 50.92 Evaluation
3. Environmental Considerations
4. Page Change Instructions
5. Typed Technical Specification Page - Unit No. 1
6. Marked-up Technical Specification Page - Unit No. 1

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.



*Barbara V. Carpenter*  
Notary (Seal)

My commission expires: 2-16-03

cc (with enclosures):

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ENCLOSURE 1

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

BASIS FOR CHANGE REQUEST

Proposed Change

On March 28, 2000, it was determined that the Brunswick Steam Electric Plant (BSEP), Unit No. 1 had developed a problem which has resulted in the inability to withdraw control rod 26-47. Control rod 26-47 is currently at position 44, with position 48 being fully withdrawn and position 00 being fully inserted. The control rod remains operable and is fully capable of being automatically or manually inserted. Due to the nature of the problem, the control rod cannot be repaired without removal of the reactor vessel head. As such, resolution of the issue is not feasible until the next Unit No. 1 refueling outage, currently scheduled to begin in March 2002.

Surveillance Requirement (SR) 3.1.3.3, of Technical Specification (TS) 3.1.3, "Control Rod Operability," requires that partially withdrawn control rods be inserted at least one notch, every 31 days. The proposed amendment modifies 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 requirement will be re-established. Verification of inward motion of control rod 26-47 will provide assurance that the control rod remains operable while avoiding the negative consequences of unnecessarily increasing the rate of depletion of its neutron absorption capability.

Current Requirement

SURVEILLANCE	FREQUENCY
SR 3.1.3.3      -----NOTE-----  Not required to be performed until 31 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of the RWM.  -----  Insert each partially withdrawn control rod at least one notch.	31 days

Proposed Change

SURVEILLANCE	FREQUENCY
<p>SR 3.1.3.3</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"><li>1. Not required to be performed until 31 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of the RWM.</li><li>2. For Cycle 13 only, SR 3.1.3.3 can be satisfied for control rod 26-47 by verifying inward motion versus inserting at least one notch.</li></ol> <p>-----</p> <p>Insert each partially withdrawn control rod at least one notch.</p>	<p>31 days</p>

Basis For Proposed Change

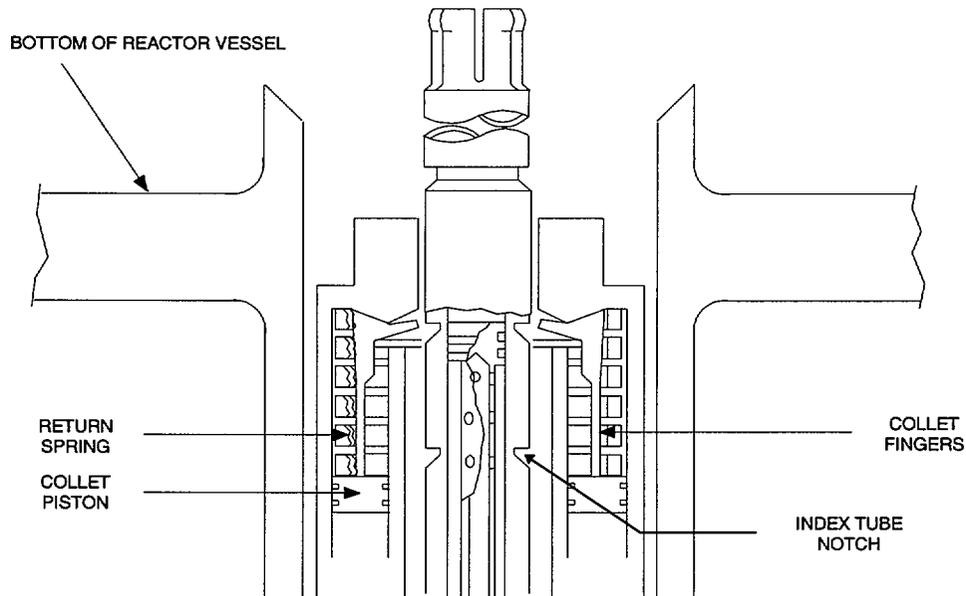
*Background*

The Control Rod Drive (CRD) system consists of 137 control rod drive mechanisms (CRDMs) and a hydraulic control unit for each drive mechanism. The CRDM is a double-acting, mechanically latched, hydraulic piston, which uses condensate water as the operating fluid. Accumulators provide additional energy for automatic insertion of the control rods. An index tube and piston, coupled to the control rod, are locked at fixed increments by a collet mechanism. The collet fingers engage notches in the index tube to prevent accidental withdrawal of the control rod; without restricting insertion. Magnetically activated reed switches provide position indication in the control room.

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., approximately 2 gpm) during the cycle. The control rod blade was replaced during the recent Unit No. 1 refueling outage, no other work was performed on either the 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 withdraw control rod 26-47 during startup from the recent Unit No. 1 refueling outage. On March 28, 2000, it was determined that control rod 26-47, which is currently at position 44, could not be withdrawn. The control rod has inserted, with no difficulty, from position 48 to position 44.

The most likely cause of the control rod 26-47 withdrawal problem is failure of the collet piston to provide sufficient lifting force to clear the collet fingers from the notch on the index tube, preventing control rod withdrawal.

### Control Rod Drive Mechanism



CP&L has determined that the HCU is working per design. As such, the remaining potential causes of the malfunctioning collet piston include:

1. The collet piston has failed and become jammed.
2. Debris has entered the collet piston area, preventing its movement.
3. Debris has entered the drive and has caused seal damage to the extent that there is insufficient drive water flow to lift the collet piston.

Since the control rod does not display any difficulty with insertion, it is not likely that the collet piston has failed. Additionally, the withdraw stall flow is now high (i.e., greater than 8 gpm). This is indicative of debris ingestion degrading the seals associated with the withdraw cycle. Based on the above, 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.

The current condition does not prevent control rod 26-47 from inserting, either manually or automatically, per design. As previously discussed, collet fingers engage notches in the index tube to prevent accidental withdrawal of the control rod; without restricting insertion.

#### *Safety Basis For The Request*

Performance of SR 3.1.3.3 by partial insertion of control rod 26-47 versus insertion of one notch can be accomplished by observing control rod position indication in the control room. A one

notch insertion represents two reed switch positions; notches are located at even numbered reed switch positions. For control rod 26-47, SR 3.1.3.3 will be performed by inserting the control rod sufficiently to cause reed switch movement, as determined by intermediate rod position indication (i.e., blackout of starting rod position on the four rod display) in the control room. At that point, the control rod will be allowed to settle to its original position.

The purpose of SR 3.1.3.3 is to demonstrate control rod insertion capability by inserting each partially or fully withdrawn control rod at least one notch and observing that the control rod moves. This ensures the control rod is not stuck and is free to insert on a scram signal. Partially withdrawn control rods are tested at a 31 day frequency, based on the potential power reduction required to allow the control rod movement and considering the large testing sample of SR 3.1.3.2 (i.e., which demonstrates the insertion capability of fully withdrawn control rods on a 7 day frequency).

Revising SR 3.1.3.3 to allow partial insertion of control rod 26-47 versus insertion of one notch will not affect the intent of SR 3.1.3.3 and will provide adequate assurance that control rod 26-47 remains capable of insertion. The proposed change is only applicable to control rod 26-47; all other partially withdrawn control rods will be tested by inserting them a full notch. The ability to insert control rod 26-47 will continue to be verified via control rod movement each 31 days. Additionally, the insertion capability of all fully withdrawn control rods is demonstrated on a 7 day frequency. Hence, the overall intent of SR 3.1.3.3, which is to detect either random stuck control rods or identify generic concerns affecting control rod operability, is not affected by the proposed change.

As discussed above, the apparent cause of the inability to withdraw control rod 26-47 is failure of the collet piston to provide sufficient lifting force to clear the collet fingers from the notch on the index tube. This is most likely caused by debris which has entered the drive and has caused seal damage to the extent that there is insufficient drive water flow to lift the collet piston or debris has fouled the collet piston rings. This condition is not affecting the ability of the control rod to insert, either manually or automatically. Partially inserting control rod 26-47 will continue to demonstrate this ability and will identify any further degradation which may affect control rod operability.

Additionally, industry experience has shown stuck control rods to be an extremely rare event. Should a stuck control rod be discovered, 100% of the remaining control rods will be tested within 24 hours per the requirements of Action A.3 of TS 3.1.3.

Due to the inability to withdraw control rod 26-47, notching the control rod as currently required by SR 3.1.3.3 will unnecessarily impact the control rod blade by increasing the rate of depletion of its neutron absorption capability as more of the blade will be exposed to the operating core. Evaluations indicate that continued notching of control rod 26-47, at the 31 day frequency, will cause the control rod blade to exceed its design life by November 2001. If pursued, additional analysis performed by the control rod blade manufacturer, may justify extension of the life of the control rod blade through the end of the current cycle. Currently this blade is operable, will meet shutdown margin requirements, and will not result in thermal limits exceeding TS limits.

However, continued notching of control rod 26-47 will unnecessarily deplete the neutron absorption capability of the control rod blade, present challenges for future cycle designs, and will present an economic penalty on the cycle including the possibility of a mid-cycle outage to repair the control rod drive and replace the control rod blade if additional analysis cannot be performed to extend the blade life.

Based on (1) the ability of control rod 26-47 to be inserted either manually or automatically, (2) the continued demonstration of the ability of control rod 26-47 to insert on a 31 day frequency, (3) the high level of assurance of continued operability of all control rods provided by SR 3.1.3.2 and SR 3.1.3.3, and (4) the benefits derived by limiting the unnecessary depletion of the neutron absorption capability of control rod 26-47, CP&L has determined that the proposed amendment does not adversely impact the health and safety of the public.

## ENCLOSURE 2

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

### 10 CFR 50.92 EVALUATION

Carolina Power & Light (CP&L) Company has concluded that the proposed change to the Brunswick Steam Electric Plant (BSEP), Unit No. 1 Technical Specifications (TSs) does not involve a Significant Hazards Consideration. The proposed amendment modifies Surveillance Requirement (SR) 3.1.3.3 to allow partial insertion of control rod 26-47 versus insertion of one notch. This revised acceptance criterion will be limited to the current Unit No. 1 operating cycle (i.e., Cycle 13), after which the current one notch requirement will be re-established.

In support of this determination, an evaluation of each of the three (3) standards set forth in 10 CFR 50.92 is provided below.

1. Partial insertion of control rod 26-47 versus insertion of one notch does not involve a significant increase in the probability or consequences of an accident previously evaluated.

This change does not affect either the design or operation of the Control Rod Drive Mechanism (CRDM). The affected surveillance is not considered to be an initiator of any analyzed event. Revising the acceptance criterion for SR 3.1.3.3 for control rod 26-47 will not affect the ability of the control rods to shutdown the reactor if required. Allowing partial insertion of control rod 26-47 versus one notch insertion will not affect the overall intent of SR 3.1.3.3 and will provide adequate assurance that control rod 26-47 remains capable of insertion. The proposed change is only applicable to control rod 26-47; all other partially withdrawn control rods will be tested by inserting them one notch. Additionally, the insertion capability of all fully withdrawn control rods is demonstrated on a 7 day frequency. Hence, the overall intent of SR 3.1.3.3, which is to detect either random stuck control rods or identify generic concerns affecting control rod operability, is not significantly affected by the proposed change.

Therefore, the proposed amendment does not significantly increase the probability or consequences of a previously analyzed accident.

2. Partial insertion of control rod 26-47 versus insertion of one notch will not create the possibility of a new or different kind of accident from any accident previously evaluated.

Revising the acceptance criterion of SR 3.1.3.3 for control rod 26-47 does not involve physical modification to the plant and does not introduce a new mode of operation. Therefore, there is no possibility of an accident of a new or different type.

3. Partial insertion of control rod 26-47 versus insertion of one notch does not involve a significant reduction in a margin of safety.

Revising the acceptance criterion of SR 3.1.3.3 only provides a minor reduction in the probability of finding that rod 26-47 is stuck. Partially inserting control rod 26-47 once per 31 days will provide adequate assurance that control rod 26-47 remains capable of insertion.

The proposed change is only applicable to control rod 26-47; all other partially withdrawn control rods will be tested by inserting them one full notch. Additionally, the insertion capability of all fully withdrawn control rods is demonstrated on a 7 day frequency. Hence, the overall intent of SR 3.1.3.3, which is to detect either random stuck control rods or identify generic concerns affecting control rod operability, is not significantly affected by the proposed change. Additionally, industry experience has shown stuck control rods to be an extremely rare event. Should a stuck control rod be discovered, 100% of the remaining control rods will be tested within 24 hours per the requirements of Action A.3 of TS 3.1.3.

On March 28, 2000, it was determined that BSEP, Unit No. 1 had developed a problem which has resulted in the inability to withdraw control rod 26-47. The control rod remains operable and is fully capable of being automatically or manually inserted. Performance of SR 3.1.3.3, with the current acceptance criterion, will unnecessarily impact the control rod blade by increasing the rate of depletion of its neutron absorption capability as more of the blade will be exposed to the operating core. Performance of SR 3.1.3.3 by partial insertion of control rod 26-47 versus insertion of one notch can be accomplished by observing control rod position indication in the control room. A one notch insertion represents two reed switch positions; notches are located at even numbered reed switch positions. For control rod 26-47, SR 3.1.3.3 will be performed by inserting the control rod sufficiently to cause reed switch movement, as determined by intermediate rod position indication (i.e., blackout of starting rod position on the four rod display) in the control room. At that point, the control rod will be allowed to settle to its original position. This provides adequate assurance of the insertion capability of the control rod.

Based on (1) the ability of control rod 26-47 to be inserted either manually or automatically, (2) the continued demonstration of the ability of control rod 26-47 to insert on a 31 day frequency, (3) the high level of assurance of continued operability of all control rods provided by SR 3.1.3.2 and SR 3.1.3.3, and (4) the benefits derived by limiting the unnecessary depletion of the neutron absorption capability of control rod 26 47, the benefits derived from revising the acceptance criterion of SR 3.1.3.3 for control rod 26-47 outweigh any risks associated with the proposed change. Therefore, the

proposed amendment will provide assurance that control rod 26-47 remains operable while avoiding the negative consequences of unnecessarily inserting control rod 26-47.

Based on the above, partial insertion of control rod 26-47 versus insertion of one notch does not involve a significant reduction in a margin of safety.

## ENCLOSURE 3

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1  
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INSERTION SURVEILLANCE OF CONTROL ROD 26-47

### ENVIRONMENTAL CONSIDERATIONS

Carolina Power & Light (CP&L) Company has concluded that the proposed change to the Brunswick Steam Electric Plant (BSEP), Unit No. 1 Technical Specifications (TSs) is eligible for categorical exclusion from performing an environmental assessment. The proposed amendment modifies Surveillance Requirement (SR) 3.1.3.3 to allow partial insertion of control rod 26-47 versus insertion of one notch. This revised acceptance criterion will be limited to the current Unit No. 1 operating cycle (i.e., Cycle 13), after which the current one notch requirement will be re-established. In support of this determination, an evaluation of each of the three (3) criteria set forth in 10 CFR 51.22(c)(9) is provided below.

1. As demonstrated in Enclosure 2, partial insertion of control rod 26-47 versus insertion of one notch does not involve a significant hazards consideration.
2. Partial insertion of control rod 26-47 versus insertion of one notch does not result in a significant change in the types or a significant increase in the amounts of any effluent that may be released offsite. The proposed amendment does not introduce any new equipment nor require any existing equipment or systems to perform a different type of function than they are presently designed to perform. The proposed amendments do not alter the function of existing equipment and will ensure that the consequences of any previously evaluated accident do not increase. Therefore, CP&L has concluded that there will not be a significant increase in the types or amounts of any effluent that may be released offsite and, as such, the proposed amendment does not involve irreversible environmental consequences beyond those already associated with normal operation.
3. Partial insertion of control rod 26-47 versus insertion of one notch does not result in an increase in individual or cumulative occupational radiation exposure.

ENCLOSURE 4

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1  
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INSERTION SURVEILLANCE OF CONTROL ROD 26-47

PAGE CHANGE INSTRUCTIONS

<u>UNIT NO. 1</u>	
Remove page	Insert page
3.1-10	3.1-10

ENCLOSURE 5

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1  
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TYPED TECHNICAL SPECIFICATION PAGE - UNIT NO. 1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Determine the position of each control rod.	24 hours
SR 3.1.3.2	<p>-----NOTE-----            Not required to be performed until 7 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of RWM.            -----</p> <p>Insert each fully withdrawn control rod at least one notch.</p>	7 days
SR 3.1.3.3	<p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>Not required to be performed until 31 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of the RWM.</li> <li>For Cycle 13 only, SR 3.1.3.3 can be satisfied for control rod 26-47 by verifying inward motion versus inserting at least one notch.</li> </ol> <p>-----</p> <p>Insert each partially withdrawn control rod at least one notch.</p>	31 days
SR 3.1.3.4	Verify each control rod scram time from fully withdrawn to notch position 06 is $\leq 7$ seconds.	In accordance with SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4

(continued)

ENCLOSURE 6

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1  
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REQUEST FOR LICENSE AMENDMENT  
INSERTION SURVEILLANCE OF CONTROL ROD 26-47

MARKED-UP TECHNICAL SPECIFICATION PAGE - UNIT NO. 1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Determine the position of each control rod.	24 hours
SR 3.1.3.2	<p>-----NOTE-----                      Not required to be performed until 7 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of RWM.                      -----</p> <p>Insert each fully withdrawn control rod at least one notch.</p>	7 days
SR 3.1.3.3	<p style="text-align: center;">NOTES</p> <p>-----NOTE-----                      1. Not required to be performed until 31 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of the RWM.                      -----</p> <p>Insert each partially withdrawn control rod at least one notch.</p>	31 days
SR 3.1.3.4	Verify each control rod scram time from fully withdrawn to notch position 06 is $\leq 7$ seconds.	In accordance with SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4

(continued)

2. For Cycle 13 only, SR 3.1.3.3 can be satisfied for control rod 26-47 by verifying inward motion versus inserting at least one notch.