Entergy

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January 4, 2007

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

SUBJECT: Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
Docket No. 50-283
License No. DPR-35

Request for License Amendment
Technical Specification Revisions for Control Rod Operability, Scram Insertion Times, and Control Rod Accumulator Requirements

LETTER NUMBER: 2.07.004

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations Inc. (Entergy) proposes to amend the Pilgrim Station Facility Operating License, DPR-35. The proposed changes would revise the Limiting Conditions for Operation (LCO) and Surveillance Requirements (SRs) for Control Rod Operability, Scram Insertion Times, and Control Rod Accumulators.

Entergy has reviewed the proposed amendment in accordance with 10 CFR 50.92 and concludes it does not involve a significant hazards consideration. The attachments provide an evaluation of the proposed change and mark-up of the Technical Specification and Bases pages.

Entergy requests approval of the proposed amendment by December 15, 2007. Once approved, Entergy will implement the amendment within 120 days.

This letter contains no regulatory commitments.

If you have any questions or require additional information, please contact Bryan Ford at (508) 830-8403.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 4th of January 2007.

Sincerely,

Kevin H. Bronson for MAB.

Michael A. Balduzzi

FXM/dl
Attachments:
1. Evaluation of Proposed Change (13 pages)
2. Mark-up of Technical Specification and Bases (32 pages)

A001

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Attachment 1 to Letter 2.07.004

Evaluation of Proposed Changes
(13 pages)

Subject: Technical Specification Revisions for Control Rod Operability, Scram Insertion Times, and Control Rod Accumulator Requirements

1. Description

This letter is a request to revise Technical Specifications (TS) for Pilgrim Nuclear Power Station (PNPS). The proposed changes involve Limiting Conditions for Operation (LCO) and Surveillance Requirements (SR) applicable to Control Rod Operability in TS 3/4.3.B; Scram Insertion Times in TS 3/4.3.C; and Control Rod Accumulators in TS 3/4.3.D.

The primary purpose of the proposed change is to revise TS 3/4.3.C to change the required control rod scram time test frequency interval from "within each 120 days of operation at-power" to "within each 200 days of cumulative operation in RUN." This change is consistent with Consolidated Line Item Improvement Process (CLIIP) Notice of Availability, dated August 23, 2004 (69 FR 51864) and Technical Specification Task Force change traveler TSTF-460 Rev. 0 (References 1 and 6).

The secondary purpose of the proposed change is to revise TS 3/4.3.B, TS 3/4.3.C, and TS 3/4.3.D to ensure consistency with NUREG-1433, Rev 3, "Standard Technical Specifications (STS), General Electric Plant, BWR/4" (Reference 2), STS 3.1.3, 3.1.4, and 3.1.5. The STS format changes involve adoption of a revised control rod scram time test methodology. The proposed scram time test criterion (TS 3/4.3.C) evaluates control rod operability based on capability of individual control rods to meet established scram times. The existing TS requirements for averaging all operable control rod scram times and for grouped array averaging of multiple control rod scram times are removed. The proposed scram time test criterion establishes a new category of operable but "slow" control rods and establishes allowable limits for the number and distribution of these "slow" rods.

Based on the establishment of operable but "slow" control rods, separation criteria for "stuck" control rods (TS 3/4.3.B) and requirements for control rod scram accumulator testing (TS 3/4.3.D) require revision. The proposed changes to these specifications are consistent with STS 3.1.3 and 3.1.5.

Attachment 2 provides a mark-up of the proposed TS changes and the associated TS bases revisions. The TS bases revisions are included to add clarity and completeness to the submittal.

2. Proposed Changes

The following changes are proposed as part of this TS amendment.

A. TS 3/4.3.B – Control Rod Operability

TS LCO 3.3.B.1 Action A1 is being revised to require that with one withdrawn control rod stuck, verify stuck control rod separation criteria are met immediately. This change is required due to revision of TS 3/4.3.C which allows control rods to be "slow" but operable. TS Bases for 3/4.3 B.1 Actions A.1, A.2, A.3, and A.4 are also being revised to specifically identify "stuck" rod separation criteria as it applies to "slow" but operable control rods. These changes are consistent with the LCO requirements defined in STS 3.1.3.

In addition, TS SR 4.3.B.1.4 is being updated to reference the additional surveillances that are proposed in the TS SR 4.3.C.

Minor editorial revisions are proposed to address TS numbering applicable to TS LCO 3.3.B.1.C (page 3/4.3-3), and TS SR 4.3.B (pages 3/4.3-4 and 3/4.3-6).

B. TS 3/4.3.C – Scram Insertion Times

TS 3/4.3.C is being revised to change the title from "Scram Insertion Times" to "Control Rod Scram Times." This is an editorial change to ensure consistency with STS 3.1.4.

TS LCO 3.3.C is being revised to change the control rod scram insertion test requirements. This LCO revision deletes the requirements for addressing average scram times for all operable rods and average scram times for the three fastest operable control rods in each group of four control rods in all two-by-two arrays. The proposed LCO identifies new scram time acceptance criteria for individual control rods. New TS Table 3.3.C-1, Control Rod Scram Times, is provided to identify scram test configuration requirements and associated acceptance criteria. Based on this table, criteria for determining "slow" and "inoperable" control rods are defined. These changes are consistent with the LCO requirements defined in STS 3.1.4.

TS SR 4.3.C.1 and 4.3.C.2 are being revised to change surveillance test criteria for scram time testing. The existing surveillances address scram time test requirements following Refueling Outages, Shutdowns greater than 120 days, and at-power tests within each 120 days of operation. The proposed surveillances (TS SR 4.3.C.1 through .4) rely on new TS Table 3.3.C-1 to control test configurations and test acceptance criteria. TS SR 4.3.C.2 extends the at-power scram time test frequency from "within each 120 days of operation" to "within each 200 days of cumulative operation in RUN." These changes are consistent with STS 3.1.4 and NRC approved Technical Specifications Change Traveler TSTF-460, Rev. 0.

C. TS 3/4.3.D – Control Rod Accumulators

TS 3/4.3.D is being revised to change the title from "Control Rod Accumulators" to "Control Rod Scram Accumulators." This is an editorial change to ensure consistency with STS 3.1.5.

TS 3/4.3.D, Control Rod Accumulators (TS LCO 3.3.D) Action, is being revised to address the option for declaring control rods associated with inoperable accumulators, either "slow" or "inoperable." The revised LCO actions address contingencies for one inoperable accumulator with reactor steam dome pressure ≥ 950 psig, two or more inoperable accumulators with reactor steam dome pressure ≥ 950 psig, and when any accumulator is inoperable with reactor pressure < 950 psig. These changes are consistent with STS 3.1.5.

TS SR 4.3.D is being revised to change the requirement for performing a check on the status of accumulator pressure and level alarms once per shift. The proposed surveillance requirement will verify that pressure in each accumulator is ≥ 940 psig once every seven days. This SR requirement change is consistent with STS SR 3.1.5.1.

D. Table of Contents

The Table of Contents is updated to reflect the proposed changes indicated above.

3. Background

Control rods are components of the Control Rod Drive (CRD) System, which is the primary reactivity control system for the reactor. In conjunction with the Reactor Protection System, the CRD System provides the means for reliable control of reactivity changes to ensure that under conditions of normal operation including anticipated operational occurrences, specified fuel design limits are not exceeded. In addition, the control rods provide the capability to maintain the reactor core subcritical under all conditions and to limit the potential amount and rate of reactivity increase if there were to be a malfunction in the CRD System.

The control rods are scrammed by positive means using hydraulic pressure exerted on the CRD piston. When a scram signal is initiated, control air is vented from the scram valves, allowing them to open by spring action. Opening the exhaust valve reduces the pressure above the main drive piston to atmospheric pressure and opening the inlet valve applies the accumulator or reactor pressure to the bottom of the piston. Since the notches in the index tube are tapered on the lower edge, the collet fingers are forced open by cam action, allowing the index tube to move upward without restriction because of the high differential pressure across the piston. As the drive moves upward, and the accumulator pressure reduces below the reactor pressure, a ball check valve opens, allowing reactor pressure to complete the scram action. If the reactor pressure is low, such as during startup, the accumulator pressure functions to fully insert the control rod in the required time without assistance from reactor pressure.

The accumulators are part of the CRD System and are provided to ensure that the control rods scram under varying reactor conditions. The accumulators store sufficient energy to fully insert a control rod at any reactor vessel pressure. The accumulator is a hydraulic cylinder with a free-floating piston. The piston separates the water used to scram control rods, from pressurized nitrogen which provides additional energy to complete control rod insertion. The accumulators are necessary to scram control rods within the required insertion times defined in proposed TS Table 3.3.C-1, “Control Rod Scram Times.”

For a detailed discussion of the CRD System components and operating characteristics of the control rods, refer to the description in Chapter 3.4 in the Updated Final Safety Analysis Report (UFSAR).

The most obvious benefit of revising the existing technical specifications is to reduce plant risk by reducing the number of times it is necessary to perform power maneuvers to accommodate at-power control rod scram time testing. The TS changes requested are based on Improved Standard Technical Specifications Change Traveler TSTF-460, Rev. 0 (Reference 1) and previously approved BWR operating requirements defined in NUREG-1433, BWR/4 (Reference 2).

4. Technical Analysis

The proposed changes revise the LCO and SRs associated with Control Rod Operability (TS 3/4.3.B), Scram Insertion Times (TS 3/4.3.C), and Control Rod Accumulator (TS 3/4.3.D).

4.1 - TS 3/4.3.B – Control Rod Operability

Existing TS LCO 3.3.B.1, Action A.1 ensured that a stuck control rod was verified to be "separated from other inoperable control rods by two or more OPERABLE rods immediately." With the introduction of "slow" but operable control rods, the LCO and stuck control rod separation criteria required revision. The proposed LCO requires operators to "verify stuck control rod separation criteria are met immediately," and the proposed TS Bases 3/4.3.B.1 identifies stuck rod separation criteria. The revised bases indicates that stuck rod separation criteria are not met if: a) the stuck control rod occupies a location adjacent to two "slow" control rods; b) the stuck control rod occupies a location adjacent to one "slow" control rod, and the one "slow" control rod is also adjacent to another "slow" control rod; or, c) if the stuck control rod occupies a location adjacent to one "slow" control rod when there is another pair of "slow" control rods adjacent to one another. "Slow" control rods are defined using new TS Table 3.3.C-1. These changes are consistent with LCO requirements and TS Bases defined in STS 3.1.3 and 3.1.4.

The above referenced TS LCO and Bases changes ensure the distribution and performance of control rods meet the local scram reactivity rate assumptions used in safety analyses in the event of a design basis accident or transient. Refer to the technical analysis discussion provided for the proposed change to TS 3/4.3.C. for a discussion as to why proposed TS 3/4.3.B.1 is justified.

Existing TS SR 4.3.B.1.4 required revision to identify the additional surveillance tests that are proposed in the change to TS SR 4.3.C. The number alignment for existing TS LCO 3.3.B.1 Action C and TS SR 4.3.B also required revision. These are considered editorial changes.

4.2 - TS 3/4.3.C – Scram Insertion Times

The title of TS 3/4.3.C is being revised to "Control Rod Scram Times" to be consistent with STS 3.1.4. This is an editorial change.

TS LCO 3.3.C

Existing TS LCO 3.3.C.1 and 3.3.C.2 require revision to identify new control rod scram time acceptance criteria. LCO requirements for average scram insertion times for all operable control rods and for average scram insertion times for the three fastest operable control rods in each group of four control rods in all two-by-two arrays are being deleted. New scram insertion times for each control rod are proposed in TS Table 3.3.C-1. The revised LCO allows no more than ten (10) control rods (or 7% of 145) to be "slow" and allows no more than two (2) operable but "slow" control rods to occupy adjacent core locations. The new TS Table establishes criteria for identifying operable but "slow" control rods, and provides reference to TS SR 4.3.B.1.4, which defines the minimum scram time (≤ 7 seconds to notch position 04) that must be satisfied to demonstrate that an individual control rod is operable. This table also identifies tests that should be performed on fully withdrawn rods and defines criteria based on reactor steam dome pressure. These proposed changes are consistent with STS 3.1.4.

The proposed TS LCO 3.3.C provides a different method to determine if the measured scram insertion times are sufficient to insert the amount of negative reactivity assumed in accident and transient analyses. A description and supporting analysis for the proposed TS LCO 3.3.C test method (which is identical to that utilized by STS LCO 3.1.4) is contained in BWROG-8754, letter from R.F. Janecek (BWROG) to R.W. Starostecki (NRC), dated September 17, 1987 (Reference 3). The purpose of the control rod scram time LCO is to ensure the negative scram reactivity corresponding to that used in licensing basis calculations is supported by individual control rod drive scram performance distributions allowed by the Technical Specifications. Current TS LCO 3.3.C.1 and 3.3.C.2 accomplishes the above purpose by placing requirements on average scram times and local scram times (average of three fastest control rods in all groups of four control rods).

The methodology used in the design basis transient analysis (one-dimensional neutronics) assumes all control rods scram at the same speed. This is called the analytical scram time requirement. Performing an evaluation assuming all control rods scram at the analytical limit will result in the generation of a scram reactivity-versus-time curve that is called the analytical scram reactivity curve. It is the purpose of the scram time LCO to ensure that under allowed plant conditions, this analytical scram reactivity will be met. Since scram reactivity cannot be readily measured at the plant, safety analyses use appropriately conservative scram reactivity-versus-insertion fraction curves to account for the variation in scram reactivity during a cycle. Therefore, the technical specifications must only ensure that the proposed scram times (in Table 3.3.C-1) are satisfied.

If all control rods scram at least as fast as the proposed scram time limits, the analytical scram reactivity curve will be met. However, it is also known that a distribution of scram times (some slower and some faster than the analytical limit) can also provide adequate scram reactivity. By definition, for a situation where individual control rods do not satisfy the analytical scram time limits, the condition is acceptable if the resulting scram reactivity meets or exceeds the analytical scram reactivity curve. This can be evaluated using models that allow for a distribution of scram speeds. It follows that the more control rods that scram slower than the analytical limit, the faster the remaining control rods must scram to compensate for the reduced scram reactivity rate of the slower control rods. Proposed TS LCO 3.3.C incorporates this philosophy by specifying scram time limits for each individual control rod instead of specifying limits for average scram times. This is the same philosophy currently used for BWR/4 plants that have converted to Improved Technical Specifications. Proposed TS LCO 3.3.B.1 Action A.1 and TS LCO 3.3.C scram time limits have margin to the analytical scram time limits to allow for a specified number and distribution of slow control rods, a single stuck control rod, and an assumed single failure.

The scram times specified in Table 3.3.C-1 reflect time measurements based on reed switch positions, which provide the control rod position indication. The reed switch closes ("pickup") when the index tube passes a specific location and then opens ("dropout") as the index tube travels upward. Verification of the specified scram times in Table 3.3.C-1 is accomplished through measurement of the "dropout" times. The scram times listed in Table 3.3.C-1 reflect the required scram time values listed in Table 3.4 of the report provided with BWROG-8754 (Reference 3) as adjusted based on the monitored notch positions used at Pilgrim Station. These scram insertion times are consistent with the generic analytical scram reactivity rates identified for BWR/2-5 control rod drives and were used in the Supplemental Reload Licensing Report for PNPS.

Therefore, if all control rods meet the LCO scram time limits found in proposed TS Table 3.3.C-1, as measured from the de-energization of scram pilot valve solenoids at time zero (Table Note a), the analytical scram reactivity assumptions credited in the cycle specific fuel limits analyses for PNPS are satisfied. If any control rods do not meet the LCO time limit, the LCO specifies the allowed number and distribution of these "slow" but operable control rods to ensure the analytical scram reactivity assumptions are still satisfied.

If the number of "slow" rods is excessive (over 7% of 145, i.e., > 10) or do not meet stuck rod separation criteria, the unit must be shut down. This change is considered more restrictive on plant operation. Currently, the "average time" of all rods or a group of rods can be improved by a few fast scramming rods, even when there may be more than ten "slow" rods as defined in the proposed specification. Therefore, the proposed specification limits the number of "slow" rods to ten (10) and ensures no more than two (2) "slow" control rods occupy adjacent locations.

The proposed note to TS Table 3.3.C-1 (Note 2) ensures a control rod is not inadvertently considered "slow" when the scram time exceeds seven (7) seconds. This note references existing TS SR 4.3.B.1.4. These changes are consistent with STS 3.1.4.

Proposed TS Table 3.3.C-1 also identifies that the referenced scram time values for each notch position apply when reactor steam dome pressure is ≥ 800 psig and that scram times may vary if testing is performed at reactor pressures < 800 psig. Existing TS LCO 3.3.C does not address reactor pressure scram test criteria. However, existing TS SR 4.3.C.1 identifies that if scram testing is not performed at reactor pressures above 950 psig then measured scram insertion times shall be extrapolated to reactor pressures above 950 psig using previously determined correlations. The proposed change to revise reactor pressure (≥ 800 psig vs. > 950 psig) is more conservative because maximum scram insertion times occur at a reactor pressure of approximately 800 psig. A reactor pressure of 800 psig corresponds to the limiting pressure for CRD scram testing for BWR/2-5 type systems. "Limiting" refers to the fact that the maximum scram insertion times will be experienced at this condition because of the competing effects of the reactor vessel pressure and the accumulator pressure scram forces. The primary scram insertion time requirements are related to transients from rated reactor pressure (assumed to be > 950 psig) and therefore, if the scram insertion times are demonstrated at pressures ≥ 800 psig, then analytical scram reactivity requirements will be met.

<u>TS SR 4.3.C.1</u>

Existing TS SR 4.3.C.1 currently requires that all operable control rods be scram tested from the fully withdrawn position with the reactor pressure above 950 psig prior to exceeding 40% rated thermal power (RTP) following a refueling outage or an extended outage greater than 120 days. The requirements of this surveillance is to be addressed via revised TS SR 4.3.C.1, SR 4.3.C.3, and SR 4.3.C.4.

A note, applicable to each of the proposed surveillances identified in the preceding paragraph identifies that the CRD pumps shall be isolated from the associated accumulator when a single control rod scram time surveillance test is performed. This is conservative because with the CRD pumps isolated (i.e., charging valve closed), the influence of CRD pump head will not affect the scram time test results. Isolating the accumulator from the CRD header also ensures consistency with STS 3.1.4.

Proposed TS SR 4.3.C.1 addresses the existing TS SR 4.3.C.1 requirement to verify that each operable control rod scram time is within limits prior to reaching 40% RTP after each reactor shutdown ≥ 120 days. The proposed surveillance is consistent with the existing surveillance and due to the reference to proposed TS Table 3.3.C-1, imposes more conservative test criteria and restrictions (i.e., reactor pressure ≥ 800 psig).

Proposed surveillance TS SR 4.3.C.4 addresses the existing TS SR 4.3.C.1 requirement to verify each operable control rod scram time is within limits prior to reaching 40% RTP after each Refueling outage. The proposed surveillance will ensure each affected control rod scram time is within limits prior to reaching 40% RTP after fuel movement within the affected cell and after work on a control rod or CRD System that could affect scram time. In addition, the proposed change to TS Bases 3/4.3.C (for TS SR 4.3.C.4) identifies that for routine refueling outages, it is expected that all control rods will be affected. Therefore, the proposed surveillance is consistent with the existing surveillance in that all potentially impacted control rods will be tested to ensure refueling outage work or CRD or CRD System work did not adversely impact capability to scram the control rod. In addition, due to the reference to proposed TS Table 3.3.C-1, proposed TS SR 4.3.C.4 surveillance imposes more conservative test criteria and restrictions (i.e., reactor pressure ≥ 800 psig) than the existing surveillance.

Proposed TS SR 4.3.C.3 also imposes a new surveillance requirement to perform scram time testing on all control rods affected by control rod or CRD System work prior to declaring the rod(s) operable. Testing affected control rods is necessary to demonstrate the control rod is operable after CRD or CRD System work is performed. This test can be performed at any reactor pressure and since maintenance or modifications to control rods or the CRD System are typically performed when the reactor is shutdown, it is expected the affected rods be scram tested and operable prior to taking the reactor critical. This ensures that the affected rods are tested before they would potentially be required to scram (i.e., before going critical).

<u>TS SR 4.3.C.2</u>

Existing TS SR 4.3.C.2 addresses the requirements to perform scram time testing on a minimum of 10% of the CRDs within each 120 days of operation. Currently, completion of an evaluation is required every 120 days of operation to provide reasonable assurance that proper scram performance is maintained. Revised TS SR 4.3.C.2 ensures the "at-power" scram tests are performed on a representative sample of CRDs in accordance with the requirements of proposed TS Table 3.3.C-1. TS Bases have been revised to indicate a representative sample contains at least 10% of the control rods. This change is consistent with the requirements of STS 3.1.4.2.

However, it must be noted that the frequency of performing scram tests in accordance with existing TS SR 4.3.C.2 has been changed from "within each 120 days of operation" to "within each 200 days of cumulative operation in RUN." This increase in the duration between required tests is consistent with TSTF-460, Rev. 0 (Reference 1), which has been reviewed and approved generically by the NRC for the Boiling Water Reactor (BWR) STS, NUREG-1433 BWR/4 (Reference 2). The basis for the reduction in "at-power" scram test frequency (every 200 days vs. 120 days) is justified based on industry operating experience which has shown control rod scram times do not significantly change over an operating cycle. In addition, the Bases for the proposed change were revised to identify that control rod acceptance criteria for the percentage of allowed "slow" rods would be 7.5% of the random at-power surveillance sample (revised TS SR 4.3.C.2) as opposed to the 20% allowance identified in STS TS 3.1.4 Bases. The more restrictive 7.5% acceptance criterion for testing the random sample is conservative and consistent with TSTF-460, Rev. 0.

To justify the acceptability of this frequency change, Entergy has reviewed the historical performance of PNPS CRD scram times over the past 5 cycles (10 years of operation). Based on the recorded test data for over 1890 individual CRD scram time tests, there were no instances of inoperable control rods and only six (6) instances where an individual CRD did not meet the revised scram time limit for the designated notch position (i.e., the CRD would have been classified as "slow"). This historical data substantiates the reliability of CRD scram capability.

4.3 - TS 3/4.3.D – Control Rod Accumulators

The title of TS 3/4.3.D is being revised to "Control Rod Scram Accumulator" to be consistent with STS 3.1.5. This is an editorial change.

Existing TS 3/4.3.D requires the accumulators to be operable when the reactor is in RUN and STARTUP MODES; and when in REFUEL MODE when the reactor vessel head is fully tensioned. In these modes, the scram function is required for mitigation of design basis accidents and transients; and therefore the accumulators must be operable to support the scram function. This requirement has not been revised.

The proposed changes to TS 3/4.3.D identify that accumulator OPERABILITY is based on a minimum pressure of 940 psig. This value was selected based on minimum pressure specifications and test data that demonstrated adequate pressure is available to insert the associated control rod and satisfy scram insertion speed requirements (References 4 and 5). The existing TS does not identify specific criteria to determine accumulator operability.

The existing TS LCO 3.3.D Actions address the required actions and time limits that apply when accumulators are found to be inoperable and specific plant conditions exist (e.g., number of inoperable accumulators identified, reactor pressure, and rated thermal power level). The proposed changes to TS LCO 3.3.D Actions ensure consistency with STS 3.1.5 "Control Rod Scram Accumulators."

The proposed changes to TS LCO actions revise the allowable actions and associated completion times for establishing control rod operability when the associated accumulator is not operable. The revised allowable actions are contingent on reactor vessel pressure (≥ 950 psig, same as existing TS value) and charging water system pressure (≥ 940 psig, currently not identified). Control rods can be declared either "slow" or "inoperable" when the associated accumulator is considered inoperable. The proposed changes fully implement the revisions previously defined in revised TS Sections 3.3.B and 3.3.C. The identified allowable actions and associated time limits are consistent with STS 3.1.5, Control Rod Scram Accumulators.

The existing requirements of TS LCO 3.3.D Actions A and B are superseded by the proposed changes identified in TS LCO 3.3.D Actions A, B, C, and D. These proposed TS changes ensure that control rods associated with inoperable accumulators are declared either "slow" or inoperable based on plant conditions involving reactor pressure, accumulator pressure, and/or CRD charging water header status. The requirements of TS LCO 3.3.B.1 will be credited to address the required actions necessary when control rods are determined to be inoperable.

Proposed TS LCO 3.3.D Action A addresses the condition where one accumulator is inoperable and reactor pressure is ≥ 950 psig. For this specific condition, the accumulator can be inoperable for up to eight (8) hours, prior to declaring the associated control rod "slow" or "inoperable." An inoperable accumulator affects the associated control rod scram time. However, at sufficiently high reactor pressure (i.e., ≥ 950 psig), the accumulators only provide a portion of the scram force. At reactor pressure ≥ 950 psig, the control rod will scram even without the associated accumulator, although possibly not within the required scram times. The allowed completion time of eight (8) hours is reasonable, based on the large number of control rods available to provide the scram function and the ability of the affected control rod to scram using reactor pressure. Proposed TS LCO 3.3.D Action A.1 provides an option to declare a control rod with an inoperable accumulator, "slow" which allows the rod to remain withdrawn but not disarmed. Proposed TS LCO 3.3.D Action A.2 provides the option of declaring the drive "inoperable," and if declared "inoperable' will ensure the associated control rod is inserted and disarmed in accordance with existing TS LCO 3.3.B.1 Action C. The limits and allowances for numbers and distribution of inoperable and "slow" control rods (proposed TS LCO 3.3.C) will be applied as appropriate. The option for declaring the control rod with an inoperable accumulator as "slow" is restricted (by a Note to LCO 3.3.D Action A.1 and LCO 3.3.D Action B.2.1) to control rods not previously known to be "slow." This restriction prevents allowing a "slow" control rod from remaining operable with the additional degradation to scram time caused by an inoperable accumulator.

Proposed TS LCO 3.3.D Action B allows two (2) or more accumulators to be inoperable for up to one (1) hour when reactor pressure is ≥ 950 psig. The requirement for declaration of "slow" or inoperable (and the implied concurrent restoration allowed time) is provided in proposed TS LCO 3.3.D Action B.2.1 and B.2.2. This one (1) hour allowance provides a reasonable time to attempt investigation and restoration of the inoperable accumulator. The allowed completion time of one (1) hour is reasonable, based on the ability of reactor pressure to scram the control rods and the low probability of a design basis accident or transient occurring while the affected accumulators are inoperable. Furthermore, proposed TS LCO 3.3.D Action B.1 addresses the situation where additional accumulators may become inoperable due to loss of charging water header pressure. Once verification of adequate charging water header pressure is made (twenty minutes is provided), and considering that reactor pressure is adequate to assure the scram function of the control rods with inoperable accumulators, the one-hour extension is not significant. Proposed TS LCO 3.3.D Action B.1 ensures that existing TS LCO 3.3.D Action C.1 is maintained such that restoration of charging water header pressure will be attempted within twenty (20) minutes.

Proposed TS LCO 3.3.D Action C addresses the situation where additional accumulators may become inoperable due to a loss of charging water header pressure coincident with reactor steam dome pressure < 950 psig. Verification is required immediately because the scram function could be jeopardized due to insufficient reactor pressure and CRD header pressure. The required action involves immediate insertion of the control rod associated with the inoperable accumulator. This action and completion time is consistent with the existing TS LCO 3.3.D Action D requirement.

Proposed TS LCO 3.3.D Action D identifies that if proposed TS LCO 3.3.D Action B.1 and C.1 are not met within the completion time, then the reactor mode switch must be placed in the SHUTDOWN position immediately. The proposed TS change accounts for the above referenced TS numbering changes and ensures the existing TS LCO 3.3.D Action E is maintained.

Existing TS SR 4.3.D currently requires a check of the status of the pressure and level alarms for each accumulator once each shift. It is proposed to modify TS SR 4.3.D to be consistent with STS SR 3.1.5.1 which requires the pressure of each accumulator be verified to be ≥ 940 psig every 7 days to ensure adequate accumulator pressure exists to provide sufficient scram force. The primary indicator of accumulator OPERABILITY is accumulator pressure. A minimum accumulator pressure of ≥ 940 psig is identified based on minimum accumulator pressure specifications and scram speed test data. Verifying accumulator water level does not assure operability. The surveillance frequency change, from once per shift to weekly takes into account the indications available in the Control Room and industry operating experience. No change to the intent of the existing requirements occurs with this proposed revision.

5. Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

The proposed amendment changes Pilgrim Station Technical Specifications applicable to control and surveillance of Control Rod Scram Time Testing (TS 3/4.3.C). Additional changes were proposed to ensure specifications for Control Rod Operability (TS 3/4.3.B) and Control Rod Scram Accumulators (TS 3/4.3.D) are consistent with the proposed TS 3/4.3.C criteria. All of the proposed changes are consistent with Standard Technical Specifications and the consideration of determination published on August 23, 2004 (69 FR 51864) for Consolidated Line Item Improvement (CLIIP) for TS Task Force (TSTF) 460 (Revision 0).

Entergy has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

i) Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed changes extend the frequency and revise the methodology for testing control rod scram times, and identify a new category of "slow" control rods for assessing control rod operability. The frequency of control rod scram testing is not an initiator of any accident previously evaluated. The frequency of surveillance testing does not affect the ability to mitigate any accident previously evaluated, because the tested component is still required to be operable. The proposed test methodology is consistent with industry approved methods and ensures control rod operability requirements for the number and distribution of operable, slow, and stuck control rods continue to satisfy scram reactivity rate assumptions used in plant safety analysis. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

ii) Does the proposed change create the possibility of a new or different kind of accident from any previously evaluated?

Response: No.

The proposed changes do not involve any physical alteration of the plant (no new or different type of equipment is being installed) and do not involve a change in the design, normal configuration, or basic operation of the plant. The proposed changes do not introduce any new accident initiators. The proposed changes do not involve significant changes in the fundamental methods governing normal plant operation and do not require unusual or uncommon operator actions. The proposed changes provide assurance that the plant will not be operated in a mode or condition that violates the assumptions or initial conditions in the safety analyses and that SSCs remain capable of performing their intended safety functions as assumed in the same analyses. Consequently, the response of the plant and the plant operator to postulated events will not be significantly different.

Therefore, the proposed TS change does not create the possibility of a new or different kind of accident from any previously evaluated.

iii) Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

Margin of safety is related to confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. The proposed changes address control rod scram test performance and acceptance criteria as well as control rod operability requirements. The scam test acceptance criteria and control rod operability restrictions are based on industry approved methodology and will continue to ensure control rod scram design functions and reactivity insertion assumptions used in safety analyses continue to be protected. The proposed changes also extend the frequency of testing control rod scram times while at-power from 120 days to 200 days. The proposed change ensures scram testing is performed and that test results verify acceptable operation of the control rods. Therefore, the proposed changes do not involve a significant reduction in the margin of safety.

Based on the above, Entergy concludes the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Environmental Consideration

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion 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 proposed amendment.

6. References

1. Improved Standard Technical Specifications Change Traveler TSTF-460, Rev. 0.
2. NUREG-1433, Standard Technical Specifications for General Electric Plants, BWR/4, Revision 3, March 2004.
3. BWROG-8754, letter from R.F. Janecek (BWROG) to R.W. Starostecki (NRC), dated September 17, 1987.
4. GE Specification 383HA821 Rev. 0, "Reduction in Accumulator Precharge."
5. NEDO-20252, "Startup Test Results Pilgrim Nuclear Station."
6. Federal Register Notice, "Notice of Availability of Model Application Concerning Technical Specifications Improvement Regarding Revision to the Control Rod Scram Times" for General Electric Boiling Water Reactors Using the Consolidated Line Item Improvement Process, published August 23, 2004 (69 FR FR 51864).

Attachment 2 to 2.07.004

Mark-up of Technical Specifications and Bases
(34 Pages with inserts)

Affected Pages
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PNPS add

LIMITING CONDITIONS FOR OPERATION

3.3 REACTIVITY CONTROL (continued)

B. Control Rod Operability

LCO 3.3.B.1

Each control rod shall be OPERABLE.

APPLICABILITY:

RUN and STARTUP MODES; REFUEL MODE when the reactor vessel head is fully tensioned. (See also 3.10.D)

ACTIONS

----------------NOTE--------------------
Separate condition entry is allowed for each control rod.

A. One withdrawn control rod stuck.

------------------NOTE------------------

Rod Worth Minimizer (RWM) may be bypassed as allowed by LCO 3.3.F.

----

1 Verify stuck control rod ~~is separated from other inoperable control rods by two or more OPERABLE control rods immediately.~~ Seperation criteria are met immediately

AND

2 Disarm the associated control rod drive (CRD) within 2 hours.

AND

3 Perform SR 4.3.B.1.1 and SR 4.3.B.1.2 for each withdrawn OPERABLE control rod within 24 hours from discovery of condition A concurrent with thermal power greater than the Low Power Setpoint (LPSP) of the RWM.

AND

4 Verify LCO 3.3.A.1 is met within 72 hours.

AND

SURVEILLANCE REQUIREMENTS

4.3 REACTIVITY CONTROL (continued)

B. Control Rod Operability

SR 4.3.B.1.1

---------------------NOTE---------------------

Not required to be performed until 7 days after the control rod is withdrawn and thermal power is greater than the LPSP of the RWM.

Insert each fully withdrawn OPERABLE control rod at least one notch once per 7 days.

SR 4.3.B.1.2

---------------------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 OPERABLE control rod at least one notch once per 31 days.

SR 4.3.B.1.3

Verify each withdrawn control rod does not go to the withdrawn overtravel position.

a. Each time the control rod is withdrawn to "full out" position.

AND

b. Prior to declaring control rod OPERABLE after work on control rod or CRD system that could affect coupling.

SR 4.3.B.1.4

Verify each control rod scram time from fully withdrawn to notch position 04 is ≤7 seconds in accordance with SR 4.3.C.1, ~~or~~ SR 4.3.C.2, SR 4.3.C.3 or SR 4.3.C.4

SR 4.3.B.1.5

Determine the position of each control rod once per 24 hours.

B. Control Rod Operability (continued)

LCO 3.3.B.1 (continued)

5 -------------NOTE--------------

Not applicable when thermal power > 20% RTP.

Ensure stuck rod is in compliance with banked position withdrawal sequence (BPWS) within 8 hours.

OR

Verify control rod drop accident limit of 280 cal/gm is not exceeded within 8 hours.

B. Two or more withdrawn control rods stuck.

1 Be in HOT SHUTDOWN within 12 hours.

~~A.~~ C. One or more control rods inoperable for reasons other than condition A or B.

1 --------------NOTE-------------

RWM may be bypassed as allowed by LCO 3.3.F.

Fully insert inoperable control rod within 3 hours.

AND

2 Disarm the associated CRD within 4 hours.

B. Control Rod Operability (continued)

B. Control Rod Operability (continued)

LCO 3.3.B.1 (continued)

D. ------------------NOTE------------------

Not applicable when thermal power > 20% RTP.

Two or more inoperable control rods not in compliance with BPWS and not separated by two or more OPERABLE control rods.

1 Restore compliance with BPWS within 8 hours.

OR

2 Verify control rod drop accident limit of 280 cal/gm is not exceeded within 8 hours.

OR

3 Restore control rod(s) to OPERABLE status within 8 hours.

E. ------------------NOTE------------------

Not applicable when thermal power > 20% RTP.

One or more groups with four or more inoperable control rods.

1 Restore control rod(s) to OPERABLE status within 8 hours.

F. Required action and associated completion time of condition A, C, D, or E not met.

OR

Nine or more control rods inoperable.

1 Be in HOT SHUTDOWN within 12 hours.

B. Control Rod Operability (continued)

fix alignment

LIMITING CONDITIONS FOR OPERATION

3.3 REACTIVITY CONTROL (continued)

B. Control Rod Operability (continued)

LCO 3.3.B.3

Control rods shall not be withdrawn for startup unless at least two source range channels have an observed count rate equal to or greater than three counts per second.

APPLICABILITY:

Prior to withdrawing control rods for startup.

ACTIONS:

A. LCO 3.3.B.3 cannot be met.

1 Place the mode switch in shutdown immediately.

SURVEILLANCE REQUIREMENTS

4.3 REACTIVITY CONTROL (continued)

B. Control Rod Operability (continued)

SR 4.3.B.3

fix alignment

Prior to control rod withdrawal for startup, verify that at least two source range channels have an observed count rate of at least three counts per second.

LIMITING CONDITIONS FOR OPERATION

3.3 REACTIVITY CONTROL (continued)

Control Rod Scram Times

C. ~~Scram Insertion Times~~

LCO 3.3.C

1 Average scram insertion time for all OPERABLE control rods from de-energization of the scram pilot valve solenoids to dropout (DO) of notches 04, 24, 34, and 44 shall be no greater than:

Notch Position	Average Scram Times (seconds)
44 DO	0.508
34 DO	1.252
24 DO	2.016
04 DO	3.578

2 Average scram insertion time for the three fastest OPERABLE control rods in each group of four control rods in all two by two arrays from de-energization of the scram pilot valve solenoids to dropout (DO) of notches 04, 24, 34, and 44 shall be no greater than:

Notch Position	Average Scram Times (seconds)
44 DO	0.538
34 DO	1.327
24 DO	2.137
04 DO	3.793

See insert

APPLICABILITY:

RUN and STARTUP MODES; REFUEL MODE when the reactor vessel head is fully tensioned.

ACTIONS:

A. LCO 3.3.C cannot be met.

1 Be in HOT SHUTDOWN within 12 hours.

SURVEILLANCE REQUIREMENTS

4.3 REACTIVITY CONTROL (continued)

Control Rod Scram Times

C. ~~Scram Insertion Times~~

SR 4.3.C.1

Following each REFUELING OUTAGE, or after a reactor shutdown that is greater than 120 days, each OPERABLE control rod shall be subjected to scram time tests from the fully withdrawn position. If testing is not accomplished with the nuclear system pressure above 950 psig, the measured scram insertion time shall be extrapolated to reactor pressures above 950 psig using previously determined correlations. Testing of all OPERABLE control rods shall be completed prior to exceeding 40% rated thermal power.

SR 4.3.C.2

Within each 120 days of operation, a minimum of 10% of the control rod drives, on a rotating basis, shall be scram tested as in SR 4.3.C.1. An evaluation shall be completed every 120 days of operation to provide reasonable assurance that proper performance is being maintained.

See insert

Add - Table 3.3.C-1 - See insert

Insert for LCO 3.3.C, Page 3/4.3-7

1. No more than 10 OPERABLE control rods shall be "slow," in accordance with Table 3.3.C-1, and
2. No more than 2 OPERABLE control rods that are "slow" shall occupy adjacent locations.

Insert for SR 4.3.C, Page 3/4.3-7

-- NOTE --
During single control rod scram time Surveillances, the control rod drive (CRD) pumps shall be isolated from the associated scram accumulator.

SR 4.3.C.1

Verify each control rod scram time is within the limits of Table 3.3.C-1 with reactor steam dome pressure $\geq$ 800 psig prior to exceeding 40% RTP after each reactor shutdown $\geq$ 120 days.

SR 4.3.C.2

Verify for a representative sample, each tested control rod scram time is within the limits of Table 3.3.C-1 with reactor steam dome pressure $\geq$ 800 psig within each 200 days of cumulative operation in RUN.

SR 4.3.C.3

Verify each affected control rod scram time is within the limits of Table 3.3.C-1 with any reactor steam dome pressure prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect scram time.

SR 4.3.C.4

Verify each affected control rod scram time is within the limits of Table 3.3.C-1 with reactor steam dome pressure $\geq$ 800 psig prior to exceeding 40% RTP after fuel movement within the affected core cell AND prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time.

Table 3.3.C-1 (page 1 of 1)
Control Rod Scram Times

-- NOTES --

1. OPERABLE Control Rod with scram times not within the limits of this Table are considered "slow."
2. Enter applicable Conditions and Required Actions of LCO 3.3.B, "Control Rod OPERABILITY," for control rods with scram times > 7 seconds to notch position 04. These control rods are inoperable, in accordance with SR 4.3.B.1.4, and are not considered "slow."

Notch Position	SCRAM TIMES[(a)(b)] (seconds) When Reactor Steam Dome Pressure $\geq$ 800 PSIG
44	0.57
~~34~~	~~1.23~~
24	1.99
04	3.51

a) Maximum scram time from fully withdrawn position, based on de-energization of scram pilot valve solenoids at time zero.

b) Scram times as a function of reactor steam dome pressure, when < 800 psig are within established limits.

LIMITING CONDITIONS FOR OPERATION

3.3 REACTIVITY CONTROL (continued)

D. Control Rod Scram Accumulators

LCO 3.3.D

Each control rod scram accumulator shall be OPERABLE.

APPLICABILITY:

RUN and STARTUP MODES;
REFUEL MODE when the reactor vessel head is fully tensioned.

ACTIONS:

-------------------NOTE---------------------
Separate condition entry is allowed for each control rod scram accumulator.

A. one Control rod scram ~~accumulator(s)~~ inoperable with reactor steam dome pressure ≥ 950 psig.

~~1.1 Verify no adjacent OPERABLE control rod has an inoperable scram accumulator within 1 hour.~~

~~AND~~

~~1.2 Verify no adjacent control rod is electrically disarmed in a non-fully inserted position within 1 hour.~~

~~OR~~

~~2 Declare the associated control rod inoperable within 1 hour.~~

see insert

~~B. Control rod scram accumulator(s) inoperable with reactor steam dome pressure < 950 psig or reactor thermal power ≤ 20 % RTP.~~

~~1 Restore inoperable accumulator to OPERABLE status within 8 hours.~~

~~OR~~

~~2 Declare the associated control rod inoperable within 8 hours.~~

SURVEILLANCE REQUIREMENTS

4.3 REACTIVITY CONTROL (continued)

D. Control Rod Scram Accumulators (continued)

SR 4.3.D

~~Once a shift, check the status of the pressure and level alarms for each accumulator.~~

see insert

Insert for LCO 3.3.D, Action A.1 and A.2; Page 3/4.3-8

1. -------------------------------- NOTE --------------------------------

   Only applicable if the associated control rod scram time was within limits of Table 3.3.C-1 during the last scram time surveillance.

   Declare the associated control rod scram time "slow" within 8 hours.

OR

2. Declare the associated control rod inoperable within 8 hours.

Insert for SR 4.3.D, Page 3/4.3-8

Verify each control rod scram accumulator pressure is ≥ 940 psig every 7 days.

LIMITING CONDITIONS FOR OPERATION

3.3 REACTIVITY CONTROL (continued)

D. Control Rod Scram Accumulators (continued)

LCO 3.3.D (continued)

B ~~C~~. Two or more control rod Scram accumulators inoperable, with ~~concurrent with loss of charging water pressure, when~~ reactor steam dome pressure ≥ 950 psig.

1 Restore charging water header pressure to ≥ 940 psig within 20 minutes from discovery of inoperable accumulators with charging water header < 940 psig

AND

2 ~~Restore inoperable accumulator(s) to OPERABLE status within~~ 8 hours. See insert

C ~~D~~. One ~~Two~~ or more control rod Scram accumulators inoperable, with ~~concurrent with loss of charging water pressure, when~~ reactor steam dome pressure < 950 psig.

1 Verify all control rods associated with inoperable accumulators are fully inserted immediately upon discovery of charging water header pressure < 940 psig.

AND

2 Declare the associated control rods inoperable within 1 hour.

D ~~E~~. Required action and associated completion time if ~~C.1 or D.1~~ B.1 or C.1 not met.

1 -------------NOTE-------------
Not applicable if all inoperable control rod scram accumulators are associated with fully inserted control rods.

Place the reactor mode switch in the shutdown position immediately.

SURVEILLANCE REQUIREMENTS

4.3 REACTIVITY CONTROL (continued)

D. Control ~~Rod~~ Scram Accumulators (continued)

Insert for LCO 3.3.D, Action B.2.1 and B.2.2, Page 3/4.3-9

2.1 ------------------------------------ NOTE --

Only applicable if the associated control rod scram time was within limits of Table 3.3.C-1 during the last scram time surveillance.

Declare the associated control rod scram time "slow" within 1 hour.

OR

2.2 Declare the associated control rod inoperable within 1 hour.

3/4.3 REACTIVITY CONTROL

3/4.3.B.1 Control Rod Operability

BASES:

BACKGROUND

Control rods are components of the control rod drive (CRD) system, which is the primary reactivity control system for the reactor. In conjunction with the reactor protection system (RPS), the CRD system provides the means for the reliable control of reactivity changes to ensure under conditions of normal operation, including anticipated operational occurrences, that specified acceptable fuel design limits are not exceeded. In addition, the control rods provide the capability to hold the reactor core subcritical under all conditions and to limit the potential amount and rate of reactivity increase caused by a malfunction in the CRD system.

The CRD system consists of 145 locking piston control rod drive mechanisms (CRDMs) and a hydraulic control unit for each drive mechanism. The locking piston type CRDM is a double acting hydraulic piston, which uses condensate water as the operating fluid. Accumulators provide additional energy for a scram. 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 unintentional withdrawal of the control rod, but without restricting insertion.

This Specification, along with LCO 3.3.C, ~~"Scram Insertion Times",~~ "Control Rod Scram Times", and LCO 3.3.D, "Control Rod Scram Accumulators", ensure that the performance of the control rods in the event of a design basis accident (DBA) or transient meets the assumptions used in the safety analyses of References 1, 2, and 3.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in the evaluations involving control rods are presented in References 1, 2, and 3. The control rods provide the primary means for rapid reactivity control (reactor scram), for maintaining the reactor subcritical, and for limiting the potential effects of reactivity insertion events caused by malfunctions in the CRD System.

The capability to insert the control rods provides assurance that the assumptions for scram reactivity in the DBA and transient analyses are not violated. Since reactivity margin ensures the reactor will be subcritical with the highest worth control rod withdrawn (assumed single failure), the additional failure of a second control rod to insert, if required, could invalidate the demonstrated reactivity margin and potentially limit the ability of the CRD System to hold the reactor subcritical. If the control rod is stuck at an inserted position and becomes decoupled from the CRD, a control rod drop accident

3/4.3 REACTIVITY CONTROL

BASES

ACTIONS A.1, A.2, A.3, and A.4

A control rod is considered stuck if it will not insert by either CRD drive water or scram pressure. With a fully inserted control rod stuck, no actions are required as long as the control rod remains fully inserted. The required ACTIONS are modified by a note, which allows the rod worth minimizer (RWM) to be bypassed if required to allow continued operation. LCO 3.3.F, "Rod Worth Minimizer", provides additional requirements when the RWM is bypassed to ensure compliance with the CRDA analysis. With one withdrawn control rod stuck, the local scram reactivity rate assumptions may not be met if the stuck control rod separation criteria ~~is~~ not met. Therefore, a verification that the separation criteria ~~is~~ met must be performed immediately. The separation criteria ~~is~~ not met if ~~the stuck control rod is not separated from all other inoperable control rods by at least two OPERABLE control rods in all direction, including the diagonal.~~ See insert In addition, the associated control rod drive must be disarmed within 2 hours. The allowed completion time of 2 hours is acceptable, considering the reactor can still be shut down. Assuming no additional control rods fail to insert, this provides a reasonable time to perform the required action in an orderly manner. The control rod directional control valves of the stuck control rod should be disarmed electrically to isolate the stuck control rod. To disarm the drive electrically the four amphenol type plug connectors should be removed from the drive insert and withdrawal solenoids rendering rod incapable of withdrawal.

are

Monitoring of the insertion capability of each withdrawn control rod must also be performed within 24 hours from the discovery of ACTION A concurrent with thermal power greater than the low power setpoint (LPSP) of the RWM. SR 4.3.B.1.1 and SR 4.3.B.1.2 perform periodic tests of the control rod insertion capability of withdrawn control rods. Testing each withdrawn control rod ensures that a generic problem does not exist. This completion time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock". The required ACTION A.3 completion time only begins upon discovery of ACTION A concurrent with thermal power greater than the actual LPSP of the RWM, since the notch insertions may not be compatible with the requirements of rod pattern control (LCO 3.3.H) and the RWM (LCO 3.3.F). The allowed completion time of 24 hours from discovery of ACTION A concurrent with thermal power greater than the LPSP of the RWM provides a reasonable time to test the control rods, considering the potential for a need to reduce power to perform the tests.

<u>Insert for Bases 3/4.3.B.1, Actions A.1, A.2, A.3, and A.4; Page B3/4.3-6</u>

Insert after "The separation criteria are not met if":

a) the stuck control rod occupies a location adjacent to two "slow" control rods, b) the stuck control rod occupies a location adjacent to one "slow" control rod, and the one "slow" control rod is also adjacent to another "slow" control rod, or c) if the stuck control rod occupies a location adjacent to one "slow" control rod when there is another pair of "slow" control rods adjacent to one another. The description of "slow" control rods is provided in LCO 3.3.C, "Control Rod Scram Times."

3/4.3 REACTIVITY CONTROL

BASES

ACTIONS (continued)

A.1, A.2, A.3, and A.4 (continued)

To allow continued operation with a withdrawn control rod stuck, an evaluation of adequate reactivity margin is also required within 72 hours. Should a DBA or transient require a shutdown, the original reactivity margin demonstration may not be valid. To preserve the single failure criterion and account for the stuck control rod, an additional control rod would have to be assumed to fail to insert when required. Therefore, the reactivity margin must be evaluated (by measurement or analysis) with the stuck control rod at its stuck position and the highest worth OPERABLE control rod assumed to be fully withdrawn.

The allowed completion time of 72 hours to verify reactivity margin is adequate, considering that with a single control rod stuck in a withdrawn position, the remaining OPERABLE control rods are capable of providing the required scram and shutdown reactivity. ~~Failure to reach COLD SHUTDOWN is only likely if an additional control rod adjacent to the stuck control rod also fails to insert during a required scram. LCO 3.3.B.1, ACTION A.1 assures adjacent control rods are immediately confirmed to~~ ~~be OPERABLE.~~ meet stuck rod seperation criteria.

A.5

The generic banked position withdrawal sequence (BPWS) analysis (Reference 4) only evaluates the effect on the maximum incremental rod worth for fully inserted, inoperable control rods not in compliance with the sequence. BPWS does not allow operation with a stuck control rod with reactor thermal power ≤ 20 % RTP, unless analysis exist to support such operation. Stuck control rods must be repaired before plant startup is initiated, unless analysis exist to support such operation. If a control rod becomes stuck during power ascent or descent the reactor will be brought to a shutdown condition, unless analysis exist to support such operation.

In addition to the requirement to verify shutdown margin is met (required ACTION A.4) with a stuck control rod, it is also necessary to ensure that the maximum incremental rod worth has not been adversely affected when operating with reactor thermal power ≤ 20 % RTP. This may be accomplished by either ensuring that the position of the stuck control rod is in compliance with the BPWS sequence or by performing an analysis to verify that the maximum incremental rod worth remains below the amount required to insert the CRDA design limit of 280 cal/gm peak fuel enthalpy. Determination that the maximum incremental rod worth is < 0.01 ΔK verifies that the peak fuel enthalpy of 280 cal/gm will not be exceeded.

3/4.3 REACTIVITY CONTROL

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 4.3.B.1.4

Verifying that the maximum scram time for each OPERABLE control rod from de-energization of the scram pilot valve solenoids to dropout of notch 04 is ≤ 7 seconds provides reasonable assurance that the control rod will insert when required during a DBA or transient, thereby completing its shutdown function. This SR is performed in conjunction with the control rod scram time testing of SR 4.3.C.1, ~~or SR 4.3.C.2~~. The associated frequencies are acceptable, considering the more frequent testing performed to demonstrate other aspects of control rod OPERABILITY and operating experience, which shows scram times do not significantly change over an operating cycle.

SR 4.3.C.3 and SR 4.3.C.4

γ

SR 4.3.B.1.5

The position of each control rod must be determined to ensure adequate information on control rod position is available to the operator for determining CRD OPERABILITY and controlling rod patterns. Control rod position may be determined by the use of OPERABLE position indicators, by moving control rods to a position with an OPERABLE indicator, or by the use of other appropriate methods. The 24 hour frequency of this SR is based on operating experience related to expected changes in control rod position and the availability of control rod position indications in the control room.

REFERENCES

1. FSAR, Section 14.5.1
2. FSAR, Section R.2.3.4
3. FSAR, Section 14.5.2
4. NEDO-21231, "Banked Position Withdrawal Sequence", Section 7.2, January 1977.

B 3/4.3 REACTIVITY CONTROL (continued)

B 3/4.3.C Control Rod Scram Times ~~Scram Insertion Times~~

BASES

BACKGROUND

The scram function of the control rod drive (CRD) system controls reactivity changes during abnormal operational transients to ensure that specified acceptable fuel design limits are not exceeded . The control rods are scrammed by positive means using hydraulic pressure exerted on the CRD piston.

When a scram signal is initiated, control air is vented from the scram valves, allowing them to open by spring action. Opening the exhaust valve reduces the pressure above the main drive piston to atmospheric pressure, and opening the inlet valve applies the accumulator or reactor pressure to the bottom of the piston. Since the notches in the index tube are tapered on the lower edge, the collet fingers are forced open by cam action, allowing the index tube to move upward without restriction because of the high differential pressure across the piston. As the drive moves upward and the accumulator pressure reduces below the reactor pressure, a ball check valve opens, letting the reactor pressure complete the scram action. If the reactor pressure is low, such as during startup, the accumulator will fully insert the control rod in the required time without assistance from reactor pressure. 8

APPLICABLE SAFETY ANALYSIS

The analytical methods and assumptions used in evaluating the control rod scram function are presented in References 1, 2, and 3. The design basis accident (DBA) and transient analyses assume that all of the control rods scram at a specified insertion rate. The resulting negative scram reactivity forms the basis for the determination of plant thermal limits (e.g., the MCPR). Other distributions of scram times (e.g., several control rods scramming slower than the average time with several control rods scramming faster than the average time) can also provide sufficient scram reactivity. Surveillance of each individual control rod's scram time ensures the scram reactivity assumed in the DBA and transient analyses can be met.

The CRD system is designed to bring the reactor subcritical at a rate fast enough to prevent fuel damage; i.e., to prevent the MCPR from becoming less than the Safety Limit MCPR. Analysis of the limiting power transient shows that the negative reactivity rates resulting from the scram with the ~~average~~ response of all the drives, as given in LCO 3.3.C, provide the required protection, and the MCPR remains greater than the Safety Limit MCPR.

B 3/4.3 REACTIVITY CONTROL

BASES

LCO

~~The specified scram times are required to ensure that the scram reactivity assumed in the DBA and transient analysis is met (Reference 4).~~

~~The scram times are specified relative to measurements based on reed switch positions, which provide the control rod position indication. The reed switch closes ("pickup") when the index tube passes a specific location and then opens ("dropout") as the index tube travels upward. Verification of the specified scram times is accomplished through measurement of the "dropout" times. To ensure that local scram reactivity rates are maintained within acceptable limits are placed on the average scram time for the three fastest OPERABLE control rods in each group of four control rods in all two by two arrays. This LCO applies only to OPERABLE control rods since inoperable control rods will be inserted and disarmed (LCO 3.3.B.1).~~

γ see insert

APPLICABILITY

In the RUN and STARTUP MODES, a scram is assumed to function during transients and accidents analyzed for these plant conditions. These events are assumed to occur during startup and power operation; therefore, the scram function of the control rods is required during these MODES. In the HOT SHUTDOWN and COLD SHUTDOWN MODES, the control rods are not able to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate requirements for control rod scram capability during these conditions. CTS 3/4.10, "CORE ALTERATIONS", provides requirements to ensure that core reactivity is within the capability of the control rods and to prevent criticality during refueling conditions.

ACTIONS

A.1

When the requirements of this LCO are not met, the rate of negative reactivity insertion during a scram may not be within the assumptions of the safety analyses. Therefore, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to the HOT SHUTDOWN MODE within 12 hours. The allowed completion time of 12 hours is reasonable, based on operating experience, to reach HOT SHUTDOWN from full power conditions in an orderly manner and without challenging plant systems.

Insert for Bases 3/4.3.C, LCO ; Page B3/4.3-18
Revise the LCO by inserting the following:

The scram times specified in Table 3.3.C-1 (in the accompanying LCO) are required to ensure that the scram reactivity assumed in the DBA and transient analysis is met (References 4 and 5). To account for single failures and "slow" scramming control rods, the scram times specified in Table 3.3.C-1 are faster than those assumed in the design basis analysis. The scram times have a margin that allows up to approximately 7% of the control rods (e.g., 145 x 7% > 10) to have scram times exceeding the specified limits (i.e., "slow" control rods) assuming a single stuck control rod (as allowed by LCO 3.3.B, "Control Rod Operability") and an additional control rod failing to scram per the single failure criterion. The scram times are specified as a function of reactor steam dome pressure to account for the pressure dependence of the scram times. The scram times are specified relative to measurements based on reed switch positions, which provide the control rod position indication. The reed switch closes ("pickup") when the index tube passes a specific location and then opens ("dropout") as the index tube travels upward. Verification of the specified scram times in Table 3.3.C-1 is accomplished through measurement of the "dropout" times. To ensure that local scram reactivity rates are maintained within acceptable limits, no more than two of the allowed "slow" control rods may occupy adjacent locations.

Table 3.3.C-1 is modified by two Notes which state that control rods with scram times not within the limits of the Table are considered "slow" and that control rods with scram times > 7 seconds are considered inoperable as required by SR 4.3.B.1.4.

This LCO applies only to OPERABLE control rods since inoperable control rods will be inserted and disarmed (LCO 3.3.B.1). Slow scramming control rods may be conservatively declared inoperable and not accounted for as "slow" control rods.

B 3/4.3 REACTIVITY CONTROL

BASES

SURVEILLANCE REQUIREMENTS

~~SR 4.3.C.1 and SR 4.3.C.2~~

~~To ensure that scram time testing is performed within a reasonable time following fuel movement within the reactor pressure vessel or after a shutdown ≥120 days or longer, control rods are required to be tested before exceeding 40% RTP following the shutdown. This frequency is acceptable considering the additional surveillances performed for control rod OPERABILITY, the frequent verification of adequate accumulator pressure, and the required testing of control rods affected by work on control rods or the CRD System.~~

~~Additional testing of a sample of control rods is required to verify the continued performance of the scram function during the cycle. A representative sample contains at least 10% of the control rods. For planned testing during an operating cycle, the control rods selected for the sample should be different for each test. The 120 -day Frequency is based on operating experience that has shown control rod scram times do not significantly change over an operating cycle.~~

See insert

REFERENCES

1. FSAR, Section 14.2
2. FSAR, Section 14.5.1
3. FSAR, Appendix R.3.2
4. NEDE-24011-P-A-13, "General Electric Standard Application for Reactor Fuel", Section 3.2.4.1.

5.
6. } See insert

Insert for Bases 3/4.3.C, Surveillance Requirements; Page B3/4.3-19
Revise the Surveillance Requirements by inserting the following:

The four SRs of this LCO are modified by a Note stating that during a single control rod scram time surveillance, the CRD pumps shall be isolated from the associated scram accumulator. With the CRD pump isolated, (i.e., charging valve closed) the influence of the CRD pump head does not affect the single control rod scram times. During a full core scram, the CRD pump head would be seen by all control rods and would have a negligible effect on the scram insertion times.

SR 4.3.C.1
The scram reactivity used in DBA and transient analyses is based on an assumed control rod scram time. Measurement of the scram times with reactor steam dome pressure ≥ 800 psig demonstrates acceptable scram times for the transients analyzed in References 3 and 4.

Maximum scram insertion times occur at a reactor steam dome pressure of approximately 800 psig because of the competing effects of reactor steam dome pressure and stored accumulator energy. Therefore, demonstration of adequate scram times at reactor steam dome pressure ≥ 800 psig ensures that the measured scram times will be within the specified limits at higher pressures. Limits are specified as a function of reactor pressure to account for the sensitivity of the scram insertion times with pressure and to allow a range of pressures over which scram time testing can be performed. To ensure that scram time testing is performed within a reasonable time following a shutdown ≥ 120 days or longer, control rods are required to be tested before exceeding 40% RTP following the shutdown. This frequency is acceptable considering the additional surveillances performed for control rod OPERABILITY, the frequent verification of adequate accumulator pressure, and the required testing of control rods affected by fuel movement within the associated core cell and by work on control rods or the CRD System.

SR 4.3.C.2
Additional testing of a sample of control rods is required to verify the continued performance of the scram function during the cycle. A representative sample contains at least 10% of the control rods. The sample remains representative if no more than 7.5 % of the control rods in the sample tested are determined to be "slow" (Reference 6). With more than 7.5 % of the sample declared to be "slow" per the criteria in Table 3.3.C-1, additional control rods are tested until this criterion (e.g., 7.5 % of the entire sample size) is satisfied, or until the total number of "slow" control rods (throughout the core, from all surveillances) exceeds the LCO limit. For planned testing, the control rods selected for the sample should be different for each test. Data from inadvertent scrams should be used whenever possible to avoid unnecessary testing at power, even if the control rods with data may have been previously tested in a sample. The 200-day frequency is based on operating experience that has shown control rod scram times do not significantly change over an operating cycle. This frequency is also reasonable based on the additional Surveillances done on the CRDs at more frequent intervals in accordance with

Insert for Bases 3/4.3.C, Surveillance Requirements; Page B3/4.3-19 (continued)

LCO 3.3.B, "Control Rod Operability" and LCO 3.3.D, "Control Rod Scram Accumulators."

SR 4.3.C.3
When work that could affect the scram insertion time is performed on a control rod or the CRD System, testing must be done to demonstrate that each affected control rod retains adequate scram performance over the range of applicable reactor pressures from zero to the maximum permissible pressure. The scram testing must be performed once before declaring the control rod OPERABLE. The required scram time testing must demonstrate the affected control rod is still within acceptable limits. The limits for reactor pressures < 800 psig are established based on a high probability of meeting the acceptance criteria at reactor pressures ≥ 800 psig. Limits for ≥ 800 psig are found in Table 3.3.C-1. If testing demonstrates that the affected control rod does not meet these limits, but is within the 7-second limit of Table 3.3.C-1, Note 2, the control rod can be declared OPERABLE and "slow."

Specific examples of work that could affect the scram times are (but are not limited to) the following: removal of any CRD for maintenance or modification; replacement of a control rod; and maintenance or modification of a scram solenoid pilot valve, scram valve, accumulator, isolation valve or check valve in the piping required for scram.

The frequency of once prior to declaring the affected control rod OPERABLE is acceptable because of the capability to test the control rod over a range of operating conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

SR 4.3.C.4
When work that could affect the scram insertion time is performed on a control rod or CRD System, or when fuel movement within the reactor pressure vessel occurs, testing must be done to demonstrate each affected control rod is still within the limits of Table 3.3.C-1 with the reactor steam dome pressure ≥ 800 psig. Where work has been performed at high reactor pressure, the requirements of SR 4.3.C.3 and SR 4.3.C.4 can be satisfied with one test. For a control rod affected by work performed while shut down, however, a zero pressure and high pressure test may be required. This testing ensures that, prior to withdrawing the control rod for continued operation; the control rod scram performance is acceptable for operating reactor pressure conditions. Alternatively, a control rod scram test during hydrostatic pressure testing could also satisfy both criteria. When fuel movement within the reactor pressure vessel occurs, only those control rods associated with the core cells affected by the fuel movement are required to be scram time tested. During a routine refueling outage, it is expected that all control rods will be affected.

Insert for Bases 3/4.3.C, Surveillance Requirements; Page B3/4.3-19 (continued)

The frequency of once prior to exceeding 40% RTP is acceptable because of the capability to test the control rod over a range of operating conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

Insert for Bases 3/4.3.C, References; Page B3/4.3-19

5. Letter from R. F. Janecek (BWROG) to R.W. Starostecki (NRC), "BWR Owners Group Revised Reactivity Control System Technical Specifications," BWROG-8754, September 17, 1987.

6. Technical Specification Task Force (TSTF) - 460, Rev. 0, "Control Rod Scram Time Testing Frequency.

B 3/4.3 REACTIVITY CONTROL (continued)

B 3/4.3.D Control Rod Scram Accumulators

BASES

BACKGROUND	The control rod scram accumulators are part of the control rod drive (CRD) system and are provided to ensure that the control rods scram under varying reactor conditions. The control rod scram accumulators store sufficient energy to fully insert a control rod at any reactor vessel pressure. The accumulator is a hydraulic cylinder with a free floating piston. The piston separates the water used to scram the control rods from the nitrogen, which provides the required energy. Below 800 psig reactor pressure, the scram accumulators are necessary to scram the control rods within the required insertion times of LCO 3.3.C, "Scram Insertion Times."
APPLICABLE SAFETY ANALYSES	The analytical methods and assumptions used in evaluating the control rod scram function are presented in References 1, 2, and 3. The design basis accident (DBA) and transient analyses assume all of the control rods scram at a specified insertion rate. OPERABILITY of each individual control rod scram accumulator, along with LCO 3.3.B.1, "Control Rod Operability", and LCO 3.3.C ~~"Scram Insertion~~ Control Rod Scram Times", ensures that the scram reactivity assumed in the DBA and transient analyses can be met. The existence of an inoperable accumulator may invalidate prior scram time measurements for the associated control rod. The scram function of the CRD system, and therefore the OPERABILITY of the accumulators, protects the "MCPR Safety Limit" (SL 2.1.1), and LCO 3.11.C, "MINIMUM CRITICAL POWER RATIO (MCPR)" and the 1% cladding plastic strain fuel design limit (see Bases for LCO 3.11.A, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)", and LCO 3.11.B, "LINEAR HEAT GENERATION RATE (LHGR)", which ensure that no fuel damage will occur if these limits are not exceeded. In addition, the scram function at low REACTOR VESSEL PRESSURE (i.e., startup conditions) provides protection against violating fuel design limits during reactivity insertion accidents (see Bases for LCO 3.3.H, "Rod Pattern Control").
LCO	The OPERABILITY of the control rod scram accumulators is required to ensure that adequate scram insertion capability exists when needed over the entire range of reactor pressures. The OPERABILITY of the scram accumulators is based on maintaining adequate accumulator pressure.

B 3/4.3 REACTIVITY CONTROL

BASES

APPLICABILITY	In the RUN and STARTUP MODES the scram function is required for mitigation of DBAs and transients, and therefore the scram accumulators must be OPERABLE to support the scram function. In the HOT SHUTDOWN and COLD SHUTDOWN MODES, control rods are not allowed to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate requirements for control rod scram accumulator OPERABILITY during these conditions. CTS 3/4.10, "CORE ALTERATIONS", provides requirements to ensure that core reactivity is within the capability of the control rods and to prevent criticality during refueling conditions.
ACTIONS	The ACTIONS are modified by a note indicating that a separate condition entry is allowed for each control rod scram accumulator. This is acceptable since the required ACTIONS for each condition provide appropriate compensatory actions for each affected accumulator. Complying with the required ACTIONS may allow for continued operation and subsequent affected accumulators governed by subsequent condition entry and application of associated required ACTIONS.

~~A.1.1 and A.1.2~~ A.1 and A.2

~~With reactor steam dome pressure ≥ 950 psig, even those control rods with inoperable accumulators will be able to meet required scram insertion times due to the action of reactor pressure. Requiring a control rod with an inoperable accumulator to be separated from control rods that are stuck or have inoperable accumulators by one OPERABLE control rod will ensure that the effects on reactivity insertion rates will be minimized. The results of a series of XY PDQ-4 quarter core calculations of a cold, clean core show that the worst case in a nine rod withdrawal sequence resulted in a k_{eff} <1.0, other repeating rod sequences with more rods withdrawn resulted in k_{eff} >1.0.~~

~~The allowed completion time of 1 hour is reasonable, based on the large number of control rods available to provide the scram function.~~

see insert

<u>Insert for Bases 3/4.3.D, Actions; Bases Page B3/4.3-21</u>

<u>A.1 and A.2</u>
With one control rod scram accumulator inoperable and the reactor steam dome pressure $\geq$ 950 psig, the control rod may be declared "slow," since the control rod will still scram at the reactor operating pressure but may not satisfy the required scram times in Table 3.3.C-1. Required Action A.1 is modified by a Note indicating that declaring the control rod "slow" only applies if the associated control rod scram time was within the limits of Table 3.3.C-1 during the last scram time test. Otherwise, the control rod would already be considered "slow" and the further degradation of scram performance with an inoperable accumulator could result in excessive scram times. In this event, the associated control rod is declared inoperable (Required Action A.2) and LCO 3.3.B is entered. This would result in requiring the affected control rod to be fully inserted and disarmed, thereby satisfying its intended function, in accordance with ACTIONS of LCO 3.3.B.1.C.

The allowed Completion Time of 8 hours is reasonable, based on the large number of control rods available to provide the scram function and the ability of the affected control rod to scram only with reactor pressure at high reactor pressures.

B 3/4.3 REACTIVITY CONTROL

BASES

ACTIONS (continued)

delete

A.2

If required ACTIONS A.1.1 and A.1.2 cannot be met, the control rod must be declared inoperable within 1 hour. Once declared inoperable, the requirements of LCO 3.3.B.1 apply.

The allowed completion time of 1 hour is reasonable, based on the large number of control rods available to provide the scram function.

B.1 and B.2

delete

With reactor steam dome pressure < 950 psig control rods with inoperable accumulators may not be able to meet required scram insertion times. In addition, when reactor thermal power is ≤ 20 % RTP the BPWS requires inoperable scram accumulators be restored to OPERABLE status within 8 hours or the control rod must be declared inoperable. Once declared inoperable, the requirements of LCO 3.3.B.1 apply.

The allowed completion time of 8 hours is reasonable, based on the large number of control rods available to provide the scram function.

B ~~C~~.1 and B ~~C~~.2

See insert

With two or more control rod accumulators inoperable, concurrent with loss of charging water pressure, when reactor steam dome pressure ≥ 950 psig, adequate pressure must be supplied to the charging water header. With inadequate charging water pressure, all of the accumulators could become inoperable, resulting in a potentially severe degradation of the scram performance. Therefore, required ACTION C.1 requires adequate charging water header pressure must be restored within 20 minutes from discovery of loss of charging water header pressure. The allowed completion time of 20 minutes is reasonable to place a CRD pump into service to restore the charging header pressure, if required.

If restoration of charging water pressure does not restore the accumulators to OPERABLE status, required ACTION C.2 provides additional time to restore the accumulators to OPERABLE status. This 8 hour allowance provides a reasonable time to attempt investigation and restoration of the inoperable accumulators considering that reactor pressure is adequate to assure the scram function of the control rods with inoperable accumulators and the low probability of a DBA or transient occurring while the affected accumulators are inoperable.

Insert for Bases 3/4.3.D, Actions; Bases Page B3/4.3-22

B.1 and B.2
With two or more control rod scram accumulators inoperable and reactor steam dome pressure ≥ 950 psig, adequate pressure must be supplied to the charging water header. With inadequate charging water pressure, all of the accumulators could become inoperable, resulting in a potentially severe degradation of the scram performance. Therefore, within 20 minutes from discovery of charging water header pressure < 940 psig concurrent with two or more accumulators inoperable, adequate charging water header pressure must be restored. The allowed Completion Time of 20 minutes is reasonable, to place a CRD pump into service to restore the charging header pressure, if required. This Completion Time is based on the ability of the reactor pressure alone to fully insert all control rods.

The control rod may be declared "slow," since the control rod will still scram using only reactor pressure, but may not satisfy the times in Table 3.3.C-1. Required Action B.2 is modified by a Note indicating that declaring the control rod "slow" only applies if the associated control scram time is within the limits of Table 3.3.C-1 during the last scram time test. Otherwise, the control rod would already be considered "slow" and the further degradation of scram performance with an inoperable accumulator could result in excessive scram times. In this event, the associated control rod is declared inoperable (Required Action B.2.2) and LCO 3.3.B.1 entered. This would result in requiring the affected control rod to be fully inserted and disarmed, thereby satisfying its intended function in accordance with ACTIONS of LCO 3.3.B.1.C.

The allowed Completion Time of 1 hour is reasonable, based on the ability of only the reactor pressure to scram the control rods and the low probability of a DBA or transient occurring while the affected accumulators are inoperable.

B 3/4.3 REACTIVITY CONTROL

BASES

ACTIONS (continued)

C.1 C.2
~~D.1~~ and ~~D.2~~

With one ~~two~~ or more control rod accumulators inoperable and the ~~concurrent with loss of charging water pressure, when~~ reactor steam dome pressure is < 950 psig, the pressure supplied to the charging water header must be adequate to ensure that accumulators remain charged. With the reactor steam dome pressure < 950 psig, the function of the accumulators in providing the scram force becomes much more important since the scram function could become severely degraded during a depressurization event or at low reactor pressures. Therefore, immediately upon discovery of loss of charging water header pressure, concurrent with reactor steam dome pressure ≤950 psig, all control rods associated with inoperable accumulators must be verified to be fully inserted. Withdrawn control rods with inoperable accumulators may fail to scram under these low pressure conditions. The associated control rods must also be declared inoperable within 1 hour. The allowed completion time of 1 hour is reasonable for required ACTION ~~D.2~~ C.2 considering the low probability of a DBA or transient occurring during the time that the accumulators are inoperable.

add space

~~E.1~~ D.1

The reactor mode switch must be immediately placed in the shutdown position if either required ACTION and associated completion time associated with loss of the CRD charging pump (required ACTIONS ~~C.1 and D.1~~ B.1 and C.1) cannot be met. This ensures that all insertable control rods are inserted and that the reactor is in a condition that does not require the active function (i.e., scram) of the control rods. This required ACTION is modified by a note stating that the ACTION is not applicable if all control rods associated with the inoperable scram accumulators are fully inserted, since the function of the control rods has been performed.

B 3/4.3 REACTIVITY CONTROL

BASES

SURVEILLANCE REQUIREMENTS

SR 4.3.D

see insert

~~SR 4.3.D requires that the accumulator pressure and level alarms be checked every shift to ensure adequate accumulator pressure exists to provide sufficient scram force. The primary indication of accumulator OPERABILITY is the accumulator pressure. A minimum accumulator pressure is specified, below which the capability of the accumulator to perform its intended function becomes degraded and the accumulator is considered inoperable. The minimum accumulator pressure is well below the expected pressure of 1380 psig (Reference 1). Declaring the accumulator inoperable when the minimum pressure is not maintained ensures that significant degradation in scram times does not occur.~~

REFERENCES

1. FSAR, Section 14.2.
2. FSAR, Section 14.5.
3. FSAR, Appendix R.2.
4. FSAR, Appendix G.
5. GE Specification 383HA821, "Reduction in Accumulator Precharge,"
6. FSAR 3.4

Insert for Bases 3/4.3.D, SR 4.3.D; Page B3/4.3-24

SR 4.3.D requires that the accumulator pressure be checked every 7 days to ensure adequate accumulator pressure exists to provide sufficient scram force. The primary indicator of accumulator OPERABILITY is the accumulator pressure. A minimum accumulator pressure is specified, below which the capability of the accumulator to perform its intended function becomes degraded and the accumulator is considered inoperable. The minimum accumulator pressure of 940 psig is well below the expected pressure of 1100 psig (Reference 5). Declaring the accumulator inoperable when the minimum pressure is not maintained ensures that significant degradation in scram times does not occur. The 7-day frequency has been shown to be acceptable through operating experience and takes into account indications available in the control room.

B 3/4.3 REACTIVITY CONTROL

BASES

ACTIONS (continued)

A.1, A.2, and A.3 (continued)

number of OPERABLE control rods not in compliance with the prescribed sequence is limited to eight, to prevent the operator from attempting to correct a control rod pattern that significantly deviates from the prescribed sequence. When the control rod pattern is not in compliance with the prescribed sequence, all control rod movement should be stopped except for moves needed to correct the rod pattern, or scram if warranted.

ACTION A.1 is modified by a note which allows the RWM to be bypassed to allow the affected control rods to be returned to their correct position. LCO 3.3.F requires verification of control rod movement by a second licensed operator (Reactor Operator or Senior Reactor Operator) or other qualified member of the technical staff. This ensures that the control rods will be moved to the correct position. A control rod not in compliance with the prescribed sequence is not considered inoperable except as required by ACTION A.2. OPERABILITY of control rods is determined by compliance with LCO 3.3.B.1, "Control Rod Operability", LCO 3.3.C, "~~Scram Insertion Times~~" Control Rod Scram Times, and LCO 3.3.D "Control Rod Scram Accumulators." The allowed completion time of 8 hours is reasonable, considering the restrictions on the number of allowed out of sequence control rods and the low probability of a CRDA occurring during the time the control rods are out of sequence.

B.1 and B.2

If nine or more OPERABLE control rods are out of sequence, the control rod pattern significantly deviates from the prescribed sequence. Control rod withdrawal should be suspended immediately to prevent the potential for further deviation from the prescribed sequence. Control rod insertion to correct the control rod pattern to be within BPWS is allowed since rod insertion reduces power which is in the conservative direction. ACTION B.1 is modified by a note which allows the RWM to be bypassed to allow the affected control rods to be returned to their correct position. LCO 3.3.F, ACTIONS A.2.2 and B.1 require verification of control rod movement by a second licensed operator (Reactor Operator or Senior Reactor Operator) or other qualified member of the technical staff.