TSTF
TECHNICAL SPECIFICATIONS TASK FORCE
A JOINT OWNERS GROUP ACTIVITY

May 22, 2007

TSTF-07-19
PROJ0753

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

SUBJECT: Response to NRC "Request for Additional Information (RAI) Regarding TSTF-475, Revision 0, "Control Rod Notch Testing Frequency and SRM Insert Control Rod Action," dated February 28, 2007

REFERENCE: Letter from T. J. Kobetz (NRC) to the Technical Specifications Task Force regarding TSTF-475, Revision 0, "Control Rod Notch Testing Frequency and SRM Insert Control Rod Action," dated February 28, 2007.

Dear Sir or Madam:

In the referenced letter, the NRC provided a Request for Additional Information (RAI) regarding TSTF-475, Revision 0, "Control Rod Notch Testing Frequency and SRM Insert Control Rod Action." This letter responds to the NRC's referenced request.

During the preparation of this response, we identified an improved presentation of the proposed changes to Example 1.4-3 in TSTF-475, Revision 0. TSTF-475, Revision 1, was created to incorporate this improvement and is attached for your review. The changes are discussed in the Revision 1 "Revision Description" section of the Traveler.

Any NRC review fees associated with the review of TSTF-475 should continue to be billed to the Boiling Water Reactors Owners Group.

The TSTF requests that the Traveler be made available under the Consolidated Line Item Improvement Process.

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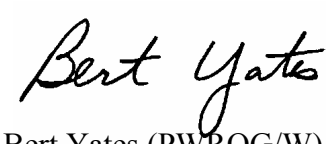
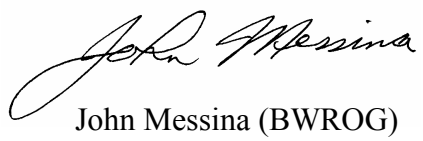
PWROG
PWR Owners Group

BWR
OWNERS' GROUP

Should you have any questions, please do not hesitate to contact us.

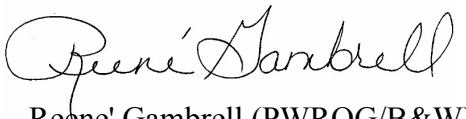


Bert Yates (PWROG/W)



John Messina (BWROG)

Dana Millar (PWROG/CE)



Reene' Gambrell (PWROG/B&W)

Enclosure
Attachment

cc: Tim Kobetz, Technical Specifications Branch, NRC
Ross Telson, Technical Specifications Branch, NRC
Matthew Hamm, Technical Specifications Branch, NRC

Technical Specification Task Force (TSTF) Response to the February 28, 2007 NRC Request for Additional Information (RAI) Regarding TSTF-475, Revision 0, "Control Rod Notch Testing Frequency and SRM Insert Control Rod Action"

The following is the Technical Specification Task Force (TSTF) response to NRC's February 28, 2007, letter requesting the following information to complete the review of TSTF-475.

NRC Request for Additional Information

"Discuss in detail any studies of industry operating experience with Control Cell Core (CCC) design plants (other than control rod drive (CRD) Notching Surveillance Testing for Limerick Generating Station, GE-NE-0000-0024-9858 R3). The discussion should include studies where CRD performance differences are observed between the CCC partially withdrawn CRDs and the fully withdrawn CRDs. The discussion should focus on performance that adversely affects the scram function.

Control Cell Core partially withdrawn control rods are less frequently notch exercised than the fully withdrawn control rods. This information is required to support chosen CRD Notch Surveillance Frequencies."

Response

In response to this RAI, the BWR Owners' Group surveyed the Reactivity Controls Review Committee and the Control Rod Drive Performance Technical Exchange Committee members to obtain information on the use of CCC fuel design features and on the effects of CCC design on CRD performance. The information provided by the committee members supports the conclusion in TSTF-475 that the proposed change in the frequency of control rod notch testing is justified.

The BWR Owners' Group committees indicated there are six BWR owners who use CCC as part of their fuel design. A CCC design plant may have a slight difference in the cumulative testing of certain control rods, but significant testing is being performed for all control rods. The testing frequency for the CCC plant control rods varies throughout the core and throughout the operating cycle. A BWR utilizing CCC design may operate with certain control rods (approximately 20% of the core) partially withdrawn for 6 months a year and fully withdrawn for the remainder of the year. Based on the existing surveillance requirements, those control rods are tested on a 31 day Frequency (six times per year) when partially withdrawn and on a 7 day Frequency (26 times a year) when fully withdrawn. Therefore, even these CCC control rods have received significant testing (32 times a year).

Other control rods within a CCC design which are fully withdrawn throughout the cycle have been tested weekly (52 times per year). For non-CCC plants, most control rods are typically tested 40 to 52 times per year, depending on their location in the core. Thus, there are minor differences in the cumulative amount of testing of control rods between CCC and non-CCC plants.

The BWR owners reported no differences in CRD performance between plants that utilize CCC design and those that do not use CCC design. The BWR owners also reported no difference in CRD performance between control rods that are notch tested monthly versus those that are notch tested weekly, regardless of whether the plant utilizes a CCC design or not.

Technical Specification Task Force
Improved Standard Technical Specifications Change Traveler

Control Rod Notch Testing Frequency and SRM Insert Control Rod Action

NUREGs Affected: ☑ 1430 ☑ 1431 ☑ 1432 ☑ 1433 ☑ 1434

Classification: 1) Correct Specifications

Recommended for CLIIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Not Exempt

Benefit: Reduces Testing

Industry Contact: John Messina, (330) 384-5878, jmessina@firstenergycorp.com

See attached.

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: Nine Mile Point 2

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 25-May-99

Owners Group Comments
9/8/99 - TSTF considered. Needs to be remarked on Revision 2 pages and justification enhanced to meet current standards.

Owners Group Resolution: Superceeded Date: 08-Sep-99

OG Revision 1 Revision Status: Closed

Revision Proposed by: BWROG

Revision Description:
Complete Replacement of BWROG-68.

Owners Group Review Information

Date Originated by OG: 12-Aug-03

Owners Group Comments
12/3/03 - EXCEL to ensure Brad F's comments are incorporated, include technical justification for deviating from the GE SIL from Limerick, and then submit to TSTF for review and NRC review with review fees.

Owners Group Resolution: Superceeded Date: 03-Dec-03

OG Revision 2 Revision Status: Closed

Revision Proposed by: BWROG

Revision Description:
The BWROG 68 Rev. 0 change (i.e., "fully insert") has been combined with a change to the Frequency of the control rod notch testing Surveillances (SR 3.1.3.2 and 3.1.3.3). The change deletes the 7 day SR, and requires that all control rod notch testing be performed on a 31 day frequency.

Rev. 2 also adds a change to Example 1.4-3 in Section 1.4 "Frequency", to make it clear that the 25% extension allowed by SR 3.0.2 may be applied to the 31 day period in the SR 3.1.3.2 NOTE in the "SURVEILLANCE" column, just like it is applied to the 31 day period in the SR 3.1.3.2 "FREQUENCY" column. (Note: discussions with the NRC in 1997 clarified that the above is true, and led to the cancellation of BWROG-36, since the BWROG-36 changes were determined to not be necessary. This change to Example 1.4-3 documents the results of those discussions.)

Owners Group Review Information

Date Originated by OG: 03-Dec-03

Owners Group Comments
Approved with changes.

Revised and approved on 5/21/04

Owners Group Resolution: Approved Date: 21-May-04

TSTF Review Information

TSTF Received Date: 21-May-05 Date Distributed for Review 28-Jun-04

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:

TSTF approves change to Example 1.4-3 to all NUREGs.

TSTF Resolution: Approved Date: 09-Jul-04

NRC Review Information

NRC Received Date: 30-Aug-04

NRC Comments:

RAI received in March 2005. RAI response submitted in July 2006 with a requested GE report in November 2006.
RAI received on March 1, 2007.

Final Resolution: Superceded by Revision

TSTF Revision 1 Revision Status: Active

Revision Proposed by: NRC

Revision Description:
TSTF-475 is revised to improve the presentation of the proposed changes to Example 1.4-3. TSTF-475 modifies Example 1.4-3 to illustrate that the extension allowed by SR 3.0.2 applies to times specified in SR Notes in the Surveillance column.

TSTF Revision 1 **Revision Status: Active**

In the other Section 1.4 examples, the statement "(plus the extension allowed by SR 3.0.2)" is typically included in sentences that dicuss the consequences of failing to perform an SR within the specified Frequency. In TSTF-475, Rev. 0, the SR 3.0.2 phrase is inserted in the second sentence of the second paragraph of the Example 1.4-3 discussion. This sentence is discussing the Note allowance and including the SR 3.0.2 phrase in this sentence is not consistent with the other Examples. Therefore, this inserted phrase is removed in TSTF-475, Revision 1. The second inserted SR 3.0.2 phrase in the last sentence of the second paragraph of the Example 1.4-3 discussion is appropriate and is retained.

The second sentence of the third paragraph of the Example discussion describes the consequences of not performing the SR within the 12 hour allowance. The SR 3.0.2 phrase should be included in this sentence. Therefore, the phrase "(plus the extension allowed by SR 3.0.2)" is added to this sentence in TSTF-475, Revision 1.

The justification is not affected by this change. However, there were two instances in the justification in which the Owners Group Traveler number, BWROG-68, was used. These were changed to reference TSTF-475.

TSTF Review Information

TSTF Received Date: 09-May-07 Date Distributed for Review 09-May-07

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 22-May-07

NRC Review Information

NRC Received Date: 22-May-07

Affected Technical Specifications

1.4	Frequency Change Description: Example 1.4-3	
Action 3.1.3.A	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
Action 3.1.3.A Bases	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
SR 3.1.3.2	Control Rod OPERABILITY Change Description: Deleted	NUREG(s)- 1433 1434 Only
SR 3.1.3.2 Bases	Control Rod OPERABILITY Change Description: Deleted	NUREG(s)- 1433 1434 Only

SR 3.1.3.3	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.2 and revised	
SR 3.1.3.3 Bases	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.2 and revised	
SR 3.1.3.4	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.3	
SR 3.1.3.4 Bases	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.3	
SR 3.1.3.5	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.4	
SR 3.1.3.5 Bases	Control Rod OPERABILITY	NUREG(s)- 1433 1434 Only
	Change Description: Renamed 3.1.3.4	
LCO 3.1.4	Control Rod Scram Times	NUREG(s)- 1433 1434 Only
	Change Description: Change to Table 3.1.4-1	
LCO 3.1.4 Bases	Control Rod Scram Times	NUREG(s)- 1433 1434 Only
Action 3.3.1.2.E Bases	SRM Instrumentation	NUREG(s)- 1433 1434 Only
LCO 3.1.4 Bases	Control Rod Scram Times	NUREG(s)- 1433 Only
Action 3.3.1.2.E	SRM Instrumentation	NUREG(s)- 1434 Only

1.0 Description

This change revises the Frequency for notch testing of fully withdrawn control rods. Currently, Surveillance Requirement (SR) 3.1.3.2 requires that each fully withdrawn control rod be inserted at least one notch, on a 7 day frequency. The proposed change revises the Frequency from 7 to 31 days. In addition, the word "fully" is added to NUREG-1434, LCO 3.3.1.2 Required Action E.2 to clarify the requirement to fully insert all insertable control rods in core cells containing one or more fuel assemblies when the associated SRM instrument is inoperable.

Finally, one Example in Section 1.4 “Frequency” is revised to make it clear that the 1.25 interval in SR 3.0.2 is applicable to time periods discussed in NOTES in the “SURVEILLANCE” column in addition to the time periods in the “FREQUENCY” column. This change to the Example is being made as part of TSTF-475 since newly re-numbered SR 3.1.3.2 has a 31 day time period discussed in both the “FREQUENCY” column and in a NOTE in the “SURVEILLANCE” column, and it needs to be clear that the 1.25 interval may be applied equally to both of these 31 day time periods.

2.0 Proposed Change

Control rod insertion capability is demonstrated by inserting each partially or fully withdrawn control rod at least one notch and observing that the control rod moves. The control rod may then be returned to its original position. This ensures the control rod is not stuck and is free to insert on a scram signal.

Partially withdrawn control rods are tested, in accordance with SR 3.1.3.3, on a 31 day Frequency. This Frequency is based on the potential power reduction required to allow the control rod movement and takes into account operating experience related to changes in Control Rod Drive performance.

The proposed change revises the Frequency of SR 3.1.3.2 from 7 days to 31 days. As a result, the frequency for testing of all withdrawn controls rods will be 31 days. Hence the existing SRs 3.1.3.2 and 3.1.3.3 are combined and, as a result, Required Action A.3 is revised to remove reference to SR 3.1.3.3.

Corresponding changes have been made to the Bases for Section 3.1.3, "Control Rod Operability," to reflect the changes made to the Technical Specifications.

NUREG-1434 (BWR/6), Specification 3.3.1.2, Required Action E.2 is revised from "Initiate action to insert all insertable control rods in core cells containing one or more fuel assemblies" to "Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies." Corresponding changes to the Bases are made. The corresponding BWR/4 Bases are revised to be consistent with the Action.

Finally, Example 1.4-3 in Section 1.4 “Frequency” is revised to clarify the applicability of the 25% allowance of SR 3.0.2 to time periods discussed in NOTES in the “SURVEILLANCE” column as well as to time periods in the “FREQUENCY” column. This is accomplished by adding the phrase

“(plus the extension allowed by SR 3.0.2)”

in two additional places in the discussion for Example 1.4-3. This change is also applicable to the Pressurized Water Reactor ISTS NUREGs (i.e., NUREG-1430, NUREG-1431, and NUREG-1432).

3.0 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 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 control rod drive mechanisms (CRDMs) and a hydraulic control unit for each drive mechanism. The CRDM is a double acting, mechanically latched, hydraulic cylinder that positions control blades. This mechanism, by design, is extremely reliable for inserting a control rod to the full in position (i.e., position 00). Incorporated in its design is a collet piston mechanism that ensures the control rod will not inadvertently withdraw by engaging the six collet fingers, mounted on the collet piston, in notches located at even positions on the index tube. Due to the tapered design of the index tube notches, the collet piston mechanism will not impede rod insertion under normal insertion or scram conditions.

During power operations, a typical BWR will have approximately 90% of the control rods fully withdrawn. For an average BWR/4, this results in approximately 120 control rod manipulations per week. The purpose of the proposed change is to reduce the number of control rod manipulations and, thereby, reduce unnecessary burden on operators and reduce the opportunity for reactivity control events.

4.0 Technical Analysis

As discussed above, SR 3.1.3.2 is applicable to fully withdrawn control rods and it is performed on a 7 day Frequency. Partially withdrawn control rods are tested, in accordance with SR 3.1.3.3, on a 31 day Frequency. The proposed change revises the Frequency of SR 3.1.3.2 from 7 days to 31 days. As a result, the frequency for testing of all withdrawn controls rods will be 31 days. Hence the existing SRs 3.1.3.2 and 3.1.3.3 are combined.

The purpose of these surveillances is to confirm control rod insertion capability. However, a stuck control rod is an extremely rare event. The CRDM, by design, is highly reliable and the tapered design of the index tube is conducive to control rod insertion. A review of industry operating experience did not identify any incidents of stuck control rods identified via performance of a rod notch surveillance. The following table illustrates the impact of the proposed change on the overall number of control rod notch surveillances performed in a year for a typical BWR reactor. It is assumed that there are 137 control rods in the typical BWR/4 and 193 control rods in a typical BWR/6. Approximately 90% are fully withdrawn during power operation.

Surveillance Requirement	**Frequency**	**Yearly Performances**	
		BWR/4	**BWR/6**
3.1.3.2 (Fully Withdrawn Control Rods)	7 Days	6429	9057
3.1.3.3 (Partially Withdrawn Control Rods)	31 Days	161	227
Total		6590	9284
Proposed 3.1.3.2 (All Withdrawn Control Rods)	31 days	1613	2272

Given the demonstrated reliability of the CRDMs, performance of weekly notch testing of fully withdrawn control rods to confirm the capability of inserting is not necessary.

The large number of tests that would still be performed will provide a very high confidence that any problems with the system would be identified. Should a control rod be determined to be stuck, Required Action A.3 continues to require that a notch test of each withdrawn control rod be performed within 24 hours of the discovery of the stuck rod. This requirement will ensure that a generic problem does not exist.

The reduction in the number of control rod positioning steps prevents unnecessary control rod manipulations and has a two fold benefit. First, it will reduce the duty on the Reactor Manual Control System and CRD hardware, which will improve equipment reliability because it reduces the number of control rod manipulations. Second, it reduces the number of potential reactivity control errors that could occur, because it reduces the number of operator actions. The potential effects of reducing the number of notch tests are far outweighed by the benefits of (1) reducing undue equipment wear, (2) reducing unnecessary burden on reactor operators and (3) reducing the potential for mispositioning events which accompanies any control rod manipulation.

The safety function of the control rods, in the event of a Design Basis Accident (DBA) or transient, is to provide the primary means of rapid reactivity control (i.e., scram). Notch testing does not specifically ensure this safety function, but rather it only verifies that the rod has freedom of movement (i.e., capable of scramming by inference). The assurance that control rods are capable of scramming is provided by surveillances in Technical Specification (TS) 3.1.4, "Control Rod Scram Times," and TS 3.1.5, "Control Rod Scram Accumulators." The proposed change is limited to the notch testing surveillance and, as such, the TS 3.1.4 and TS 3.1.5 surveillances will continue to ensure that the performance of the control rods in the event of a DBA or transient meets the assumptions used in the safety analyses. The TS 3.1.4 and TS 3.1.5 surveillances are more likely to identify issues which may affect the ability of the control rods to perform their safety function, such as (1) fuel channel bowing, which occurs nearer to the center of the fuel channel and would not be identified by notch testing of full out rods, or (2) mispositioning of manual isolation valves on the hydraulic control units (HCUs) causing failure to scram of individual control rods, which would most likely occur during maintenance activities and would be apparent during scram time testing performed prior to or during the return to operation (as required by SR 3.1.4.3 and 3.1.4.4). Failure mechanisms expected to be found via notch testing would be more gradual in nature, such as debris (i.e., crud buildup) within the CRDM affecting normal operation of the control rods. The proposed frequency for notch testing each withdrawn control rod every 31 days is more than adequate to detect such gradual changes.

Revising the frequency for notch testing fully withdrawn control rods will have the indirect effect

of reducing the number of coupling checks performed in accordance with the existing SR 3.1.3.5, which requires coupling checks be performed any time a control rod is fully withdrawn. However, coupling integrity continues to be assured, because of the improbability of a control rod becoming decoupled when it has not been moved.

Another use of notch testing of fully withdrawn control rods is to identify collet/flange tube cracking. This cracking is discussed in GE Service Information Letter (SIL) No. 139 (Ref. 1). GE, the control rod drive manufacturer, does not specify any particular preventative maintenance frequency for control rod drive mechanisms. However, GE recommended in 1975, as part of SIL No. 139, that each control rod drive mechanism be exercised weekly to detect a failure in the collet housing region of the control rod drive flange tube. A collet housing failure could result in the inability to insert, withdraw, and/or scram a control rod. SR 3.1.3.2 ensured compliance with the SIL No. 139 recommendation. However, GE has since evaluated the acceptability of the proposed change for Limerick Generating Station and the results of the evaluation are documented in GE Nuclear Energy Report GE-NE-0000-0024-9858 R0 (Ref. 2). The GE evaluation concluded that extending the control rod notch testing frequency for fully withdrawn control rods from 7 days to 31 days would not compromise the material condition or reliability of the CRD system. Furthermore, the evaluation concluded that monthly control rod notch testing was adequate to detect collet housing failures given the slow collet housing crack growth rate.

In summary, the CRDs and CRDMs are extremely reliable systems and, as such, reducing the number of control rod notch tests on fully withdrawn rods will not significantly impact the likelihood of detecting an inoperable control rod. If an inoperable control rod is detected, existing action requirements will ensure prompt action is taken to ensure there is not a generic problem. Other surveillances (e.g., SR 3.1.4.2) are routinely performed to ensure the safety function of the control rods to scram in the event of a DBA or transient meets the assumptions used in the safety analyses. As such, potential effects of reducing the number of notch tests are far outweighed by the benefit of reducing undue burden on reactor operators, reducing the potential for mispositioning events which accompanies any control rod manipulation, and reducing undue equipment wear.

Regarding the change to NUREG-1434, Specification 3.3.1.2, Required Action E.2, the requirement to insert control rods is meant to require control rods to be fully inserted. The equivalent action in the BWR/4 ISTS NUREG (NUREG-1433) requires the control rods to be fully inserted. Other similar Required Actions also require the control rods to be fully inserted (i.e., LCO 3.1.1, Required Actions C.1, D.1, and E.1; LCO 3.1.3, Required Action C.1; LCO 3.3.1.1, Required Action 1.1; LCO 3.3.1.2, Required Action D.1; LCO 3.3.2.1, Required Action C.2 (BWR/6 STS only); LCO 3.3.2.1, Required Action E.2 (BWR/4 STS only); LCO 3.3.8.2, Required Action D.1; LCO 3.9.2, Required Action A.2; LCO 3.9.4, Required Actions A.1.3 and A.2.1; LCO 3.9.5, Required Action A.1; LCO 3.10.2, Required Action A.2; LCO 3.10.3, Required Action A.2.1; LCO 3.10.4, Required Actions A.2.1 and B.2.1; LCO 3.10.5, Required Action A.2.1; LCO 3.10.6, Required Action A.3.1; and LCO 3.10.8, Required Action A.1.)

Regarding the change to Example 1.4-3 in Section 1.4 “Frequency”, this change makes it clear that the 1.25 provision in SR 3.0.2 is equally applicable to time periods specified in the “FREQUENCY” column and in NOTEs in the “SURVEILLANCE” column. This change to Example 1.4-3 is linked to TSTF-475 since the newly re-numbered SR 3.1.3.2 contains a 31 day time period in both the “SURVEILLANCE” column and in the “FREQUENCY” column - and the revised Example makes it clear that the 1.25 provision is equally applicable to both of these 31 day periods in SR 3.1.3.2. This is a “consistency” change, being made to be consistent with

the definition of "specified Frequency" provided in the second paragraph of Section 1.4. This paragraph states:

> *"The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Surveillance Requirement (SR) Applicability. The "specified Frequency" consists of the requirements of the Frequency column of each SR, as well as certain Notes in the Surveillance column that modify performance requirements."*

As made clear in the second sentence above, the "*specified Frequency*" includes time periods discussed in Notes in the "*Surveillance*" column, in addition to time periods listed in the "*Frequency*" column. Therefore, the provisions of SR 3.0.2 (which permit a 25% grace period to facilitate surveillance scheduling and avoid plant operating conditions that may not be suitable for conducting the test) also apply to the time periods listed in Notes in the "SURVEILLANCE" column. This is because SR 3.0.2 states that "The *specified Frequency* (emphasis added) for each SR is met if the Surveillance is performed within 1.25 times the interval specified…".

Therefore, Example 1.4-3 is revised to be consistent with the above statements. The Example currently explicitly recognizes that the 25% extension allowed by SR 3.0.2 is applicable to the time period listed in the "FREQUENCY" column, but it does not explicitly recognize that the SR 3.0.2 extension is applicable to the time period listed in the NOTE in the "SURVEILLANCE" column. The change to the Example provides this explicit recognition by copying the phrase "(plus the extension allowed by SR 3.0.2)" in two additional portions of the discussion for this Example.

5.0 Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

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

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

   Response: No

   This change does not affect either the design or operation of the Control Rod Drive Mechanism (CRDM). The affected surveillance and Required Action is not considered to be an initiator of any analyzed event. Revising the frequency for notch testing fully withdrawn control rods will not affect the ability of the control rods to shutdown the reactor if required. Given the extremely reliable nature of the CRDM, as demonstrated through industry operating experience, the proposed monthly notch testing of all withdrawn control rods continues to provide a high level of confidence in control rod operability. Hence, the overall intent of the notch testing surveillances, which is to detect either random stuck control rods or identify generic concerns affecting control rod operability, is not significantly affected by the proposed change. Requiring control rods to be fully inserted when the associated SRM is inoperable is consistent with other similar requirements and will increase the shutdown margin. The clarification of Example 1.4-3 in Section 1.4 "Frequency" is an editorial change made to provide consistency with other

discussions in Section 1.4. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No

   Revising the frequency for notch testing fully withdrawn control rods does not involve physical modification to the plant and does not introduce a new mode of operation. Requiring control rods to be fully inserted will make this action consistent with other similar actions. The clarification of Example 1.4-3 in Section 1.4 "Frequency" is an editorial change made to provide consistency with other discussions in Section 1.4. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No

   The CRDs and CRDMs are extremely reliable systems and, as such, reducing the number of control rod notch tests will not significantly impact the likelihood of detecting a stuck control rod. If a stuck control rod is detected, existing action requirements will ensure prompt action is taken to ensure there is not a generic problem. Other surveillances are routinely performed to ensure that the performance of the control rods in the event of a DBA or transient meets the assumptions used in the safety analyses. As such, potential effects of reducing the number of notch tests are far outweighed by the benefit of reducing undue burden on reactor operators and reducing the potential for mispositioning events which accompanies any control rod manipulation. Requiring control rods to be fully inserted instead of partially inserted when the associated SRM is inoperable will increase the margin of safety. The clarification of Example 1.4-3 in Section 1.4 "Frequency" is an editorial change made to provide consistency with other discussions in Section 1.4. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed amendments present 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 Applicable Regulatory Requirements/Criteria

The control rod drive (CRD) system consists of the control rods and the related mechanical components which provide the means for mechanical movement. General Design Criteria 26 and 27 require that the CRD sytem provide one of the independent reactivity control systems. The rods and the drive mechanism shall be capable of reliably controlling reactivity changes either under conditions of anticipated normal plant operational occurrences, or under postulated accident conditions. A positive means for inserting the rods shall always be maintained to ensure appropriate margin for malfunction, such as stuck rods. Since the CRD system is a system important to safety and portions of the CRD system are a part of the reactor coolant pressure boundary (RCPB), General Design Criteria 1, 2, 14, and 29 and 10 CFR Part 50, Sec. 50.55a, require that the system shall be designed, fabricated, and tested to quality standards

commensurate with the safety functions to be performed, so as to assure an extremely high probability of accomplishing the safety functions either in the event of anticipated operational occurrences or in withstanding the effects of postulated accidents and natural phenomena such as earthquakes.

This change does not affect either the design or operation of the CRD system. Revising the frequency for notch testing fully withdrawn control rods will not affect the ability of the control rods to shutdown the reactor if required. The CRD system and CRDMs are extremely reliable systems and, as such, reducing the number of control rod notch tests will not significantly impact the likelihood of detecting a stuck control rod. If a stuck control rod is detected, existing action requirements will ensure prompt action is taken to ensure there is not a generic problem. Other surveillances are routinely performed to ensure that the performance of the control rods in the event of a DBA or transient meets the assumptions used in the safety analyses. Based on the above, the proposed change does not affect the ability of the CRD system or CRDMs to satisfy all applicable regulatory requirements and criteria.

6.0 Environmental Considerations

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, 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 effluents 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 impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 References

1. General Electric Service Information Letter (SIL) No. 139, "Control Rod Drive Collet Retainer Tube Cracking," dated July 18, 1975, including supplements.

2. GE Nuclear Energy Report, "CRD Notching Surveillance Testing for Limerick Generating Station," GE-NE-0000-0024-9858 R0, February 2004.

1.4 Frequency

EXAMPLES (continued)

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 12 hours after ≥ 25% RTP. ----------	
Perform channel adjustment.	7 days

The interval continues whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be performed within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day (plus the extension allowed by SR 3.0.2) interval, but operation was < 25% RTP, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of SR 3.0.4 occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours (plus the extension allowed by SR 3.0.2) with power ≥ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval (plus the extension allowed by SR 3.0.2), there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of SR 3.0.3 would apply.

EXAMPLES (continued)

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 12 hours after ≥ 25% RTP. ----------	
Perform channel adjustment.	7 days

The interval continues, whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be performed within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day (plus the extension allowed by SR 3.0.2) interval, but operation was < 25% RTP, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of SR 3.0.4 occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours (plus the extension allowed by SR 3.0.2) with power ≥ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval (plus the extension allowed by SR 3.0.2), there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of SR 3.0.3 would apply.

1.4 Frequency

EXAMPLES (continued)

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 12 hours after ≥ 25% RTP. ----------	
Perform channel adjustment.	7 days

The interval continues, whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be performed within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day (plus the extension allowed by SR 3.0.2) interval, but operation was < 25% RTP, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of SR 3.0.4 occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours (plus the extension allowed by SR 3.0.2) with power ≥ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval (plus the extension allowed by SR 3.0.2), there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of SR 3.0.3 would apply.

1.4 Frequency

EXAMPLES (continued)

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 12 hours after ≥ 25% RTP. ----------	
Perform channel adjustment.	7 days

The interval continues, whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day interval (plus the extension allowed by SR 3.0.2), but operation was < 25% RTP, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of SR 3.0.4 occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours (plus the extension allowed by SR 3.0.2) with power ≥ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval (plus the extension allowed by SR 3.0.2), there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of SR 3.0.3 would apply.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	A.3	Perform SR 3.1.3.2 and SR 3.1.3.3 for each withdrawn OPERABLE control rod.	24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) of the RWM
	AND		
	A.4	Perform SR 3.1.1.1.	72 hours
B. Two or more withdrawn control rods stuck.	B.1	Be in MODE 3.	12 hours
C. One or more control rods inoperable for reasons other than Condition A or B.	C.1	----------NOTE---------- RWM may be bypassed as allowed by LCO 3.3.2.1, if required, to allow insertion of inoperable control rod and continued operation. ----------	
		Fully insert inoperable control rod.	3 hours
	AND		
	C.2	Disarm the associated CRD.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.3.1	Determine the position of each control rod.	24 hours
SR 3.1.3.2	----------NOTE---------- Not required to be performed until 7 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP of RWM. ---------- Insert each fully withdrawn control rod at least one notch.	7 days
SR 3.1.3.~~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 control rod at least one notch.	31 days
SR 3.1.3.~~2~~ 3	Verify each control rod scram time from fully withdrawn to notch position [06] is ≤ 7 seconds.	In accordance with SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4
SR 3.1.3.~~3~~ 4	Verify each control rod does not go to the withdrawn overtravel position.	Each time the control rod is withdrawn to "full out" position AND Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect coupling

Table 3.1.4-1 (page 1 of 1)
Control Rod Scram Times

----------NOTES----------

1. OPERABLE control rods with scram times not within the limits of this Table are considered "slow."

2. Enter applicable Conditions and Required Actions of LCO 3.1.3, "Control Rod OPERABILITY," for control rods with scram times > 7 seconds to notch position [06]. These control rods are inoperable, in accordance with SR 3.1.3.4, and are not considered "slow."

NOTCH POSITION	SCRAM TIMES[(a)(b)] (seconds) WHEN REACTOR STEAM DOME PRESSURE ≥ [800] psig
[46]	[0.44]
[36]	[1.08]
[26]	[1.83]
[06]	[3.35]

(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.

No Change -
For Reference Only

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One or more required SRMs inoperable in MODE 5.	E.1 Suspend CORE ALTERATIONS except for control rod insertion.	Immediately
	AND	
	E.2 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

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

Refer to Table 3.3.1.2-1 to determine which SRs apply for each applicable MODE or other specified conditions.

SURVEILLANCE		FREQUENCY
SR 3.3.1.2.1	Perform CHANNEL CHECK.	12 hours

BASES

ACTIONS (continued)

Monitoring of the insertion capability of each withdrawn control rod must also be performed within 24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) of the RWM. SR 3.1.3.2 and SR 3.1.3.3 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 allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The Required Action A.2 Completion Time only begins upon discovery of Condition 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 3.1.6) and the RWM (LCO 3.3.2.1). The allowed Completion Time of 24 hours from discovery of Condition 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.

To allow continued operation with a withdrawn control rod stuck, an evaluation of adequate SDM is also required within 72 hours. Should a DBA or transient require a shutdown, to preserve the single failure criterion, an additional control rod would have to be assumed to fail to insert when required. Therefore, the original SDM demonstration may not be valid. The SDM must therefore 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 SDM 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 MODE 4 is only likely if an additional control rod adjacent to the stuck control rod also fails to insert during a required scram. Even with the postulated additional single failure of an adjacent control rod to insert, sufficient reactivity control remains to reach and maintain MODE 3 conditions (Ref. 5).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.3.1

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.

SR 3.1.3.2 and SR 3.1.3.3

Control rod insertion capability is demonstrated by inserting each partially or fully withdrawn control rod at least one notch and observing that the control rod moves. The control rod may then be returned to its original position. This ensures the control rod is not stuck and is free to insert on a scram signal. These Surveillances are not required when THERMAL POWER is less than or equal to the actual LPSP of the RWM, since the notch insertions may not be compatible with the requirements of the Banked Position Withdrawal Sequence (BPWS) (LCO 3.1.6) and the RWM (LCO 3.3.2.1). The 7 day Frequency of SR 3.1.3.2 is based on operating experience related to the changes in CRD performance and the ease of performing notch testing for fully withdrawn control rods. Partially withdrawn control rods are tested at a 31 day Frequency, based on the potential power reduction required to allow the control rod movement and considering the large testing sample of SR 3.1.3.2. Furthermore, the 31 day Frequency takes into account operating experience related to changes in CRD performance. At any time, if a control rod is immovable, a determination of that control rod's trippability (OPERABILITY) must be made and appropriate action taken.

SR 3.1.3.4 (3)

Verifying that the scram time for each control rod to notch position 06 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 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4 (3). The LOGIC SYSTEM FUNCTIONAL TEST in LCO 3.3.1.1, "Reactor

BASES

SURVEILLANCE REQUIREMENTS (continued)

Protection System (RPS) Instrumentation," and the functional testing of SDV vent and drain valves in LCO 3.1.8, "Scram Discharge Volume (SDV) Vent and Drain Valves," overlap this Surveillance to provide complete testing of the assumed safety function. 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 3.1.3.~~6~~ 4

Coupling verification is performed to ensure the control rod is connected to the CRDM and will perform its intended function when necessary. The Surveillance requires verifying a control rod does not go to the withdrawn overtravel position. The overtravel position feature provides a positive check on the coupling integrity since only an uncoupled CRD can reach the overtravel position. The verification is required to be performed any time a control rod is withdrawn to the "full out" position (notch position 48) or prior to declaring the control rod OPERABLE after work on the control rod or CRD System that could affect coupling. This includes control rods inserted one notch and then returned to the "full out" position during the performance of SR 3.1.3.2. This Frequency is acceptable, considering the low probability that a control rod will become uncoupled when it is not being moved and operating experience related to uncoupling events.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26, GDC 27, GDC 28, and GDC 29.
2. FSAR, Section [4.2.3.2.2.4].
3. FSAR, Section [5A.4.3].
4. FSAR, Section [15.1].
5. NEDO-21231, "Banked Position Withdrawal Sequence," Section 7.2, January 1977.

BASES

APPLICABLE SAFETY ANALYSES (continued)

reactivity at a rate fast enough to prevent the actual MCPR from becoming less than the MCPR SL, during the analyzed limiting power transient. Below 800 psig, the scram function is assumed to perform during the control rod drop accident (Ref. 5) and, therefore, also provides protection against violating fuel damage limits during reactivity insertion accidents (see Bases for LCO 3.1.6, "Rod Pattern Control"). For the reactor vessel overpressure protection analysis, the scram function, along with the safety/relief valves, ensure that the peak vessel pressure is maintained within the applicable ASME Code limits.

Control rod scram times satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The scram times specified in Table 3.1.4-1 (in the accompanying LCO) are required to ensure that the scram reactivity assumed in the DBA and transient analysis is met (Ref. 6). To account for single failures and "slow" scramming control rods, the scram times specified in Table 3.1.4-1 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., 137 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 3.1.3, "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 3.1.4-1 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 3.1.4-1 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 ~~3.1.3.4~~. 3.1.3.3

This LCO applies only to OPERABLE control rods since inoperable control rods will be inserted and disarmed (LCO 3.1.3). Slow scramming control rods may be conservatively declared inoperable and not accounted for as "slow" control rods.

BASES

ACTIONS (continued)

D.1 and D.2

With one or more required SRMs inoperable in MODE 3 or 4, the neutron flux monitoring capability is degraded or nonexistent. The requirement to fully insert all insertable control rods ensures that the reactor will be at its minimum reactivity level while no neutron monitoring capability is available. Placing the reactor mode switch in the shutdown position prevents subsequent control rod withdrawal by maintaining a control rod block. The allowed Completion Time of 1 hour is sufficient to accomplish the Required Action, and takes into account the low probability of an event requiring the SRM occurring during this interval.

E.1 and E.2

With one or more required SRM channels inoperable in MODE 5, the ability to detect local reactivity changes in the core during refueling is degraded. CORE ALTERATIONS must be immediately suspended and action must be immediately initiated to fully insert all insertable control rods in core cells containing one or more fuel assemblies. Suspending CORE ALTERATIONS prevents the two most probable causes of reactivity changes, fuel loading and control rod withdrawal, from occurring. Inserting all insertable control rods ensures that the reactor will be at its minimum reactivity given that fuel is present in the core. Suspension of CORE ALTERATIONS shall not preclude completion of the movement of a component to a safe, conservative position.

Action (once required to be initiated) to insert control rods must continue until all insertable rods in core cells containing one or more fuel assemblies are inserted.

SURVEILLANCE REQUIREMENTS

The SRs for each SRM Applicable MODE or other specified conditions are found in the SRs column of Table 3.3.1.2-1.

SR 3.3.1.2.1 and SR 3.3.1.2.3

Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on another channel. It is based on the assumption that instrument channels monitoring the same parameter should read

1.4 Frequency

EXAMPLES (continued)

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 12 hours after ≥ 25% RTP. ----------	
Perform channel adjustment.	7 days

The interval continues, whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day interval (plus the extension allowed by SR 3.0.2), but operation was < 25% RTP, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of SR 3.0.4 occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours (plus the extension allowed by SR 3.0.2) with power ≥ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval (plus the extension allowed by SR 3.0.2), there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of SR 3.0.3 would apply.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	A.3	Perform SR 3.1.3.2 and SR 3.1.3.3 for each withdrawn OPERABLE control rod.	24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) of the Rod Pattern Controller
	AND		
	A.4	Perform SR 3.1.1.1.	72 hours
B. Two or more withdrawn control rods stuck.	B.1	Be in MODE 3.	12 hours
C. One or more control rods inoperable for reasons other than Condition A or B.	C.1	----------NOTE---------- Inoperable control rods may be bypassed in RACS in accordance with SR 3.3.2.1.9, if required, to allow insertion of inoperable control rod and continued operation. ----------	
		Fully insert inoperable control rod.	3 hours
	AND		
	C.2	Disarm the associated CRD.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.3.1	Determine the position of each control rod.	24 hours
SR 3.1.3.2	----------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 RPCS. ---------- Insert each fully withdrawn control rod at least one notch.	7 days
SR 3.1.3.~~3~~ 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 RPCS. ---------- Insert each ~~partially~~ withdrawn control rod at least one notch.	31 days
SR 3.1.3.~~4~~ 3	Verify each control rod scram time from fully withdrawn to notch position [13] is ≤ [ ] seconds.	In accordance with SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4
SR 3.1.3.~~5~~ 4	Verify each control rod does not go to the withdrawn overtravel position.	Each time the control rod is withdrawn to "full out" position AND Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect coupling

Table 3.1.4-1
Control Rod Scram Times

----------NOTES----------

1. OPERABLE control rods with scram times not within the limits of this Table are considered "slow."

2. Enter applicable Conditions and Required Actions of LCO 3.1.3, "Control Rod OPERABILITY," for control rods with scram times > [ ] seconds to notch position [13]. These control rods are inoperable, in accordance with SR 3.1.3.4, and are not considered "slow."

NOTCH POSITION	SCRAM TIMES[a][b] (seconds)	
	REACTOR STEAM DOME PRESSURE[c] [950] psig	REACTOR STEAM DOME PRESSURE[c] [1050] psig
[43]	[0.30]	[0.31]
[29]	[0.78]	[0.84]
[13]	[1.40]	[1.53]

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

(b) Scram times as a function of reactor steam dome pressure, when < 950 psig, are within established limits.

(c) For intermediate reactor steam dome pressures, the scram time criteria are determined by linear interpolation.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One or more required SRMs inoperable in MODE 5.	E.1 Suspend CORE ALTERATIONS except for control rod insertion.	Immediately
	AND	
	E.2 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.1.2-1 to determine which SRs apply for each applicable MODE or other specified conditions.

SURVEILLANCE		FREQUENCY
SR 3.3.1.2.1	Perform CHANNEL CHECK.	12 hours

BASES

ACTIONS

The ACTIONS Table is modified by a Note indicating that a separate Condition entry is allowed for each control rod. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable control rod. Complying with the Required Actions may allow for continued operation, and subsequent inoperable control rods are governed by subsequent Condition entry and application of associated Required 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 that allows a stuck control rod to be bypassed in the Rod Action Control System (RACS) to allow continued operation. SR 3.3.2.1.9 provides additional requirements when control rods are bypassed in RACS 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 are not met. Therefore, a verification that the separation criteria are met must be performed immediately. 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 3.1.4, "Control Rod Scram Times." 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, and provides a reasonable amount of time to perform the Required Action in an orderly manner. Isolating the control rod from scram prevents damage to the CRDM. The control rod can be isolated from scram by isolating the hydraulic control unit from scram and normal insert and withdraw pressure, yet still maintain cooling water to the CRD.

Monitoring of the insertion capability for each withdrawn control rod must also be performed within 24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) of the rod pattern controller (RPC). SR 3.1.3.2 and SR 3.1.3.3 perform periodic tests of the control rod insertion capability of withdrawn control rods. Testing each withdrawn control rod ensures that a generic

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.3.2 and SR 3.1.3.3

Control rod insertion capability is demonstrated by inserting each partially or fully withdrawn control rod at least one notch and observing that the control rod moves. The control rod may then be returned to its original position. This ensures the control rod is not stuck and is free to insert on a scram signal. These Surveillances are not required when THERMAL POWER is less than or equal to the actual LPSP of the RPC since the notch insertions may not be compatible with the requirements of the Banked Position-Withdrawal Sequence (BPWS) (LCO 3.1.6) and the RPC (LCO 3.3.2.1). The 7 day Frequency of SR 3.1.3.2 is based on operating experience related to the changes in CRD performance and the ease of performing notch testing for fully withdrawn control rods. Partially withdrawn control rods are tested at a 31 day Frequency, based on the potential power reduction required to allow the control rod movement, and considering the large testing sample of SR 3.1.3.2. Furthermore, the 31 day Frequency takes into account operating experience related to changes in CRD performance. At any time, if a control rod is immovable, a determination of that control rod's trippability (OPERABILITY) must be made and appropriate action taken.

SR 3.1.3.4 (3)

Verifying the scram time for each control rod to notch position 13 is ≤ [ ] 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 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and (3) SR 3.1.4.4. The LOGIC SYSTEM FUNCTIONAL TEST in LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," and the functional testing of SDV vent and drain valves in LCO 3.1.8, "Scram Discharge Volume (SDV) Vent and Drain Valves," overlap this Surveillance to provide complete testing of the assumed safety function. 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.3.~~5~~ 4

Coupling verification is performed to ensure the control rod is connected to the CRDM and will perform its intended function when necessary. The Surveillance requires verifying that a control rod does not go to the withdrawn overtravel position when it is fully withdrawn. The overtravel position feature provides a positive check on the coupling integrity, since only an uncoupled CRD can reach the overtravel position. The verification is required to be performed anytime a control rod is withdrawn to the "full out" position (notch position 48) or prior to declaring the control rod OPERABLE after work on the control rod or CRD System that could affect coupling. This includes control rods inserted one notch and then returned to the "full out" position during the performance of SR 3.1.3.2. This Frequency is acceptable, considering the low probability that a control rod will become uncoupled when it is not being moved and operating experience related to uncoupling events.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26, GDC 27, GDC 28, and GDC 29.
2. FSAR, Section [4.3.2.5.5].
3. FSAR, Section [4.6.1.1.2.5.3].
4. FSAR, Section [5.2.2.2.3].
5. FSAR, Section [15.4.1].
6. FSAR, Section [15.4.9].
7. NEDO-21231, "Banked Position Withdrawal Sequence," Section 7.2, January 1977.

BASES

ACTIONS (continued)

C.1

In MODE 2, if the required number of SRMs is not restored to OPERABLE status within the allowed Completion Time, the reactor shall be placed in MODE 3. With all control rods fully inserted, the core is in its least reactive state with the most margin to criticality. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 in an orderly manner and without challenging plant systems.

D.1 and D.2

With one or more required SRM channels inoperable in MODE 3 or 4, the neutron flux monitoring capability is degraded or nonexistent. The requirement to fully insert all insertable control rods ensures that the reactor will be at its minimum reactivity level while no neutron monitoring capability is available. Placing the reactor mode switch in the shutdown position prevents subsequent control rod withdrawal by maintaining a control rod block. The allowed Completion Time of 1 hour is sufficient to accomplish the Required Action, and takes into account the low probability of an event requiring the SRM occurring during this time.

E.1 and E.2

With one or more required SRMs inoperable in MODE 5, the capability to detect local reactivity changes in the core during refueling is degraded. CORE ALTERATIONS must be immediately suspended, and action must be immediately initiated to fully insert all insertable control rods in core cells containing one or more fuel assemblies. Suspending CORE ALTERATIONS prevents the two most probable causes of reactivity changes, fuel loading and control rod withdrawal, from occurring. Inserting all insertable control rods ensures that the reactor will be at its minimum reactivity, given that fuel is present in the core. Suspension of CORE ALTERATIONS shall not preclude completion of the movement of a component to a safe, conservative position.

Action (once required to be initiated) to insert control rods must continue until all insertable rods in core cells containing one or more fuel assemblies are inserted.