Industry/TSTF Standard Technical Specification Change Traveler

Control Rod Scram Time Testing

Classification: 3) Improve Specifications

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

Description:

Clarify that post-refueling control rod scram time testing only applies to control rods affected by movement of fuel.

Justification:

The current words of SR 3.1.4.1 require each control rod to be tested if any fuel movement in the reactor pressure vessel (RPV) occurs. This effectively means that even if only one bundle is moved (e.g., replacing a leaking fuel bundle mid-cycle), all the control rods are required to be tested per the words of the SR. While a generic change to the Bases attempted to ensure that only those rods affected be tested (BWR-18, Comments C.2 and C.14, which are adopted in NUREG-1433 and -1434, Rev. 1), the current Bases words do not preclude misinterpretation of this requirement. The actual SR was not modified (by generic change BWR-18) and continues to require each rod to be tested. In addition, there are other SRs (SR 3.1.4.2 and SR 3.1.4.3) that require only the affected control rods to be tested, further adding confusion. Therefore, it is proposed to move the first Frequency of SR 3.1.4.1 to SR 3.1.4.4 and modify it to read "associated core cell" in lieu of "reactor pressure vessel." The Bases for SR 3.1.4.4 will state that it is expected that during a routine refueling outage, all control rods will be affected. Thus, the requirement to test all the control rods remains essentially unchanged. Other appropriate Bases changes have been made to support the movement of the Frequency. This is consistent with the actual intent of the SRs and with the existing Bases.

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Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by:

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 27-Nov-95

Owners Group Comments
2/11/97 - Revised by the BWROG.

Owners Group Resolution: Approved Date: 27-Nov-95

TSTF Review Information

TSTF Received Date: 30-Apr-97 Date Distributed for Review 30-Apr-97

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

TSTF Comments:

NA PWRs
Originally approved by the TSTF on April 30, 1996. Subsequently, substantial comments were received from the BWRs which will require a rewrite of the package. The package was withdrawn from the TSTF.

TSTF Resolution: Withdrawn Date: 16-May-97

OG Revision 0 Revision Status: Closed

OG Revision 1 Revision Status: Closed

Revision Proposed by: BWROG

Revision Description:
Revised the Traveler to only add the word "affected" to SR 3.1.4.1. Revised the justification accordingly.
Sent to the BWROG for review.
BWROG requested revision.

Owners Group Review Information

Date Originated by OG: 11-Feb-97

Owners Group Comments
(No Comments)

Owners Group Resolution: Withdrawn Date:

OG Revision 2 Revision Status: Active Next Action:

Revision Proposed by: BWROG

Revision Description:
Complete replacement. Revised justification and affected Specifications.

Owners Group Review Information

Date Originated by OG: 19-May-97

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 19-May-97

TSTF Review Information

TSTF Received Date: 19-May-97 Date Distributed for Review 01-Dec-97

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

TSTF Comments:

Rev. 2 comments - NA to WOG, CEOG and BWOG. Approved.
Delete the "only" in front of fuel movement in the BWR/4 and BWR/6 Bases. SR 3.1.4.1. change "associated" to "affected" to be consistent.

TSTF Resolution: Approved Date: 05-Feb-98

NRC Review Information

NRC Received Date: 10-Mar-98

NRC Comments:

(No Comments)

Final Resolution: NRC Approves Final Resolution Date: 07-Apr-98

TSTF Revision 1 **Revision Status: Active** **Next Action:**

Revision Proposed by: BWROG

Revision Description:
TSTF-222, Rev. 0 inadvertently did not delete a sentence from BWR/6 page B 3.1-24. Specifically, Rev. 0 deleted a section from the Bases starting "In the event fuel movement is limited . . .". In the BWR/4 markup, the deletion extended through the sentence ending " . . . All control rods are required to be scram time tested." In the BWR/6 markup, the deletion did not remove the last sentence.

This revision corrects the BWR/6 markup.

TSTF Review Information

TSTF Received Date: 03-Feb-99 Date Distributed for Review 09-Mar-99

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

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 09-Apr-99

NRC Review Information

NRC Received Date: 30-Apr-99

NRC Comments:
(No Comments)

Final Resolution: NRC Action Pending Final Resolution Date:

Incorporation Into the NUREGs

File to BBS/LAN Date: TSTF Informed Date: TSTF Approved Date:

NUREG Rev Incorporated:

Affected Technical Specifications

SR 3.1.4.1	Control Rod Scram Times
SR 3.1.4.1 Bases	Control Rod Scram Times
SR 3.1.4.4	Control Rod Scram Times
SR 3.1.4.4 Bases	Control Rod Scram Times

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3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Control Rod Scram Times

LCO 3.1.4

a. No more than [10] OPERABLE control rods shall be "slow," in accordance with Table 3.1.4-1; and

b. No more than 2 OPERABLE control rods that are "slow" shall occupy adjacent locations.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

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

SURVEILLANCE	FREQUENCY
SR 3.1.4.1 Verify each control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [800] psig.	Prior to exceeding 40% RTP after fuel movement within the affected core cell reactor pressure vessel AND Move to SR 3.1.4.4 (continued)

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	(continued)	Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days
SR 3.1.4.2	Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [800] psig.	120 days cumulative operation in MODE 1
SR 3.1.4.3	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 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 3.1.4.4	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [800] psig.	Prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time

Insert Frequency from SR 3.1.4.1

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3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Control Rod Scram Times

LCO 3.1.4

a. No more than [14] OPERABLE control rods shall be "slow," in accordance with Table 3.1.4-1; and

b. No more than 2 OPERABLE control rods that are "slow" shall occupy adjacent locations.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

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

SURVEILLANCE	FREQUENCY
SR 3.1.4.1 Verify each control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [950] psig.	Prior to exceeding 40% RTP after fuel movement within the reactor pressure vessel AND (continued)

affected core cell

Move to SR 3.1.4.4

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	(continued)	Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days
SR 3.1.4.2	Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [950] psig.	120 days cumulative operation in MODE 1
SR 3.1.4.3	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 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 3.1.4.4	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ [950] psig.	AND Prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time

Insert Frequency from SR 3.1.4.1

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BASES (continued)

SURVEILLANCE REQUIREMENTS

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 3.1.4.1

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 fuel movement within the reactor pressure vessel after a shutdown ≥ 120 days or longer, control rods are required to be tested before exceeding 40% RTP following the shutdown. In the event fuel movement is limited to selected core cells, it is the intent of this SR that only those CRDs associated with the core cells affected by the fuel movements are required to be scram time tested. However, if the reactor remains shutdown ≥ 120 days, all control rods are required to be scram time tested. 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.

fuel movement within the associated core cell and by

(continued)

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.4.3 (continued)

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 3.1.4.4

Or when fuel movement within the reactor pressure vessel occurs,

When work that could affect the scram insertion time is performed on a control rod or CRD System, testing must be done to demonstrate each affected control rod is still within the limits of Table 3.1.4-1 with the reactor steam dome pressure ≥ 800 psig. Where work has been performed at high reactor pressure, the requirements of SR 3.1.4.3 and SR 3.1.4.4 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.

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.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10.
2. FSAR, Section [4.2.3.2.2.4].
3. FSAR, Section [5A.4.3].

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BASES (continued)

SURVEILLANCE REQUIREMENTS

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 3.1.4.1

The scram reactivity used in DBA and transient analyses is based on assumed control rod scram time. Measurement of the scram times with reactor steam dome pressure ≥ 950 psig demonstrates acceptable scram times for the transients analyzed in References 3 and 4.

Scram insertion times increase with increasing reactor pressure 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 ≥ 950 psig ensures that the 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 scram time testing is performed within a reasonable time following fuel movement within the reactor pressure vessel or after a shutdown ≥ 120 days, control rods are required to be tested before exceeding 40% RTP. In the event fuel movement is limited to selected core cells, it is the intent of this SR that only those CRDs associated with the core cells affected by the fuel movements are required to be scram time tested. However, if the reactor remains shutdown ≥ 120 days, all control rods are required to be scram time tested. 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.

fuel movement within the associated core cell and by

(continued)

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.4.3 (continued)

Specific examples of work that could affect the scram times include (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 valves in the piping required for scram.

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

SR 3.1.4.4

When work that could affect the scram insertion time is performed on a control rod or CRD System, testing must be done to demonstrate each affected control rod is still within the limits of Table 3.1.4-1 with the reactor steam dome pressure ≥ 950 psig. Where work has been performed at high reactor pressure, the requirements of SR 3.1.4.3 and SR 3.1.4.4 will be satisfied with one test. For a control rod affected by work performed while shut down, however, a zero pressure and a high pressure test may be required. This testing ensures that the control rod scram performance is acceptable for operating reactor pressure conditions prior to withdrawing the control rod for continued operation. Alternatively, a test during hydrostatic pressure testing could also satisfy both criteria.

The Frequency of once prior to exceeding 40% RTP is acceptable because of the capability of testing the control rod at the different conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

or when fuel movement within the reactor pressure vessel occurs,

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.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10.
2. FSAR, Section [4.3.2.5.5].
3. FSAR, Section [4.6.1.1.2.5.3].

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