Industry/TSTF Standard Technical Specification Change Traveler

Delete SR frequencies based on inoperable alarms

Priority/Classification 2) Consistency/Standardization

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

Description:

Several Surveillances (rod position deviation monitor, rod insertion limit monitor, AFD monitor and QPTR alarm) contain actions (in the form of an increased surveillance frequency) to be performed in the event of inoperable alarms. These actions are relocated from the Technical Specifications to plant administrative practices.

Justification:

These actions are relocated from the Technical Specifications to plant administrative practices since the alarms themselves do not directly relate to the LCO limits. This detail is not required to be in the TS to provide adequate protection of the public health and safety. Therefore, relocation of this detail is acceptable.

The alarms serve indication only. The procedures dictate the appropriate actions to be taken under these conditions. There are no underlying reliability issues associated with relocating these alarms. There is no adverse effect in permitting the normal surveillance frequency to be used instead of the frequency associated with any alarms. There are no safety functions adversely effected by this change.

Revision History

OG Revision 0 **Revision Status: Closed**

Revision Proposed by:

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 18-Jan-96

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 18-Jan-96

TSTF Review Information

TSTF Received Date: 20-Feb-96 Date Distributed for Review 12-Apr-96

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

TSTF Comments:

NA CEOG No SR frequencies based on inop alarms
NA BWROG
BWOG - Applies to BWOG and BWOG accepts. Mark-ups sent June 26, 1996

TSTF Resolution: Approved Date: 26-Jun-96

NRC Review Information

NRC Received Date: 01-Aug-96 NRC Reviewer: R. Tjader

NRC Comments:

9/18/96 - NRC would like to arrange a technical discussion on this change.
9/18/96 - TSTF to arrange meeting or conference call.
10/30/96 - TSTF to enhance the justification for this change to 1) ensure that there are no underlying reliability issues, 2) justify or eliminate any "artificial" STIs, and 3) ensure there are no safety functions. The justification will also specifically address the deletion of SR 3.2.3.2.

Final Resolution: Superceded by Revision Final Resolution Date: 23-Jan-97

TSTF Revision 1 Revision Status: Closed

Revision Proposed by: WOG

Revision Description:
Revise the Bases of WOG SR 3.1.7.1 to reflect the elimination of the Rod Insertion Limit monitor from the SR.

TSTF Review Information

TSTF Received Date: 01-Jul-96 Date Distributed for Review 01-Jul-96

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 18-Sep-96

NRC Review Information

NRC Received Date: 23-Jan-97 NRC Reviewer: R. Tjader

NRC Comments:

10/1/97 - In discussions between the TSTF and the NRC, agreed to changes to the justifications.

Final Resolution: Superceded by Revision Final Resolution Date: 02-Oct-97

TSTF Revision 2 Revision Status: Active Next Action:

Revision Proposed by: NRC

Revision Description:
Revised the justification to incorporate information discussed and agreed to by the NRC and the TSTF.

TSTF Review Information

TSTF Received Date: 01-Oct-97 Date Distributed for Review 02-Oct-97

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 02-Oct-97

NRC Review Information

NRC Received Date: 02-Oct-97 NRC Reviewer: R. Tjader

NRC Comments:

(No Comments)

Final Resolution: NRC Approves Final Resolution Date: 03-Oct-97

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 Group Alignment Limits	NUREG(s)- 1430 Only
SR 3.1.4.1 Bases	Control Rod Group Alignment Limits	NUREG(s)- 1430 Only
SR 3.1.6.1	APSR Alignment Limits	NUREG(s)- 1430 Only
SR 3.1.6.1 Bases	APSR Alignment Limits	NUREG(s)- 1430 Only
SR 3.1.7.1	Position Indicator Channels	NUREG(s)- 1430 Only
SR 3.1.7.1 Bases	Position Indicator Channels	NUREG(s)- 1430 Only
SR 3.2.1.1	Regulating Rod Insertion Limits	NUREG(s)- 1430 Only
SR 3.2.1.1 Bases	Regulating Rod Insertion Limits	NUREG(s)- 1430 Only
SR 3.2.1.2	Regulating Rod Insertion Limits	NUREG(s)- 1430 Only
SR 3.2.1.2 Bases	Regulating Rod Insertion Limits	NUREG(s)- 1430 Only
SR 3.2.3.1	Axial Power Imbalance Operating Limits	NUREG(s)- 1430 Only
SR 3.2.3.1 Bases	Axial Power Imbalance Operating Limits	NUREG(s)- 1430 Only
SR 3.2.4.1	QPT	NUREG(s)- 1430 Only
SR 3.2.4.1 Bases	QPT	NUREG(s)- 1430 Only
SR 3.1.5.1	Rod Group Alignment Limits	NUREG(s)- 1431 Only
SR 3.1.5.1 Bases	Rod Group Alignment Limits	NUREG(s)- 1431 Only
SR 3.1.7.2	Control Bank Insertion Limits	NUREG(s)- 1431 Only
SR 3.1.7.2 Bases	Control Bank Insertion Limits	NUREG(s)- 1431 Only
Bkgnd 3.2.3A Bases	AFD (CAOC Methodology)	NUREG(s)- 1431 Only

Bkgnd 3.2.3B Bases	AFD (RAOC Methodology)	NUREG(s)- 1431 Only
LCO 3.2.3A Bases	AFD (CAOC Methodology)	NUREG(s)- 1431 Only
SR 3.2.3.1	AFD (RAOC Methodology)	NUREG(s)- 1431 Only
SR 3.2.3.1 Bases	AFD (CAOC methodology)	NUREG(s)- 1431 Only
SR 3.2.3.1 Bases	AFD (RAOC Methodology)	NUREG(s)- 1431 Only
SR 3.2.3.2	AFD (CAOC methodology) Change Description: Delete	NUREG(s)- 1431 Only
SR 3.2.3.2 Bases	AFD (CAOC methodology) Change Description: Deleted	NUREG(s)- 1431 Only
SR 3.2.3.3	AFD (CAOC methodology) Change Description: Renumber to 3.2.3.2	NUREG(s)- 1431 Only
SR 3.2.3.3 Bases	AFD (CAOC methodology) Change Description: Renumber to 3.2.3.2	NUREG(s)- 1431 Only
SR 3.2.3.4	AFD (CAOC methodology) Change Description: Renumber to 3.2.3.3	NUREG(s)- 1431 Only
SR 3.2.3.4 Bases	AFD (CAOC methodology) Change Description: Renumber to 3.2.3.3	NUREG(s)- 1431 Only
SR 3.2.4.1	QPTR	NUREG(s)- 1431 Only
SR 3.2.4.1 Bases	QPTR	NUREG(s)- 1431 Only

TSTF-110
Rev 2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. More than one rod not within alignment limit.	D.1.1 Verify SDM is ≥ [1.6]% Δk/k.	1 hour
	<u>OR</u>	
	D.1.2 Initiate boration to restore required SDM to within limit.	1 hour
	<u>AND</u>	
	D.2 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.5.1 Verify individual rod positions within alignment limit.	12 hours <u>AND</u> ~~Once within 4 hours and every 4 hours thereafter when the rod position deviation monitor is inoperable~~

(continued)

TSTF-110 Rev 2

BASES

ACTIONS

D.1 (continued)

conditions in an orderly manner and without challenging the plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.5.1

Verification that individual rod positions are within alignment limits at a Frequency of 12 hours provides a history that allows the operator to detect a rod that is beginning to deviate from its expected position. ~~If the rod position deviation monitor is inoperable, a Frequency of 4 hours accomplishes the same goal.~~ The specified Frequency takes into account other rod position information that is continuously available to the operator in the control room, so that during actual rod motion, deviations can immediately be detected.

SR 3.1.5.2

Verifying each control rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each control rod would result in radial or axial power tilts, or oscillations. Exercising each individual control rod every 92 days provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each control rod by 10 steps will not cause radial or axial power tilts, or oscillations, to occur. The 92 day Frequency takes into consideration other information available to the operator in the control room and SR 3.1.5.1, which is performed more frequently and adds to the determination of OPERABILITY of the rods. Between required performances of SR 3.1.5.2 (determination of control rod OPERABILITY by movement), if a control rod(s) is discovered to be immovable, but remains trippable and aligned, the control rod(s) is considered to be OPERABLE. At any time, if a control rod(s) is immovable, a determination of the trippability (OPERABILITY) of the control rod(s) must be made, and appropriate action taken.

(continued)

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify each control bank insertion is within the limits specified in the COLR.	12 hours AND Once within 4 hours and every 4 hours thereafter when the rod insertion limit monitor is inoperable
SR 3.1.7.3	Verify sequence and overlap limits specified in the COLR are met for control banks not fully withdrawn from the core.	12 hours

TSTF-110
Rev 2

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1 (continued)

that point. Performing the ECP calculation within 4 hours prior to criticality avoids a large error from changes in xenon concentration, but allows the operator some flexibility to schedule the ECP calculation with other startup activities.

SR 3.1.7.2

Rev. 1

~~With an OPERABLE bank insertion limit monitor,~~ verification of the control bank insertion limits at a Frequency of 12 hours is sufficient to ~~ensure OPERABILITY of the bank insertion limit monitor and to~~ detect control banks that may be approaching the insertion limits since, normally, very little rod motion occurs in 12 hours. ~~If the insertion limit monitor becomes inoperable, verification of the control bank position at a Frequency of 4 hours is sufficient to detect control banks that may be approaching the insertion limits~~.

SR 3.1.7.3

When control banks are maintained within their insertion limits as checked by SR 3.1.7.2 above, it is unlikely that their sequence and overlap will not be in accordance with requirements provided in the COLR. A Frequency of 12 hours is consistent with the insertion limit check above in SR 3.1.7.2.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10, GDC 26, GDC 28.
2. 10 CFR 50.46.
3. FSAR, Chapter [15].
4. FSAR, Chapter [15].
5. FSAR, Chapter [15].

TSTF-110 Rev 2

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.3.2	-------------------NOTE------------------- Assume logged values of AFD exist during the preceding time interval. -- Verify AFD is within limits and log AFD for each OPERABLE excore channel.	-----NOTE------ Only required to be performed if AFD monitor alarm is inoperable --------------- Once within 15 minutes and every 15 minutes thereafter when THERMAL POWER ≥ 90% RTP <u>AND</u> Once within 1 hour and every 1 hour thereafter when THERMAL POWER < 90% RTP
SR 3.2.3.3 (2)	Update target flux difference of each OPERABLE excore channel by: a. Determining the target flux difference in accordance with SR 3.2.3.4 (3), or b. Using linear interpolation between the most recently measured value, and either the predicted value for the end of cycle or 0% AFD.	Once within 31 EFPD after each refueling <u>AND</u> 31 EFPD thereafter

(continued)

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.3.~~4~~ 3	------------------NOTE------------------ The initial target flux difference after each refueling may be determined from design predictions. -- Determine, by measurement, the target flux difference of each OPERABLE excore channel.	Once within 31 EFPD after each refueling <u>AND</u> 92 EFPD thereafter

TSTF-110
Rev 2

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3A AXIAL FLUX DIFFERENCE (AFD) (Constant Axial Offset Control (CAOC) Methodology)

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the values of the AFD in order to limit the axial power distribution skewing to either the top or bottom of the core. By limiting the amount of power distribution skewing, core peaking factors are consistent with the assumptions used in the safety analyses. Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in axial power distribution control.

The operating scheme used to control the axial power distribution, CAOC, involves maintaining the AFD within a tolerance band around a burnup dependent target, known as the target flux difference, to minimize the variation of the axial peaking factor and axial xenon distribution during unit maneuvers.

The target flux difference is determined at equilibrium xenon conditions. The control banks must be positioned within the core in accordance with their insertion limits and Control Bank D should be inserted near its normal position (i.e., ≥ 210 steps withdrawn) for steady state operation at high power levels. The power level should be as near RTP as practical. The value of the target flux difference obtained under these conditions divided by the Fraction of RTP is the target flux difference at RTP for the associated core burnup conditions. Target flux differences for other THERMAL POWER levels are obtained by multiplying the RTP value by the appropriate fractional THERMAL POWER level.

INSERT FROM pg 34

Periodic updating of the target flux difference value is necessary to follow the change of the flux difference at steady state conditions with burnup.

The Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$) and QPTR LCOs limit the radial component of the peaking factors.

(continued)

TSTF-110
Rev 2

LCO (continued)

be operated outside of the target band but within the acceptable operation limits provided in the COLR. This penalty time is accumulated at the rate of 1 minute for each 1 minute of operating time within the power range of Part B of this LCO (i.e., THERMAL POWER > 50% RTP but < 90% RTP). The cumulative penalty time is the sum of penalty times from Parts B and C of this LCO.

For THERMAL POWER levels > 15% RTP and < 50% RTP (i.e., Part C of this LCO), deviations of the AFD outside of the target band are less significant. The accumulation of 1/2 minute penalty deviation time per 1 minute of actual time outside the target band reflects this reduced significance. With THERMAL POWER < 15% RTP, AFD is not a significant parameter in the assumptions used in the safety analysis and, therefore, requires no limits. Because the xenon distribution produced at THERMAL POWER levels less than RTP does affect the power distribution as power is increased, unanalyzed xenon and power distribution is prevented by limiting the accumulated penalty deviation time.

MOVE TO BACKGROUND (INSERT AS NOTED ON PG 34)

The frequency of monitoring the AFD by the unit computer is once per minute providing an essentially continuous accumulation of penalty deviation time that allows the operator to accurately assess the status of the penalty deviation time.

Violating the LCO on the AFD could produce unacceptable consequences if a Condition 2, 3, or 4 event occurs while the AFD is outside its limits.

Figure B 3.2.3A-1 shows a typical target band and typical AFD acceptable operation limits.

APPLICABILITY

AFD requirements are applicable in MODE 1 above 15% RTP. Above 50% RTP, the combination of THERMAL POWER and core peaking factors are the core parameters of primary importance in safety analyses (Ref. 1).

Between 15% RTP and 90% RTP, this LCO is applicable to ensure that the distributions of xenon are consistent with safety analysis assumptions.

(continued)

TSTF-110
Rev 2

BASES

ACTIONS

D.1 (continued)

previous 24 hours, or the AFD is not within the target band and not within the acceptable operation limits.

Condition D is modified by a Note that requires Action D.1 be completed whenever this Condition is entered.

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

<INSERT FROM pg 31>

<MOVE TO BACKGROUND (pg 28)>

The AFD is monitored on an automatic basis using the unit process computer that has an AFD monitor alarm. The computer determines the 1 minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFDs for two or more OPERABLE excore channels are outside the target band and the THERMAL POWER is > 90% RTP. During operation at THERMAL POWER levels < 90% RTP but > 15% RTP, the computer sends an alarm message when the cumulative penalty deviation time is > 1 hour in the previous 24 hours.

This Surveillance verifies that the AFD as indicated by the NIS excore channels is within the target band ~~and consistent with the status of the AFD monitor alarm.~~ The Surveillance Frequency of 7 days is adequate because the AFD is controlled by the operator and monitored by the process computer. Furthermore, any deviations of the AFD from the target band that is not alarmed should be readily noticed.

~~SR 3.2.3.2~~

~~With the AFD monitor alarm inoperable, the AFD is monitored to detect operation outside of the target band and to compute the penalty deviation time. During operation at ≥ 90% RTP, the AFD is monitored at a Surveillance Frequency of 15 minutes to ensure that the AFD is within its limits at high THERMAL POWER levels. At power levels < 90% RTP, but > 15% RTP, the Surveillance Frequency is reduced to 1 hour because the AFD may deviate from the target band for up to 1 hour using the methodology of Parts B and C of this LCO to calculate the cumulative penalty deviation time before corrective action is required.~~

(continued)

TSTF-110 Rev 2

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.3.2 (1) (continued)

~~SR 3.2.3.2 is modified by a Note that states that monitored and logged values of the AFD are assumed to exist for the preceding 24 hour interval in order for the operator to compute the cumulative penalty deviation time~~. The AFD should be monitored and logged more frequently in periods of operation for which the power level or control bank positions are changing to allow corrective measures when the AFD is more likely to move outside the target band.

SR 3.2.3.3 (2)

This Surveillance requires that the target flux difference is updated at a Frequency of 31 effective full power days (EFPD) to account for small changes that may occur in the target flux differences in that period due to burnup by performing SR 3.2.3.4 (3).

Alternatively, linear interpolation between the most recent measurement of the target flux differences and a predicted end of cycle value provides a reasonable update because the AFD changes due to burnup tend toward 0% AFD. When the predicted end of cycle AFD from the cycle nuclear design is different from 0%, it may be a better value for the interpolation.

SR 3.2.3.4 (3)

Measurement of the target flux difference is accomplished by taking a flux map when the core is at equilibrium xenon conditions, preferably at high power levels with the control banks nearly withdrawn. This flux map provides the equilibrium xenon axial power distribution from which the target value can be determined. The target flux difference varies slowly with core burnup.

A Frequency of 31 EFPD after each refueling and 92 EFPD thereafter for remeasuring the target flux differences adjusts the target flux difference for each excore channel to the value measured at steady state conditions. This is the basis for the CAOC. Remeasurement at this Surveillance interval also establishes the AFD target flux difference

(continued)

TSTF-110
Rev 2

3.2 POWER DISTRIBUTION LIMITS

3.2.3B AXIAL FLUX DIFFERENCE (AFD) (Relaxed Axial Offset Control (RAOC) Methodology)

LCO 3.2.3 The AFD in % flux difference units shall be maintained within the limits specified in the COLR.

-----NOTE-----
The AFD shall be considered outside limits when two or more OPERABLE excore channels indicate AFD to be outside limits.

APPLICABILITY: MODE 1 with THERMAL POWER ≥ 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. AFD not within limits.	A.1 Reduce THERMAL POWER to < 50% RTP.	30 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.3.1 Verify AFD within limits for each OPERABLE excore channel.	7 days ~~AND~~ ~~Once within 1 hour and every 1 hour thereafter with the AFD monitor alarm inoperable~~

TSTF-110
Rev 2

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3B AXIAL FLUX DIFFERENCE (AFD) (Relaxed Axial Offset Control (RAOC) Methodology)

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the values of the AFD in order to limit the amount of axial power distribution skewing to either the top or bottom of the core. By limiting the amount of power distribution skewing, core peaking factors are consistent with the assumptions used in the safety analyses. Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in axial power distribution control.

RAOC is a calculational procedure that defines the allowed operational space of the AFD versus THERMAL POWER. The AFD limits are selected by considering a range of axial xenon distributions that may occur as a result of large variations of the AFD. Subsequently, power peaking factors and power distributions are examined to ensure that the loss of coolant accident (LOCA), loss of flow accident, and anticipated transient limits are met. Violation of the AFD limits invalidate the conclusions of the accident and transient analyses with regard to fuel cladding integrity.

INSERT FROM pg 41

Although the RAOC defines limits that must be met to satisfy safety analyses, typically an operating scheme, Constant Axial Offset Control (CAOC), is used to control axial power distribution in day to day operation (Ref. 1). CAOC requires that the AFD be controlled within a narrow tolerance band around a burnup dependent target to minimize the variation of axial peaking factors and axial xenon distribution during unit maneuvers.

The CAOC operating space is typically smaller and lies within the RAOC operating space. Control within the CAOC operating space constrains the variation of axial xenon distributions and axial power distributions. RAOC calculations assume a wide range of xenon distributions and then confirm that the resulting power distributions satisfy the requirements of the accident analyses.

(continued)

TSTF-110
Rev 2

BASES

ACTIONS

A.1 (continued)

30 minutes is reasonable, based on operating experience, to reach 50% RTP without challenging plant systems.

SURVEILLANCE REQUIREMENTS

MOVE TO BACKGROUND pg 38

SR 3.2.3.1

The AFD is monitored on an automatic basis using the unit process computer, which has an AFD monitor alarm. The computer determines the 1 minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels is outside its specified limits.

This Surveillance verifies that the AFD, as indicated by the NIS excore channel, is within its specified limits ~~and is consistent with the status of the AFD monitor alarm. With the AFD monitor alarm inoperable, the AFD is monitored every hour to detect operation outside its limit. The Frequency of 1 hour is based on operating experience regarding the amount of time required to vary the AFD, and the fact that the AFD is closely monitored. With the AFD monitor alarm OPERABLE,~~ The Surveillance Frequency of 7 days is adequate considering that the AFD is monitored by a computer and any deviation from requirements is alarmed.

REFERENCES

1. WCAP-8403 (nonproprietary), "Power Distribution Control and Load Following Procedures," Westinghouse Electric Corporation, September 1974.

2. R. W. Miller et al., "Relaxation of Constant Axial Offset Control: F_Q Surveillance Technical Specification," WCAP-10217(NP), June 1983.

3. FSAR, Chapter [15].

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.4.1	-------------------NOTES------------------- 1. With input from one Power Range Neutron Flux channel inoperable and THERMAL POWER < 75% RTP, the remaining three power range channels can be used for calculating QPTR. 2. SR 3.2.4.2 may be performed in lieu of this Surveillance if adequate Power Range Neutron Flux channel inputs are not OPERABLE. --- Verify QPTR is within limit by calculation.	7 days AND Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable
SR 3.2.4.2	-------------------NOTE------------------- Only required to be performed if input from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER ≥ 75% RTP. --- Verify QPTR is within limit using the movable incore detectors.	Once within 12 hours AND 12 hours thereafter

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 (continued)

within its limits. The Frequency of 7 days ~~when the QPTR alarm is OPERABLE is acceptable because of the low probability that this alarm can remain inoperable without detection.~~ takes into account other information and alarms available to the operator in the control room.

~~When the QPTR alarm is inoperable, the Frequency is increased to 12 hours. This Frequency is adequate to detect any relatively slow changes in QPTR, because~~ For those causes of QPT that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 3.2.4.2

This Surveillance is modified by a Note, which states that it is required only when the input from one or more Power Range Neutron Flux channels are inoperable and the THERMAL POWER is ≥ 75% RTP.

With an NIS power range channel inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased. Performing SR 3.2.4.2 at a Frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.

For purposes of monitoring the QPTR when one power range channel is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or two sets of four thimble locations with quarter core symmetry. The two sets of four symmetric thimbles is a set of eight unique detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8 for three and four loop cores.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full

(continued)

TSTF-110 Rev 2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify individual CONTROL ROD positions are within [6.5]% of their group average height.	~~4 hours when the asymmetric CONTROL ROD alarm is inoperable~~ ~~AND~~ 12 hours ~~when the asymmetric CONTROL ROD alarm is OPERABLE~~
SR 3.1.4.2	Verify CONTROL ROD freedom of movement (trippability) by moving each individual CONTROL ROD that is not fully inserted ≥ 3% in any direction.	92 days
SR 3.1.4.3	-------------------NOTE------------------- With rod drop times determined with less than four reactor coolant pumps operating, operation may proceed provided operation is restricted to the pump combination operating during the rod drop time determination. -- Verify the rod drop time for each CONTROL ROD, from the fully withdrawn position, is ≤ [1.66] seconds from power interruption at the CONTROL ROD drive breakers to $\frac{3}{4}$ insertion (25% withdrawn position) with T_{avg} ≥ 525°F.	Prior to reactor criticality after each removal of the reactor vessel head

TSTF-110 Rev2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Verify position of each APSR is within [6.5]% of the group average height.	4 hours when the asymmetric CONTROL ROD alarm is inoperable AND 12 hours when the asymmetric CONTROL ROD alarm is OPERABLE

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Verify the absolute position indicator channels and the relative position indicator channels agree within the limit specified in the COLR.	4 hours when the asymmetric CONTROL ROD alarm is inoperable **AND** 12 hours when the asymmetric CONTROL ROD alarm is OPERABLE

TSTF-110 Rev 2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify regulating rod groups are within the sequence and overlap limits as specified in the COLR.	4 hours when the CONTROL ROD drive sequence alarm is inoperable AND 12 hours when the CONTROL ROD drive sequence alarm is OPERABLE
SR 3.2.1.2	Verify regulating rod groups meet the insertion limits as specified in the COLR	4 hours when the regulating rod insertion limit alarm is inoperable AND 12 hours when the regulating rod insertion limit alarm is OPERABLE
SR 3.2.1.3	Verify SDM ≥ 1% Δk/k.	Within 4 hours prior to achieving criticality

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.2.3.1	Verify AXIAL POWER IMBALANCE is within limits as specified in the COLR.	1 hour when AXIAL POWER IMBALANCE alarm is inoperable AND 12 hours when AXIAL POWER IMBALANCE alarm is OPERABLE

TSTF-110
Rev 2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.4.1	Verify QPT is within limits as specified in the COLR.	12 hours when the QPT alarm is inoperable AND 7 days when the QPT alarm is OPERABLE AND When QPT has been restored to less than or equal to the steady state limit, 1 hour for 12 consecutive hours, or until verified acceptable at ≥ 95% RTP

TSTF-110
Rev 2

BASES

ACTIONS (continued)

D.1.1 and D.1.2

When one or more rods are untrippable, the SDM may be adversely affected. Under these conditions, it is important to determine the SDM and, if it is less than the required value, initiate boration until the required SDM is recovered. The Completion Time of 1 hour is adequate for determining SDM and, if necessary, for initiating emergency boration to restore SDM.

In this situation, SDM verification must include the worth of the untrippable rod as well as a rod of maximum worth.

D.2

If the untrippable rod(s) cannot be restored to OPERABLE status, the plant must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

Verification that individual rods are aligned within [6.5]% of their group average height limits at a 12 hour Frequency allows the operator to detect a rod that is beginning to deviate from its expected position. If the asymmetric CONTROL ROD alarm is inoperable, a Frequency of 4 hours is reasonable to prevent large deviations in CONTROL ROD alignment from occurring without detection. The specified Frequency takes into account other rod position information that is continuously available to the operator in the control room, so that during actual rod motion, deviations can immediately be detected.

(continued)

TSTF-110 Rev2

BASES

ACTIONS

A.1 and A.2 (continued)

Required Action A.1 is only practical for instances where small movements of the APSR group are sufficient to re-establish APSR alignment.

The reactor may continue in operation with the APSR misaligned if further movement of the APSR group is prohibited, so that the misalignment does not increase and cause the limits on AXIAL POWER IMBALANCE to be exceeded. The required Completion Time of up to 2 hours will not cause significant xenon redistribution to occur.

B.1

The plant must be brought to a MODE in which the LCO does not apply if the Required Actions and associated Completion Times cannot be met. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours. The Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from RTP in an orderly manner and without challenging plant systems. In MODE 3, APSR group alignment limits are not required because the reactor is not generating THERMAL POWER and excessive local LHRs cannot occur from APSR misalignment.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

Verification at a 12 hour Frequency that individual APSR positions are within [6.5]% of the group average height limits allows the operator to detect an APSR beginning to deviate from its expected position. If the asymmetric CONTROL ROD alarm is inoperable, a 4 hour Frequency is reasonable to prevent large deviations in APSR alignment from occurring without detection. In addition, APSR position is continuously available to the operator in the control room so that during actual rod motion, deviations can immediately be detected.

(continued)

TSTF-110 Rev.2

BASES

ACTIONS (continued)

C.1

If both the absolute position indicator channel and relative position indicator channel are inoperable for one or more rods, or if the Required Actions and associated Completion Times are not met, the position of the rod(s) is not known with certainty. Therefore, each affected rod must be declared inoperable, and the limits of LCO 3.1.4 or LCO 3.1.6 apply. The required Completion Time for declaring the rod(s) inoperable is immediately. Therefore LCO 3.1.4 or LCO 3.1.6 is entered immediately, and the required Completion Times for the appropriate Required Actions in those LCOs apply without delay.

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1

Verification is required that the Absolute Position Indicator channels and Relative Position Indicator channels agree within the limit given in the COLR. This verification ensures that the Relative Position Indicator channels, which are regarded as the potentially less reliable means of position indication, remain OPERABLE and accurate. The required Frequency of 12 hours is adequate for verifying that no degradation in system OPERABILITY has occurred. If the asymmetric CONTROL ROD alarm is inoperable, then the Surveillance is performed every 4 hours. This required Frequency is adequate for ensuring that the CONTROL RODS and APSRs do not exceed their alignment limits.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13.

2. FSAR, Section [14.1.2.2], Section [14.1.2.3], Section [14.1.2.6], Section [14.1.2.7], Section [14.2.2.4], and Section [14.2.2.5].

TSTF-110
Rev 2

BASES

ACTIONS (continued)

C.2.2

The SDM and ejected rod worth limit can also be restored by reducing the THERMAL POWER to a value allowed by the regulating rod insertion limits in the COLR. The required Completion Time of 2 hours is sufficient to allow the operator to complete the power reduction in an orderly manner and without challenging the plant systems. Operation for up to 2 hours more in the restricted region shown in the COLR is acceptable, based on the low probability of an event occurring simultaneously with the limit out of specification in this relatively short time period. In addition, it precludes long term depletion with abnormal group insertions or configurations and limits the potential for an adverse xenon redistribution.

D.1

If the regulating rods cannot be restored to within the acceptable operating limits for the original THERMAL POWER, or if the power reduction cannot be completed within the required Completion Time, then the reactor is placed in MODE 3, in which this LCO does not apply. This Action ensures that the reactor does not continue operating in violation of the peaking limits, the ejected rod worth, the reactivity insertion rate assumed as initial conditions in the accident analyses, or the required minimum SDM assumed in the accident analyses. The required Completion Time of 6 hours is reasonable, based on operating experience regarding the amount of time required to reach MODE 3 from RTP without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1

This Surveillance ensures that the sequence and overlap limits are not violated. A Surveillance Frequency of 12 hours ~~or 4 hours, depending on whether the CONTROL ROD drive sequence alarm is OPERABLE or not,~~ is acceptable because little rod motion occurs in ~~4~~ 12 hours due to fuel burnup, and the probability of a deviation occurring simultaneously with an inoperable sequence monitor in this relatively short time frame is low. Also, the Frequency

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TSTF-110 Rev 2

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1 (continued)

takes into account other information available in the control room for monitoring the status of the regulating rods.

SR 3.2.1.2

With an OPERABLE regulating rod insertion limit alarm, verification of the regulating rod insertion limits as specified in the COLR at a Frequency of 12 hours is sufficient to ensure the OPERABILITY of the regulating rod insertion limit alarm and to detect regulating rod banks that may be approaching the group insertion limits, because little rod motion due to fuel burnup occurs in 12 hours. If the insertion limit alarm becomes inoperable, verification of the regulating rod group position at a Frequency of 4 hours is sufficient to detect whether the regulating rod groups may be approaching or exceeding their group insertion limits, although more frequent surveillance is prudent if the regulating rod insertion limit alarm is not OPERABLE. Also, the Frequency takes into account other information available in the control room for monitoring the status of the regulating rods.

SR 3.2.1.3

Prior to achieving criticality, an estimated critical position for the CONTROL RODS is determined. Verification that SDM meets the minimum requirements ensures that sufficient SDM capability exists with the CONTROL RODS at the estimated critical position if it is necessary to shut down or trip the reactor after criticality. The Frequency of 4 hours prior to criticality provides sufficient time to verify SDM capability and establish the estimated critical position.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10 and GDC 26.
2. 10 CFR 50.46.

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TSTF-110
Rev 2

BASES

SURVEILLANCE REQUIREMENTS (continued)

Incore Detector System consists of OPERABLE detectors configured as follows:

a. Nine detectors shall be arranged such that there are three detectors in each of three strings and there are three detectors lying in the same axial plane, with one plane at the core midplane and one plane in each axial core half;

b. The axial planes in each core half shall be symmetrical about the core midplane; and

c. The detector strings shall not have radial symmetry.

Figure B 3.2.3-1 (Minimum Incore Detector System for AXIAL POWER IMBALANCE Measurement) depicts an example of this configuration. This arrangement is chosen to reduce the uncertainty in the measurement of the AXIAL POWER IMBALANCE by the Minimum Incore Detector System. For example, the requirement for placing one detector of each of the three strings at the core midplane puts three detectors in the central region of the core where the neutron flux tends to be higher. It also helps prevent measuring an AXIAL POWER IMBALANCE that is excessively large when the reactor is operating at low THERMAL POWER levels. The third requirement for placement of detectors (i.e., radial asymmetry) reduces uncertainty by measuring the neutron flux at core locations that are not radially symmetric.

SR 3.2.3.1

If the plant computer becomes inoperable, then the Excore System or Minimum Incore Detector System may be used to monitor the AXIAL POWER IMBALANCE. Although these systems do not provide a direct calculation and display of the AXIAL POWER IMBALANCE, a 1 hour Frequency provides reasonable time between calculations for detecting any trends in the AXIAL POWER IMBALANCE that may exceed its alarm setpoint and for undertaking corrective action.

When the Full Incore Detector System is OPERABLE, the operator receives an alarm if the AXIAL POWER IMBALANCE increases to its alarm setpoint. When the AXIAL POWER IMBALANCE is less then the alarm setpoint, verification of the AXIAL POWER IMBALANCE indication every 12 hours ensures

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TSTF-110
Rev 2

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1 (continued)

that the AXIAL POWER IMBALANCE limits are not violated and verifies that the alarm system is OPERABLE. This Surveillance Frequency is acceptable because the mechanisms that can cause AXIAL POWER IMBALANCE, such as xenon redistribution or CONTROL ROD drive mechanism malfunctions that cause slow AXIAL POWER IMBALANCE increases, can be discovered by the operator before the specified limits are violated.

takes into account other information and alarms available in the control room

REFERENCES

1. 10 CFR 50.46.
2. FSAR, Chapter [15].

SURVEILLANCE REQUIREMENTS (continued)

differences in the errors applicable for these systems. For QPT measurements using the Incore Detector System, the Minimum Incore Detector System consists of OPERABLE detectors configured as follows:

a. Two sets of four detectors shall lie in each core half. Each set of detectors shall lie in the same axial plane. The two sets in the same core half may lie in the same axial plane.

b. Detectors in the same plane shall have quarter core radial symmetry.

Figure B 3.2.4-2 (Minimum Incore Detector System for QPT Measurement) depicts an example of this configuration. The symmetric incore system for QPT uses the Incore Detector System as described above and is configured such that at least 75% of the detectors in each core quadrant are OPERABLE.

SR 3.2.4.1

Should the plant computer become inoperable, then the Excore System or Minimum Incore Detector System may be used to monitor the QPT. Because these systems do not provide a direct calculation and display of the QPT, performing the calculations at a 12 hour Frequency is sufficient to follow any changes in the QPT that may approach the setpoint because with the exception of CONTROL ROD related effects detected by other systems, QPT changes are slow. This Frequency also provides operators sufficient time to undertake corrective actions if QPT approaches the setpoints.

When the full symmetrical Incore Detector System is in use, the operator receives an alarm, if QPT increases to the alarm setpoint. When QPT is less than the alarm setpoint, checking the QPT indication every 7 days ensures that the operator can determine whether the plant computer software and Incore Detector System inputs for monitoring QPT are functioning properly, and that the monitoring and alarm system remains OPERABLE. This procedure allows the QPT mechanisms, such as xenon redistribution, burnup gradients, and CONTROL ROD drive mechanism malfunctions, which can cause slow development of a QPT, to be detected. Operating

takes into account other information and alarms available to the operator in the control room

(continued)