Industry/TSTF Standard Technical Specification Change Traveler

Correct logarithmic power vs. RTP

Classification: 1) Correct Specifications

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

Description:

Several footnotes associated with Table 3.3.1-1, a Note associated with SR 3.3.1.7, an Allowable value in Table 3.3.1-1, LCO 3.3.2, and the Applicability of LCO 3.3.2 refer to THERMAL POWER and RTP in conjunction with nuclear instrumentation that reads out logarithmic power. This change revises these statements and their associated Bases to more accurately reflect the parameter being measured by referring to "logarithmic power" instead of "THERMAL POWER" and replacing "% RTP" with "%" where appropriate.

Also, these footnotes identify operating bypass permissive and trip enable requirements. The wording of these footnotes has been revised to clarify the requirements, consistent with the descriptions provided in the Bases, to prevent possible confusion and misinterpretation of the requirements.

In addition, the Pressurizer Pressure - Low Trip and the SIAS Function are changed from being bypassed when RCS pressure is below 400 psia to when it is below 500 psia.

Justification:

The use of the terms "THERMAL POWER" and "% RTP" is inappropriate in conjunction with the 1E-4 bistables. The parameter used when in this range of reactor power is logarithmic power. THERMAL POWER is defined in Section 1.0 as the total reactor core heat transfer rate to the reactor coolant. RTP is defined as a total reactor core heat transfer rate to the reactor coolant of [3410] MWt. THERMAL POWER, as defined, does not drop to 1E-4% RTP during any normal shutdown interval and therefore can not provide the plant protection function correlation required by the safety analysis. However, the neutron flux, as measured by logarithmic power, does. Since the nuclear instrumentation measures the logarithmic power as a percent, it is more appropriate to replace the term "THERMAL POWER" with the term "logarithmic power," and the term "% RTP" with "%" in these footnotes.

Footnotes associated with Table 3.3.1-1 that identify operating bypass permissive and trip enable requirements contain wording that results in confusion with verbatim compliance. For example, footnote (a) requires the bypass to be automatically removed when THERMAL POWER is </=[1E-4]% RTP. If the bypass is manually removed prior to the automatic removal, is verbatim compliance met? More properly, the footnote should allow the bypass to be instituted and capable of automatic removal when above [1E-4]%, for this specific footnote. This will ensure that the bypass automatic removal capability is available while allowing the operator to manually enable the trip function as plant conditions allow. The footnotes also discuss "trip" and "bypass" one after the other. This existing wording is not human factored as it requires a change in thought process. The proposed wording presents a more consistent approach, from the human factors standpoint, by discussing this feature in the terms of the bypass status only.

Several CE plants have all made submittals revising their Technical Specifications to correct these problems. However, each plant chose different methods in dealing with the issues. By letter dated January 4, 1999, addressed to Mr. J. Davis, NEI, Mr. W. Beckner, Technical Specifications Branch, requested the CEOG resolve this issue on a generic basis. This generic change is intended to provide a suitable revision to provide for more consistency between the CEOG utilities.

The Pressurizer Pressure - Low Trip and the SIAS Function are changed from being bypassed when RCS pressure is below 400 psia to when it is below 500 psia to maintain consistency with the last sentence in Insert B and with NUREG-1431.

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7/16/99

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: CEOG

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 20-Jan-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 20-Jan-99

TSTF Review Information

TSTF Received Date: 20-Jan-99 Date Distributed for Review 03-Feb-99

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

TSTF Comments:
CEOG Only

TSTF Resolution: Approved Date: 08-Feb-99

NRC Review Information

NRC Received Date: 12-Feb-99

NRC Comments:

6/16/99 - CSS has minor changes.
6/17/99 - TSTF to get back to CSS.
6/29/99 - NRC Comments:
1) Revise Insert B to replace [500] with [400] for the pressurizer pressure to maintain consistency with the last sentence in Insert B and with NUREG-1431.

2) Make a global change to Inserts A, B, C and D by replacing "bypass" with "trip bypass." This change is needed because as used in Notes A, B, C, and D "bypass" is jargon referring to the reactor protection system design feature for placing a reactor trip channel in a condition which removes the channel from the specified function trip logic.

Final Resolution: Superceded by Revision Final Resolution Date: 17-Jul-99

TSTF Revision 1 Revision Status: Active Next Action: NRC

Revision Proposed by: NRC

Revision Description:
Revised to address NRC comments:
1. All of the values in insert B are revised to be consistent and to be 500 psia. As a result, Bases changes are needed. The last sentence of the section LCO #4 "Pressurizer Pressure-Low" on page B 3.3-20 should be deleted. This sentence is there to explain why there is a difference in the setpoints. Since we would be making the setpoints the same, this sentence is not longer necessary. The first sentence of the first complete paragraph in section LCO #4 "Pressurizer Pressure-Low" on page B 3.3-20 has 400 psia changed to 500

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

psia.

2. In the second line of inserts A, B, C and D, the term "when" has been replaced with the term "whenever."

TSTF Review Information

TSTF Received Date: 17-Jul-99 Date Distributed for Review 17-Jul-99

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

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 17-Jul-99

Incorporation Into the NUREGs

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

NUREG Rev Incorporated:

Affected Technical Specifications

S/A 3.3.1 Bases	RPS Instrumentation - Operating (Digital)
LCO 3.3.1	RPS Instrumentation - Operating (Digital) Change Description: Table3.3.1-1
LCO 3.3.1 Bases	RPS Instrumentation - Operating (Digital)
SR 3.3.1.7	RPS Instrumentation - Operating (Digital)
SR 3.3.1.7 Bases	RPS Instrumentation - Operating (Digital)
S/A 3.3.2	RPS Instrumentation - Shutdown (Digital)
LCO 3.3.2	RPS Instrumentation - Shutdown (Digital)
LCO 3.3.2	RPS Instrumentation - Shutdown (Digital)
Appl. 3.3.2	RPS Instrumentation - Shutdown (Digital)
Appl. 3.3.2	RPS Instrumentation - Shutdown (Digital)

INSERT A

Bypass may be enabled when logarithmic power is > [1E-4] % and shall be capable of automatic removal whenever logarithmic power is > [1E-4] %. Bypass shall be removed prior to reducing logarithmic power to a value ≤ [1E-4] %.

INSERT B

Bypass may be enabled when pressurizer pressure is < [500] psia and shall be capable of automatic removal whenever pressurizer pressure is < [500] psia. Bypass shall be removed prior to raising pressurizer pressure to a value ≥ [500] psia.

INSERT C

Bypass may be enabled when logarithmic power is < [1E-4] % and shall be capable of automatic removal whenever logarithmic power is < [1E-4] %. Bypass shall be removed prior to raising logarithmic power to a value ≥ [1E-4] %. During testing pursuant to LCO 3.4.17, bypass may be enabled when THERMAL POWER is < [5] % RTP and shall be capable of automatic removal whenever THERMAL POWER is < [5] % RTP. Bypass shall be removed above 5 % RTP.

INSERT D

Bypass may be enabled when THERMAL POWER is < [55] % RTP and shall be capable of automatic removal whenever THERMAL POWER is < [55] % RTP. Bypass shall be removed prior to raising THERMAL POWER to a value ≥ [55] % RTP.

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SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.3.1.5	NOTE Not required to be performed until 12 hours after THERMAL POWER ≥ 70% RTP.	
	Verify total RCS flow rate indicated by each CPC is less than or equal to the RCS flow determined by calorimetric calculations.	31 days
SR 3.3.1.6	NOTE Not required to be performed until 12 hours after THERMAL POWER ≥ 15% RTP.	
	Verify linear power subchannel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the CPCs.	31 days
SR 3.3.1.7	NOTES 1. The CPC CHANNEL FUNCTIONAL TEST shall include verification that the correct values of addressable constants are installed in each OPERABLE CPC. 2. Not required to be performed for logarithmic power level channels until 2 hours after reducing THERMAL POWER below 1E-4% RTP and only if reactor trip circuit breakers (RTCBs) are closed.	
	Perform CHANNEL FUNCTIONAL TEST on each channel except Loss of Load and power range neutron flux.	92 days

(continued)

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Table 3.3.1-1 (page 1 of 3)
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Linear Power Level—High	1,2	SR 3.3.1.1 SR 3.3.1.4 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.8 SR 3.3.1.10 SR 3.3.1.14	≤ [111.3]% RTP
2. Logarithmic Power Level—High[(a)]	2[(b)]	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.13 SR 3.3.1.14	≤ [.96]% RTP
3. Pressurizer Pressure—High	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≤ [2389] psia
4. Pressurizer Pressure—Low[(c)]	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.13 SR 3.3.1.14	≥ [1763] psig
5. Containment Pressure—High	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≤ [3.14] psig
6. Steam Generator #1 Pressure—Low	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≥ [711] psia
7. Steam Generator #2 Pressure—Low	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≥ [711] psia

(continued)

<INSERT A>

(a) Trip may be bypassed when THERMAL POWER is > [1E-4]% RTP. Bypass shall be automatically removed when THERMAL POWER is ≤ [1E-4]% RTP. Trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops—Test Exceptions."

(b) When any RTCB is closed.

(c) The setpoint may be decreased to a minimum value of [500] psia, as pressurizer pressure is reduced, provided the margin between pressurizer pressure and the setpoint is maintained ≤ [400] psi. Trip may be bypassed when pressurizer pressure is ≤ [400] psia. Bypass shall be automatically removed when pressurizer pressure is ≥ [500] psia. The setpoint shall be automatically increased to the normal setpoint as pressurizer pressure is increased.

<INSERT B>

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Table 3.3.1-1 (page 2 of 3)
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
8. Steam Generator #1 Level—Low	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≥ [24.23]%
9. Steam Generator #2 Level—Low	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≥ [24.23]%
10. Steam Generator #1 Level—High	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≤ [90.74]%
11. Steam Generator #2 Level—High	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.14	≤ [90.74]%
12. Reactor Coolant Flow—Low[d]	1,2	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 [SR 3.3.1.13] SR 3.3.1.14	Ramp: ≤ [0.231] psid/sec Floor: ≥ [12.1] psid Step: [7.231] psid
13. Loss of Load (turbine stop valve control oil pressure)[e]	1	SR 3.3.1.9 SR 3.3.1.10 [SR 3.3.1.13]	≥ [100] psig

<INSERT C>

(contin

(d) Trip may be bypassed when THERMAL POWER is < [1E-4]% RTP. Bypass shall be automatically removed when THERMAL POWER is ≥ [1E-4]% RTP. During testing pursuant to LCO 3.4.17, trip may be bypassed below 5% RTP. Bypass shall be automatically removed when THERMAL POWER is ≥ 5% RTP.

(e) Trip may be bypassed when THERMAL POWER is < [50]% RTP. Bypass shall be automatically removed when THERMAL POWER is ≥ [50]% RTP.

<INSERT D>

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Table 3.3.1-1 (page 3 of 3)
Reactor Protective System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
14. Local Power Density—High[(d)]	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13 SR 3.3.1.14	≤ [21.0] kW/ft
15. Departure From Nucleate Boiling Ratio (DNBR)—Low[(d)]	1,2	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.3 SR 3.3.1.4 SR 3.3.1.5 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.11 SR 3.3.1.12 SR 3.3.1.13 SR 3.3.1.14	≥ [1.31]

<INSERT C>

(d) Trip may be bypassed when THERMAL POWER is < [1E-4]% RTP. Bypass shall be automatically removed when THERMAL POWER is ≥ [1E-4]% RTP. During testing pursuant to LCO 3.4.17, trip may be bypassed below 5% RTP. Bypass shall be automatically removed when THERMAL POWER is > 5% RTP.

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3.3 INSTRUMENTATION

3.3.2 Reactor Protective System (RPS) Instrumentation—Shutdown (Digital)

LCO 3.3.2 Four RPS Logarithmic Power Level—High trip channels and associated instrument and bypass removal channels shall be OPERABLE. Trip channels shall have an Allowable Value of ≤ [.93]% RTP.

APPLICABILITY: MODES 3, 4, and 5, with any reactor trip circuit breakers (RTCBs) closed and any control element assembly capable of being withdrawn.

<INSERT A> →

NOTE

Trip may be bypassed when THERMAL POWER is > [1E-4]% RTP.
Bypass shall be automatically removed when THERMAL POWER is ≤ [1E-4]% RTP.

ACTIONS

NOTE

If a channel is placed in bypass, continued operation with the channel in the bypassed condition for the Completion Time specified by Required Action A.2 or C.2.2 shall be reviewed in accordance with Specification 5.5.1.2.e.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RPS logarithmic power level trip channel inoperable.	A.1 Place channel in bypass or trip. AND	1 hour
	A.2 Restore channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry

(continued)

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APPLICABLE SAFETY ANALYSES (continued)

2. Logarithmic Power Level—High

The Logarithmic Power Level—High trip protects the integrity of the fuel cladding and helps protect the RCPB in the event of an unplanned criticality from a shutdown condition.

In MODES 2, 3, 4, and 5, with the RTCBs closed and the CEA Drive System capable of CEA withdrawal, protection is required for CEA withdrawal events originating when logarithmic power THERMAL POWER is < 1E-4% RTP. For events originating above this power level, other trips provide adequate protection.

MODES 3, 4, and 5, with the RTCBs closed, are addressed in LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation—Shutdown."

In MODES 3, 4, or 5, with the RTCBs open or the CEAs not capable of withdrawal, the Logarithmic Power Level—High trip does not have to be OPERABLE. However, the indication and alarm portion of two logarithmic channels must be OPERABLE to ensure proper indication of neutron population and to indicate a boron dilution event. The indication and alarm functions are addressed in LCO 3.3.13, "[Logarithmic] Power Monitoring Channels."

3. Pressurizer Pressure—High

The Pressurizer Pressure—High trip provides protection for the high RCS pressure SL. In conjunction with the pressurizer safety valves and the main steam safety valves (MSSVs), it provides protection against overpressurization of the RCPB during the following events:

- Loss of Electrical Load Without a Reactor Trip Being Generated by the Turbine Trip (AOO);
- Loss of Condenser Vacuum (AOO);
- CEA Withdrawal From Low Power Conditions (AOO);
- Chemical and Volume Control System Malfunction (AOO); and

(continued)

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BASES

LCO (continued) channel is inoperable if its actual trip setpoint is not within its required Allowable Value. Each Allowable Value specified is more conservative than the analytical limit assumed in the safety analysis in order to account for instrument uncertainties appropriate to the trip Function. These uncertainties are defined in the "Plant Protection System Selection of Trip Setpoint Values". (Ref. 7).

The Bases for the individual Function requirements are as follows:

1. Linear Power Level—High

This LCO requires all four channels of Linear Power Level—High to be OPERABLE in MODES 1 and 2.

The Allowable Value is high enough to provide an operating envelope that prevents unnecessary Linear Power Level—High reactor trips during normal plant operations. The Allowable Value is low enough for the system to maintain a margin to unacceptable fuel cladding damage should a CEA ejection accident occur.

2. Logarithmic Power Level—High

This LCO requires all four channels of Logarithmic Power Level—High to be OPERABLE in MODE 2, and in MODE 3, 4, or 5 when the RTCBs are shut and the CEA Drive System is capable of CEA withdrawal.

The MODES 3, 4, and 5 Condition is addressed in LCO 3.3.2.

The Allowable Value is high enough to provide an operating envelope that prevents unnecessary Logarithmic Power Level—High reactor trips during normal plant operations. The Allowable Value is low enough for the system to maintain a margin to unacceptable fuel cladding damage should a CEA withdrawal event occur.

logarithmic power

The Logarithmic Power Level—High trip may be bypassed when THERMAL POWER is above 1E-4% RTP to allow the reactor to be brought to power during a reactor startup. This bypass is automatically removed when THERMAL POWER decreases below 1E-4% RTP. Above

(continued)

LCO

2. Logarithmic Power Level—High (continued)

1E-4% RTP, the Linear Power Level—High and Pressurizer Pressure—High trips provide protection for reactivity transients.

The trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops—Test Exceptions." During this testing, the Linear Power Level—High trip and administrative controls provide the required protection.

3. Pressurizer Pressure—High

This LCO requires four channels of Pressurizer Pressure—High to be OPERABLE in MODES 1 and 2.

The Allowable Value is set below the nominal lift setting of the pressurizer code safety valves, and its operation avoids the undesirable operation of these valves during normal plant operation. In the event of a complete loss of electrical load from 100% power, this setpoint ensures the reactor trip will take place, thereby limiting further heat input to the RCS and consequent pressure rise. The pressurizer safety valves may lift to prevent overpressurization of the RCS.

4. Pressurizer Pressure—Low

This LCO requires four channels of Pressurizer Pressure—Low to be OPERABLE in MODES 1 and 2.

The Allowable Value is set low enough to prevent a reactor trip during normal plant operation and pressurizer pressure transients. However, the setpoint is high enough that with a LOCA, the reactor trip will occur soon enough to allow the ESF systems to perform as expected in the analyses and mitigate the consequences of the accident.

The trip setpoint may be manually decreased to a minimum value of 300 psia as pressurizer pressure is reduced during controlled plant shutdowns, provided the margin between the pressurizer pressure and the setpoint is maintained < 400 psia. This allows for

(continued)

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BASES

LCO

4. Pressurizer Pressure—Low (continued)

controlled depressurization of the RCS while still maintaining an active trip setpoint until the time is reached when the trip is no longer needed to protect the plant. Since the same Pressurizer Pressure—Low bistable is also shared with the SIAS, an inadvertent SIAS actuation is also prevented. The setpoint increases automatically as pressurizer pressure increases, until the trip setpoint is reached.

The Pressurizer Pressure—Low trip and the SIAS Function may be simultaneously bypassed when RCS pressure is below 500 psia, when neither the reactor trip nor an inadvertent SIAS actuation are desirable and these Functions are no longer needed to protect the plant. The bypass is automatically removed as RCS pressure increases above 500 psia. The difference between the bypass enable and removal features allows for bypass permissive bistable hysteresis and allows setting the bypass setpoint close enough to the limit so as to avoid inadvertent actuation at the 300 psia trip setpoint minimum value.

5. Containment Pressure—High

The LCO requires four channels of Containment Pressure—High to be OPERABLE in MODES 1 and 2.

The Allowable Value is set high enough to allow for small pressure increases in containment expected during normal operation (i.e., plant heatup) and is not indicative of an abnormal condition. It is set low enough to initiate a reactor trip when an abnormal condition is indicated.

6, 7. Steam Generator Pressure—Low

This LCO requires four channels of Steam Generator #1 Pressure—Low and Steam Generator #2 Pressure—Low to be OPERABLE in MODES 1 and 2.

This Allowable Value is sufficiently below the full load operating value for steam pressure so as not to interfere with normal plant operation, but still high enough to provide the required protection in the event

(continued)

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BASES

LCO (continued)

10, 11. Steam Generator Level—High

This LCO requires four channels of Steam Generator #1 Level—High and Steam Generator #2 Level—High to be OPERABLE in MODES 1 and 2.

The Allowable Value is high enough to allow for normal plant operation and transients without causing a reactor trip. It is set low enough to ensure a reactor trip occurs before the level reaches the steam dryers. Having steam generator water level at the trip value is indicative of the plant not being operated in a controlled manner.

This trip and the Steam Generator Level—Low trip may be manually bypassed simultaneously when cold leg temperature is below the specified limit to allow for CEA withdrawal during testing with the steam generators in wet layup. The bypass is automatically removed when cold leg temperature reaches 200°F. Below 200°F the plant is in shutdown cooling; therefore, the steam generators are not required for heat removal.

12. Reactor Coolant Flow—Low

This LCO requires four channels of Reactor Coolant Flow—Low to be OPERABLE in MODES 1 and 2. The Allowable Value is set low enough to allow for slight variations in reactor coolant flow during normal plant operations while providing the required protection. Tripping the reactor ensures that the resultant power to flow ratio provides adequate core cooling to maintain DNBR under the expected pressure conditions for this event.

logarithmic

The Reactor Coolant Flow—Low trip may be manually bypassed when ~~reactor~~ power is less than 1E-4% ~~RTP~~. This allows for de-energization of one or more RCPs (e.g., for plant cooldown), while maintaining the ability to keep the shutdown CEA banks withdrawn from the core if desired.

LCO 3.4.5, "RCS Loops—MODE 3," LCO 3.4.6, "RCS Loops—MODE 4," and LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," ensure adequate RCS flow rate is

(continued)

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BASES

LCO

12. Reactor Coolant Flow—Low (continued)

logarithmic power → THERMAL POWER

maintained. The bypass is automatically removed when THERMAL POWER increases above 1E-4% RTP as sensed by the wide range (logarithmic) nuclear instrumentation. When below the power range, the Reactor Coolant Flow—Low is not required for plant protection.

13. Loss of Load

This LCO requires four channels of Loss of Load trip to be OPERABLE in MODES 1 and 2.

The Steam Bypass Control System is capable of passing 45% of the full power main steam flow (45% RTP bypass capability) directly to the condenser without causing the MSSVs to lift. The Nuclear Steam Supply System is capable of absorbing a 10% step change in power when a primary to secondary system energy mismatch occurs, without causing the pressurizer safety valves to lift. This means that the plant can sustain a turbine trip without causing the pressurizer safety valves or the MSSV to lift, provided power is $\leq$ 55% RTP. Therefore, the Loss of Load trip may be bypassed when reactor power is $\leq$ 55% RTP, as sensed by the power range nuclear instrumentation. Both the bypass and bypass removal, when above 55% power, are automatically performed.

Loss of Load trip is equipment protective and not credited in the accident analysis. As such, the 55% bypass power permissive is a nominal value and does not include any instrument uncertainties.

14. Local Power Density—High

This LCO requires four channels of LPD—High to be OPERABLE.

The LCO on the CPCs ensures that the SLs are maintained during all AOOs and the consequences of accidents are acceptable.

A CPC is not considered inoperable if CEAC inputs to the CPC are inoperable. The Required Actions required

(continued)

LCO

14. Local Power Density—High (continued)

in the event of CEAC channel failures ensure the CPCs are capable of performing their safety Function.

The CPC channels may be manually bypassed below 1E-4% RTP, as sensed by the logarithmic nuclear instrumentation. This bypass is enabled manually in all four CPC channels when plant conditions do not warrant the trip protection. The bypass effectively removes the DNBR—Low and LPD—High trips from the RPS Logic circuitry. The operating bypass is automatically removed when enabling bypass conditions are no longer satisfied.

This operating bypass is required to perform a plant startup, since both CPC generated trips will be in effect whenever shutdown CEAs are inserted. It also allows system tests at low power with Pressurizer Pressure—Low or RCPs off.

During special testing pursuant to LCO 3.4.17, the CPC channels may be manually bypassed when THERMAL POWER is below 5% RTP to allow special testing without generating a reactor trip. The Linear Power Level—High trip setpoint is reduced, so as to provide protection during testing.

15. Departure from Nucleate Boiling Ratio (DNBR)—Low

This LCO requires four channels of DNBR—Low to be OPERABLE.

The LCO on the CPCs ensures that the SLs are maintained during all AOOs and the consequences of accidents are acceptable.

A CPC is not considered inoperable if CEAC inputs to the CPC are inoperable. The Required Actions required in the event of CEAC channel failures ensure the CPCs are capable of performing their safety Function.

The CPC channels may be manually bypassed below 1E-4% RTP, as sensed by the logarithmic nuclear instrumentation. This bypass is enabled manually in all four CPC channels when plant conditions do not

(continued)

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.6 (continued)

are still proper. Power must be > 15% because the CPCs do not use the excore generated signals for axial flux shape information at low power levels. The Note allowing 12 hours after reaching 15% RTP is required for plant stabilization and testing.

The 31 day Frequency is adequate because the demonstrated long term drift of the instrument channels is minimal.

SR 3.3.1.7

A CHANNEL FUNCTIONAL TEST on each channel except Loss of Load, power range neutron flux, and logarithmic power level channels is performed every 92 days to ensure the entire channel will perform its intended function when needed. The SR is modified by two Notes. Note 1 is a requirement to verify the correct CPC addressable constant values are installed in the CPCs when the CPC CHANNEL FUNCTIONAL TEST is performed. Note 2 allows the CHANNEL FUNCTIONAL TEST for the Logarithmic Power Level—High channels to be performed 2 hours after power drops below 1E-4% RTP and is required to be performed only if the RTCBs are closed.

logarithmic

In addition to power supply tests, the RPS CHANNEL FUNCTIONAL TEST consists of three overlapping tests as described in Reference 8. These tests verify that the RPS is capable of performing its intended function, from bistable input through the RTCBs. They include:

Bistable Tests

A test signal is superimposed on the input in one channel at a time to verify that the bistable trips within the specified tolerance around the setpoint. This is done with the affected RPS channel trip channel bypassed. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint analysis.

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the interval between surveillance interval extension analysis. The requirements for this review are outlined in Reference [9].

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BASES (continued)

APPLICABLE SAFETY ANALYSES

The RPS functions to maintain the SLs during AOOs and mitigates the consequence of DBAs in all MODES in which the RTCBs are closed.

Each of the analyzed transients and accidents can be detected by one or more RPS Functions. Functions not specifically credited in the accident analysis were qualitatively credited in the safety analysis and the NRC staff approved licensing basis for the plant. Noncredited Functions include the Steam Generator Water Level—High and the Loss of Load. The Steam Generator Water Level—High and the Loss of Load trips are purely equipment protective, and their use minimizes the potential for equipment damage.

The Logarithmic Power Level—High trip protects the integrity of the fuel cladding and helps protect the RCPB in the event of an unplanned criticality from a shutdown condition.

In MODES 2, 3, 4, and 5, with the RTCBs closed, and the Control Element Assembly (CEA) Drive System capable of CEA withdrawal, protection is required for CEA withdrawal events originating when logarithmic power is < 1E-4% RTP. For events originating above this power level, other trips provide adequate protection.

MODES 3, 4, and 5, with the RTCBs closed, are addressed in this LCO. MODE 2 is addressed in LCO 3.3.1.

In MODES 3, 4, or 5, with the RTCBs open or the CEAs not capable of withdrawal, the Logarithmic Power Level—High trip does not have to be OPERABLE. However, the indication and alarm portion of two logarithmic channels must be OPERABLE to ensure proper indication of neutron population and to indicate a boron dilution event. The indication and alarm functions are addressed in LCO 3.3.13.

The RPS satisfies Criterion 3 of the NRC Policy Statement.

LCO

The LCO requires the Logarithmic Power Level—High RPS Function to be OPERABLE. Failure of any required portion of the instrument channel renders the affected channel(s) inoperable and reduces the reliability of the affected Function.

(continued)

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LCO (continued)

Actions allow maintenance (trip channel) bypass of individual channels, but the bypass activates interlocks that prevent operation with a second channel in the same Function bypassed. With one channel in each Function trip channel bypassed, this effectively places the plant in a two-out-of-three logic configuration in those Functions. Plants are restricted to 48 hours in a trip channel bypass condition before either restoring the function to four channel operation (two-out-of-four logic) or placing the channel in trip (one-out-of-three logic).

Only the Allowable Values are specified for this RPS trip Function in the LCO. Nominal trip setpoints are specified in the plant specific setpoint calculations. The nominal setpoint is selected to ensure the setpoint measured by CHANNEL FUNCTIONAL TESTS does not exceed the Allowable Value if the bistable is performing as required. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that operation and testing are consistent with the assumptions of the plant specific setpoint calculations. Each Allowable Value specified is more conservative than the analytical limit assumed in the safety analysis in order to account for instrument uncertainties appropriate to the trip Function. These uncertainties are defined in the "Plant Protection System Selection of Trip Setpoint Values" (Ref. 4). A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.

This LCO requires all four channels of the Logarithmic Power Level—High to be OPERABLE in MODE 2, and in MODE 3, 4, or 5 when the RTCBs are closed and the CEA Drive System is capable of CEA withdrawal.

The Allowable Value is high enough to provide an operating envelope that prevents unnecessary Logarithmic Power Level—High reactor trips during normal plant operations. The Allowable Value is low enough for the system to maintain a safety margin for unacceptable fuel cladding damage should a CEA withdrawal event occur.

logarithmic power

The Logarithmic Power Level—High trip may be bypassed when ~~THERMAL POWER~~ is above 1E-4% ~~RTP~~ to allow the reactor to be brought to power during a reactor startup. This bypass is automatically removed when ~~THERMAL POWER~~ decreases below 1E-4% ~~RTP~~. Above 1E-4% ~~RTP~~, the Linear Power Level—High

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LCO (continued)

and Pressurizer Pressure—High trips provide protection for reactivity transients.

The trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops—Test Exceptions." During this testing, the Linear Power Level—High trip and administrative controls provide the required protection.

APPLICABILITY

Most RPS trips are required to be OPERABLE in MODES 1 and 2 because the reactor is critical in these MODES. The trips are designed to take the reactor subcritical, which maintains the SLs during AOOs and assists the Engineered Safety Features Actuation System (ESFAS) in providing acceptable consequences during accidents. Most trips are not required to be OPERABLE in MODES 3, 4, and 5. In MODES 3, 4, and 5, the emphasis is placed on return to power events. The reactor is protected in these MODES by ensuring adequate SDM. Exceptions to this are:

- The Logarithmic Power Level—High trip, RPS Logic RTCBs, and Manual Trip are required in MODES 3, 4, and 5, with the RTCBs closed, to provide protection for boron dilution and CEA withdrawal events. The Logarithmic Power Level—High trip in these lower MODES is addressed in this LCO. The RPS Logic in MODES 1, 2, 3, 4, and 5 is addressed in LCO 3.3.4, "Reactor Protective System (RPS) Logic and Trip Initiation."

logarithmic power

The Applicability is modified by a Note that allows the trip to be bypassed when THERMAL POWER is > 1E-4% RTP and the bypass is automatically removed when THERMAL POWER is ≤ 1E-4% RTP.

ACTIONS

The most common causes of channel inoperability are outright failure or drift of the bistable or process module sufficient to exceed the tolerance allowed by the plant specific setpoint analysis. Typically, the drift is found to be small and results in a delay of actuation rather than a total loss of function. This determination is generally made during the performance of a CHANNEL FUNCTIONAL TEST when the process instrument is set up for adjustment to bring it to within specification. If the trip setpoint is

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