2.2 LIMITING SAFETY SYSTEM SETTINGS

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

2.2.1 The reactor protection system instrumentation setpoints shall be set consistent with the Trip Setpoint values shown in Table 2.2.1-1.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

With a reactor protection system instrumentation setpoint* less conservative than the value shown in the Allowable Values column of Table 2.2.1-1, declare the channel inoperable and apply the applicable ACTION statement requirement of Specification 3.3.1 until the channel is restored to OPERABLE status with its setpoint adjusted consistent with the Trip Setpoint value.

SIMULATED THERMAL POWER-UPSCALE FUNCTIONAL UNIT

*The APRM ~~flow biased instrumentation~~ need not be declared inoperable upon entering single recirculation loop operation provided the setpoints are ~~adjusted~~ within 4 hours per Specification 3.4.1.1.

CHANGED

FLOW BIASED

TABLE 2.2.1-1
REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Intermediate Range Monitor, Neutron Flux - High	≤ 120/125 divisions of of full scale	≤ 122/125 divisions of full scale
2. Average Power Range Monitor:		
a. Neutron Flux-Upscale, (Setdown)	≤ 15% of RATED THERMAL POWER	≤ 20% of RATED THERMAL POWER
b. ~~Flow Biased~~ Simulated Thermal Power-Upscale		
~~1) During two recirculation loop operation:~~	(W-ΔW)#	
1 ~~a.~~ Flow Biased	≤ 0.63 ~~W~~+61.4%, with a maximum of	≤ 0.63 ~~W~~+64.3%, with a maximum of
2 ~~b.~~ High Flow Clamped	≤ 113.5% of RATED THERMAL POWER	≤ 115.5% of RATED THERMAL POWER
~~2) During single recirculation loop operation:~~		
~~a. Flow Biased~~	~~≤ 0.63W+56.3%,**~~	~~≤ 0.63W+59.2%,**~~
~~b. High Flow Clamped~~	~~NA~~	~~NA~~
c. ~~Fixed~~ Neutron Flux-Upscale	≤ 118% of RATED THERMAL POWER	≤ 120% of RATED THERMAL POWER
d. Inoperative	NA	NA
e. 2-OUT-OF-4 TRIP VOTERS	NA	NA
3. Reactor Vessel Steam Dome Pressure - High	≤ 1093 psig	≤ 1113 psig
4. Reactor Vessel Low Water Level - Level 3	≥ 173.4 inches*	≥ 171.9 inches

*See Bases Figure B 3/4 3-1.

~~**During single recirculation loop operation, rather than adjusting the APRM Flow Biased Setpoints to comply with the single loop values, the gain of the APRMs may be adjusted for a period not to exceed 72 hours such that the final APRM readings are at least 5.1% of rated power greater than 100% times FRTP, provided that the adjusted APRM readings do not exceed 100% of RATED THERMAL POWER and a notice of adjustment is posted on the reactor control panel.~~

THE AVERAGE POWER RANGE MONITOR SIMULATED THERMAL POWER - UPSCALE FLOW BIASED SCRAM SETPOINT VARIES AS A FUNCTION OF RECIRCULATION LOOP DRIVE FLOW (W). ΔW IS DEFINED AS THE DIFFERENCE IN INDICATED DRIVE FLOW (IN PERCENT OF DRIVE FLOW WHICH PRODUCES RATED CORE FLOW) BETWEEN TWO LOOP AND SINGLE LOOP OPERATION AT THE SAME CORE FLOW. ΔW = 0% FOR TWO LOOP OPERATION. ΔW = 8% FOR SINGLE LOOP OPERATION.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.1 As a minimum, the reactor protection system instrumentation channels shown in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

a. With the number of OPERABLE channels less than required by the Minimum OPERABLE channels per Trip System requirement for one trip system, #

1. Within 1 hour, verify that each Functional Unit within the affected trip system contains no more than one inoperable channel or place the inoperable channel(s) and/or that trip system in the tripped condition*.

2. If placing the inoperable channel(s) in the tripped condition would cause a scram, the inoperable channel(s) shall be restored to OPERABLE status within 6 hours or the ACTION required by Table 3.3.1-1 for the affected Functional Unit shall be taken.

3. If placing the inoperable channel(s) in the tripped condition would not cause a scram, place the inoperable channel(s) and/or that trip system in the tripped condition within 12 hours.

b. With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip System requirement for both trip systems, place at least one trip system** in the tripped condition within 1 hour and take the ACTION required by Table 3.3.1-1. #

INSERT (C) here →

add

Actions a and b not applicable to APRM functional Units 2.a, 2.b, 2.c, and 2.d.
Action C is applicable to APRM functional Units 2.a, 2.b, 2.c, and 2.d.

*An inoperable channel need not be placed in the tripped condition where this would cause a scram to occur. In these cases, the inoperable channel shall be restored to OPERABLE status within 2 hours after the channel was first determined to be inoperable or the ACTION required by Table 3.3.1-1 for that Functional Unit shall be taken.

**The trip system need not be placed in the tripped condition if this would cause a scram to occur. When a trip system can be placed in the tripped condition without causing a scram to occur, place the trip system with the most inoperable channels in the tripped condition; if both systems have the same number of inoperable channels, place either trip system in the tripped condition.

INSERT (D) here →

INSERT C

c. With one or more channels required by Table 3.3.1-1 inoperable in one or more APRM Functional Units 2.a, 2.b, 2.c, or 2.d:

1. Within 1 hour, verify sufficient channels remain OPERABLE or tripped*** to maintain trip capability in the Functional Unit, and

2. Within 12 hours, restore the inoperable channels to an OPERABLE status or tripped***.

INSERT D

***An inoperable channel need not be placed in the tripped condition where this would cause a scram to occur. In these cases, if the inoperable channel is not restored to OPERABLE status within the required time, the ACTION required by Table 3.3.1-1 for the Functional Unit shall be taken.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

SURVEILLANCE REQUIREMENTS

4.3.1.1 Each reactor protection system instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.1.1-1.

4.3.1.2 LOGIC SYSTEM FUNCTIONAL TESTS and simulated automatic operation of all channels shall be performed at least once per 18 months, EXCEPT TABLE 4.3.1.1-1,

4.3.1.3 The REACTOR PROTECTION SYSTEM RESPONSE TIME of each applicable reactor trip functional unit* shall be demonstrated to be within its limit at least once per 18 months. Neutron detectors are exempt from response time testing. Each test shall include at least one channel per trip system such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific reactor trip system.

ITEMS 2.a, 2.b 2.c, 2.d and 2.e. FUNCTIONS 2.a, 2.b, 2.c, and 2.d DO NOT REQUIRE SEPARATE LOGIC SYSTEM FUNCTIONAL TESTS. FOR FUNCTION 2.e, TESTS SHALL BE PERFORMED AT LEAST ONCE PER 24 MONTHS. THE LOGIC SYSTEM FUNCTIONAL TEST FOR FUNCTION 2.e INCLUDES SIMULATING APRM TRIP CONDITIONS AT THE APRM CHANNEL INPUTS TO THE 2-OUT-OF-4 TRIP VOTER CHANNEL TO CHECK ALL COMBINATIONS OF TWO TRIPPED INPUTS TO THE 2-OUT-OF-4 TRIP VOTER LOGIC IN THE VOTER CHANNELS.

*The sensor response time for Reactor Vessel Steam Dome Pressure - High and Reactor Vessel Low Water Level - Level 3 need not be measured and may be assumed to be the design sensor response time.

TABLE 3.3.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	APPLICABLE OPERATIONAL CONDITIONS	MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM[a]	ACTION
1. Intermediate Range Monitors[b]:			
a. Neutron Flux - High	2 3, 4 5[c]	3 3 3[d]	1 2 3
b. Inoperative	2 3, 4 5	3 3 3[d]	1 2 3
2. Average Power Range Monitor[e]:			
a. Neutron Flux - High, (Setdown) UPSCALE	2 3 5[c]	2 3(K) 2 2[d]	1 2 3
b. Flow Biased Simulated Thermal Power - High UPSCALE	1	2	4
c. Fixed Neutron Flux - High UPSCALE	1	2	4
d. Inoperative	1, 2 3 5[c]	2 2 2[d]	1 2 3
e. 2-OUT-OF-4 TRIP VOTERS	1, 2	2	1
3. Reactor Vessel Steam Dome Pressure - High	1, 2[f]	2	1
4. Reactor Vessel Low Water Level - Level 3	1, 2	2	1
5. Main Steam Line Isolation Valve - Closure	1[g]	4	4

TABLE 3.3.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION

TABLE NOTATIONS

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the trip system in the tripped condition provided at least one OPERABLE channel in the same trip system is monitoring that parameter.

(b) This function shall be automatically bypassed when the reactor mode switch is in the Run position.

(c) Unless adequate shutdown margin has been demonstrated per Specification 3.1.1, the "shorting links" shall be removed from the RPS circuitry prior to and during the time any control rod is withdrawn.*

(d) When the "shorting links" are removed, the Minimum OPERABLE Channels Per Trip System is ~~4 APRMs,~~ 6 IRMs and per Specification 3.9.2, 2 SRMs.

(e) ~~An APRM channel is inoperable if there are less than 2 LPRM inputs per level or less than 14 LPRM inputs to an APRM channel.~~ DELETED

(f) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(g) This function shall be automatically bypassed when the reactor mode switch is not in the Run position.

(h) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required.

(i) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(j) This function shall be automatically bypassed when turbine first stage pressure is ≤ 161.9 psig, equivalent to THERMAL POWER less than 30% of RATED THERMAL POWER.

(k) SINCE EACH APRM CHANNEL PROVIDES INPUT TO BOTH TRIP SYSTEMS, THE MINIMUM OPERABLE CHANNELS SPECIFIED IN TABLE 3.3.1-1 ARE THE TOTAL APRM CHANNELS REQUIRED (i.e. IT IS NOT ON A TRIP SYSTEM BASIS). THE 6 HOUR ALLOWED TEST TIME TO COMPLETE A CHANNEL SURVEILLANCE TEST (NOTE (a) ABOVE) IS APPLICABLE PROVIDED AT LEAST TWO OPERABLE CHANNELS ARE MONITORING THAT PARAMETER.

---

*Not required for control rods removed per Specification 3.9.10.1 or 3.9.10.2.

TABLE 4.3.1.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Intermediate Range Monitors:				
a. Neutron Flux - High	S/U,S,(b) S	S/U(c), W W	SA SA	2 3, 4, 5
b. Inoperative	NA	W	NA	2, 3, 4, 5
2. Average Power Range Monitor(f):				
a. Neutron Flux - ~~High~~ UPSCALE, Setdown	D ~~S/U,S~~,(b) ~~S~~	SA ~~S/U(c), W~~ ~~W~~	~~SA~~ (m) 2 YEARS ~~SA~~	2 ~~3, 5~~
b. ~~Flow Biased~~ Simulated Thermal Power - ~~High~~ UPSCALE	~~S~~ D	SA(L) ~~S/U(c), Q~~	W(d), ~~(e), SA, R(h)~~ 2 YEARS (e)	1
c. ~~Fixed~~ Neutron Flux - ~~High~~ UPSCALE	~~S~~ D	SA ~~S/U(c), Q~~	W(d), ~~SA~~ 2 YEARS	1
d. Inoperative	NA	~~Q~~ SA	NA	1, 2, ~~3, 5~~
e. 2-OUT-OF-4 TRIP VOTERS	D	SA	NA	1,2
3. Reactor Vessel Steam Dome Pressure - High	S	Q(k)	R	1, 2
4. Reactor Vessel Low Water Level - Level 3	S	Q(k)	R	1, 2
5. Main Steam Line Isolation Valve - Closure	NA	Q	R	1
6. Main Steam Line Radiation - High	S	Q	R	1, 2(i)
7. Drywell Pressure - High	S	Q(k)	R	1, 2

TABLE 4.3.1.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
8. Scram Discharge Volume Water Level - High				
a. Float Switch	NA	Q	R	1, 2, 5(j)
b. Level Transmitter	S	Q(k)	R	1, 2, 5(j)
9. Turbine Stop Valve - Closure	NA	Q	R	1
10. Turbine Control Valve Fast Closure	NA	Q	NA	1
11. Reactor Mode Switch Shutdown Position	NA	R	NA	1, 2, 3, 4, 5
12. Manual Scram	NA	W	NA	1, 2, 3, 4, 5
13. Deleted.				

(a) Neutron detectors may be excluded from CHANNEL CALIBRATION.

(b) The IRM and SRM channels shall be determined to overlap for at least ½ decades during each startup after entering OPERATIONAL CONDITION 2 and the IRM and APRM channels shall be determined to overlap for at least ½ decades during each controlled shutdown, if not performed within the previous 7 days.

(c) Within 24 hours prior to startup, if not performed within the previous 7 days.

(d) This calibration shall consist of the adjustment of the APRM channel to conform to the power values calculated by a heat balance during OPERATIONAL CONDITION 1 when THERMAL POWER > 25% of RATED THERMAL POWER. Adjust the APRM channel if the absolute difference is greater than 2% of RATED THERMAL POWER.

(e) This calibration ~~shall consist of the adjustment of the APRM flow biased channel to conform to a calibrated flow signal.~~ INCLUDES FLOW INPUT FUNCTION, INCLUDING FLOW TRANSMITTERS.

(f) The LPRMs shall be calibrated at least once per 1000 effective full power hours (EFPH) using the TIP system.

(g) Deleted.

(h) ~~This calibration shall consist of verifying the 6 ± 1 second simulated thermal power time constant.~~ DELETED.

(i) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(j) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(k) Includes verification of the trip setpoint of the trip unit.

(l) CHANNEL FUNCTIONAL TEST SHALL INCLUDE THE FLOW INPUT FUNCTION, EXCLUDING FLOW TRANSMITTERS.

(m) NOT REQUIRED TO BE PERFORMED WHEN ENTERING MODE 2 FROM MODE 1 UNTIL 12 HOURS AFTER ENTERING MODE 2.

3/4.3.6 CONTROL ROD BLOCK INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.6. The control rod block instrumentation channels shown in Table 3.3.6-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3.6-2.

APPLICABILITY: As shown in Table 3.3.6-1.

ACTION:

a. With a control rod block instrumentation channel trip setpoint* less conservative than the value shown in the Allowable Values column of Table 3.3.6-2, declare the channel inoperable until the channel is restored to OPERABLE status with its trip setpoint adjusted consistent with the Trip Setpoint value.

b. With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, take the ACTION required by Table 3.3.6-1.

SURVEILLANCE REQUIREMENTS

4.3.6 Each of the above required control rod block trip systems and instrumentation channels shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.6-1.

SIMULATED THERMAL POWER — UPSCALE FUNCTIONAL UNIT

*The APRM ~~Flow Biased Neutron Flux-High instrumentation~~ need not be declared inoperable upon entering single reactor recirculation loop operation provided the setpoints are adjusted within 4 hours per Specification 3.4.1.1.

FLOW BIASED CHANGED

TABLE 3.3.6-1

CONTROL ROD BLOCK INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1. ROD BLOCK MONITOR[(a)]			
a. Upscale	2	1*	60
b. Inoperative	2	1*	60
c. Downscale	2	1*	60
2. ~~APRM~~ AVERAGE POWER RANGE MONITOR			
SIMULATED THERMAL POWER - UPSCALE			
a. ~~Flow Biased Neutron Flux - High~~	~~4~~ 3	1	61
b. Inoperative	~~4~~ 3	1, 2 ~~5~~	61
c. NEUTRON FLUX Downscale SIMULATED THERMAL POWER	~~4~~ 3	1	61
d. ~~Neutron Flux~~ - Upscale (Setdown)	~~4~~ 3	2 ~~5~~	61
e. FLOW - UPSCALE	3	1	61
3. SOURCE RANGE MONITORS			
a. Detector not full in[(b)]	3	2	61
	2[(f)]	5	61
b. Upscale[(c)]	3	2	61
	2[(f)]	[illegible]	61
c. Inoperative[(c)]	3	2	61
	2[(f)]	5	61
d. Downscale[(d)]	3	2	61
	2[(f)]	5	61
4. INTERMEDIATE RANGE MONITORS			
a. Detector not full in	6	2, 5	61
b. Upscale	6	2, 5	61
c. Inoperative	6	2, 5	61
d. Downscale[(e)]	6	2, 5	61
5. SCRAM DISCHARGE VOLUME			
a. Water Level-High	2	1, 2, 5**	62
b. Scram Trip Bypass	2	2, 5**	62
6. ~~REACTOR COOLANT SYSTEM RECIRCULATION FLOW~~ DELETED			
~~a. Upscale~~	~~2~~	~~1~~	~~62~~
~~b. Inoperative~~	~~2~~	~~1~~	~~62~~
~~c. Comparator~~	~~2~~	~~1~~	~~62~~
7. REACTOR MODE SWITCH SHUTDOWN POSITION	2	3, 4	63

3

TABLE 4.3.6-2

CONTROL ROD BLOCK INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. ROD BLOCK MONITOR		
a. Upscale	As specified in the CORE OPERATING LIMITS REPORT	As specified in the CORE OPERATING LIMITS REPORT
b. Inoperative	NA	NA
c. Downscale	≥ 94% of Reference Level	≥ 92.3% of Reference Level
2. ~~APRM~~ AVERAGE POWER RANGE Monitor		
a. ~~Flow Biased Neutron Flux - High~~ Simulated Thermal Power - Upscale	(W-ΔW)#	
~~1) During two recirculation loop operation~~ Flow Biased	≤ 0.63 ~~W~~ + 55.6%~~*~~ with a maximum of 108% of RATED THERMAL POWER	≤ 0.63 ~~W~~ + 58.5%~~*~~ with a maximum of 110% of RATED THERMAL POWER
~~2) During single recirculation loop operation~~ High Flow Clamped	~~≤ 0.63 W + 50.5%#*~~	~~≤ 0.63 W + 53.4%#*~~
b. Inoperative	NA	NA
c. Neutron Flux - Downscale	≥ 5% of RATED THERMAL POWER	≥ 3% of RATED THERMAL POWER
d. ~~Neutron Flux~~ Simulated Thermal Power - Upscale (Setdown)	≤ 12% of RATED THERMAL POWER	≤ 14% of RATED THERMAL POWER
e. Flow-Upscale	≤ 110% of rated flow	≤ 113% of rated flow
3. SOURCE RANGE MONITORS		
a. Detector not full in	NA	NA
b. Upscale	$\leq 1.0 \times 10^5$ cps	$\leq 1.6 \times 10^5$ cps
c. Inoperative	NA	NA
d. Downscale	≥ 3 cps**	≥ 2 cps**

~~*The APRM rod block function is varied as a function of recirculation loop drive flow (W).~~

**May be reduced to ≥ 0.7 cps provided the signal-to-noise ratio ≥ 20.

~~#During single recirculation loop operation, rather than adjusting the APRM Flow Biased Setpoints to comply with the single loop values, the gain of the APRMs may be adjusted for a period not to exceed 72 hours such that the final APRM readings are at least 5.1% of rated power greater than 100% times FRTP, provided that the adjusted APRM readings do not exceed 100% of RATED THERMAL POWER and a notice of adjustment is posted on the reactor control panel.~~

Replace

THE AVERAGE POWER RANGE MONITOR SIMULATED THERMAL POWER - UPSCALE FLOW BIASED ROD BLOCK SETPOINT VARIES AS A FUNCTION OF RECIRCULATION LOOP DRIVE FLOW (W). ΔW IS DEFINED AS THE DIFFERENCE IN INDICATED DRIVE FLOW (IN PERCENT OF DRIVE FLOW WHICH PRODUCES RATED CORE FLOW) BETWEEN TWO LOOP AND SINGLE LOOP OPERATION AT THE SAME CORE FLOW. ΔW = 0% FOR TWO LOOP OPERATION. ΔW = 8% FOR SINGLE LOOP OPERATION

TABLE
STRUMENTAT

TRIP FUNCTION	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. ROD BLOCK MONITOR				
a. Upscale	NA	S/U(b),Q	~~Q~~ 2 YEARS	1*
b. Inoperative	NA	S/U(b),Q	NA	1*
c. Downscale	NA	S/U(b),Q SA	~~Q~~ 2 YEARS	1*
2. APRM				
a. ~~Flow Biased Neutron Flux - High~~ SIMULATED THERMAL POWER - UPSCALE	~~S~~ NA	S/U(b),Q	SA	1
b. Inoperative	NA	S/U(b),Q	NA	1, 2, 5
c. NEUTRON FLUX - Downscale SIMULATED THERMAL POWER	~~S~~ NA	S/U(b),Q	SA 2 YEARS	1
d. Neutron Flux Upscale (Setdown)	~~S~~ NA	S/U(b),Q SA	SA	2, 5
e. FLOW - UPSCALE	NA			1
3. SOURCE RANGE MONITORS				
a. Detector not full in	NA	S/U(b),W	NA	2***, 5
b. Upscale	S	S/U(b),W	SA	2***, 5
c. Inoperative	NA	S/U(b),W	NA	2***, 5
d. Downscale	S	S/U(b),W	SA	2***, 5
4. INTERMEDIATE RANGE MONITORS				
a. Detector not full in	NA	S/U(b),W	NA	2, 5
b. Upscale	S	S/U(b),W	SA	2, 5
c. Inoperative	NA	S/U(b),W	NA	2, 5
d. Downscale	S	S/U(b),W	SA	2, 5
5. SCRAM DISCHARGE VOLUME				
a. Water Level - High	NA	Q	R	1, 2, 5**
b. Scram Trip Bypass	NA	R	NA	2, 5**
6. ~~REACTOR COOLANT SYSTEM RECIRCULATION FLOW~~ DELETED				
~~a. Upscale~~	~~NA~~	~~S/U(b),Q~~	~~Q~~	~~1~~
~~b. Inoperative~~	~~NA~~	~~S/U(b),Q~~	~~NA~~	~~1~~
~~c. Comparator~~	~~NA~~	~~S/U(b),Q~~	~~Q~~	~~1~~
7. REACTOR MODE SWITCH SHUTDOWN POSITION	NA	R	NA	3, 4

3/4.4.1 RECIRCULATION SYSTEM

RECIRCULATION LOOPS

LIMITING CONDITION FOR OPERATION

3.4.1.1 Two reactor coolant system recirculation loops shall be in operation.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2*.

ACTION:

a. With one reactor coolant system recirculation loop not in operation:

1. Within 4 hours:

   a) Place the individual recirculation pump flow controller for the operating recirculation pump in the Manual mode.

   b) Reduce THERMAL POWER to less than or equal to 67.2% of RATED THERMAL POWER.

   c) Limit the speed of the operating recirculation pump to less than or equal to 75% of rated pump speed.

   d) Increase the MINIMUM CRITICAL POWER RATIO (MCPR) Safety Limit to the value for single loop operation required by Specification 2.1.2.

   e) ~~Reduce~~ Change the Average Power Range Monitor (APRM) SIMULATED THERMAL POWER - UPSCALE FLOW BIASED Scram and Rod Block Trip Setpoints and Allowable Values to those applicable for single recirculation loop operation# per Specifications 2.2.1 and 3.3.6.

   f) Perform Surveillance Requirement 4.4.1.1.4 if THERMAL POWER is less than or equal to 30% of RATED THERMAL POWER or the recirculation loop flow in the operating loop is less than or equal to 50% of rated loop flow.

2. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

b. With no reactor coolant system recirculation loop in operation while in OPERATIONAL CONDITION 1, immediately place the Reactor Mode Switch in the SHUTDOWN position.

c. With no reactor coolant system recirculation loops in operation, while in OPERATIONAL CONDITION 2, initiate measures to place the unit in at least HOT SHUTDOWN within the next 6 hours.

*See Special Test Exception 3.10.4.
~~#APRM gain adjustments may be made in lieu of adjusting the APRM Flow Biased Setpoints to comply with the single loop values for a period of up to 72 hours.~~

2.2 LIMITING SAFETY SYSTEM SETTINGS

BASES

2.2.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

The Reactor Protection System instrumentation setpoints specified in Table 2.2.1-1 are the values at which the reactor trips are set for each parameter. The Trip Setpoints have been selected to ensure that the reactor core and reactor coolant system are prevented from exceeding their Safety Limits during normal operation and design basis anticipated operational occurrences and to assist in mitigating the consequences of accidents. Operation with a trip set less conservative than its Trip Setpoint but within its specified Allowable Value is acceptable on the basis that the difference between each Trip Setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the safety analyses.

1. Intermediate Range Monitor, Neutron Flux - High

The IRM system consists of 8 chambers, 4 in each of the reactor trip systems. The IRM is a 5 decade 10 range instrument. The trip setpoint of 120 divisions of scale is active in each of the 10 ranges. Thus as the IRM is ranged up to accommodate the increase in power level, the trip setpoint is also ranged up. The IRM instruments provide for overlap with both the APRM and SRM systems.

The most significant source of reactivity changes during the power increase is due to control rod withdrawal. In order to ensure that the IRM provides the required protection, a range of rod withdrawal accidents have been analyzed. The results of these analyses are in Section 15B.4.1.2 of the FSAR. The most severe case involves an initial condition in which THERMAL POWER is at approximately 1% of RATED THERMAL POWER. Additional conservatism was taken in this analysis by assuming the IRM channel closest to the control rod being withdrawn is bypassed. The results of this analysis show that the reactor is shutdown and peak power is limited to 21% of RATED THERMAL POWER with the peak fuel enthalpy well below the fuel failure threshold of 170 cal/gm. Based on this analysis, the IRM provides protection against local control rod errors and continuous withdrawal of control rods in sequence and provides backup protection for the APRM.

2. Average Power Range Monitor

NEUTRON FLUX - UPSCALE (SETDOWN)

For operation at low pressure and low flow during STARTUP, the APRM scram setting of 15% of RATED THERMAL POWER provides adequate thermal margin between the setpoint and the Safety Limits. The margin accommodates the anticipated maneuvers associated with power plant startup. Effects of increasing pressure at zero or low void content are minor and cold water from sources available during startup is not much colder than that already in the system. Temperature coefficients are small and control rod patterns are constrained by the RWM. Of all the possible sources of reactivity input, uniform control rod withdrawal is the most probable cause of significant power increase.

LIMITING SAFETY SYSTEM SETTINGS

BASES

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS (Continued)

Average Power Range Monitor (Continued)

Because the flux distribution associated with uniform rod withdrawals does not involve high local peaks and because several rods must be moved to change power by a significant amount, the rate of power rise is very slow. Generally the heat flux is in near equilibrium with the fission rate. In an assumed uniform rod withdrawal approach to the trip level, the rate of power rise is not more than 5% of RATED THERMAL POWER per minute and the APRM system would be more than adequate to assure shutdown before the power could exceed the Safety Limit. The 15% Neutron Flux trip remains active until the mode switch is placed in the Run position. -UPSCALE (SETDOWN)

The APRM trip system is calibrated using heat balance data taken during steady state conditions. Fission chambers provide the basic input to the system and therefore the monitors respond directly and quickly to changes due to transient operation for the case of the Fixed Neutron Flux-Upscale setpoint; i.e, for a power increase, the THERMAL POWER of the fuel will be APPROXIMATELY less than that indicated by the neutron flux due to the time constants of the heat transfer associated with the fuel. For the Flow Biased Simulated Thermal Power - High setpoint, a time constant of 6 ± 1 seconds is introduced into the flow biased APRM in order to simulate the fuel thermal transient characteristics. A more conservative maximum values is used for the flow biased setpoints as shown in Table 2.2.1-1.

SIGNAL

APPLIED

TO THE NEUTRON FLUX SIGNAL

ARE

THESE

SIMULATED THERMAL POWER-UPSCALE, FLOW BIASED AND HIGH FLOW CLAMPED

The APRM setpoints were selected to provide adequate margin for the Safety Limits and yet allow operating margin that reduces the possibility of unnecessary shutdown. For single recirculation loop operation, the reduced APRM setpoints are based on a Δ W value of 8%. The Δ W value corrects for the difference in indicated drive flow (in percentage of drive flow which produces rated core flow) between two loop and single loop operation of the same core flow. The decrease in setpoint is derived by multiplying the slope of the setpoint curve by 8%. The High Flow Clamped Flow Biased Neutron Flux-High setpoint is not applicable to single loop operation as core power levels which would require this limit are not achievable in a single loop configuration.

SIMULATED THERMAL POWER-UPSCALE FLOW BIASED

ADD INSERT "A" changing changed due

SIMULATED THERMAL POWER - UPSCALE HIGH FLOW CLAMPED

3. Reactor Vessel Steam Dome Pressure-High

High pressure in the nuclear system could cause a rupture to the nuclear system process barrier resulting in the release of fission products. A pressure increase while operating will also tend to increase the power of the reactor by compressing voids thus adding reactivity. The trip will quickly reduce the neutron flux, counteracting the pressure increase. The trip setting is slightly higher than the operating pressure to permit normal operation without spurious

Insert "A"

The APRM System is divided into four APRM channels and four 2-out-of-4 Trip Voter channels. Each APRM channel provides inputs to each of the 2-out-of-4 Trip Voter channels. The four 2-out-of-4 Trip Voter channels are divided into two groups each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no voter channels, to be bypassed. A trip from any one un-bypassed APRM will result in a "half-trip" in all four 2-out-of-4 Trip Voter channels, but no trip inputs to either RPS trip system. Therefore, any APRM Function 2.a, 2.b, 2.c, or 2.d trip from any two un-bypassed APRM channels will result in a full trip in each of the four voter cchannels, which in turn results in two trip inputs into each RPS trip system.

Three of the four APRM channels and all four of the 2-out-of-4 Trip Voter channels are required to be OPERABLE to ensure that no single failure will preclude a scram on a valid signal. The 2-out-of-4 Trip Voter includes separate outputs to RPS for the independently voted sets of functions, each of which is redundant (four total outputs). The 2-out-of-4 Trip Voter function 2.e must be declared inoperable if any of its functionality applicable for the plant OPERATIONAL CONDITION is inoperable. Due to the independent voting of APRM trips and the redundancy of outputs, there may be conditions where the Trip Voter function 2.e is inoperable, but trip capability for one or more of the other APRM functions through that Trip Voter is still maintained. This may be considered when determining the condition of the other APRM functions resulting from partial inoperability of the Trip Voter function 2.e. In addition, to provide adequate coverage of the entire core, consistent with the design bases for the APRM functions 2.a, 2.b, and 2.c, at least 20 LPRM inputs, with at least three LPRM inputs from each of the four axial levels at which the LPRMs are located, must be operable for each APRM channel.

Insert D

The system meets the intent of IEEE-279 for nuclear power plant protection systems. Specified surveillance intervals and surveillance and maintenance outage times have been determined in accordance with NEDC-30815P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," and NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," and NEDC-32410P-A Supplement 1, "NUMAC PRNM Retrofit Plus Option III Stability Trip Function." The bases for the trip settings of the RPS are discussed in the bases for Specification 2.2.1.

Insert "B"

For the digital electronic portions of the APRM Simulated Thermal Power - Upscale and Neutron Flux - Upscale trip functions, performance characteristics that determine response time are checked by a combination of automatic self-test, calibration activities, and response time tests of the 2-out-of-4 Trip Voter.

Insert C

... The APRM system is divided into four APRM channels and four 2-out-of-4 Trip Voter channels. Each APRM channel provides inputs to each of the four 2-out-of 4 Trip Voter channels. The four 2-out-of-4 Trip Voter channels are divided into two groups of two each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no 2-out-of-4 Trip Voter channels, to be bypassed. Note (k) to Table 3.3.1-1 states that the Minimum Operable channels in Table 3.3.1-1 for the APRM Functional Units (except the 2-out-of-4 Trip Voter Functional Unit) are the total number of APRM channels required and are not on a trip system basis. The basis for the APRM Functional Unit 2.a, 2.b, 2.c, and 2.d actions is to assure trip capability within 1 hour and restore channel redundancy with 12 hours.

3/4.3 INSTRUMENTATION

BASES

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

The reactor protection system automatically initiates a reactor scram to:

a. Preserve the integrity of the fuel cladding.

b. Preserve the integrity of the reactor coolant system.

c. Minimize the energy which must be adsorbed following a loss-of-coolant accident, and

d. Prevent inadvertent criticality.

This specification provides the limiting conditions for operation necessary to preserve the ability of the system to perform its intended function even during periods when instrument channels may be out of service because of maintenance. When necessary, one channel may be made inoperable for brief intervals to conduct required surveillance.

The reactor protection system is made up of two independent TRIP systems. There are usually four channels to monitor each parameter with two channels in each trip system. The outputs of the channels in a trip system are combined in a logic so that either channel will trip that trip system. The tripping of both trip systems will produce a reactor scram. ~~The system meets the intent of IEEE-279 for nuclear power plant protection systems. The bases for the trip settings of the RPS are discussed in the bases for Specification 2.2.1.~~

REPLACE W/ INSERT C

ADD NEW ¶ INSERT D

The measurement of response time at the specified frequencies provides assurance that the protective functions associated with each channel are completed within the time limit assumed in the safety analyses. ~~No credit was taken for those channels with response times indicated as not applicable.~~ EXCEPT FOR APRM SIMULATED THERMAL POWER - UPSCALE AND NEUTRON FLUX - UPSCALE TRIP FUNCTION Response time may be demonstrated by any series of sequential, overlapping or total channel test measurement, provided such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either (1) inplace, onsite or offsite test measurements, or (2) utilizing replacement sensors with certified response times.

ADD INSERT "B"

RESPONSE TIME REQUIREMENTS ARE SPECIFIED IN UFSAR TABLE 7.2-4.

changed

SIMULATED THERMAL POWER - UPSCALE FLOW BIASED SCRAM AND CONTROL ROD BLOCK

3/4.4.1 RECIRCULATION SYSTEM

The impact of single recirculation loop operation upon plant safety is assessed and shows that single-loop operation is permitted at power levels up to 67.2% of RATED THERMAL POWER if the MCPR fuel cladding safety limit is increased as noted by Specification 2.1.2. APRM ~~scram and control rod block~~ setpoints ~~(or APRM gains)~~ are adjusted as noted in Tables 2.2.1-1 and 3.3.6-2, respectively. A time period of 4 hours is allowed to make these ~~adjustments~~ CHANGES following the establishment of single loop operation since the need for single loop operation often cannot be anticipated. MCPR operating limits adjustments in Specification 3.2.3 for different plant operating situations are applicable to both single and two recirculation loop operation.

To prevent potential control system oscillations from occurring in the recirculation flow control system, the operating mode of the recirculation flow control system must be restricted to the manual control mode for single-loop operation.

Additionally, surveillance on the pump speed of operating recirculation loop is imposed to exclude the possibility of excessive core internals vibration. The surveillance on differential temperatures below 30% THERMAL POWER or 50% rated recirculation loop flow is to prevent undue thermal stress on vessel nozzles, recirculation pump and vessel bottom head during a power or flow increase following extended operation in the single recirculation loop mode.

An inoperable jet pump is not, in itself, a sufficient reason to declare a recirculation loop inoperable, but it does, in case of a design-basis-accident, increase the blowdown area and reduce the capability of reflooding the core; thus, the requirement for shutdown of the facility with a jet pump inoperable. Jet pump failure can be detected by monitoring jet pump performance on a prescribed schedule for significant degradation.

Recirculation pump speed mismatch limits are in compliance with the ECCS LOCA analysis design criteria for two recirculation loop operation. The limits will ensure an adequate core flow coastdown from either recirculation loop following a LOCA.

In the case where the mismatch limits cannot be maintained during two loop operation, continued operation is permitted in a single recirculation loop mode.

In order to prevent undue stress on the vessel nozzles and bottom head region, the recirculation loop temperatures shall be within 50°F of each other prior to startup of an idle loop. The loop temperature must also be within 50°F of the reactor pressure vessel coolant temperature to prevent thermal shock to the recirculation pump and recirculation nozzles.

Enclosure 3 to
NRC-97-0105

PROPOSED TECHNICAL SPECIFICATION CHANGES

RETYPED FORMAT

<u>Pages Included</u>

2-3
2-4
3/4 3-1
3/4 3-1a
3/4 3-2
3/4 3-5
3/4 3-7
3/4 3-8
3/4 3-41
3/4 3-42
3/4 3-44
3/4 3-45
3/4 4-1
B 2-6
B 2-7
B 2-7a
B 3/4 3-1
B 3/4 3-1a
B 3/4 4-1

2.2 LIMITING SAFETY SYSTEM SETTINGS

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

2.2.1 The reactor protection system instrumentation setpoints shall be set consistent with the Trip Setpoint values shown in Table 2.2.1-1.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

With a reactor protection system instrumentation setpoint* less conservative than the value shown in the Allowable Values column of Table 2.2.1-1, declare the channel inoperable and apply the applicable ACTION statement requirement of Specification 3.3.1 until the channel is restored to OPERABLE status with its setpoint adjusted consistent with the Trip Setpoint value.

---

*The APRM Simulated Thermal Power - Upscale Functional Unit need not be declared inoperable upon entering single recirculation loop operation provided the Flow Biased setpoints are changed within 4 hours per Specification 3.4.1.1.

TABLE 2.2.1-1
REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Intermediate Range Monitor, Neutron Flux - High	≤ 120/125 divisions of of full scale	≤ 122/125 divisions of full scale
2. Average Power Range Monitor:		
a. Neutron Flux - Upscale (Setdown)	≤ 15% of RATED THERMAL POWER	≤ 20% of RATED THERMAL POWER
b. Simulated Thermal Power - Upscale		
1. Flow Biased	≤ 0.63 (W-ΔW)# +61.4%, with a maximum of	≤ 0.63 (W-ΔW)# +64.3%, with a maximum of
2. High Flow Clamped	≤ 113.5% of RATED THERMAL POWER	≤ 115.5% of RATED THERMAL POWER
c. Neutron Flux - Upscale	≤ 118% of RATED THERMAL POWER	≤ 120% of RATED THERMAL POWER
d. Inoperative	NA	NA
e. 2-out-of-4 Trip Voters	NA	NA
3. Reactor Vessel Steam Dome Pressure - High	≤ 1093 psig	≤ 1113 psig
4. Reactor Vessel Low Water Level - Level 3	≥ 173.4 inches*	≥ 171.9 inches

*See Bases Figure B 3/4 3-1.

#The Average Power Range Monitor Simulated Thermal Power - Upscale Flow Biased scram setpoint varies as a function of recirculation loop drive flow (W). ΔW is defined as the difference in indicated drive flow (in percent of drive flow which produces rated core flow) between two loop and single loop operation at the same core flow. ΔW = 0% for two loop operation. ΔW = 8% for single loop operation.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.1 As a minimum, the reactor protection system instrumentation channels shown in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.1-1.

ACTION:

a. With the number of OPERABLE channels less than required by the Minimum OPERABLE channels per Trip System requirement for one trip system:#

   1. Within 1 hour, verify that each Functional Unit within the affected trip system contains no more than one inoperable channel or place the inoperable channel(s) and/or that trip system in the tripped condition*.

   2. If placing the inoperable channel(s) in the tripped condition would cause a scram, the inoperable channel(s) shall be restored to OPERABLE status within 6 hours or the ACTION required by Table 3.3.1-1 for the affected Functional Unit shall be taken.

   3. If placing the inoperable channel(s) in the tripped condition would not cause a scram, place the inoperable channel(s) and/or that trip system in the tripped condition within 12 hours.

b. With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip System requirement for both trip systems, place at least one trip system** in the tripped condition within 1 hour and take the ACTION required by Table 3.3.1-1.#

c. With one or more channels required by Table 3.3.1-1 inoperable in one or more APRM Functional Units 2.a, 2.b, 2.c, or 2.d:

   1. Within 1 hour, verify sufficient channels remain OPERABLE or tripped*** to maintain trip capability in the Functional Unit, and

   2. Within 12 hours, restore the inoperable channels to an OPERABLE status or tripped***.

Otherwise, take the ACTION required by Table 3.3.1-1 for the Functional Unit.

#Actions a and b not applicable to APRM Functional Units 2.a, 2.b, 2.c, and 2.d. Action c applies only to APRM functions 2.a, 2.b, 2.c and 2.d.

*An inoperable channel need not be placed in the tripped condition where this would cause a scram to occur. In these cases, the inoperable channel shall be restored to OPERABLE status within 2 hours after the channel was first determined to be inoperable or the ACTION required by Table 3.3.1-1 for that Functional Unit shall be taken.

**The trip system need not be placed in the tripped condition if this would cause a scram to occur. When a trip system can be placed in the tripped condition without causing a scram to occur, place the trip system with the most inoperable channels in the tripped condition; if both systems have the same number of inoperable channels, place either trip system in the tripped condition.

***An inoperable channel need not be placed in the tripped condition where this would cause a scram to occur. In these cases if the inoperable channel is not restored to OPERABLE status within the required time, the ACTION required by Table 3.3.1-1 for the Functional Unit shall be taken.

LIMITING CONDITION FOR OPERATION (Continued)

SURVEILLANCE REQUIREMENTS

4.3.1.1 Each reactor protection system instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.1.1-1.

4.3.1.2 LOGIC SYSTEM FUNCTIONAL TESTS and simulated automatic operation of all channels shall be performed at least once per 18 months, except Table 4.3.1.1-1, Items 2.a, 2.b, 2.c, 2.d and 2.e. Functions 2.a, 2.b, 2.c, and 2.d do not require separate LOGIC SYSTEM FUNCTIONAL TESTS. For Function 2.e, tests shall be performed at least once per 24 months. The LOGIC SYSTEM FUNCTIONAL TEST for Function 2.e includes simulating APRM trip conditions at the APRM channel inputs to the 2-out-of-4 Trip Voter channel to check all combinations of two tripped inputs to the 2-out-of-4 Trip Voter logic in the Voter channels.

4.3.1.3 The REACTOR PROTECTION SYSTEM RESPONSE TIME of each applicable reactor trip functional unit* shall be demonstrated to be within its limit at least once per 18 months. Neutron detectors are exempt from response time testing. Each test shall include at least one channel per trip system such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific reactor trip system.

*The sensor response time for Reactor Vessel Steam Dome Pressure - High and Reactor Vessel Low Water Level - Level 3 need not be measured and may be assumed to be the design sensor response time.

TABLE 3.3.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	APPLICABLE OPERATIONAL CONDITIONS	MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM[a]	ACTION
1. Intermediate Range Monitors[b]:			
a. Neutron Flux - High	2	3	1
	3, 4	3	2
	5[c]	3[d]	3
b. Inoperative	2	3	1
	3, 4	3	2
	5	3[d]	3
2. Average Power Range Monitor:			
a. Neutron Flux - Upscale (Setdown)	2	3[k]	1
b. Simulated Thermal Power - Upscale	1	3[k]	4
c. Neutron Flux - Upscale	1	3[k]	4
d. Inoperative	1, 2	3[k]	1
e. 2-out-of-4 Trip Voters	1, 2	2	1
3. Reactor Vessel Steam Dome Pressure - High	1, 2[f]	2	1
4. Reactor Vessel Low Water Level - Level 3	1, 2	2	1
5. Main Steam Line Isolation Valve - Closure	1[g]	4	4

TABLE 3.3.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION

TABLE NOTATIONS

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the trip system in the tripped condition provided at least one OPERABLE channel in the same trip system is monitoring that parameter.

(b) This function shall be automatically bypassed when the reactor mode switch is in the Run position.

(c) Unless adequate shutdown margin has been demonstrated per Specification 3.1.1, the "shorting links" shall be removed from the RPS circuitry prior to and during the time any control rod is withdrawn.*

(d) When the "shorting links" are removed, the Minimum OPERABLE Channels Per Trip System is 6 IRMs and per Specification 3.9.2, 2 SRMs.

(e) DELETED

(f) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.

(g) This function shall be automatically bypassed when the reactor mode switch is not in the Run position.

(h) This function is not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required.

(i) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

(j) This function shall be automatically bypassed when turbine first stage pressure is ≤ 161.9 psig, equivalent to THERMAL POWER less than 30% of RATED THERMAL POWER.

(k) Since each APRM channel provides input to both trip systems, the minimum operable channels specified in Table 3.3.1-1 are the total APRM channels required (i.e., it is not on a trip system basis). The 6 hour allowed test time to complete a channel surveillance test (note (a) above) is applicable provided at least two OPERABLE channels are monitoring that parameter.

---

*Not required for control rods removed per Specification 3.9.10.1 or 3.9.10.2.

TABLE 4.3.1.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION[(a)]	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. Intermediate Range Monitors:				
a. Neutron Flux - High	S/U,S,(b)	S/U[(c)], W	SA	2
	S	W	SA	3, 4, 5
b. Inoperative	NA	W	NA	2, 3, 4, 5
2. Average Power Range Monitor[(f)]:				
a. Neutron Flux - Upscale (Setdown)	D,(b)	SA(m)	2 years	2
b. Simulated Thermal Power - Upscale	D	SA[(l)]	W[(d)], 2 years[(e)]	1
c. Neutron Flux - Upscale	D	SA	W[(d)], 2 years	1
d. Inoperative	NA	SA	NA	1, 2
e. 2-out-of-4 Trip Voters	D	SA	NA	1, 2
3. Reactor Vessel Steam Dome Pressure - High	S	Q[(k)]	R	1, 2
4. Reactor Vessel Low Water Level - Level 3	S	Q[(k)]	R	1, 2
5. Main Steam Line Isolation Valve - Closure	NA	Q	R	1
6. Main Steam Line Radiation - High	S	Q	R	1, 2[(i)]
7. Drywell Pressure - High	S	Q[(k)]	R	1, 2

TABLE 4.3.1.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
8. Scram Discharge Volume Water Level - High				
a. Float Switch	NA	Q	R	1, 2, 5(j)
b. Level Transmitter	S	Q(k)	R	1, 2, 5(j)
9. Turbine Stop Valve - Closure	NA	Q	R	1
10. Turbine Control Valve Fast Closure	NA	Q	NA	1
11. Reactor Mode Switch Shutdown Position	NA	R	NA	1, 2, 3, 4, 5
12. Manual Scram	NA	W	NA	1, 2, 3, 4, 5
13. Deleted.				

(a) Neutron detectors may be excluded from CHANNEL CALIBRATION.
(b) The IRM and SRM channels shall be determined to overlap for at least ½ decades during each startup after entering OPERATIONAL CONDITION 2 and the IRM and APRM channels shall be determined to overlap for at least ½ decades during each controlled shutdown, if not performed within the previous 7 days.
(c) Within 24 hours prior to startup, if not performed within the previous 7 days.
(d) This calibration shall consist of the adjustment of the APRM channel to conform to the power values calculated by a heat balance during OPERATIONAL CONDITION 1 when THERMAL POWER ≥ 25% of RATED THERMAL POWER. Adjust the APRM channel if the absolute difference is greater than 2% of RATED THERMAL POWER.
(e) Calibration includes flow input function, including flow transmitters.
(f) The LPRMs shall be calibrated at least once per 1000 effective full power hours (EFPH) using the TIP system.
(g) Deleted.
(h) Deleted.
(i) This function is not required to be OPERABLE when the reactor pressure vessel head is removed per Specification 3.10.1.
(j) With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.
(k) Includes verification of the trip setpoint of the trip unit.
(l) Channel Functional Test shall include the flow input function, excluding flow transmitters.
(m) Not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2.

3/4.3.6 CONTROL ROD BLOCK INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.6. The control rod block instrumentation channels shown in Table 3.3.6-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3.6-2.

APPLICABILITY: As shown in Table 3.3.6-1.

ACTION:

a. With a control rod block instrumentation channel trip setpoint* less conservative than the value shown in the Allowable Values column of Table 3.3.6-2, declare the channel inoperable until the channel is restored to OPERABLE status with its trip setpoint adjusted consistent with the Trip Setpoint value.

b. With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, take the ACTION required by Table 3.3.6-1.

SURVEILLANCE REQUIREMENTS

4.3.6 Each of the above required control rod block trip systems and instrumentation channels shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.6-1.

*The APRM Simulated Thermal Power - Upscale Functional Unit need not be declared inoperable upon entering single reactor recirculation loop operation provided the Flow Biased setpoints are changed within 4 hours per Specification 3.4.1.1.

TABLE 3.3.6-1

CONTROL ROD BLOCK INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1. ROD BLOCK MONITOR[(a)]			
a. Upscale	2	1*	60
b. Inoperative	2	1*	60
c. Downscale	2	1*	60
2. AVERAGE POWER RANGE MONITOR			
a. Simulated Thermal Power - Upscale	3	1	61
b. Inoperative	3	1, 2	61
c. Neutron Flux - Downscale	3	1	61
d. Simulated Thermal Power - Upscale (Setdown)	3	2	61
e. Flow - Upscale	3	1	61
3. SOURCE RANGE MONITORS			
a. Detector not full in[(b)]	3	2	61
	2[(f)]	5	61
b. Upscale[(c)]	3	2	61
	2[(f)]	5	61
c. Inoperative[(c)]	3	2	61
	2[(f)]	5	61
d. Downscale[(d)]	3	2	61
	2[(f)]	5	61
4. INTERMEDIATE RANGE MONITORS			
a. Detector not full in	6	2, 5	61
b. Upscale	6	2, 5	61
c. Inoperative	6	2, 5	61
d. Downscale[(e)]	6	2, 5	61
5. SCRAM DISCHARGE VOLUME			
a. Water Level - High	2	1, 2, 5**	62
b. Scram Trip Bypass	2	2, 5**	62
6. Deleted			
7. REACTOR MODE SWITCH SHUTDOWN POSITION	2	3, 4	63

TABLE 3.3.6-2

CONTROL ROD BLOCK INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. ROD BLOCK MONITOR		
a. Upscale	As specified in the CORE OPERATING LIMITS REPORT	As specified in the CORE OPERATING LIMITS REPORT
b. Inoperative	NA	NA
c. Downscale	$\geq$ 94% of Reference Level	$\geq$ 92.3% of Reference Level
2. AVERAGE POWER RANGE MONITOR		
a. Simulated Thermal Power - Upscale		
1) Flow Biased	$\leq 0.63\ (W-\Delta W)^{\#} + 55.6\%$, with a maximum of	$\leq 0.63\ (W-\Delta W)^{\#} + 58.5\%$, with a maximum of
2) High Flow Clamped	108% of RATED THERMAL POWER	110% of RATED THERMAL POWER
b. Inoperative	NA	NA
c. Neutron Flux - Downscale	$\geq$ 5% of RATED THERMAL POWER	$\geq$ 3% of RATED THERMAL POWER
d. Simulated Thermal Power - Upscale (Setdown)	$\leq$ 12% of RATED THERMAL POWER	$\leq$ 14% of RATED THERMAL POWER
e. Flow Upscale	$\leq$ 110% of rated flow	$\leq$ 113% of rated flow
3. SOURCE RANGE MONITORS		
a. Detector not full in	NA	NA
b. Upscale	$\leq 1.0 \times 10^5$ cps	$\leq 1.6 \times 10^5$ cps
c. Inoperative	NA	NA
d. Downscale	$\geq$ 3 cps**	$\geq$ 2 cps**

**May be reduced to $\geq$ 0.7 cps provided the signal-to-noise ratio $\geq$ 20.

#The Average Power Range Monitor Simulated Thermal Power - Upscale Flow Biased Rod Block setpoint varies as a function of recirculation loop drive flow (W). ΔW is defined as the difference in indicated drive flow (in percent of drive flow which produces rated core flow) between two loop and single loop operation at the same core flow. ΔW = 0% for two loop operation. ΔW = 8% for single loop operation.

TABLE 4.3.6-1
CONTROL ROD BLOCK INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. ROD BLOCK MONITOR				
a. Upscale	NA	SA	2 years	1*
b. Inoperative	NA	SA	NA	1*
c. Downscale	NA	SA	2 years	1*
2. AVERAGE POWER RANGE MONITOR				
a. Simulated Thermal Power - Upscale	NA	SA	2 years	1
b. Inoperative	NA	SA	NA	1, 2
c. Neutron Flux - Downscale	NA	SA	2 years	1
d. Simulated Thermal Power - Upscale (Setdown)	NA	SA	2 years	2
e. Flow - Upscale	NA	SA	2 years	1
3. SOURCE RANGE MONITORS				
a. Detector not full in	NA	S/U(b),W	NA	2***, 5
b. Upscale	S	S/U(b),W	SA	2***, 5
c. Inoperative	NA	S/U(b),W	NA	2***, 5
d. Downscale	S	S/U(b),W	SA	2***, 5
4. INTERMEDIATE RANGE MONITORS				
a. Detector not full in	NA	S/U(b),W	NA	2, 5
b. Upscale	S	S/U(b),W	SA	2, 5
c. Inoperative	NA	S/U(b),W	NA	2, 5
d. Downscale	S	S/U(b),W	SA	2, 5
5. SCRAM DISCHARGE VOLUME				
a. Water Level - High	NA	Q	R	1, 2, 5**
b. Scram Trip Bypass	NA	R	NA	2, 5**
6. Deleted				
7. REACTOR MODE SWITCH SHUTDOWN POSITION	NA	R	NA	3, 4

3/4.4.1 RECIRCULATION SYSTEM

RECIRCULATION LOOPS

LIMITING CONDITION FOR OPERATION

3.4.1.1 Two reactor coolant system recirculation loops shall be in operation.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2*.

ACTION:

a. With one reactor coolant system recirculation loop not in operation:

   1. Within 4 hours:

      a) Place the individual recirculation pump flow controller for the operating recirculation pump in the Manual mode.

      b) Reduce THERMAL POWER to less than or equal to 67.2% of RATED THERMAL POWER.

      c) Limit the speed of the operating recirculation pump to less than or equal to 75% of rated pump speed.

      d) Increase the MINIMUM CRITICAL POWER RATIO (MCPR) Safety Limit to the value for single loop operation required by Specification 2.1.2.

      e) Change the Average Power Range Monitor (APRM) Simulated Thermal Power - Upscale Flow Biased Scram and Rod Block Trip Setpoints and Allowable Values to those applicable for single recirculation loop operation per Specifications 2.2.1 and 3.3.6.

      f) Perform Surveillance Requirement 4.4.1.1.4 if THERMAL POWER is less than or equal to 30% of RATED THERMAL POWER or the recirculation loop flow in the operating loop is less than or equal to 50% of rated loop flow.

   2. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

b. With no reactor coolant system recirculation loop in operation while in OPERATIONAL CONDITION 1, immediately place the Reactor Mode Switch in the SHUTDOWN position.

c. With no reactor coolant system recirculation loops in operation, while in OPERATIONAL CONDITION 2, initiate measures to place the unit in at least HOT SHUTDOWN within the next 6 hours.

*See Special Test Exception 3.10.4.

2.2 LIMITING SAFETY SYSTEM SETTINGS

BASES

2.2.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

The Reactor Protection System instrumentation setpoints specified in Table 2.2.1-1 are the values at which the reactor trips are set for each parameter. The Trip Setpoints have been selected to ensure that the reactor core and reactor coolant system are prevented from exceeding their Safety Limits during normal operation and design basis anticipated operational occurrences and to assist in mitigating the consequences of accidents. Operation with a trip set less conservative than its Trip Setpoint but within its specified Allowable Value is acceptable on the basis that the difference between each Trip Setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the safety analyses.

1. Intermediate Range Monitor, Neutron Flux - High

The IRM system consists of 8 chambers, 4 in each of the reactor trip systems. The IRM is a 5 decade 10 range instrument. The trip setpoint of 120 divisions of scale is active in each of the 10 ranges. Thus as the IRM is ranged up to accommodate the increase in power level, the trip setpoint is also ranged up. The IRM instruments provide for overlap with both the APRM and SRM systems.

The most significant source of reactivity changes during the power increase is due to control rod withdrawal. In order to ensure that the IRM provides the required protection, a range of rod withdrawal accidents have been analyzed. The results of these analyses are in Section 15B.4.1.2 of the FSAR. The most severe case involves an initial condition in which THERMAL POWER is at approximately 1% of RATED THERMAL POWER. Additional conservatism was taken in this analysis by assuming the IRM channel closest to the control rod being withdrawn is bypassed. The results of this analysis show that the reactor is shutdown and peak power is limited to 21% of RATED THERMAL POWER with the peak fuel enthalpy well below the fuel failure threshold of 170 cal/gm. Based on this analysis, the IRM provides protection against local control rod errors and continuous withdrawal of control rods in sequence and provides backup protection for the APRM.

2. Average Power Range Monitor

For operation at low pressure and low flow during STARTUP, the Neutron Flux - Upscale (Setdown) scram setting of 15% of RATED THERMAL POWER provides adequate thermal margin between the setpoint and the Safety Limits. The margin accommodates the anticipated maneuvers associated with power plant startup. Effects of increasing pressure at zero or low void content are minor and cold water from sources available during startup is not much colder than that already in the system. Temperature coefficients are small and control rod patterns are constrained by the RWM. Of all the possible sources of reactivity input, uniform control rod withdrawal is the most probable cause of significant power increase.

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS (Continued)

Average Power Range Monitor (Continued)

Because the flux distribution associated with uniform rod withdrawals does not involve high local peaks and because several rods must be moved to change power by a significant amount, the rate of power rise is very slow. Generally the heat flux is in near equilibrium with the fission rate. In an assumed uniform rod withdrawal approach to the trip level, the rate of power rise is not more than 5% of RATED THERMAL POWER per minute and the APRM system would be more than adequate to assure shutdown before the power could exceed the Safety Limit. The 15% Neutron Flux - Upscale (Setdown) trip remains active until the mode switch is placed in the Run position.

The APRM trip system is calibrated using heat balance data taken during steady state conditions. Fission chambers provide the basic input to the system and therefore the monitors respond directly and quickly to changes due to transient operation. For the case of the Neutron Flux - Upscale setpoint; i.e., for a power increase, the THERMAL POWER of the fuel will be less than that indicated by the neutron flux due to the time constants of the heat transfer associated with the fuel. For the Simulated Thermal Power signal, a time constant of approximately 6 seconds is applied to the Neutron Flux signal in order to simulate the fuel thermal transient characteristics. More conservative Simulated Thermal Power - Upscale, Flow Biased and High Flow Clamped maximum values are used for these setpoints as shown in Table 2.2.1-1.

The APRM setpoints were selected to provide adequate margin for the Safety Limits and yet allow operating margin that reduces the possibility of unnecessary shutdown. For single recirculation loop operation, the APRM Simulated Thermal Power - Upscale Flow Biased setpoints are based on a ΔW value of 8%. The ΔW value corrects for the difference in indicated drive flow (in percentage of drive flow which produces rated core flow) between two loop and single loop operation of the same core flow. The Simulated Thermal Power - Upscale High Flow Clamped setpoint is not changed due to single loop operation as core power levels which would require changing this limit are not achievable in a single loop configuration.

The APRM System is divided into four APRM channels and four 2-out-of-4 Trip Voter channels. Each APRM channel provides inputs to each of the 2-out-of-4 Trip Voter channels. The four 2-out-of-4 Trip Voter channels are divided into two groups each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no 2-out-of-4 Trip Voter channels, to be bypassed. A trip from any one un-bypassed APRM will result in a "half-trip" in all four 2-out-of-4 Trip Voter channels, but no trip inputs to either RPS trip system. Therefore, any APRM Function 2.a, 2.b, 2.c, or 2.d trip from any two un-bypassed APRM channels will result in a full trip in each of the four 2-out-of-4 Trip Voter channels, which in turn results in two trip inputs into each RPS trip system.

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS (Continued)

Average Power Range Monitor (Continued)

Three of the four APRM channels and all four of the 2-out-of-4 Trip Voter channels are required to be OPERABLE to ensure that no single failure will preclude a scram on a valid signal. The 2-out-of-4 Trip Voter includes separate outputs to RPS for the independently voted sets of functions, each of which is redundant (four total outputs). The 2-out-of-4 Trip Voter function 2.e must be declared inoperable if any of its functionality applicable for the plant OPERATIONAL CONDITION is inoperable. Due to the independent voting of APRM trips and the redundancy of outputs, there may be conditions where the Trip Voter function 2.e is inoperable, but trip capability for one or more of the other APRM functions through that Trip Voter is still maintained. This may be considered when determining the condition of the other APRM functions resulting from partial inoperability of the Trip Voter function 2.e. In addition, to provide adequate coverage of the entire core, consistent with the design bases for the APRM functions 2.a, 2.b, and 2.c, at least 20 LPRM inputs, with at least three LPRM inputs from each of the four axial levels at which the LPRMs are located, must be operable for each APRM channel.

3. Reactor Vessel Steam Dome Pressure - High

High pressure in the nuclear system could cause a rupture to the nuclear system process barrier resulting in the release of fission products. A pressure increase while operating will also tend to increase the power of the reactor by compressing voids thus adding reactivity. The trip will quickly reduce the neutron flux, counteracting the pressure increase. The trip setting is slightly higher than the operating pressure to permit normal operation without spurious trips. The setting provides for a wide margin to the maximum allowable design pressure and takes into account the location of the pressure measurement compared to the highest pressure that occurs in the system during a transient. This trip setpoint is effective at low power/flow conditions when the turbine stop valve closure trip is bypassed. For a turbine trip under these conditions, the transient analysis indicated an adequate margin to the thermal hydraulic limit.

BASES

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION

The reactor protection system automatically initiates a reactor scram to:

a. Preserve the integrity of the fuel cladding.

b. Preserve the integrity of the reactor coolant system.

c. Minimize the energy which must be absorbed following a loss-of-coolant accident, and

d. Prevent inadvertent criticality.

This specification provides the limiting conditions for operation necessary to preserve the ability of the system to perform its intended function even during periods when instrument channels may be out of service because of maintenance. When necessary, one channel may be made inoperable for brief intervals to conduct required surveillance.

The reactor protection system is made up of two independent trip systems. There are usually four channels to monitor each parameter with two channels in each trip system. The outputs of the channels in a trip system are combined in a logic so that either channel will trip that trip system. The tripping of both trip systems will produce a reactor scram. The APRM system is divided into four APRM channels and four 2-out-of-4 Trip Voter channels. Each APRM channel provides inputs to each of the four 2-out-of 4 Trip Voter channels. The four 2-out-of-4 Trip Voter channels are divided into two groups of two each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no 2-out-of-4 Trip Voter channels, to be bypassed. Note (k) to Table 3.3.1-1 states that the Minimum Operable channels in Table 3.3.1-1 for the APRM Functional Units (except the 2-out-of-4 Trip Voter Functional Unit) are the total number of APRM channels required and are not on a trip system basis. The basis for the APRM Functional Unit 2.a, 2.b, 2.c, and 2.d actions is to assure trip capability within 1 hour and restore channel redundancy with 12 hours.

The system meets the intent of IEEE-279 for nuclear power plant protection systems. Specified surveillance intervals and surveillance and maintenance outage times have been determined in accordance with NEDC-30815P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," and NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," and NEDC-32410P Supplement 1, "NUMAC PRNM Retrofit Plus Option III Stability Trip Function." The bases for the trip settings of the RPS are discussed in the bases for Specification 2.2.1.

3/4.3.1 REACTOR PROTECTION SYSTEM INSTRUMENTATION (Continued)

The measurement of response time at the specified frequencies provides assurance that the protective functions associated with each channel are completed within the time limit assumed in the safety analyses. Response time requirements are specified in UFSAR Table 7.2-4. No credit was taken for those channels with response times indicated as not applicable except for APRM Simulated Thermal Power - Upscale and Neutron Flux - Upscale trip functions. Response time may be demonstrated by any series of sequential, overlapping or total channel test measurement, provided such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either (1) inplace, onsite or offsite test measurements, or (2) utilizing replacement sensors with certified response times. For the digital electronic portions of the APRM Simulated Thermal Power - Upscale and Neutron Flux - Upscale trip functions, performance characteristics that determine response time are checked by a combination of automatic self-test, calibration activities, and response time tests of the 2-out-of-4 Trip Voter.

3/4.4 REACTOR COOLANT SYSTEM

BASES

3/4.4.1 RECIRCULATION SYSTEM

The impact of single recirculation loop operation upon plant safety is assessed and shows that single-loop operation is permitted at power levels up to 67.2% of RATED THERMAL POWER if the MCPR fuel cladding safety limit is increased as noted by Specification 2.1.2. APRM Simulated Thermal Power - Upscale Flow Biased scram and control rod block setpoints are changed as noted in Tables 2.2.1-1 and 3.3.6-2, respectively. A time period of 4 hours is allowed to make these changes following the establishment of single loop operation since the need for single loop operation often cannot be anticipated. MCPR operating limits adjustments in Specification 3.2.3 for different plant operating situations are applicable to both single and two recirculation loop operation.

To prevent potential control system oscillations from occurring in the recirculation flow control system, the operating mode of the recirculation flow control system must be restricted to the manual control mode for single-loop operation.

Additionally, surveillance on the pump speed of operating recirculation loop is imposed to exclude the possibility of excessive core internals vibration. The surveillance on differential temperatures below 30% THERMAL POWER or 50% rated recirculation loop flow is to prevent undue thermal stress on vessel nozzles, recirculation pump and vessel bottom head during a power or flow increase following extended operation in the single recirculation loop mode.

An inoperable jet pump is not, in itself, a sufficient reason to declare a recirculation loop inoperable, but it does, in case of a design-basis-accident, increase the blowdown area and reduce the capability of reflooding the core; thus, the requirement for shutdown of the facility with a jet pump inoperable. Jet pump failure can be detected by monitoring jet pump performance on a prescribed schedule for significant degradation.

Recirculation pump speed mismatch limits are in compliance with the ECCS LOCA analysis design criteria for two recirculation loop operation. The limits will ensure an adequate core flow coastdown from either recirculation loop following a LOCA.

In the case where the mismatch limits cannot be maintained during two loop operation, continued operation is permitted in a single recirculation loop mode.

In order to prevent undue stress on the vessel nozzles and bottom head region, the recirculation loop temperatures shall be within 50°F of each other prior to startup of an idle loop. The loop temperature must also be within 50°F of the reactor pressure vessel coolant temperature to prevent thermal shock to the recirculation pump and recirculation nozzles.