

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.

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 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. Range 10 allows the IRM instruments to remain on scale at higher power levels to provide for additional overlap and also permits calibration at these higher powers.

The most significant source of reactivity change 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, Section 7.5 of the FSAR. The most severe case involves an initial condition in which the reactor is just subcritical and the IRMs are not yet on scale. Additional conservatism was taken in this analysis by assuming the IRM channel closest to the rod being withdrawn is bypassed. The results of this analysis show that the reactor is shut down and peak power is limited to 1% of RATED THERMAL POWER, thus maintaining MCPR above the safety limit MCPR. 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 APRM scram setting of 15% of RATED THERMAL POWER provides adequate thermal margin between the setpoint and the Safety Limits. This margin accommodates the anticipated maneuvers associated with power plant startup. Effects of increasing pressure at zero or low void content are minor, 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 RSCS and RWM. Of all

REACTIVITY CONTROL SYSTEMSROD BLOCK MONITORLIMITING CONDITION FOR OPERATION

3.1.4.3 Both Rod Block Monitor (RBM) channels shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 30% of RATED THERMAL POWER.

ACTION:

- a. With one RBM channel inoperable, POWER OPERATION may continue provided that either:
 1. The inoperable RBM channel is restored to OPERABLE status within 24 hours, or
 2. The redundant RBM is demonstrated OPERABLE within 4 hours and at least once per 24 hours until the inoperable RBM is restored to OPERABLE status, and the inoperable RBM is restored to OPERABLE status within 7 days, or
 3. THERMAL POWER is limited such that MCPR will remain above the safety limit MCPR, assuming a single error that results in complete withdrawal of any single control rod that is capable of withdrawal.
- Otherwise, trip at least one rod block monitor channel.
- b. With both RBM channels inoperable, trip at least one rod block monitor channel within one hour.

SURVEILLANCE REQUIREMENTS

4.1.4.3 Each of the above required RBM channels shall be demonstrated OPERABLE by performance of a CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION at the frequencies and during the OPERATIONAL CONDITIONS specified in Table 4.3.4-1.

INSTRUMENTATION3/4.3.4 CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATIONLIMITING CONDITION FOR OPERATION

3.3.4 The control rod withdrawal block instrumentation shown in Table 3.3.4-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3.4-2.

APPLICABILITY: As shown in Table 3.3.4-1.

ACTION:

- a. With a control rod withdrawal block instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3.4-2, 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 requirements for the minimum number of OPERABLE channels not satisfied for one trip system, POWER OPERATION may continue provided that either:
 1. The inoperable channel(s) is restored to OPERABLE status within 24 hours, or
 2. The redundant trip system is demonstrated OPERABLE within 4 hours and at least once per 24 hours until the inoperable channel is restored to OPERABLE status, and the inoperable channel is restored to OPERABLE status within 7 days, or
 3. For the Rod Block Monitor only, THERMAL POWER is limited such that MCPR will remain above the safety limit MCPR, assuming a single error that results in complete withdrawal of any single control rod that is capable of withdrawal.
 4. Otherwise, place at least one trip system in the tripped condition within the next hour.
- c. With the requirements for the minimum number of OPERABLE channels not satisfied for both trip systems, place at least one trip system in the tripped condition within one hour.
- d. The provisions of Specification 3.0.3 are not applicable in OPERATIONAL CONDITION 5.

SURVEILLANCE REQUIREMENTS

4.3.4 Each of the above required control rod withdrawal block instrumentation channels shall be demonstrated OPERABLE by the performance of a CHANNEL CHECK, CHANNEL CALIBRATION, and a CHANNEL FUNCTIONAL TEST during the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.4-1.

TABLE 3.3.4-2

CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATION SETPOINTS

<u>TRIP FUNCTION AND INSTRUMENT NUMBER</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUE</u>
1. <u>APRM (C51-APRM-CH. A,B,C,D,E,F)</u>		
a. Upscale (Flow Biased)	$< (0.66W + 42\%) T^{(a)}$	$< (0.66W + 42\%) T^{(a)}$
b. Inoperative	NA	NA
c. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
d. Upscale (Fixed)	$< 12\%$ of RATED THERMAL POWER	$< 12\%$ of RATED THERMAL POWER
2. <u>ROD BLOCK MONITOR (C51-RBM-CH.A,B)</u>		
a. Upscale	$< (0.66W + 41\%) T^{(a)}$	$< (0.66W + 41\%) T^{(a)}$
b. Inoperative	NA	NA
c. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
3. <u>SOURCE RANGE MONITORS (C51-SRM-K600A,B,C,D)</u>		
a. Detector not full in	NA	NA
b. Upscale	$< 1 \times 10^5$ cps	$< 1 \times 10^5$ cps
c. Inoperative	NA	NA
d. Downscale	> 3 cps	> 3 cps
4. <u>INTERMEDIATE RANGE MONITORS (C51-IRM-K601A,B,C,D,E,F,G,H)</u>		
a. Detector not full in	NA	NA
b. Upscale	$< 108/125$ of full scale	$< 108/125$ of full scale
c. Inoperative	NA	NA
d. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
5. <u>SCRAM DISCHARGE VOLUME (C11-LSH-N013E)</u>		
a. Water Level - High	< 73 gallons	< 73 gallons

(a) T as established in the SUPPLEMENTAL RELOAD LICENSING REPORT, Appendix A.

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.

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 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. Range 10 allows the IRM instruments to remain on scale at higher power levels to provide for additional overlap and also permits calibration at these higher powers.

The most significant source of reactivity change 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 in Section 7.3 of the FSAR. The most severe case involves an initial condition in which the reactor is just subcritical and the IRMs are not yet on scale. Additional conservatism was taken in this analysis by assuming the IRM channel closest to the rod being withdrawn is bypassed. The results of this analysis show that the reactor is shut down and peak power is limited to 1% of RATED THERMAL POWER, thus maintaining MCPR above the safety limit MCPR. 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 APRM scram setting of 15% of RATED THERMAL POWER provides an adequate thermal margin between the setpoint and the Safety Limits. This margin accommodates the anticipated maneuvers associated with power plant startup. Effects of increasing pressure at zero or low void content are minor; 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 RSCS and RWM. Of all

REACTIVITY CONTROL SYSTEMSROD BLOCK MONITORLIMITING CONDITION FOR OPERATION

3.1.4.3 Both Rod Block Monitor (RBM) channels shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 30% of RATED THERMAL POWER.

ACTION:

- a. With one RBM channel inoperable, POWER OPERATION may continue provided that either:
 - 1. The inoperable RBM channel is restored to OPERABLE status within 24 hours, or
 - 2. The redundant RBM is demonstrated OPERABLE within 4 hours and at least once per 24 hours until the inoperable RBM is restored to OPERABLE status within 7 days, or
 - 3. THERMAL POWER is limited such that MCPR will remain above the safety limit MCPR, assuming a single error that results in complete withdrawal of any single control rod that is capable of withdrawal.

Otherwise, trip at least one rod block monitor channel.

- b. With both RBM channels inoperable, trip at least one rod block monitor channel within one hour.

SURVEILLANCE REQUIREMENTS

4.1.4.3 Each of the above required RBM channels shall be demonstrated OPERABLE by performance of a CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION at the frequencies and during the OPERATIONAL CONDITIONS specified in Table 4.3.4-1.

INSTRUMENTATION3/4.3.4 CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATIONLIMITING CONDITION FOR OPERATION

3.3.4 The control rod withdrawal block instrumentation shown in Table 3.3.4-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3.4-2.

APPLICABILITY: As shown in Table 3.3.4-1.

ACTION:

- a. With a control rod withdrawal block instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3.4-2, 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 requirements for the minimum number of OPERABLE channels not satisfied for one trip system, POWER OPERATION may continue provided that either:
 1. The inoperable channel(s) is restored to OPERABLE status within 24 hours, or
 2. The redundant trip system is demonstrated OPERABLE within 4 hours and at least once per 24 hours until the inoperable channel is restored to OPERABLE status, and the inoperable channel is restored to OPERABLE status within 7 days, or
 3. For the Rod Block Monitor only, THERMAL POWER is limited such that the MCPR will remain above the safety limit MCPR, assuming a single error that results in complete withdrawal of any single control rod that is capable of withdrawal.
 4. Otherwise, place at least one trip system in the tripped condition within the next hour.
- c. With the requirements for the minimum number of OPERABLE channels not satisfied for both trip systems, place at least one trip system in the tripped condition within one hour.
- d. The provisions of Specification 3.0.3 are not applicable in OPERATIONAL CONDITION 5.

SURVEILLANCE REQUIREMENTS

4.3.4 Each of the above required control rod withdrawal block instrumentation channels shall be demonstrated OPERABLE by the performance of a CHANNEL CHECK, CHANNEL CALIBRATION, and a CHANNEL FUNCTIONAL TEST during the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.4-1.

TABLE 3.3.4-2

CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATION SETPOINTS

<u>TRIP FUNCTION AND INSTRUMENT NUMBER</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUE</u>
1. <u>APRM</u> (C51-APRM-CH. A,B,C,D,E,F)		
a. Upscale (Flow Biased)	$< (0.66W + 42\%) T^{(a)}$	$< (0.66W + 42\%) T^{(a)}$
b. Inoperative	NA	NA
c. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
d. Upscale (Fixed)	$< 12\%$ of RATED THERMAL POWER	$< 12\%$ of RATED THERMAL POWER
2. <u>ROD BLOCK MONITOR</u> (C51-RBM-CH.A,B)		
a. Upscale	$< (0.66W + 39\%) T^{(a)}$	$< (0.66W + 39\%) T^{(a)}$
b. Inoperative	NA	NA
c. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
3. <u>SOURCE RANGE MONITORS</u> (C51-SRM-K600A,B,C,D)		
a. Detector not full in	NA	NA
b. Upscale	$< 1 \times 10^5$ cps	$< 1 \times 10^5$ cps
c. Inoperative	NA	NA
d. Downscale	> 3 cps	> 3 cps
4. <u>INTERMEDIATE RANGE MONITORS</u> (C51-IRM-K601A,B,C,D,E,F,G,H)		
a. Detector not full in	NA	NA
b. Upscale	$< 108/125$ of full scale	$< 108/125$ of full scale
c. Inoperative	NA	NA
d. Downscale	$> 3/125$ of full scale	$> 3/125$ of full scale
5. <u>SCRAM DISCHARGE VOLUME</u> (C12-LSH-N013E)		
a. Water Level High	< 73 gallons	< 73 gallons

(a) T as established in the SUPPLEMENTAL RELOAD LICENSING REPORT, Appendix A.