INFO ONLY. SEE PROPOSED AMENDMENT 74: PLA-3209 6/16/89.

INDEX

LIST OF FIGURES

1d

with the reactor at a THERMAL POWER/core flow condition outside of Regions I and II of Figure 3.4.1.1.1-1.

3/4.4 REACTOR COOLANT SYSTEM

3/4.4.1 RECIRCULATION SYSTEM

RECIRCULATION LOOPS - TWO LOOP OPERATION

LIMITING CONDITION FOR OPERATION

3.4.1.1.1 Two reactor coolant system recirculation loops shall be in operation ~~and~~

~~a. Total core flow shall be greater than or equal to 55 million lbs/hr, or~~

~~b. The reactor is at a THERMAL POWER/core flow condition less than or equal to the limit specified in Figure 3.4.1.1.1-1.~~

APPLICABILITY: OPERATIONAL CONDITIONS 1* and ~~2*~~† except during single loop operation.#

ACTION:

~~a. With one reactor coolant system recirculation loop not in operation, comply with the requirements of Specification 3.4.1.1.2, or take the associated ACTION.~~

~~b. With no reactor coolant system recirculation loops in operation, immediately initiate an orderly reduction of THERMAL POWER to less than or equal to the limit specified in Figure 3.4.1.1.1-1, and initiate measures to place the unit in at least STARTUP within 6 hours and in HOT SHUTDOWN within the next 6 hours.~~

INSERT A

~~c. With two reactor coolant system recirculation loops in operation and total core flow less than 55 million lbs/hr and the reactor at a THERMAL POWER/core flow condition greater than the limit specified in Figure 3.4.1.1.1-1:~~

~~1. Restore the reactor to a THERMAL POWER/core flow condition less than or equal to the limit specified in Figure 3.4.1.1.1-1, or~~

~~2. Increase core flow to greater than 55 million lbs/hr, or~~

~~3. Determine the APRM and LPRM*** neutron flux noise levels within 1 hour, and:~~

~~a) If the APRM and LPRM*** neutron flux noise levels are less than three times their established baseline levels, continue to determine the noise levels at least once per 8 hours and within 30 minutes after the completion of a THERMAL POWER increase of at least 5% of RATED THERMAL POWER, or~~

~~b) If the APRM or LPRM*** neutron flux noise levels are greater than or equal to three times their established baseline levels, immediately initiate corrective action and restore the noise levels to within the required limits within 2 hours by increasing core flow to greater than 55 million lbs/hr, and/or by returning the reactor to a THERMAL POWER/core flow condition less than or equal to the limit specified in Figure 3.4.1.1.1-1.~~

*See Special Test Exception 3.10.4.

~~***Detectors A and C of one LPRM string per core octant plus detectors A and C of one LPRM string in the center of the core should be monitored.~~

#See Specification 3.4.1.1.2 for single loop operation requirements.

†The LPRM upscale alarms are not required to be OPERABLE to meet this specification in OPERATIONAL CONDITION 2.

INSERT A

a. In OPERATIONAL CONDITION 1:

1. With:

a) No reactor coolant system recirculation loops in operation, or

b) Region I of Figure 3.4.1.1.1-1 entered, or

c) Region II of Figure 3.4.1.1.1-1 entered and core thermal hydraulic instability occurring as evidenced by:

1) Two or more APRM readings oscillating with at least one oscillating greater than or equal to 10% of RATED THERMAL POWER peak-to-peak, or

2) Two or more LPRM upscale alarms activating and deactivating with a 1 to 5 second period, or

3) Observation of a sustained LPRM oscillation of greater than 10 w/cm^2 peak-to-peak with a 1 to 5 second period, or

d) Region II of Figure 3.4.1.1.1-1 entered and less than 50% of the required LPRM upscale alarms OPERABLE,

immediately place the reactor mode switch in the shutdown position.

2. If Region II of Figure 3.4.1.1.1-1 is entered and greater than or equal to 50% of the required LPRM upscale alarms OPERABLE, immediately exit the region by:

a) inserting a predetermined set of high worth control rods, or

b) increasing core flow.

3. With less than 50% of the required LPRM upscale alarms OPERABLE, follow ACTION a.1.d upon entry into Region II of Figure 3.4.1.1.1-1.

b. In OPERATIONAL CONDITION 2 with no reactor coolant system recirculation loops in operation, return at least one reactor coolant system recirculation loop to operation, or be in HOT SHUTDOWN within the next 6 hours.

c. With any pump discharge valve not OPERABLE remove the associated loop from operation, close the valve and comply with the requirements of Specification 3.4.1.1.2.

d. With any pump discharge bypass valve not OPERABLE close the valve and verify closed at least once per 31 days.

SURVEILLANCE REQUIREMENTS

4.4.1.1.1.1 Each pump discharge valve and bypass valve shall be demonstrated OPERABLE by cycling each valve through at least one complete cycle of full travel during each startup** prior to THERMAL POWER exceeding 25% of RATED THERMAL POWER.

~~4.4.1.1.1.2 Each pump discharge bypass valve, if not OPERABLE, shall be verified to be closed at least once per 31 days.~~

4.4.1.1.1.3 Each pump MG set scoop tube electrical and mechanical stop shall be demonstrated OPERABLE with overspeed setpoints less than or equal to 102.5 and 105%, respectively, of rated core flow, at least once per 18 months.

~~4.4.1.1.1.4 Establish a baseline APRM and LPRM neutron flux noise value at a point within 5% RATED THERMAL POWER of the 100% rated rod line with total core flow between 35% and 50% of rated total core flow during startup testing following each refueling outage.~~

INSERT B

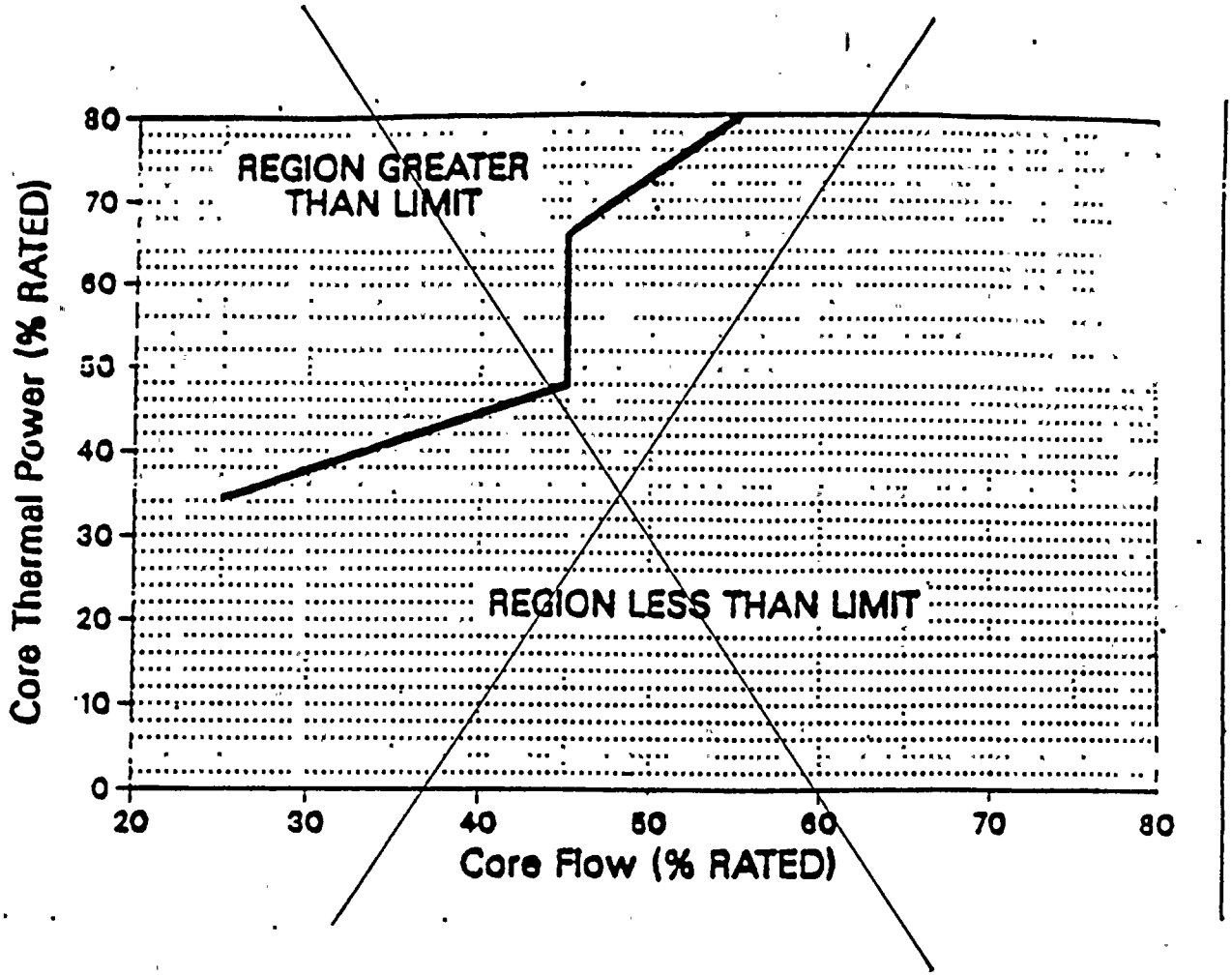
**If not performed within the previous 31 days.

INSERT B

4.4.1.1.1.3 At least 50% of the required LPRM upscale alarms shall be determined OPERABLE by performance of the following on each LPRM upscale alarm:

1) CHANNEL FUNCTIONAL TEST at least once per 92 days, and

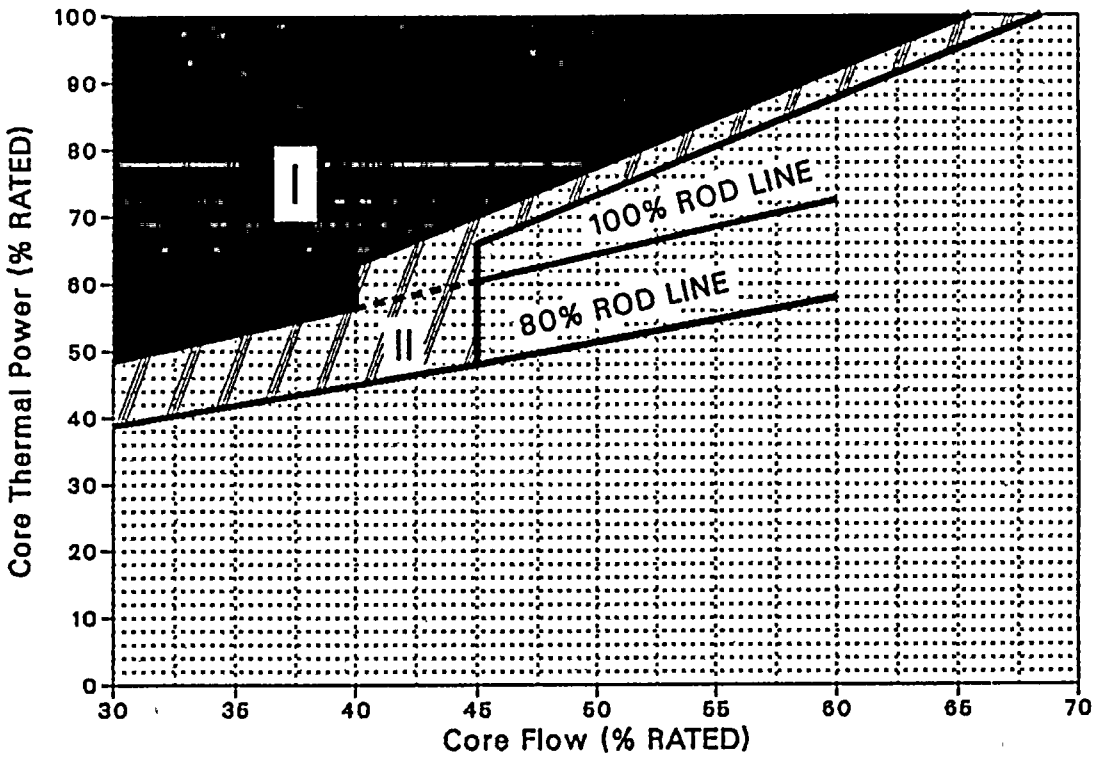
2) CHANNEL CALIBRATION at least once per 184 days.



REPLACE WITH REVISED FIGURE 3.4.1.1.1-1

Figure 3.4.1.1.1-1
THERMAL POWER/CORE FLOW LIMITATIONS

Figure 3.4.1.1.1-1
THERMAL POWER RESTRICTIONS



and the reactor at a THERMAL POWER/core flow condition outside of Regions I and II of Figure 3.4.1.1.1-1

REACTOR COOLANT SYSTEM

RECIRCULATION LOOPS - SINGLE LOOP OPERATION

LIMITING CONDITION FOR OPERATION

3.4.1.1.2 One reactor coolant recirculation loop shall be in operation with the pump speed ≤ 80% of the rated pump speed, and

a. the following revised specification limits shall be followed:

1. Specification 2.1.2: the MCPR Safety Limit shall be increased to 1.07.

2. Table 2.2.1-1: the APRM Flow-Biased Scram Trip Setpoints shall be as follows:

	Trip Setpoint	Allowable Value
	≤ 0.58W + ~~55%~~ 54%	≤ 0.58W + ~~58%~~ 57%

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~~3. Specification 3.2.1: The MAPLHGR limits shall be the limits specified in Figures 3.2.1-1 and 3.2.1-2 multiplied by 0.81 and Figure 3.2.1-3 multiplied by 1.0.~~

~~4.~~ 3 Specification 3.2.2: the APRM Setpoints shall be as follows:

	Trip Setpoint 54%	Allowable Value 57%
	$S \leq (0.58W + \sout{55\%})T$	$S \leq (0.58W + \sout{58\%})T$
	$S_{RB} \leq (0.58W + \sout{46\%})T$ 45%	$S_{RB} \leq (0.58W + \sout{49\%})T$ 48%

~~5.~~ 4 Specification 3.2.3: The MINIMUM CRITICAL POWER RATIO (MCPR) shall be greater than or equal to the largest of the following values:

~~a. 1.37,~~

~~b.~~ a. the MCPR determined from Figure 3.2.3-1 plus 0.01, and

~~c.~~ b. the MCPR determined from Figure 3.2.3-2 plus 0.01.

~~6.~~ 5 Table 3.3.6-2: the RBM/APRM Control Rod Block Setpoints shall be as follows:

		Trip Setpoint	Allowable Value
a.	RBM - Upscale	≤ 0.66W + ~~37%~~ 36%	≤ 0.66W + ~~40%~~ 39%
b.	APRM-Flow Biased	≤ 0.58W + ~~46%~~ 45%	≤ 0.58W + ~~49%~~ 48%

~~b. APRM and LPRM*** neutron flux noise levels shall be less than three times their established baseline levels when THERMAL POWER is greater than the limit specified in Figure 3.4.1.1.2-1.~~

~~c. Total core flow shall be greater than or equal to 42 million lbs/hr when THERMAL POWER is greater than the limit specified in Figure 3.4.1.1.2-1.~~

APPLICABILITY: OPERATIONAL CONDITIONS 1* and 2*, except during two loop operation.#

ACTION:

~~a. With no reactor coolant system recirculation loops in operation, take the ACTION required by Specification 3.4.1.1.1.~~

INSERT C →

INSERT C

a. In OPERATIONAL CONDITION 1:

1. With:

a) No reactor coolant system recirculation loops in operation, or

b) Region I of Figure 3.4.1.1.1-1 entered, or

c) Region II of Figure 3.4.1.1.1-1 entered and core thermal hydraulic instability occurring as evidenced by:

1) Two or more APRM readings oscillating with at least one oscillating greater than or equal to 10% of RATED THERMAL POWER peak-to-peak, or

2) Two or more LPRM upscale alarms activating and deactivating with a 1 to 5 second period, or

3) Observation of a sustained LPRM oscillation of greater than 10 w/cm^2 peak-to-peak with a 1 to 5 second period, or

d) Region II of Figure 3.4.1.1.1-1 entered and less than 50% of the required LPRM upscale alarms OPERABLE,

immediately place the reactor mode switch in the shutdown position.

2. If Region II of Figure 3.4.1.1.1-1 is entered and greater than or equal to 50% of the required LPRM upscale alarms are OPERABLE, immediately exit the region by:

a) inserting a predetermined set of high worth control rods, or

b) increasing core flow by increasing the speed of the operating recirculation pump.

3. With less than 50% of the required LPRM upscale alarms OPERABLE, follow ACTION a.1.d upon entry into Region II of Figure 3.4.1.1.1-1.

b. In OPERABLE CONDITION 2 with no reactor coolant system recirculation loops in operation, return at least one reactor coolant system recirculation loop to operation, or be in HOT SHUTDOWN within the next 6 hours.

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION (Continued)

c. b. With any of the limits specified in 3/4.1.1.2a not satisfied:

1. Upon entering single loop operation, comply with the new limits within 6 hours or be in at least HOT SHUTDOWN within the following 6 hours.

2. If the provisions of ACTION c. b.1 do not apply, take the ACTION(s) required by the referenced Specification(s).

~~c. With the APRM or LPRM*** neutron flux noise levels greater than or equal to three times their established baseline levels when THERMAL POWER is greater than the limit specified in Figure 3.4.1.1.2-1, immediately initiate corrective action and restore the noise levels to within the required limits within 2 hours by initiating an orderly reduction of THERMAL POWER to less than or equal to the limit specified in Figure 3.4.1.1.2-1. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.~~

INSERT D →

d. With one or more jet pumps inoperable, be in at least HOT SHUTDOWN within 12 hours.

~~e. With total core flow less than 42 million lbs/hr when THERMAL POWER is greater than the limit specified in Figure 3.4.1.1.2-1, immediately initiate corrective action by either:~~

~~1. Reducing THERMAL POWER to less than or equal to the limit specified in Figure 3.4.1.1.2-1 within 4 hours, or~~

~~2. Increasing total core flow to greater than or equal to 42 million lbs/hr within 4 hours.~~

SURVEILLANCE REQUIREMENTS

4.4.1.1.2.1 Upon entering single loop operation and at least once per 24 hours thereafter, verify that the pump speed in the operating loop is ≤ 80% of the rated pump speed.

INSERT E →

~~4.4.1.1.2.2 With THERMAL POWER greater than the limit specified in Figure 3.4.1.1.2-1, determine the APRM and LPRM*** neutron flux noise levels within 1 hour. Continue to determine the noise levels at least once per 8 hours and within 30 minutes after the completion of the THERMAL POWER increase ≥ 5% of RATED THERMAL POWER.~~

4.4.1.1.2.3 Within 15 minutes prior to either THERMAL POWER increase resulting from a control rod withdrawal or recirculation loop flow increase, verify that the following differential temperature requirements are met if THERMAL POWER is < 30%**** of RATED THERMAL POWER or the recirculation loop flow in the operating recirculation loop is ≤ 50%**** of rated loop flow:

INSERT D

e. With any pump discharge valve not OPERABLE remove the associated loop from operation, close the valve and verify closed at least once per 31 days.

f. With any pump discharge bypass valve not OPERABLE close the valve and verify closed at least once per 31 days.

INSERT E

4.4.1.1.2.2 At least 50% of the required LPRM upscale alarms shall be determined OPERABLE by performance of the following on each LPRM upscale alarm:

1) CHANNEL FUNCTIONAL TEST at least once per 92 days, and

2) CHANNEL CALIBRATION at least once per 184 days.

SURVEILLANCE REQUIREMENTS (Continued)

a. ≤ 145°F between reactor vessel steam space coolant and bottom head drain line coolant,

b.## ≤ 50°F between the reactor coolant within the loop not in operation and the coolant in the reactor pressure vessel, and

c.## ≤ 50°F between the reactor coolant within the loop not in operation and operating loop.

~~4.4.1.1.2.4 a. Establish a baseline APRM and LPRM neutron flux noise value at a point within 5% RATED THERMAL POWER of the 100% rated rod line with total core flow between 35% and 50% of rated total core flow during startup testing following each refueling outage, or~~

~~b. In lieu of establishing a single loop operation baseline value, utilize the value established pursuant to Specification 4.4.1.1.1.4 if a baseline value is needed to meet the requirements of Specification 3.4.1.1.2.~~

4.4.1.1.2.~~4~~4 The pump discharge valve and bypass valve in both loops shall be demonstrated OPERABLE by cycling each valve through at least one complete cycle of full travel during each startup** prior to THERMAL POWER exceeding 25% of RATED THERMAL POWER.

~~4.4.1.1.2.6 The pump discharge bypass valve in the OPERABLE loop, if not OPERABLE, shall be verified to be closed at least once per 31 days.~~

4.4.1.1.2.~~5~~5 The pump MG set scoop tube electrical and mechanical stop shall be demonstrated OPERABLE with overspeed setpoints less than or equal to 102.5% and 105%, respectively, of rated core flow, at least once per 18 months.

~~4.4.1.1.2.8 The pump discharge valve and bypass valve in the inoperable loop, if not OPERABLE, shall be verified to be closed at least once per 31 days.~~

4.4.1.1.2.~~6~~6 During single recirculation loop operation, all jet pumps, including those in the inoperable loop, shall be demonstrated OPERABLE at least once per 24 hours by verifying that no two of the following conditions occur:###

a. The indicated recirculation loop flow in the operating loop differs by more than 10% from the established single recirculation pump speed-loop flow characteristics.

b. The indicated total core flow differs by more than 10% from the established total core flow value from single recirculation loop flow measurements.

SURVEILLANCE REQUIREMENTS (Continued)

c. The indicated diffuser -to-lower plenum differential pressure of any individual jet pump differs from established single recirculation loop patterns by more than 10%.

4.4.1.1.2.~~10~~ 7 The SURVEILLANCE REQUIREMENTS associated with the specifications referenced in 3.4.1.1.2a shall be followed.

* See Special Test Exception 3.10.4.

** If not performed within the previous 31 days.

*** ~~Detectors A and C of one LPRM string per core octant plus detectors A and C of one LPRM string in the center of the core should be monitored.~~

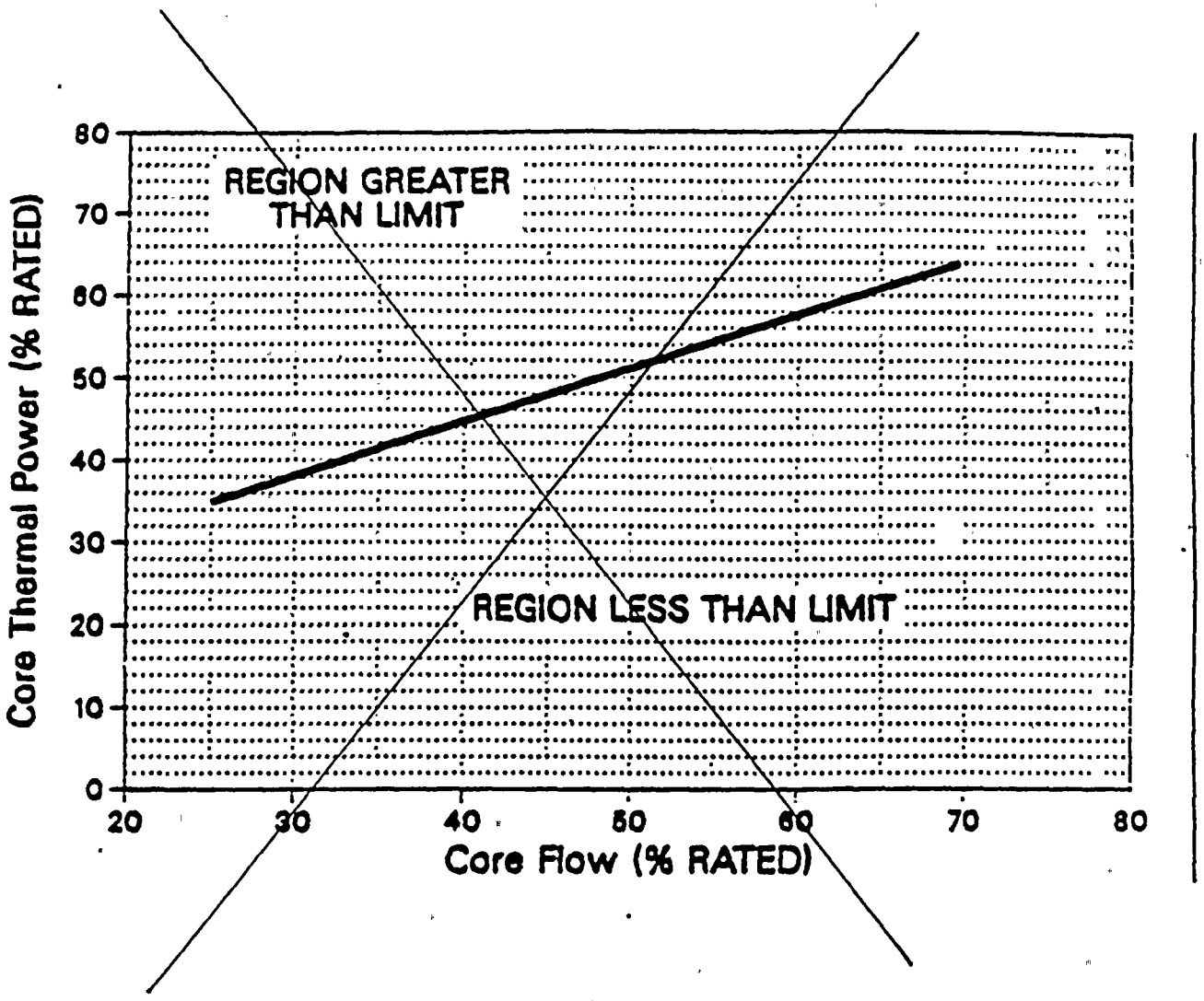
**** Initial value. Final value to be determined based on startup testing. Any required change to this value shall be submitted to the Commission within 90 days of test completion.

\# See Specification 3.4.1.1.1 for two loop operation requirements.

\## This requirement does not apply when the loop not in operation is isolated from the reactor pressure vessel.

\### During startup testing following each refueling outage, data shall be recorded for the parameters listed to provide a basis for establishing the specified relationships. Comparisons of the actual data in accordance with the criteria listed shall commence upon the performance of subsequent required surveillances.

+ The LPRM upscale alarms are not required to be OPERABLE to meet this specification in OPERATIONAL CONDITION 2.



DELETE THIS FIGURE

Figure 3.4.1.1.2-1
SINGLE LOOP OPERATION
THERMAL POWER LIMITATIONS

REACTOR COOLANT SYSTEM

IDLE RECIRCULATION LOOP STARTUP

LIMITING CONDITION FOR OPERATION

3.4.1.4 An idle recirculation loop shall not be started unless the temperature differential between the reactor pressure vessel steam space coolant and the bottom head drain line coolant is less than or equal to 145°F, and:

a. When both loops have been idle, unless the temperature differential between the reactor coolant within the idle loop to be started up and the coolant in the reactor pressure vessel is less than or equal to 50°F, or

b. When only one loop has been idle, unless the temperature differential between the reactor coolant within the idle and operating recirculation loops is less than or equal to 50°F ~~and~~ the operating loop flow rate is less than or equal to 50% of ~~rated~~ loop flow, and the reactor is operating at a THERMAL POWER / core flow condition below the 80% Rod Line shown in Figure 3.4.1.1.1-1.

APPLICABILITY: ~~OPERATIONAL CONDITIONS 1, 2, 3 and 4.~~

ACTION:

With temperature differences and/or flow rates exceeding the above limits, suspend startup of any idle recirculation loop.

SURVEILLANCE REQUIREMENTS

4.4.1.4 The temperature differentials and flow rate shall be determined to be within the limits within 15 minutes prior to startup of an idle recirculation loop.

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3/4.4 REACTOR COOLANT SYSTEM

BASES

3/4.4.1 RECIRCULATION SYSTEM

Operation with one reactor recirculation loop inoperable has been evaluated and found acceptable, provided that the unit is operated in accordance with Specification 3.4.1.1.2.

INSERT F

~~For single loop operation, the MAPLHGR limits are multiplied by a factor of 0.81 for GE fuel and 1.0 for the ANF fuel. These multiplication factors are derived from LOCA analyses initiated from single loop operation conditions. The resulting MAPLHGR limits for single loop operation assure the peak cladding temperature during a LOCA event remains below 2200°F.~~

The MINIMUM CRITICAL POWER RATIO (MCPR) limits for single loop operation assure that the Safety Limit MCPR is not exceeded for any Anticipated Operational Occurrence (AOO) ~~and for the Recirculation Pump Seizure Accident~~.

For single loop operation, the RBM and APRM setpoints are adjusted by a ~~7%~~ 8.5% decrease in recirculation drive flow to account for the active loop drive flow that bypasses the core and goes up through the inactive loop jet pumps.

Surveillance on the pump speed of the operating recirculation loop is imposed to exclude the possibility of excessive reactor vessel internals vibration. Surveillance on differential temperatures below the threshold limits of THERMAL POWER or recirculation loop flow mitigates undue thermal stress on vessel nozzles, recirculation pumps and the vessel bottom head during extended operation in the single loop mode. The threshold limits are those values which will sweep up the cold water from the vessel bottom head.

INSERT G

~~THERMAL POWER, core flow, and neutron flux noise level limitations are prescribed in accordance with the recommendations of General Electric Service Information Letter No. 380, Revision 1, "BWR Core Thermal Hydraulic Stability," dated February 10, 1984.~~

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 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 the loop operation, continued operation is permitted in the single 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. Since the coolant in the bottom of the vessel is at a lower temperature than the coolant in the upper regions of the core, undue stress on the vessel would result if the temperature difference was greater than 145°F.

INSERT F

LOCA analyses for two loop operating conditions, which result in Peak Cladding Temperatures (PCTs) below 2200°F, bound single loop operating conditions. Single loop operation LOCA analyses using two-loop MAPLHGR limits result in lower PCTs. Therefore, the use of two-loop MAPLHGR limits during single loop operation assures that the PCT during a LOCA event remains below 2200°F.

INSERT G

Specifications have been provided to prevent, detect, and mitigate core thermal hydraulic instability events. These specifications are prescribed in accordance with NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors (BWRs)," dated December 30, 1988. The boundaries of the regions in Figure 3.4.1.1.1-1 are determined using ANF decay ratio calculations and supported by Susquehanna SES stability testing.

LPRM upscale alarms are required to detect reactor core thermal hydraulic instability events. The criteria for determining which LPRM upscale alarms are required is based on assignment of these alarms to designated core zones. These core zones consist of the level A, B and C alarms in 4 or 5 adjacent LPRM strings. The number and location of LPRM strings in each zone assure that with 50% or more of the associated LPRM upscale alarms OPERABLE sufficient monitoring capability is available to detect core wide and regional oscillations. Operating plant instability data is used to determine the specific LPRM strings assigned to each zone. The core zones and required LPRM upscale alarms in each zone are specified in appropriate procedures.