Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

June 23, 1989

Docket No. 50-397

Mr. G. C. Sorensen, Manager
Regulatory Programs
Washington Public Power Supply System
P.O. Box 968
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Sorensen:

SUBJECT: ISSUANCE OF AMENDMENT NO. 71 TO FACILITY OPERATING LICENSE NO. NPF-21 - WPPSS NUCLEAR PROJECT NO. 2 (TAC NO. 72924)

The U.S. Nuclear Regulatory Commission has issued the enclosed amendment to Facility Operating License NPF-21 to the Washington Public Power Supply System for WPPSS Nuclear Project No. 2, located in Benton County near Richland, Washington. This amendment is in response to your letter dated March 31, 1989 (G02-89-051) and supplemental letter dated June 1, 1989 (G02-89-101).

The amendment revises Technical Specification Section 3/4.2.6 "Power/Flow Instability" to redefine the segment of the reactor core power/flow map in which operation is prohibited and modifies action to be taken when power/flow conditions lie within the prohibited region. Section 3/4.2.7 "Neutron Flux Noise Monitoring" is eliminated. A new section 3/4.2.7 "Stability Monitoring - Two Loop Operation" is added to specify operation of the new stability monitoring system when both reactor recirculation pumps are in operation. A new section 3/4.2.8 "Stability Monitoring - Single Loop Operation" is added to specifiy operation of the stability monitoring system when only one reactor recirculation pump is in operation. Section 3/4.4.1 "Recirculation System" is amended by revising the actions to be taken with only one recirculation pump in operation in different regions of the core power/flow map. The related bases sections and the index to the technical specifications are revised to reflect the above changes. Additionally, page B 3/4 2-1 and page 6-1 are revised to correct administrative errors introduced in recent amendments.

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A copy of the related safety evaluation supporting the amendment is enclosed. A Notice of Issuance will be included in the Commission's bi-weekly Federal Register notice.

Sincerely,

Robert B. Samworth

Robert B. Samworth, Senior Project Manager
Project Directorate V
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 71 to Facility Operating License No. NPF-21
2. Safety Evaluation

cc: w/enclosures
See next page

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Sincerely,

original signed by

Robert B. Samworth, Senior Project Manager
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

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2. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO.71 TO FACILITY OPERATING LICENSE NO. NPF-21

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NO. 2

DOCKET NO. 50-397

1.0 INTRODUCTION

In a letter from G. Sorensen, Washington Public Power Supply System (WPPSS) to the NRC dated March 31, 1989 (Ref. 1), WPPSS proposed Technical Specification (TS) changes for Nuclear Plant No. 2 (WNP 2). The proposed changes would alter some of the boundaries of, and allowed or required operations within, regions of the power-flow map with potential for thermal hydraulic stability (THS) problems. WPPSS further proposed to augment the surveillance of instability in the regions by using the Advanced Nuclear Fuels (ANF) ANNA Stability Monitoring System (ASMS). There were several discussions between the NRC and WPPSS staff resulting in a June 1, 1989 letter from WPPSS (Ref. 2) providing details of ASMS hardware implementation and proposing several modifications in the previously submitted TS clarifying the intent and language of the specifications. The June 1 letter did not alter the action noticed in the Federal Register on May 3, 1989 and did not affect the initial no significant hazards determination.

The proposed changes are to specifications 3/4.2.6, designating a region in which operation is prohibited, 3/4.2.7 providing for instability monitoring in a designated region during two (recirculation) loop operation (TLO), 3/4.2.8 (a new specification) providing for instability monitoring in a designated region during single loop operation (SLO), and 3/4.4.1, designating (as the primary change) a region to be avoided in SLO. (3/4.4.1 is the primary specification providing for actions to be taken on going to SLO.) The proposed regions, and operation within these regions, are modifications of current WNP2 regions and are in general accord with the General Electric "Interim Recommendations for Stability Actions" (IRSA) presented in NRC Bulletin 88-07, Supplement 1 (December 30, 1988). The bulletin supplement requested that licensees implement the recommendations (along with additional actions relating to scram with recirculation pump trip and region boundary justification) by modifying relevant procedures. Modification of TS was not requested since it is expected that long term solution implementation will begin within a year. WPPSS has responded (Ref. 3) to the bulletin supplement and has indicated that the requested changes have been made to the procedures. The proposed TS changes for WNP2 result in several differences from the IRSA in region boundaries or allowed operations. These differences are either

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO.71 TO FACILITY OPERATING LICENSE NO. NPF-21

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NO. 2

DOCKET NO. 50-397

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2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-21 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 71, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert B. Samworth

for George W. Knighton, Director
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 23, 1989

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

DOCKET NO. 50-397

NUCLEAR PROJECT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 71
License No. NPF-21

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:

   A. The application for amendment filed by the Washington Public Power Supply System (the licensee), dated March 31, 1989 as supplemented by letter dated June 1, 1989 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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conservative or the justification for the proposed differences is based on the improved surveillance possible with the ASMS.

Two unrealted editorial changes are also to be made. In bases section 3/4.2.1,"Average Planar Linear Heat Generation Rate" the first reference for the calculational models is to be changed to NEDO-20566P. This was cited incorrectly in Amendment 69, issued on June 7, 1989.

In section 6.1.2 Responsibility a change is to be made to show that it is the Assistant Managing Director for Operations, not the Director of Power Generation, who signs the directive regarding responsibility of the Shift Manager. The licensee eliminated the position of Director of Power Generation. By letter dated March 9, 1984 (G02-84-126) the licensee requested an amendment to the technical specifications, identifying places where "Director of Power Generation" should be replaced with "Assistant Managing Director for Operations." The correction to section 6.1.2 was inadvertently omitted from Amendment 6, dated October 12, 1984.

2.0 EVALUATION

The IRSA specify three regions (A, B, C) on the power-flow map involving different degrees of allowed or prohibited operation. These are bounded by constant flow lines or control rod lines (lines of flow variation with all other reactor parameters, particularly control rod position, held constant). Region A is above the 100 percent rod line (intercepts 100 percent rated power at 100 percent rated flow) and below 40 percent flow. Region B is between the 80 and 100 percent rod lines and below 40 percent flow. Region C is above the 80 percent rod line and between 40 and 45 percent flow. Deliberate entry into regions A and B is not permitted, and if it occurs immediate exit is required. For a group 2 plant (such as WNP2) scram is required in region A, while for region B control rod insertion or flow increase may be used to exit. Operations may be conducted in region C, with suitable surveillance, if required during "startups" to prevent fuel damage.

The current WNP2 TS are generally compatible with these recommendations; however, operation is permitted (with surveillance) in the above region B and part of region C. While the proposed TS changes will bring operations in closer accord with IRSA, WPPSS would prefer to operate the facility in regions B and lower C, using the superior ASMS surveillance, to help alleviate problems with the recirculation pumps. The following TS changes are proposed to accomplish this.

Specification 3.2.6 and Figure 3.2.6-1 provide, in both the current and proposed TS, a prohibited region which is larger than the IRSA region A. In the new TS, it extends to the 45 percent flow line, thus covering the upper part of IRSA region C. It can also extend below the 100 percent rod line since the lower boundary is the more conservative of the 100 percent rod line or a line below (ANF) calculated 0.90 oscillation decay ratio (DR). The proposed TS requires a manual scram exit from the region, in accord with the IRSA. These, and other wording changes of this Specification, are reasonable, generally conservative compared to the current Specification or IRSA, and are acceptable.

Specification 3.2.7 and Figure 3.2.7-1 provide a WNP2 region "C" (different boundaries than for IRSA region C) in which TLO is permitted if the ASMS is operable and indicating a DR less than 0.75. This region is directly below WNP2 region A and has a lower boundary on the 80 percent rod line. The region extends to the 45 percent flow line and covers approximately IRSA region B and the lower part of region C. The current TS permits operation in this region if the neutron monitoring system noise levels remain below criteria based on GE SIL 380 (Ref. 4) recommendations for surveillance. Operation is not permitted in the IRSA region B but is permitted in region IRSA C during startup, if necessary, with SIL 380 surveillance. Thus operation in Figure 3.2.7-1 region "C" is generally compatible with the current TS and to some extent with IRSA region C. It is not directly compatible with the required avoidance of operation in IRSA region B. Justification for this operation is based on ASMS surveillance.

ASMS as used in WNP2 is an implementation by ANF and WPPSS of the ANNA software system on the existing WNP2 plant configuration. The hardware is already in place in the form of the Plant Process Computer Replacement System. This consists of a DEC VAX 8200 CPU, associated peripherals and the necessary neutron flux monitoring system (Local Power Range Monitor (LPRM) and Average Power Range Monitor (APRM)) readings. The system measures and records neutron flux noise and uses the software system to analyze and to extract information on the stability of the reactor. The ANNA software system is an adaptation by ANF of stability software developed at ORNL. The ORNL software has been used in a portable noise-based stability meter used by NRC consultants in connection with NRC sponsored measurements at several operating reactors. The ANNA algorithms determine the neutron noise autocorrelation function and can be used in either a "stability detector" mode or a "stability meter" mode. The former collects and analyzes flux data over a relatively short time frame (about 30 seconds), while the latter may require about 30 minutes to achieve a sufficiently accurate reading. The proposed WNP2 operations and TS use the "instability detector" mode which can determine the DR with sufficient accuracy when the DR is not far from 1.0 (e.g., above about 0.75 as used in the TS limit) to provide an acceptable warning and operating margin to instability.

TS 3.2.7 and 3.2.8 require two LPRM string detector levels in nine core regions as well as four APRMs to be monitored by ASMS for the system to be considered operational. This provides reasonable coverage of the core (comparable to SIL 380) and is acceptable. ANNA has been benchmarked against operating reactor data and the staff review has determined that the comparisons are satisfactory. The ANF Topical Report ANF-1161-P (Ref. 5) describes the system and the benchmarking. The report, as well as the hardware implementation at WNP2, has been reviewed by the technical staff. The review has progressed sufficiently to conclude that the methodology and implementation is satisfactory and acceptable for use by WNP2 for operation in the requested region Cs (in TS 3.2.7 and 3.2.8) as an "instability detector" with a maximum limit of 0.75 before DR reduction or departure from the region is required.

The current TS also requires surveillance or restrictions for SLO (but not TLO) in the region above the 80 percent line and above 45 percent flow. This was based on some early test observations of neutron flux noise in this region. Final evaluation of such noise resulted in the staff position that such noise is not related to THS and surveillance or operating restrictions related to THS are not necessary and have not been included in plant TS for several years. Such monitoring is not required by IMSA. The removal from TS 3.2.7 is acceptable.

A new specification 3.2.8 and Figure 3.2.8-1 provide for a region with allowed operation in SLO. The specification defines a region "C" in Figure 3.2.8-1 which is a subregion of the TLO region "C" of Figure 3.2.7-1. This region includes only the 3.2.7-1 region "C" above 39 percent flow and thus involves the lower part of IRSA region C. Other than the more limited region area and the applicability to SLO, this TS is essentially the same as TS 3.2.7, and requires the same 0.75 DR limit and the same ASMS surveillance. Since the THS characteristics are similar for SLO and TLO in this region, this new Specification is also acceptable. The basis for acceptance is the same as discussed above for TS 3.2.7.

Specification 3/4.4.1 and Figure 3.4.1-1 contain most of the actions required when going to SLO. The only parts of the Specification which are proposed to be changed are those related to THS associated restricted regions and surveillance. The proposed TS prohibits SLO in WNP2 region "C" of TS 3.2.7 except for WNP2 region "C" of TS 3.2.8. Thus SLO is prohibited in (approximately) IRSA region B. This prohibited region is designated WNP2 region "B". Requirements for existing region "B", if entered, are provided. The changes and restrictions are compatible with those previously discussed for the TS changes, and are acceptable.

An action statement and corresponding surveillance on core plate noise has been removed from TS 3/4.4.1. It does not apply to the THS noise area but is rather related to jet pump operability. Jet pump requirements and surveillance are suitably covered in another specification and the noise surveillance, like the high flow noise discussed above for TS 3.2.7, has not been required for other reactors for several years. The removal from TS 3/4.4.1 is acceptable.

The Bases for TS 3/4.2.6, .7 and .8 have been changed to remove the discussions of the old surveillance regions and methods and replace them with the new methodology and boundaries. The changes suitably reflect the reasons for the changes to the specifications and are acceptable.

The NRC staff, its consultants, the BWR Owners' Group (BWROG), GE and others are continuing the review of THS concerns. The BWROG is developing several long term solutions for the problem. It is expected that a selection will be announced by the end of 1989. Any new requirements resulting from the continuing generic review of ANNA applications, THS concerns and BWROG long term solutions will be applicable to WNP2 and may impact some of the operations or systems found to be acceptable in this review.

The changes to the bases section B 3/4.2.1 and to section 6.1.2 are administrative in nature and are acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation and use of a facility component located within the restricted area as defined in 10 CFR Part 20, a change to administrative procedures and requirements, and changes in surveillance requirements. The staff has determined that this amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and (c)(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONTACT WITH STATE OFFICIAL

The Commission made a proposed determination that the amendment involves no significant hazards consideration (54 FR 18963, May 3, 1989) and consulted with the State of Washington. No public comments were received, and the State of Washington did not have any comment.

5.0 CONCLUSION

We have reviewed the reports submitted by WPPSS for WNP2 proposing TS changes relating to THS requirements for power-flow map operating restraints and surveillance, and proposing the use of the new ASMS system for monitoring the DR to accomplish the required surveillance. Ultimate resolution of concerns over thermal hydraulic stability based on generic studies in progress may result in new or different restraints or surveillance requirements. We have concluded at this time that appropriate documentation was submitted, staff questions were appropriately responded to and the proposed monitoring system and TS changes (as presented with the June 1, 1989 letter, Reference 2) satisfy staff positions and requirements in these areas. Operation in the regions and in the modes proposed by WPPSS, and in particular, use of the ASMS to operate in what are otherwise IRSA restricted regions, is acceptable.

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Howard J. Richings

Date: June 23, 1989

6.0 REFERENCES

1. Letter and enclosures from G. Sorensen (WPPSS) to NRC, dated March 31, 1989, "Request for Amendment to Technical Specifications 3/4.2.6, Power Flow Instability and 3/4.2.7 Neutron Flux Noise Monitoring in Support of the Supply System Response to IEB 88-07 Supplement 1."

2. Letter and enclosures from G. Sorensen (WPPSS) to NRC, dated June 1, 1989, "Supplemental Information."

3. Letter from G. Sorensen (WPPSS) to NRC, dated March 3, 1989, "Response to IE Bulletin 88-07, Supplement 1."

4. GE Service Information Letter (SIL) 380, Revision 1, "BWR Core Thermal Hydraulic Stability," February 10, 1984.

5. ANF-1161-P, "ANNA: Advanced Neutron Noise Analysis Software System," April 1988.

ENCLOSURE TO LICENSE AMENDMENT NO. 71

FACILITY OPERATING LICENSE NO. NPF-21

DOCKET NO. 50-397

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. Also to be replaced are the following overleaf pages.

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3/4.2.6 POWER/FLOW INSTABILITY

LIMITING CONDITION FOR OPERATION

3.2.6 Operation with THERMAL POWER/core flow conditions which lay in Region A of Figure 3.2.6-1 is prohibited.

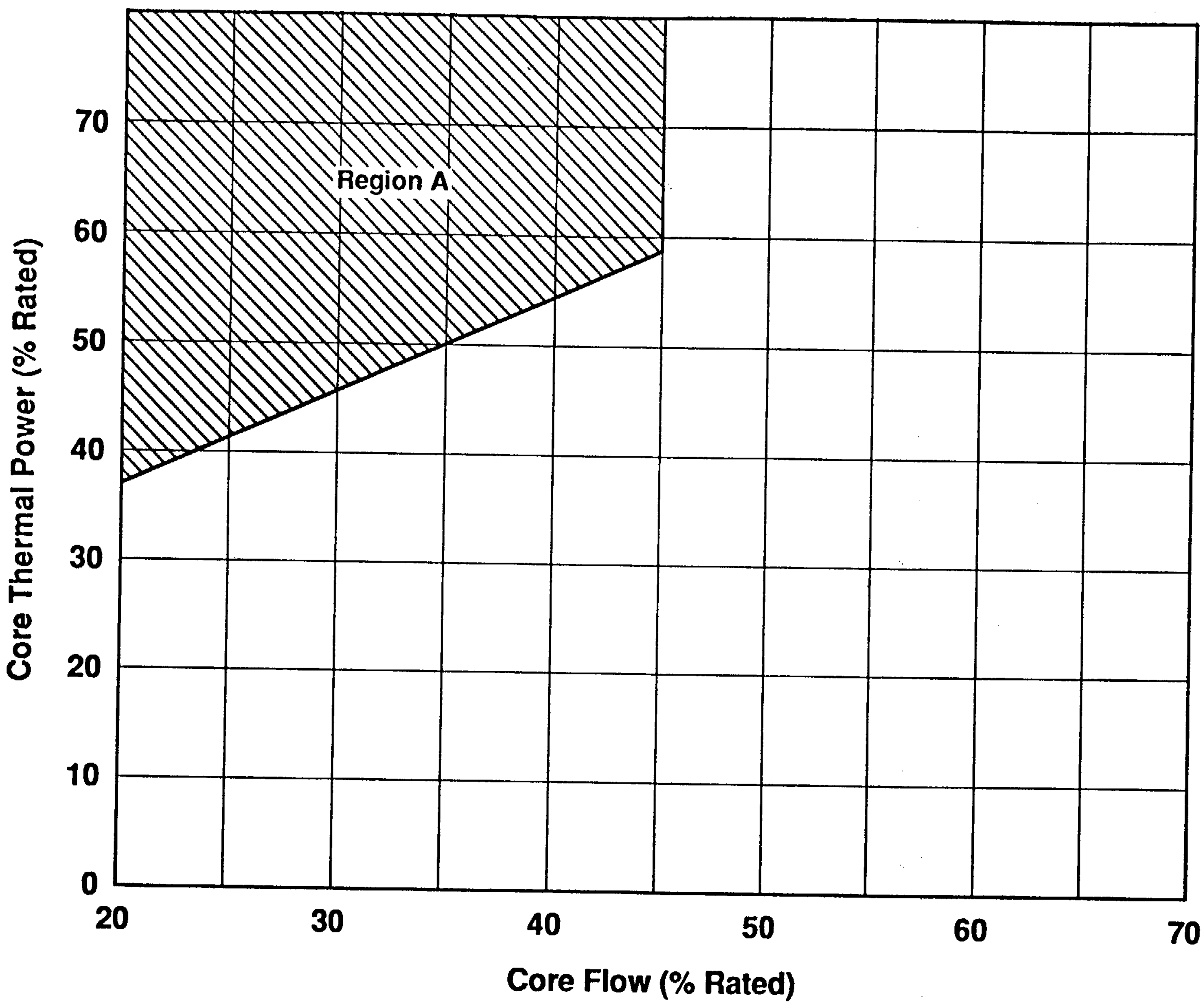
APPLICABILITY: OPERATIONAL CONDITION 1, when THERMAL POWER is greater than 39% of RATED THERMAL POWER and core flow is less than or equal to 45% of rated core flow.

ACTION:

With THERMAL POWER/core flow conditions which lay in Region A of Figure 3.2.6-1, then as soon as practical, but in all cases within 15 minutes, initiate a MANUAL SCRAM.

SURVEILLANCE REQUIREMENTS

4.2.6 The THERMAL POWER/core flow conditions shall be verified to lay outside Region A of Figure 3.2.6-1 once per 24 hours when operating in the region of APPLICABILITY.



Operating Region Limits of Specification 3.2.6
Figure 3.2.6-1

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.7 STABILITY MONITORING - TWO LOOP OPERATION

LIMITING CONDITION FOR OPERATION

3.2.7 The stability monitoring system shall be operable* and the decay ratio of the neutron signals shall be less than .75 when operating in the region of APPLICABILITY.

APPLICABILITY: OPERATIONAL CONDITION 1, with two recirculation loops in operation and THERMAL POWER/core flow conditions which lay in Region C of Figure 3.2.7-1.

ACTION:

a. With decay ratios of any two (2) neutron signals greater than .75 or with two (2) consecutive decay ratios on any single neutron signal greater than .75:

As soon as practical, but in all cases within 15 minutes, initiate action to reduce the decay ratio by either decreasing THERMAL POWER with control rod insertion or increasing core flow with recirculation flow control valve manipulation. The starting or shifting of a recirculation pump for the purpose of decreasing decay ratio is specifically prohibited.

b. With the stability monitoring system inoperable and when operating in the region of APPLICABILITY:

As soon as practical, but in all cases within 15 minutes, initiate action to exit the region of APPLICABILITY by either decreasing THERMAL POWER with control rod insertion or increasing core flow with recirculation flow control valve manipulation. The starting or shifting of a recirculation pump for the purpose of exiting the region of APPLICABILITY when the stability monitoring system is inoperable is specifically prohibited. Exit the region of APPLICABILITY within one (1) hour.

SURVEILLANCE REQUIREMENTS

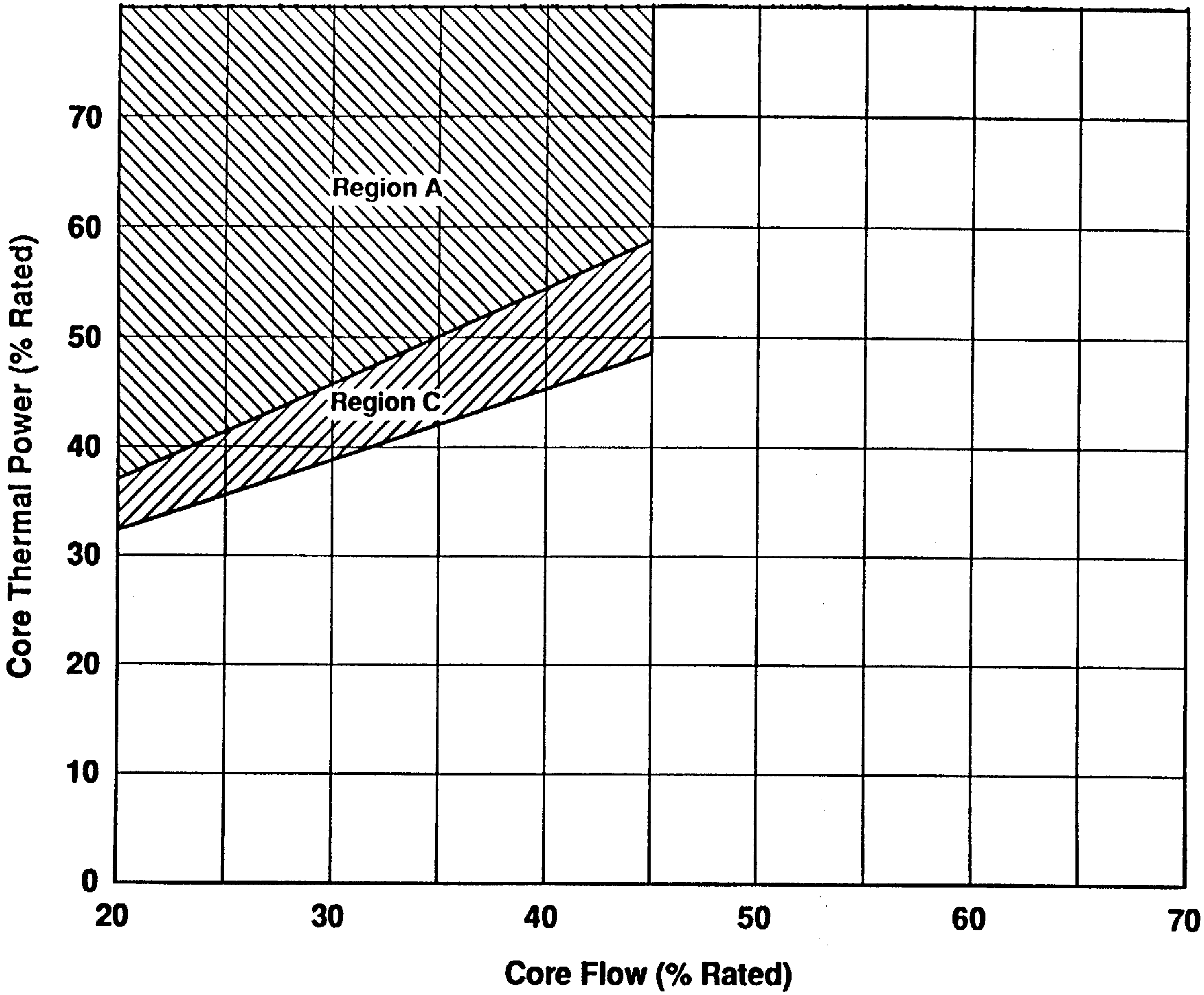
4.2.7.1 The provisions of Specification 4.0.4 are not applicable.

4.2.7.2 The stability monitoring system shall be demonstrated operable* within one (1) hour prior to entry into the region of APPLICABILITY.

4.2.7.3 Decay ratio and peak-to-peak noise values calculated by the stability monitoring system shall be monitored when operating in the region of APPLICABILITY.

---

*Verify that the stability monitoring system data acquisition and calculational modules are functioning, and that displayed values of signal decay ratio and peak-to-peak noise are being updated. Detector levels A and C (or B and D) of one LPRM string in each of the nine core regions (a total of 18 LPRM detectors) shall be monitored. A minimum of four (4) APRMs shall also be monitored.



Operating Region Limits of Specification 3.2.7
Figure 3.2.7-1

3/4.2.8 STABILITY MONITORING - SINGLE LOOP OPERATION

LIMITING CONDITION FOR OPERATION

3.2.8 The stability monitoring system shall be operable* and the decay ratio of the neutron signals shall be less than .75 when operating in the region of APPLICABILITY.

APPLICABILITY: OPERATIONAL CONDITION 1, with one recirculation loop in operation and THERMAL POWER/core flow conditions which lay in Region C of Figure 3.2.8-1.

ACTION:

a. With decay ratios of any two (2) neutron signals greater than .75 or with two (2) consecutive decay ratios on any single neutron signal greater than .75:

As soon as practical, but in all cases within 15 minutes, initiate action to reduce the decay ratio by either decreasing THERMAL POWER with control rod insertion or increasing core flow with recirculation flow control valve manipulation. The starting or shifting of a recirculation pump for the purpose of decreasing decay ratio is specifically prohibited.

b. With the stability monitoring system inoperable and when operating in the region of APPLICABILITY:

As soon as practical, but in all cases within 15 minutes, initiate action to exit the region of APPLICABILITY by decreasing THERMAL POWER with control rod insertion. Exit the region of APPLICABILITY within one (1) hour.

SURVEILLANCE REQUIREMENTS

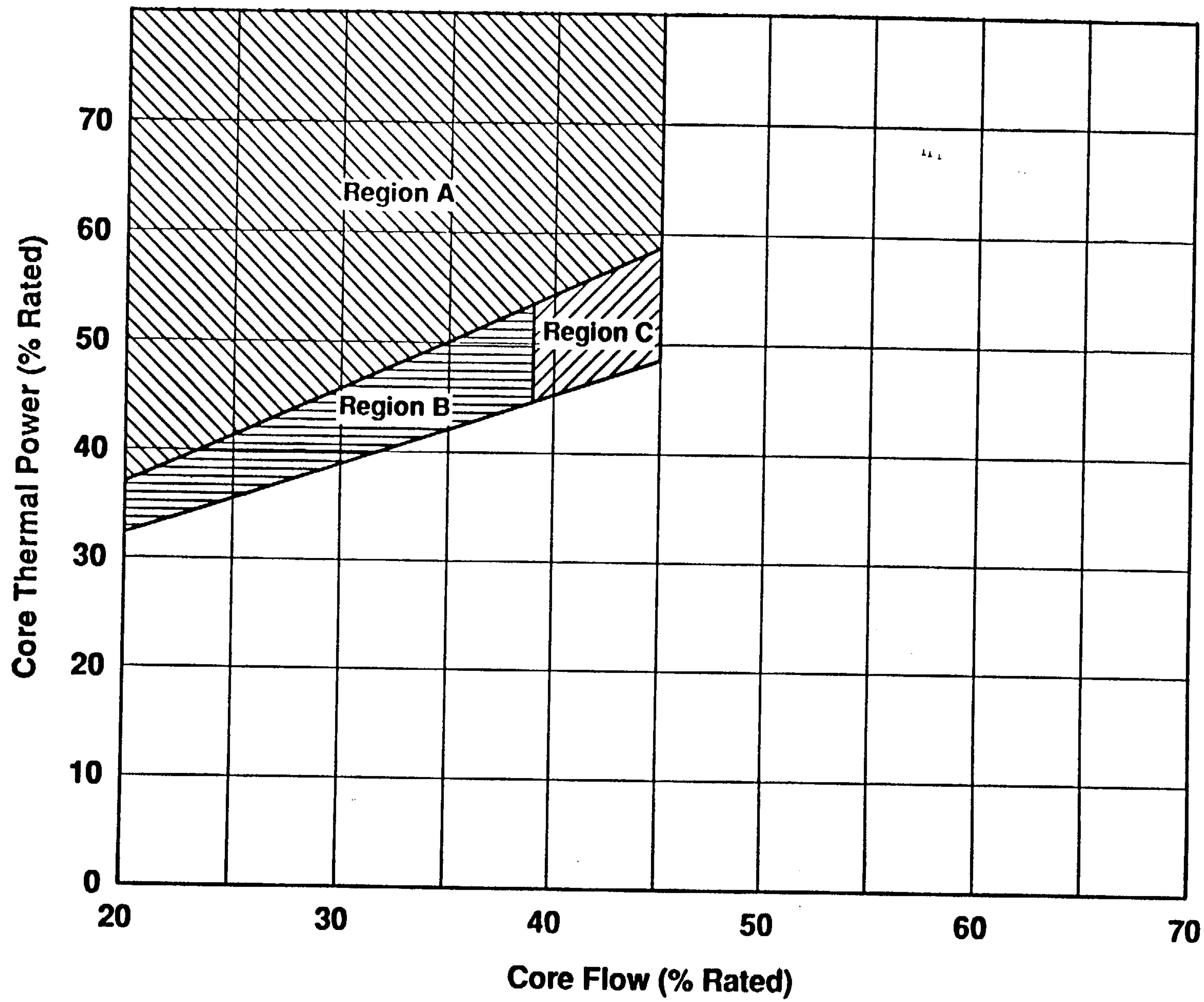
4.2.8.1 The provisions of Specification 4.0.4 are not applicable.

4.2.8.2 The stability monitoring system shall be demonstrated operable* within one (1) hour prior to entry into the region of APPLICABILITY.

4.2.8.3 Decay ratio and peak-to-peak noise values calculated by the stability monitoring system shall be monitored when operating in the region of APPLICABILITY.

---

*Verify that the stability monitoring system data acquisition and calculational modules are functioning, and that displayed values of signal decay ratio and peak-to-peak noise are being updated. Detector levels A and C (or B and D) of one LPRM string in each of the nine core regions (a total of 18 LPRM detectors) shall be monitored. A minimum of four (4) APRMs shall also be monitored.



Operating Region Limits of Specification 3.2.8
Figure 3.2.8-1

3/4.4 REACTOR COOLANT SYSTEM

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. Verify that the requirements of LCO 3.2.6 and LCO 3.2.8 are met, or comply with the associated ACTION statements

2. Verify that THERMAL POWER/core flow conditions lay outside Region B of Figure 3.4.1.1-1.

   With THERMAL POWER/core flow conditions which lay in Region B of Figure 3.4.1.1-1, as soon as practical, but in all cases within 15 minutes, initiate action to exit Region B by either decreasing THERMAL POWER with control rod insertion or increasing core flow with flow control valve manipulation. Within 1 hour exit Region B. The starting or shifting of a recirculation pump for the purpose of exiting Region B is specifically prohibited.

3. Within 4 hours:

   a) Place the recirculation flow control system in the Local Manual (Position Control) mode, and

   b) Increase the MINIMUM CRITICAL POWER RATIO (MCPR) Safety Limit by 0.01 to 1.07 per Specification 2.1.2, and,

   c) Reduce the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) for General Electric fuel limit to a value of 0.84 times the two recirculation loop operation limit per Specification 3.2.1, and,

   d) Reduce the volumetric flow rate of the operating recirculation loop to $\leq$ 41,725** gpm.

*See Special Test Exception 3.10.4.
**This value represents the actual volumetric recirculation loop flow which produces 100% core flow at 100% THERMAL POWER. This value was determined during the Startup Test Program.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

e) Perform Surveillance Requirement 4.4.1.1.2 if THERMAL POWER is ≤ 25%*** of RATED THERMAL POWER or the recirculation loop flow in the operating loop is ≤ 10%*** of rated loop flow.

4. The provisions of Specification 3.0.4 are not applicable.

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

b. With no reactor coolant system recirculation loops in operation, immediately initiate measures to place the unit in at least HOT SHUTDOWN within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.4.1.1.1 With one reactor coolant system recirculation loop not in operation, at least once per 8 hours verify that:

a. The recirculation flow control system is in the Local Manual (Position Control) mode, and

b. The volumetric flow rate of the operating loop is ≤ 41,725 gpm.**

**This value represents the actual volumetric recirculation loop flow which produces 100% core flow at 100% THERMAL POWER. This value was determined during the Startup Test Program.

***Final values were determined during Startup Testing based upon actual THERMAL POWER and recirculation loop flow which will sweep the cold water from the vessel bottom head preventing stratification.

SURVEILLANCE REQUIREMENTS (Continued)

c. Core flow is greater than or equal to 39% of rated core flow when core THERMAL POWER is greater than the limit specified in Figure 3.4.1.1-1.

4.4.1.1.2 With one reactor coolant system recirculation loop not in operation, within no more than 15 minutes prior to either THERMAL POWER increase or recirculation loop flow increase, verify that the following differential temperature requirements are met if THERMAL POWER is ≤ 25%*** of RATED THERMAL POWER or the recirculation loop flow in the operating recirculation loop is ≤ 10%*** of rated loop flow:

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 the operating loop.

The differential temperature requirements of Specification 4.4.1.1.2b. and c. do not apply when the loop not in operation is isolated from the reactor pressure vessel.

4.4.1.1.3 Each reactor coolant system recirculation loop flow control valve shall be demonstrated OPERABLE at least once per 18 months by:

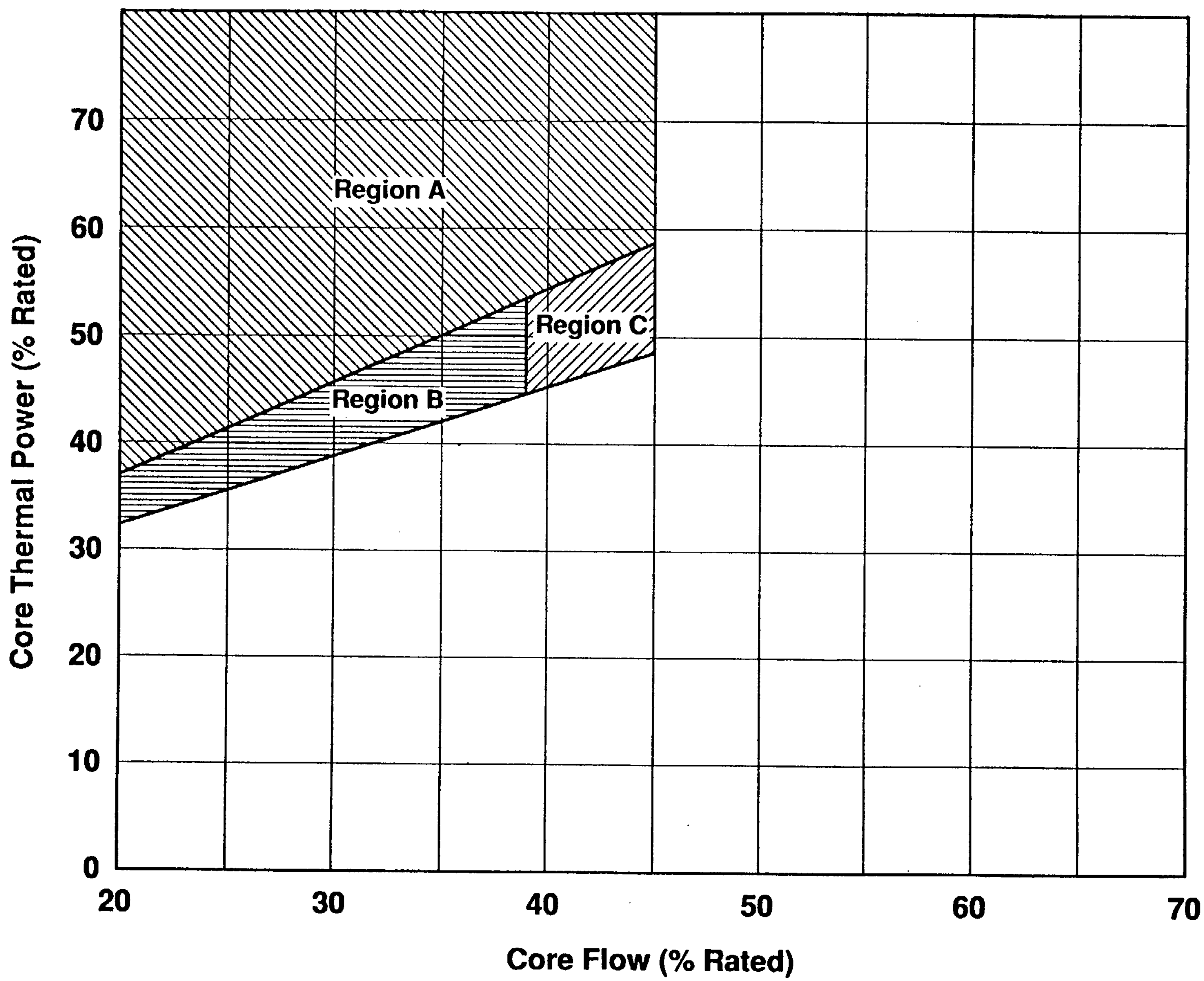
a. Verifying that the control valve fails "as is" on loss of hydraulic pressure (at the hydraulic control unit), and

b. Verifying that the average rate of control valve movement is:

    1. Less than or equal to 11% of stroke per second opening, and

    2. Less than or equal to 11% of stroke per second closing.

***Final values were determined during Startup Testing based upon actual THERMAL POWER and recirculation loop flow which will sweep the cold water from the vessel bottom head preventing stratification.



Operating Region Limits of Specification 3.4.1.1
Figure 3.4.1.1-1

JET PUMPS

LIMITING CONDITION FOR OPERATION

3.4.1.2 All jet pumps shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

ACTION:

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

SURVEILLANCE REQUIREMENTS

4.4.1.2.1 Each of the above required jet pumps shall be demonstrated OPERABLE prior to THERMAL POWER exceeding 25% of RATED THERMAL POWER and at least once per 24 hours by determining recirculation loop flow, total core flow and diffuser-to-lower plenum differential pressure for each jet pump and verifying that no two of the following conditions occur when both recirculation loops are operating at the same flow control valve position.

a. The indicated recirculation loop flow differs by more than 10% from the established flow control valve position-loop flow characteristics for two recirculation loop operation.

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

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

4.4.1.2.2 During single recirculation loop operation, each of the above required jet pumps 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 flow control valve position-loop flow characteristics.

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

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

3/4.2 POWER DISTRIBUTION LIMITS

BASES

The specifications of this section assure that the peak cladding temperature following the postulated design basis loss-of-coolant accident will not exceed the 2200°F limit specified in 10 CFR 50.46.

3/4.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE

The peak cladding temperature (PCT) following a postulated loss-of-coolant accident is primarily a function of the average heat generation rate of all the rods of a fuel assembly at any axial location and is dependent only secondarily on the rod to rod power distribution within an assembly. For GE fuel, the peak clad temperature is calculated assuming a LHGR for the highest powered rod which is equal to or less than the design LHGR corrected for densification. This LHGR times 1.02 is used in the heatup code along with the exposure dependent steady-state gap conductance and rod-to-rod local peaking factor. The Technical Specification AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR) for GE fuel is this LHGR of the highest powered rod divided by its local peaking factor which results in a calculated LOCA PCT much less than 2200°F. The Technical Specification APLHGR for ANF fuel is specified to assure the PCT following a postulated LOCA will not exceed the 2200°F limit. The limiting value for APLHGR is shown in Figures 3.2.1-1 and 3.2.1-2 for two recirculation loop operation and Figures 3.2.1-4 and 3.2.1-5 for single loop operation. Figures 3.2.1-3, and 3.2.1-6 apply to both single and two loop operation.

The calculational procedure used to establish the APLHGR shown on Figures 3.2.1-1, 3.2.1-2, 3.2.1-3, 3.2.1-4, 3.2.1-5, and 3.2.1-6 is based on a loss-of-coolant accident analysis. The analysis was performed using calculational models which are consistent with the requirements of Appendix K to 10 CFR Part 50. These models are described in NEDO-20566P or XN-NF-80-19, Volumes 2, 2A, 2B and 2C, Rev. 1.

3/4.2.2 APRM SETPOINTS

The flow biased simulated thermal power-upscale scram setting and control rod block functions of the APRM instruments limit plant operations to the region covered by the transient and accident analysis. In addition, the APRM setpoints must be adjusted for both two recirculation loop operation and single recirculation loop operation to ensure that the MCPR does not become less than the fuel cladding safety limit or that $\geq$ 1% plastic strain does not occur in the degraded situation. The scram settings and rod block settings are adjusted in accordance with the formula in this specification when the combination of THERMAL POWER and MFLPD indicates a higher peaked power distribution to ensure that an LHGR transient would not be increased in the degraded condition.

POWER/FLOW INSTABILITY (Continued)

Predicated on the SIL 380 endorsement, WNP-2 has divided the power/flow map on the following boundary lines:

1. 80% rod line
2. 45% core flow line
3. 100% rod line
4. Natural Circulation flow line
5. Minimum Forced Circulation for normal recirculation lineup.

This division conforms to the SIL 380 recommendations. For LCO 3.2.6, the region of concern (Region A) is bounded by the more conservative of either the 100% rodline or a line defining a calculated decay ratio of 0.9, the natural circulation flow line, and the 45% core flow line. Calculated decay ratios outside Region A must be less than 0.9. Operation in the region between the two flow lines and above the more conservative of either the 100% rodline or a line defining a calculated decay ratio of 0.9 is forbidden due to the potential for boiling instabilities.

3/4.2.7 STABILITY MONITORING - TWO LOOP OPERATION

At the high power/low flow corner of the operating domain, a small probability of limit cycle neutron flux oscillations exists depending on combinations of operating conditions (e.g., rod patterns, power shape). To provide assurance that neutron flux limit cycle oscillations are detected and suppressed, APRM and LPRM neutron flux signal decay ratios should be monitored while operating in this region.

Stability tests at operating BWRs were reviewed to determine a generic region of the power/flow map in which surveillance of neutron flux noise levels should be performed. A conservative decay ratio of 0.75 was chosen as the basis for determining the generic region for surveillance to account for the plant to plant variability of decay ratio with core and fuel designs. This generic region has been determined to correspond to a core flow of less than or equal to 45% of rated core flow and a thermal power greater than that corresponding to the 80% rodline.

Stability monitoring is performed utilizing the ANNA system. The system shall be used to monitor APRM and LPRM signal decay ratio and peak-to-peak noise values when operating in the region of concern. A minimum number of LPRM and APRM signals are required to be monitored in order to assure that both global (in-phase) and regional (out-of-phase) oscillations are detectable. Decay ratios are calculated from 30 seconds worth of data at a sample rate of 10 samples/second. This sample interval results in some inaccuracy in the decay ratio calculation, but provides rapid update in decay ratio data. A decay ratio of 0.75 is selected as a decay ratio limit for operator response such that sufficient margin to an instability occurrence is maintained. When operating in the region of applicability, decay ratio and peak-to-peak

STABILITY MONITORING - TWO LOOP OPERATION (Continued)

information shall be continuously calculated and displayed. A surveillance requirement to continuously monitor decay ratio and peak-to-peak noise values ensures rapid response such that changes in core conditions do not result in approaching a point of instability.

3/4.2.8 STABILITY MONITORING - SINGLE LOOP OPERATION

The basis for stability monitoring during single loop operation is consistent with that given above for two loop operation. The smaller size of the region of allowable operation, Region C, is due to a limit on the allowed flow above the 80% rodline. When operating above the 80% rodline in single loop operation, the core flow is required to be greater than 39%.

6.0 ADMINISTRATIVE CONTROLS

6.1 RESPONSIBILITY

6.1.1 The Plant Manager shall be responsible for overall unit operation and shall delegate in writing the succession to this responsibility during his absence.

6.1.2 The Shift Manager (or during his absence from the control room, a designated individual) shall be responsible for the control room command function. A management directive to this effect, signed by the Assistant Managing Director for Operations shall be reissued to all station personnel on an annual basis.

6.2 ORGANIZATION

6.2.1 OFFSITE AND ONSITE ORGANIZATIONS

Onsite and offsite organizations shall be established for unit operation and corporate management, respectively. The onsite and offsite organizations shall include the positions for activities affecting the safety of the nuclear power plant.

a. Lines of authority, responsibility, and communication shall be established and defined for the highest management levels through intermediate levels to and including all operating organization positions. These relationships shall be documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions. These requirements are documented in the WNP-2 FSAR and updated in accordance with 10 CFR 50.71.

b. The Plant Manager shall be responsible for overall unit safe operation and shall have control over those onsite activities necessary for safe operation and maintenance of the plant.

c. The Assistant Managing Director for Operations shall have corporate responsibility for overall plant nuclear safety and shall take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to ensure nuclear safety.

d. The individuals who train the operating staff and those who carry out health physics functions may report to the appropriate onsite manager; however, they shall have sufficient organizational freedom to ensure their independence from operating pressures.

e. The organization responsible for the overall quality assurance functions shall report to the Supply System Managing Director.

6.2.2 UNIT STAFF

a. Each on duty shift shall be composed of at least the minimum shift crew composition shown in Table 6.2.2-1;

UNIT STAFF (continued)

b. At least one licensed Operator shall be in the control room when fuel is in the reactor. In addition, while the unit is in OPERATIONAL CONDITION 1, 2, or 3, at least one licensed Senior Operator shall be in the control room.

c. A Health Physics Technician* shall be on site when fuel is in the reactor and at least one fully qualified chemistry technician shall be on site in OPERATIONAL CONDITION 1, 2, or 3;

d. All CORE ALTERATIONS shall be observed and directly supervised by either a licensed Senior Operator or licensed Senior Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation;

e. Administrative procedures shall be developed and implemented to limit the working hours of unit staff who perform safety-related functions e.g., licensed Senior Operators, licensed Operators, health physicists, chemistry technicians, auxiliary operators, and key maintenance personnel.

Adequate shift coverage shall be maintained without routine heavy use of overtime. The objective shall be to have operating personnel work a normal 8-hour day, 40-hour week while the unit is operating. However, in the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance, or major unit modifications, on a temporary basis the following guidelines shall be followed:

1. An individual should not be permitted to work more than 16 hours straight, excluding shift turnover time.

2. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time.

3. A break of at least 8 hours should be allowed between work periods, including shift turnover time.

*The Health Physics Technician and fire brigade composition may be less than the minimum requirements for a period of time not to exceed 2 hours, in order to accommodate unexpected absence, provided immediate action is taken to fill the required positions.