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Constellation Energy
Nine Mile Point Nuclear Station

October 19, 2006

U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station
Unit No. 1; Docket No. 50-220

License Amendment Request Pursuant to 10 CFR 50.90:
Revision to Control Rod System Surveillance Requirements –
Technical Specification 4.1.1

Pursuant to 10 CFR 50.90, Nine Mile Point Nuclear Station, LLC, (NMPNS) hereby requests an amendment to Nine Mile Point Unit 1 (NMP1) Operating License DPR-63. The proposed change contained herein would modify Surveillance Requirements (SR) in Technical Specification 4.1.1, "Control Rod System," associated with control rod scram time testing (STT). Specifically, these changes would modify the conditions under which STT of control rods is required and add a requirement to perform STT on a defined portion of control rods, at a specified frequency, during the operating cycle. These proposed SR modifications and additions would improve the NMP1 STT requirements to be consistent with other U.S. boiling water reactors by: (1) allowing STT of non-maintenance affected control rods during power operations, prior to exceeding 40% power, (2) providing the required STT data necessary to apply actual scram times to implement improved Minimum Critical Power Ratio (MCPR) operating limits, and (3) replacing the requirement to test "eight selected rods" after a reactor scram or other outage with a requirement to periodically test at least 20 control rods, on a rotating basis, every 180 days.

The description and technical basis of the proposed change are contained in Attachment (1). The proposed Technical Specification changes are shown in the markup in Attachment (2). Changes to TS Bases pages are provided for information only and are shown in the markup in Attachment (3).

NMPNS requests approval of this request by March 1, 2007 to support activities to be conducted during the upcoming Unit 1 refueling outage, currently scheduled to begin in March 2007, with implementation prior to completion of the refueling outage.

A001

Pursuant to 10 CFR 50.91(b)(1), NMPNS has provided a copy of this license amendment request, with attachments, to the appropriate state representative.

Should you have any questions regarding the information in this submittal, please contact M. H. Miller, Licensing Director, at (315) 349-1510.

Very truly yours,

STATE OF NEW YORK :
: **TO WIT:**
COUNTY OF OSWEGO :

I, Timothy J. O'Connor, being duly sworn, state that I am Vice President Nine Mile Point, and that I am duly authorized to execute and file this request on behalf of Nine Mile Point Nuclear Station, LLC. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other Nine Mile Point employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Subscribed and sworn before me, a Notary Public in and for the State of New York and County of Oswego, this 19 day of October, 2006.

WITNESS my Hand and Notarial Seal:

Notary Public

My Commission Expires: 10/25/09
Date

SANDRA A. OSWALD
Notary Public, State of New York
No. 01OS6032276
Qualified in Oswego County
Commission Expires 10/25/09

TJO/RF/kms

Attachments: (1) Technical Basis and No Significant Hazards Determination
(2) Proposed Technical Specification Changes (Mark-up)
(3) Changes to Technical Specification Bases (Mark-up)

cc: S. J. Collins, NRC
T. G. Colburn, NRC
Resident Inspector, NRC
J. P. Spath, NYSERDA

ATTACHMENT (1)

TECHNICAL BASIS AND

NO SIGNIFICANT HAZARDS DETERMINATION

TABLE OF CONTENTS

1. DESCRIPTION

This letter is a request to amend Operating License DPR-63 for Nine Mile Point Unit 1 (NMP1).

The requested changes would revise Appendix A, Technical Specifications (TS), of the Operating License to modify the Surveillance Requirements (SR) described in TS 4.1.1.c, "Scram Insertion Times." These changes would modify the conditions under which scram time testing (STT) of control rods is required and add a requirement to perform STT on a defined portion of control rods, at a specified frequency, during the operating cycle. The requested changes would also revise the SR described in TS 4.1.7.c, "Minimum Critical Power Ratio (MCPR)," to add a requirement to determine the MCPR operating limits following completion of control rod STT per TS 4.1.1.c. These proposed SR modifications and additions would improve the NMP1 STT requirements to be consistent with other U.S. boiling water reactors (BWRs) by: (1) allowing STT of non-maintenance affected control rods during power operations, prior to exceeding 40% power, (2) providing the required STT data necessary to apply actual scram times to implement improved MCPR operating limits, and (3) replacing the requirement to test "eight selected rods" after a reactor scram or other outage with a requirement to periodically test at least 20 control rods, on a rotating basis, every 180 days.

2. PROPOSED CHANGE

The proposed amendment would revise TS 4.1.1.c to modify the conditions under which STT is required. Specifically, STT of non-maintenance affected control rods would be allowed during power operations prior to exceeding 40% power, and the requirements to test "eight selected rods" after a reactor scram from rated pressure or any outage not initiated by a reactor scram would be eliminated. The proposed amendment would add a new SR to TS 4.1.1.c. This SR would require STT for "At least 20 control rods, on a rotating basis, on a frequency of less than or equal to once per 180 days of cumulative power operation, with reactor pressure above 800 psig." The proposed amendment would also revise TS 4.1.7.c to add a SR requiring that the MCPR operating limit be determined within 72 hours of completing scram time testing as required in TS 4.1.1.c.

The proposed frequency and test population for the new TS 4.1.1.c SR is based on a review of current industry standard practice and consideration of NMP1 operational practices and surveillance requirements. Implementation of the new SR will require plant power reductions, which will be aligned with other activities requiring plant power reductions (e.g., control rod sequence exchanges). Many U.S. BWRs perform the proposed surveillance every 120 days, testing 10% of the total reactor control rod population each surveillance. This results in approximately 30% of the total control rod population being tested each year of operation. The review of NMP1 operational practice indicates a different surveillance frequency, 180 days, is more appropriate and constitutes a cost beneficial burden reduction relative to a 120 day surveillance frequency. The proposed 180 day frequency is sufficient to enable detection of Control Rod Drive (CRD) performance deficiencies experienced in the industry. A test population of at least 20 control rods is selected for this surveillance frequency. The combination of this proposed surveillance frequency and test population also results in approximately 30% of the total control rod population being tested each year of operation, which is consistent with current practice at other U.S. BWRs. Thus, the proposed surveillance frequency and test population is deemed appropriate and acceptable.

The proposed TS changes are indicated on the mark-up pages provided in Attachment (2). Associated TS Bases changes are shown in Attachment (3). These TS Bases changes are provided for information only and will be processed in accordance with the NMP1 TS Bases Control Program (TS 6.5.6).

3. BACKGROUND

Control rod scram time testing (STT) is currently required per station TS following refueling outages, following any outage not initiated by a reactor scram and following each reactor scram from rated pressure. STT is performed to demonstrate that control rods are performing as expected and within the limits prescribed by the plant safety analysis.

Currently all control rods must be tested under pressurized reactor conditions prior to power operation. This requirement applies whether or not maintenance has been performed on a control rod. The industry standard is to perform STT on non-maintenance affected rods only prior to going above 40% thermal power following core alterations or after a reactor shutdown that is greater than 120 days.

The proposed changes to the NMP1 TS are consistent with the practice at other U.S. BWRs and ensure that:

1. Control rods that have had no maintenance performed on their Hydraulic Control Unit (HCU) or Control Rod Drive Mechanism (CRDM) will have STT performed prior to operating above 40% thermal power following core alterations or after a reactor shutdown that is greater than 120 days to provide scram speed data and assurance of expected performance prior to operating at higher power levels.

2. Control rods that have had work/maintenance performed on components that could affect scram speed will be functionally scram time tested to ensure operability prior to leaving them at a position other than fully inserted. STT for the maintenance affected control rod(s) will be performed with reactor pressure above 800 psig.

The current NMP1 TS SRs specify that following a reactor scram (or other outage) STT will be performed on eight selected control rods. The STT of these eight selected rods is performed to monitor control rod performance and provide an early indication of possible deterioration and required maintenance. The addition of the new STT SR performed on a 180 day frequency will provide sufficient information for monitoring control rod performance. Thus, the "eight rod" surveillance requirements will be deleted.

MCPR is a ratio of the fuel assembly power that would result in the onset of boiling transition to the actual fuel assembly power. The MCPR Safety Limit (SL) is set such that 99.9% of the fuel rods avoid boiling transition when operation within the limit is maintained. The MCPR operating limit is then established to ensure that no fuel damage results during anticipated operational occurrences (AOOs). Although fuel damage does not necessarily occur if a fuel rod actually experiences boiling transition, the critical power at which boiling transition is calculated to occur has been adopted as a fuel design criterion.

The onset of transition boiling is a phenomenon that is readily detected during the testing of various fuel bundle designs. Based on these experimental data, correlations have been developed to predict critical bundle power (i.e., the bundle power level at the onset of transition boiling) for a given set of plant parameters (e.g., reactor vessel pressure, core flow, and reactor coolant inlet temperature). Because plant operating conditions and bundle power levels are monitored and determined relatively easily, monitoring the MCPR is a convenient way of ensuring that fuel failures due to inadequate cooling do not occur.

To ensure the MCPR SL is not exceeded during any transient event that occurs with moderate frequency, limiting transients have been analyzed to determine the largest reduction in critical power

ratio (CPR). The types of transients evaluated are loss of flow, increase in pressure and power, positive reactivity insertion, and coolant temperature decrease. The limiting transient yields the largest change in CPR (ΔCPR). When the largest ΔCPR is added to the MCPR SL, the required operating limit MCPR is obtained.

The MCPR operating limits derived from the transient analysis are dependent on the operating core flow state to ensure adherence to fuel design limits during the worst transient that occurs with moderate frequency. The MCPR operating limits specified in the Core Operating Limits Report (COLR) are the result of the design basis accident and transient analysis. TS 3.1.7.c requires that the MCPR for all fuel be within the MCPR operating limits specified in the COLR when thermal power is greater than 25% rated thermal power.

For most BWR plants, the MCPR operating limits have historically been established by pressurization events (limiting events). Currently, the NMP1 TS scram speed (i.e., the scram times required by TS 3.1.1.c) is used to determine the MCPR operating limits (Option A methodology). However, most BWRs have control rod drives that provide scram speeds that are faster than the TS requirements. For example, the core average scram time to 20% insertion (approximately position 39) for NMP1, for Operating Cycle 17, was approximately 0.701 seconds, as compared to the TS requirement of 0.900 seconds. As a method to improve operating limits, many BWRs have credited the application of a mean scram speed based MCPR operating limits (Option B methodology). Under this method, the transient analyses credit the mean control rod scram speed performance. Faster scram speeds produce lower MCPR operating limits for pressurization events.

To implement the Option B methodology, it must be demonstrated that the measured scram speed distribution is consistent with that used in the transient analyses. Therefore, the Option B basis requires additional scram speed data beyond what is currently required by the NMP1 TS. The proposed new SR in TS 4.1.1.c determines the actual scram speed distribution. The actual scram speed distribution is compared to the assumed distribution. The MCPR operating limit is then determined based either on the applicable limit associated with scram times of TS 3.1.1.c or the actual scram times. This determination must be performed and any necessary changes must be implemented within 72 hours after each set of control rod scram time tests required by TS 4.1.1.c because the effective scram speed distribution may change during the cycle or after maintenance that could affect scram times. The proposed SR for TS 4.1.7.c (determine MCPR operating limit within 72 hours) is based on the improved standard TS and is consistent with the specified completion time in standard TS. The 72 hour completion time is acceptable due to the relatively minor changes in the actual control rod scram speed distribution expected during the operating cycle. These relatively minor changes to the control rod scram speed distribution are unlikely to result in a change to the required MCPR operating limit. Furthermore, sufficient margin to the MCPR operating limit is generally maintained during operation such that even in the unlikely case that a change to the MCPR operating limit is required, margin to the new MCPR operating limit is expected to be available. Maintaining the actual reactor core MCPR within the MCPR operating limit ensures that the MCPR SL cannot be exceeded.

4. TECHNICAL ANALYSIS

The proposed change revises allowable conditions for the STT of non-maintenance affected control rods. The requirement to test "eight selected rods" is replaced by a new SR to perform periodic STT. The addition of the new periodic STT SR will provide sufficient information for monitoring control rod performance. No active or passive failure mechanisms are affected by this proposed change.

The methodology for use of the Option A and Option B limits is included in the General Electric Standard Application for Reactor Fuel, GESTAR II (Ref. 1). Use of this methodology is previously approved by the NRC and is properly documented in the NMP1 TS and in the Core Operating Limits Report. This is the same methodology used by other BWRs that have historically been limited by pressurization events.

The function of the MCPR operating limit is to ensure that no fuel damage results during anticipated operational occurrences. This function is met whether the operating limit is determined by Option A or B.

As stated above, the Option B basis requires additional scram speed data beyond what is currently required by the NMP1 TS. Use of the Option B analysis takes credit for faster scram speeds to provide for a lower MCPR operating limit. This lower operating limit ensures that the MCPR SL is not exceeded while providing for additional operating margin.

In summary, the proposed changes will modify the SRs associated with TS 4.1.1.c and 4.1.7.c. The proposed changes will not affect the limiting condition for operation (LCO) or any actions taken if the requirements of the LCO are not met. The proposed surveillance requirements are sufficient to enable detection of CRD performance deficiencies and will ensure the proper MCPR operating limit is used based on the results of the scram time testing.

5. NO SIGNIFICANT HAZARDS DETERMINATION

Nine Mile Point Nuclear Station, LLC (NMPNS) is requesting a revision to Facility Operating License No. DPR-63 for Nine Mile Point Unit 1 (NMP1). The proposed change would modify the conditions under which scram time testing (STT) of control rods is required and add a requirement to perform STT on a defined portion of control rods, at a specified frequency, during the operating cycle. The proposed change would also add a requirement to determine the Minimum Critical Power Ratio (MCPR) limits following completion of control rod STT.

NMPNS has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change adds new surveillance requirements (SR) to the MCPR Technical Specification (TS) which requires determination of the MCPR operating limit following the completion of scram time testing (STT) of the control rods. Use of the scram speed in determining the MCPR operating limit (i.e., Option B) is an alternative to the current method for determining the operating limit (i.e., Option A). The probability of an accident previously evaluated is unrelated to the MCPR operating limit that is provided to ensure no fuel damage results during anticipated operational occurrences. This is an operational limit to ensure conditions following an assumed accident do not result in fuel failure and therefore do not contribute to the occurrence of an accident.

   The proposed change revises allowable conditions for the STT of non-maintenance affected control rods and eliminates the requirement to test "eight control rods" after a reactor scram or

other outage. The requirement to test "eight selected rods" is replaced by a new SR to perform periodic STT. No active or passive failure mechanisms that could lead to an accident are affected by this proposed change and the STT acceptance criteria are not being revised. Therefore, the proposed change in STT requirements does not significantly increase the probability or consequences of an accident previously evaluated.

The proposed change ensures that the appropriate MCPR operating limit is in place. By implementing the correct MCPR operating limit the MCPR SL will continue to be ensured. Ensuring the MCPR SL is not exceeded will result in prevention of fuel failure. Therefore, since there is no increase in the potential for fuel failure there is no increase in the consequences of any accidents previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change adds a new SR to the MCPR TS which requires determination of the MCPR operating limit following the completion of scram time testing of the control rods. The proposed change revises allowable conditions for the STT of non-maintenance affected control rods and eliminates the requirement to test "eight control rods" after a reactor scram or other outage. The requirement to test "eight selected rods" is replaced by a new SR to perform periodic STT. The proposed change does not involve the use or installation of new equipment. Installed equipment is not operated in a new or different manner. No new or different system interactions are created, and no new processes are introduced. No new failures have been created by the addition of the proposed SR and the use of the alternate method for determining the MCPR operating limit. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   Use of Option B for determining the MCPR operating limit will result in a reduced operating limit in comparison to the use of Option A. However, a reduction in the operating limit margin does not result in a reduction in the safety margin. The MCPR SL remains the same regardless of the method used for determining the operating limit. The proposed change revises allowable conditions for the STT of non-maintenance affected control rods and eliminates the requirement to test "eight control rods" after a reactor scram or other outage. The requirement to test "eight selected rods" is replaced by a new SR to perform periodic STT. No active or passive failure mechanisms that could adversely impact the consequences of an accident are affected by this proposed change. All analyzed transient results remain within the design values for structures, systems and components. Therefore, the proposed change does not involve a significant reduction in margin of safety.

Based on the above, NMPNS concludes that the proposed amendment presents no significant hazards considerations under the standards set forth in 10 CFR 50.92c, and, accordingly, a finding of "no significant hazards consideration" is justified.

6. ENVIRONMENTAL ASSESSMENT

NMPNS review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22c(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7. PRECEDENT

The proposed change to the STT SR is consistent with a similar change for Oyster Creek Generating Station, which was approved by the NRC in Amendment 249, dated October 4, 2004, as corrected in an NRC letter dated October 20, 2004. The proposed change to the Nine Mile Point Unit 1 TS is consistent with the change for Oyster Creek Generating Station in allowing STT of non-maintenance affected control rods during power operations prior to exceeding 40% power, replacing the requirement to test "eight selected rods" after a reactor scram or other outage by a new SR to perform periodic STT, and adding a requirement to determine the MCPR operating limits following completion of control rod STT.

8. REFERENCES

1. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel, GESTAR-II," as amended through Amendment 26.

9. REGULATORY COMMITMENTS

The following table identifies those actions committed to by NMPNS in this submittal. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

REGULATORY COMMITMENTS	DUE DATE
None	None

ATTACHMENT (2)

PROPOSED TECHNICAL SPECIFICATION CHANGES (MARK-UP)

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34
66

LIMITING CONDITION FOR OPERATION

c. Scram Insertion Times

(1) The average scram insertion time of all operable control rods, in the power operation condition, shall be no greater than:

% Inserted From Fully Withdrawn	Average Scram Insertion Times (sec)
5	0.375
20	0.90
50	2.00
90	5.00

(2) Except as noted in 3.1.1.c(3), the maximum insertion scram time, in the power operation condition, shall be no greater than:

% Inserted From Fully Withdrawn	Maximum Scram Insertion Times (sec)
5	0.398
20	0.954
50	2.12
90	5.30

SURVEILLANCE REQUIREMENT

c. Scram Insertion Times

Insert 1

(1) After each major refueling outage and prior to power operation with reactor pressure above 800 psig, all operable control rods shall be scram time tested from the fully withdrawn position.

(2) Following each reactor scram from rated pressure, the mean 90% insertion time shall be determined for eight selected rods. If the mean 90% insertion time of the selected control rod drives does not fall within the range of 2.4 to 3.1 seconds or the measured scram time of any one drive for 90% insertion does not fall within the range of 1.9 to 3.6 seconds, an evaluation shall be made to provide reasonable assurance that proper control rod drive performance is maintained.

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
(3) Control rods with longer scram insertion time will be permitted provided that no other control rod in a nine-rod square array around this rod has a: (a) Scram insertion time greater than the maximum allowed, (b) Malfunctioned accumulator, (c) Valved out of service in a non-fully inserted position.	~~(3) Following any outage not initiated by a reactor scram, eight rods shall be scram tested with reactor pressure above 800 psig. The same criteria of 4.1.1.c(2) shall apply~~ e
d. Control Rod Accumulators At all reactor operating pressures, a rod accumulator may be out of service provided that no other control rod in a nine-rod square array around this rod has a: (1) Malfunctioned accumulator, (2) Valved out of service in a non-fully inserted position, (3) Scram insertion greater than maximum permissible insertion time.	d. Control Rod Accumulators Once a shift check the status of the accumulator pressure and level alarms in the control room.

LIMITING CONDITION FOR OPERATION	SURVEILLANCE REQUIREMENT
not returned to within the prescribed limits within two (2) hours, reactor power reductions shall be initiated at a rate not less than 10% per hour until APLHGR at all nodes is within the prescribed limits.	
b. Linear Heat Generation Rate (LHGR) During power operation, the Linear Heat Generation Rate (LHGR) of any rod in any fuel assembly at any axial location shall not exceed the limiting value specified in the Core Operating Limits Report. If at any time during power operation it is determined by normal surveillance that the limiting value for LHGR is being exceeded at any location, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. If the LHGR at all locations is not returned to within the prescribed limits within two (2) hours, reactor power reductions shall be initiated at a rate not less than 10% per hour until LHGR at all locations is within the prescribed limits.	b. Linear Heat Generation Rate (LHGR) The LHGR as a function of core height shall be checked daily during reactor operation at ≥25% rated thermal power.
c. Minimum Critical Power Ratio (MCPR) During power operation, the MCPR for all fuel at rated power and flow shall be within the limit provided in the Core Operating Limits Report. If at any time during power operation it is determined by normal surveillance that the above limit is no longer met, action shall be initiated within 15 minutes to restore operation to within	c. Minimum Critical Power Ratio (MCPR) ~~MCPR shall be determined daily during reactor power operation at >25% rated thermal power.~~ Insert 2

Insert 1 (for TS Section 4.1.1c; page 33)

The maximum scram insertion time shall be demonstrated through measurement for*:

(1) All control rods prior to thermal power exceeding 40% power with reactor pressure above 800 psig, after each major refueling outage or after a reactor shutdown that is greater than 120 days.

(2) Specifically affected individual control rods following maintenance on or modification to the control rod or control rod drive system which could affect the scram insertion time of those specific control rods with reactor pressure above 800 psig.

(3) At least 20 control rods, on a rotating basis, on a frequency of less than or equal to once per 180 days of cumulative power operation, with reactor pressure above 800 psig.

* For single control rod scram time tests, the control rod drive pumps shall be isolated from the accumulators.

Insert 2 (for TS Section 4.1.7c; page 66)

(1) MCPR shall be determined daily during reactor power operation at > 25% rated thermal power.
(2) MCPR operating limit shall be determined within 72 hours of completing scram time testing as required in Specification 4.1.1(c).

ATTACHMENT (3)

CHANGES TO TECHNICAL SPECIFICATION BASES (MARK-UP)

The current version of Technical Specifications Bases page 72 has been marked-up by hand to reflect the proposed changes. This Bases page is provided for information only and does not require NRC approval.

Minimum Critical Power Ratio (MCPR)

At core thermal power levels less than or equal to 25%, the reactor will be operating at a minimum recirculation pump speed and the moderator void content will be very small. For all designated control rod patterns which may be employed at this point, operating plant experience and thermal-hydraulic analysis indicated that the resulting MCPR value is in excess of requirements by a considerable margin. With this low void content, any inadvertent core flow increase would only place operation in a more conservative mode relative to MCPR. During initial startup testing of the plant, an MCPR evaluation will be made at the 25% thermal power level with minimum recirculation pump speed. The MCPR margin will thus be demonstrated such that future MCPR evaluations below this power level will be shown to be unnecessary. The daily requirement for calculating MCPR above 25% rated thermal power is sufficient since power distribution shifts are very slow when there have not been significant power or control rod changes. The requirement for calculating MCPR when a limiting control rod pattern is approached ensures that MCPR will be known following a change in power or power shape (regardless of magnitude) that could place operation at a thermal limit.

MCPR limits during operation at other than rated conditions are provided in the Core Operating Limits Report. For the case of automatic flow control, the K_f factor is determined such that any automatic increase in power (due to flow control) will always result in arriving at the nominal required MCPR at 100% power. For manual flow control, the K_f is determined such that an inadvertent increase in core flow (i.e., operator error or recirculation pump speed controller failure) would result in arriving at the 99.9% limit MCPR when core flow reaches the maximum possible core flow corresponding to a particular setting of the recirculation pump MG set scoop tube maximum speed control limiting set screws. These screws are to be calibrated and set to a particular value and whenever the plant is operating in manual flow control, the K_f defined by that setting of the screws is to be used in the determination of required MCPR. This will assure that the reduction in MCPR associated with an inadvertent flow increase always satisfies the 99.9% requirement. Irrespective of the scoop tube setting, the required MCPR is never allowed to be less than the nominal MCPR (i.e., K_f is never less than unity).

Power/Flow Relationship

The power/flow curve is the locus of critical power as a function of flow from which the occurrence of abnormal operating transients will yield results within defined plant safety limits. Each transient and postulated accident applicable to operation of the plant was analyzed along the power/flow line. The analysis [7, 8, 12, 14] justifies the operating envelope bounded by the power/flow curve as long as other operating limits are satisfied. Operation under the power/flow line is designed to enable the direct ascension to full power within the design basis for the plant.

Insert A

Insert A (for TS Bases page 72)

Because the transient analysis takes credit for conservatism in the scram speed performance, it must be demonstrated that the specific scram speed distribution is consistent with that used in the transient analysis. SR 4.1.1(c) determines the actual scram speed distribution which is compared to the assumed distribution. The MCPR operating limit is then determined based either on the applicable limit associated with the scram times of TS 3.1.1(c) or the actual scram times. The MCPR operating limit must be determined once within 72 hours after each set of scram time tests required by SR 4.1.1(c) because the effective scram speed distribution may change during the cycle or after maintenance that could affect scram times. The 72 hour Completion Time is acceptable due to the relatively minor changes in scram speed expected during the fuel cycle.