SUMMARY OF CHANGES TO ITS SECTION 3.2

SUMMARY OF CHANGES TO ITS SECTION 3.2 - REVISION D

Source of Change	Summary of Change	Affected Pages
TSTF-229, Rev. 0	Change to the ISTS was pending at the time of the submittal. At this time the change has been approved. Accordingly, the JFD is changed from TP1 to TA1	**Section 3.2.2** ITS mark-up p 3.2-3 JFD TA1 (JFDs p 1 of 1) ITS Bases mark-up p B 3.2-9 Bases JFD TA1 (Bases JFDs p 1 of 1)
RAI 3.2-01	ITS 3.2.4 modified to reflect CTS level of detail. Specifically, adjustments required when MFLPD is greater than the fraction of RTP will reference adjustements "as specified in the COLR." Affected areas include: CTS Markup page 1 of 1 (CTS 4.1.B); DOC A3; LCO 3.2.4.b & c; SR 3.2.4.2; JFD PA1 for ITS and JFD PA2 for ITS Bases	**Section 3.2.4** CTS mark-up p 1 of 1 DOC A3 (DOCs p 1 of 3) ITS mark-up pp 3.2-5, 3.2-6 JFD PA1 (JFDs p 1 of 1) Bases JFD PA2 (Bases JFDs p 1 of 2) Clean typed ITS pp 3.2-5, 3.2-6
Typographical	ITS SR 3.2.2.2 -- minor typographical corrections for consistency in presentation within the SR. The meaning of the SR is unaffected by these corrections.	**Section 3.2.2** Clean typed ITS p 3.2-3

ITS CONVERSION PACKAGE

SECTION 3.2 - POWER DISTRIBUTION LIMITS

JAFNPP
IMPROVED TECHNICAL SPECIFICATION (ITS)

CONVERSION PACKAGE

Section 3.2 - POWER DISTRIBUTION LIMITS

Table of Contents

The markup package for each Specification contains the following:

Markup of the current Technical Specifications (CTS);
Discussion of changes (DOCs) to the CTS;
No significant hazards consideration (NSHC) for each less restrictive change (Lx) to the CTS;
Markup of the corresponding NUREG-1433 Specification;
Justification of differences (JFDs) from the NUREG;
Markup of NUREG-1433 Bases;
Justification for differences (JFDs) from NUREG-1433 Bases; and
Retyped proposed Improved Technical Specifications (ITS) and Bases.

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

MARKUP OF NUREG-1433, REVISION 1, SPECIFICATION

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1
MARKUP OF NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

Specification 3.2.1

(A1)

3.5 (cont'd)

condition, that pump shall be considered inoperable for purposes of satisfying Specifications 3.5.A, 3.5.C, and 3.5.E.

See ITS: 3.5.1, 3.5.2, 3.5.3

4.5 (cont'd)

2. Following any period where the LPCI subsystems or core spray subsystems have not been maintained in a filled condition; the discharge piping of the affected subsystem shall be vented from the high point of the system and water flow observed.

3. Whenever the HPCI or RCIC System is lined up to take suction from the condensate storage tank, the discharge piping of the HPCI or RCIC shall be vented from the high point of the system, and water flow observed on a monthly basis.

4. The level switches located on the Core Spray and RHR System discharge piping high points which monitor these lines to ensure they are full shall be functionally tested each month.

[3.2.1] H. Average Planar Linear Heat Generation Rate (APLHGR)

[Applicability] [LCO 3.2.1] (A2) During power operation the APLHGR for each type of fuel as a function of axial location and average planar exposure shall be within limits based on applicable APLHGR limit values which have been approved for the respective fuel and lattice types. (LA2) These values are specified in the Core Operating Limits Report.

[Applicability] [ACTION A] If at anytime during reactor power operation greater than 25% of rated power it is determined that the limiting value for APLHGR is being exceeded, action shall then be initiated within 15 minutes to restore operation to within the prescribed limits. (LA1) If the APLHGR is not returned to within the prescribed limits within two (2) hours,

[ACTION B] the reactor power shall be reduced to less than 25% of rated power within the next four hours, or until the APLHGR is returned to within the prescribed limits. (A3)

[3.2.1] H. Average Planar Linear Heat Generation Rate (APLHGR)

[SR 3.2.1.1] The APLHGR for each type of fuel as a function of average planar exposure shall be determined daily during reactor operation at ≥25% rated thermal power. (LA2) (M1) [Applicability] (A2)

less than or equal to the limits specified in the COLR once within 12 hours after ≥25% RTP AND 24 hours thereafter

Page 1 of 1

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

DISCUSSION OF CHANGES
ITS: 3.2.1 - AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

ADMINISTRATIVE CHANGES

A1 In the conversion of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Current Technical Specification (CTS) to the proposed plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes. Editorial changes, reformatting, and revised numbering are adopted to make the ITS consistent with the conventions in NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 1 (i.e., Improved Standard Technical Specifications (ISTS)).

A2 CTS 3.5.H requires the APLHGR be within limits "during power operations." CTS 4.5.H only requires the limit to be checked when thermal power is ≥ 25% RTP. ITS 3.2.1 Applicability for the APLHGR specification is for "THERMAL POWER ≥ 25% RTP". In addition, consistent with these requirements, if APLHGR is not restored to within limits when thermal power is ≥ 25% RTP, the current actions of CTS 3.5.H require power to be reduced to < 25% RTP. This change implements human factor considerations to ensure that the Applicability and Surveillance Requirements are consistent with each other. This change is a presentation preference consistent with NUREG-1433, Revision 1, and is administrative.

A3 CTS 3.5.H requires the reactor power be reduced "to less than 25% of rated power within the next four hours or until the APLHGR is returned to within the prescribed limits". The phrase "or until the APLHGR is returned to within the prescribed limits" is being deleted, since it is redundant to ITS LCO 3.0.2 which states generically that Required Actions are not required to be continued once the LCO is met. Therefore, the elimination of this application in CTS 3.5.H is considered administrative.

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 CTS 4.5.H requires that APLHGR be determined "daily during reactor operation at ≥ 25% rated thermal power." ITS 3.2.1.1 Frequency is "within 12 hours after ≥ 25% RTP AND 24 hours thereafter". This change requires the first APLHGR determination within 12 hours and the current specifications require the same determination be made within 24 hours after RTP ≥ 25% RTP. This change imposes added time restraints on operations consistent with the BWR Standard Technical Specifications, NUREG-1433, Revision 1, and therefore is more restrictive. This change is necessary to ensure APLHGRs are verified to be within limits in a timely manner upon entry into the Applicability.

DISCUSSION OF CHANGES
ITS: 3.2.1 - AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

LA1 The details in CTS 3.5.H require that action be initiated within 15 minutes to restore operation to within prescribed limits. These details are not required in the LCO and are being relocated to the Bases of ITS 3.2.1 the APLHGR Specification in the form of a discussion that "prompt action" should be taken to restore the parameter to within limits. A 15 minute action may not always be conservative to assure safety. The 2 hour completion time in ITS 3.2.1 Required Action A.1 for restoration of the limit is the bounding requirement and allows appropriate actions to be evaluated by the operator and completed in a timely manner. Thus, the 15 minute requirement is not critical in assuring that the appropriate actions are taken. Therefore, these details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

LA2 The details in CTS 3.5.H and 4.5.H (related to APLHGR and APLHGR limits) are proposed to be relocated to the Bases. ITS 3.2.1 requires all APLHGRs to be less than or equal to the limits specified in the COLR. This requirement is adequate for ensuring all APLHGRs are maintained within limits. As such, these relocated details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

None

TECHNICAL CHANGES - RELOCATIONS

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

NO SIGNIFICANT HAZARDS CONSIDERATION
ITS: 3.2.1 - AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

There are no plant specific less restrictive changes identified for this Specification.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

MARKUP OF NUREG-1433, REVISION 1 SPECIFICATION

3.2 POWER DISTRIBUTION LIMITS

3.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

[3.5.H] LCO 3.2.1 All APLHGRs shall be less than or equal to the limits specified in the COLR.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

[3.5.H]

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Any APLHGR not within limits.	A.1 Restore APLHGR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

[4.5.H]

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify all APLHGRs are less than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP AND 24 hours thereafter

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS: 3.2.1 - AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

RETENTION OF EXISTING REQUIREMENT (CLB)

None

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

None

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

None

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE (X)

None

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

MARKUP OF NUREG-1433, REVISION 1, BASES

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

BASES

BACKGROUND

The APLHGR is a measure of the average LHGR of all the fuel rods in a fuel assembly at any axial location. Limits on the APLHGR are specified to ensure that the fuel design limits identified in Reference 1 are not exceeded during anticipated operational occurrences (AOOs) and that the peak cladding temperature (PCT) during the postulated design basis loss of coolant accident (LOCA) does not exceed the limits specified in 10 CFR 50.46.

abnormal operational transients PA1

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the fuel design limits are presented in References 1 and 2. The analytical methods and assumptions used in evaluating Design Basis Accidents (DBAs), anticipated operational transients, and normal operation that determine the APLHGR limits are presented in References 1, 2, 3, 4, 5, 6, and 7.

abnormal PA1 , and 8 DB3

Fuel design evaluations are performed to demonstrate that the 1% limit on the fuel cladding plastic strain and other fuel design limits described in Reference 1 are not exceeded during AOOs for operation with LHGRs up to the operating limit LHGR. APLHGR limits are equivalent to the LHGR limit for each fuel rod divided by the local peaking factor of the fuel assembly. APLHGR limits are developed as a function of exposure and the various operating core flow and power states to ensure adherence to fuel design limits during the limiting AOOs (Refs. 5, 6, and 7). Flow dependent APLHGR limits are determined using the three dimensional BWR simulator code (Ref. 8) to analyze slow flow runout transients. The flow dependent multiplier, $MAPFAC_f$, is dependent on the maximum core flow runout capability. The maximum runout flow is dependent on the existing setting of the core flow limiter in the Recirculation Flow Control System.

abnormal operational transients PA1 DB1 DB1

Based on analyses of limiting plant transients (other than core flow increases) over a range of power and flow conditions, power dependent multipliers, $MAPFAC_p$, are also generated. Due to the sensitivity of the transient response to initial core flow levels at power levels below those at

DB1

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

which turbine stop valve closure and turbine control valve fast closure scram trips are bypassed, both high and low core flow $MAPFAC_f$ limits are provided for operation at power levels between 25% RTP and the previously mentioned bypass power level. The exposure dependent APLHGR limits are reduced by $MAPFAC_p$ and $MAPFAC_f$ at various operating conditions to ensure that all fuel design criteria are met for normal operation and AOOs. A complete discussion of the analysis code is provided in Reference 9. (DB1)

LOCA analyses are then performed to ensure that the above determined APLHGR limits are adequate to meet the PCT and maximum oxidation limits of 10 CFR 50.46. The analysis is performed using calculational models that are consistent with the requirements of 10 CFR 50, Appendix K. A complete discussion of the analysis code is provided in Reference 10 [8] (DB1). The PCT following a postulated LOCA is a function of the average heat generation rate of all the rods of a fuel assembly at any axial location and is not strongly influenced by the rod to rod power distribution within an assembly. The APLHGR limits specified are equivalent to the LHGR of the highest powered fuel rod assumed in the LOCA analysis divided by its local peaking factor. A conservative multiplier is applied to the LHGR assumed in the LOCA analysis to account for the uncertainty associated with the measurement of the APLHGR.

For single recirculation loop operation, the MAPFAC multiplier is limited to a maximum of 0.75 (Ref. 5) [a conservative multiplier is applied to the exposure dependent APLHGR limits for two loop operation (Ref. 5, 7, and 8)] (DB3) (DB1). This maximum limit is due to the conservative analysis assumption of an earlier departure from nucleate boiling with one recirculation loop available, resulting in a more severe cladding heatup during a LOCA.

The APLHGR satisfies Criterion 2 of the NRC Policy Statement [10 CFR 50.36(c)(2)(ii) (Ref. 10)] (X1).

LCO

The APLHGR limits [and] specified in the COLR are the result of the fuel design, DBA, and transient analyses. (PA2) For two recirculation loops operating, the limit is determined by multiplying the smaller of the $MAPFAC_p$ and $MAPFAC_f$ factors times the exposure dependent APLHGR limits [for each lattice type as a function of average planar exposure and is approved by the NRC] (DB2) (DB1). With only one recirculation loop in operation, in conformance with the requirements of LCO 3.4.1, "Recirculation Loops Operating,"

(continued)

BASES

LCO (continued)

the limit is determined by multiplying the exposure dependent APLHGR limit by the smaller of either MAPFAC, MAPFAC, and 0.75, where 0.75 has been determined by a specific single recirculation loop analysis (Ref. 5).

a conservative multiplier

DB1

APPLICABILITY

analyses of ⑤ ⑤

The APLHGR limits are primarily derived from fuel design evaluations and LOCA and transient analyses that are assumed to occur at high power levels. Design calculations (Ref. 9) and operating experience have shown that as power is reduced, the margin to the required APLHGR limits increases. This trend continues down to the power range of 5% to 15% RTP when entry into MODE 2 occurs. When in MODE 2, the intermediate range monitor scram function provides prompt scram initiation during any significant transient, thereby effectively removing any APLHGR limit compliance concern in MODE 2. Therefore, at THERMAL POWER levels ≤ 25% RTP, the reactor is operating with substantial margin to the APLHGR limits; thus, this LCO is not required.

PA2 PB1 PA2

ACTIONS

A.1

If any APLHGR exceeds the required limits, an assumption regarding an initial condition of the DBA and transient analyses may not be met. Therefore, prompt action should be taken to restore the APLHGR(s) to within the required limits such that the plant operates within analyzed conditions and within design limits of the fuel rods. The 2 hour Completion Time is sufficient to restore the APLHGR(s) to within its limits and is acceptable based on the low probability of a transient or DBA occurring simultaneously with the APLHGR out of specification.

B.1

If the APLHGR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER must be reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on

PA2

(continued)

BASES

ACTIONS

B.1 (continued)

operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1

APLHGRs are required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. They are compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on both engineering judgment and recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

REFERENCES

1. NEDO-24011-P-A, "General Electric Standard Application for Reactor Fuel" (latest approved version).
2. FSAR, Chapter [5].
3. FSAR, Chapter [6].
4. FSAR, Chapter [15].
5. [Plant specific single loop operation].
6. [Plant specific load line limit analysis].
7. [Plant Specific Average Power Range Monitor, Rod Block Monitor and Technical Specification Improvements (ARTS) Program].
8. NEDO-30130-A, "Steady State Nuclear Methods," May 1985.

NEDO-24281, FitzPatrick Nuclear Power Plant Single-Loop Operation, August 1980; NEDO-24243, General Electric Boiling Water Reactor Load Line Limit Analysis for James A. FitzPatrick Nuclear Power Plant, February 1980; NEDC-32016P, Power Uprate Safety Analysis for the James A. FitzPatrick Nuclear Power Plant, December 1991

(continued)

BASES

REFERENCES (continued)

9. NEDO-24154, "Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors," October 1978. (DB3)

10. [Plant specific loss of coolant accident analysis].

9. NEDC-31317P Revision 2, James A. FitzPatrick Nuclear Power Plant SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis, April 1993. (DB3)

10. 10 CFR 50.36 (c)(2)(ii). (X1)

8. J11-03359SRL, Revision 1, Supplemental Reload Licensing Report for James A. FitzPatrick Reload 13 Cycle 14, October 1998 (DB3)

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS BASES: 3.2.1 - AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

RETENTION OF EXISTING REQUIREMENT (CLB)

None

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

PA1 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific nomenclature.

PA2 Editorial changes have been made for enhanced clarity or to correct a grammatical/typographical error.

PA3 Editorial change made with no change in intent.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

DB1 ITS 3.2.1 has been modified to reflect the specific design analyses, which does not include the Average Power Range Monitor Rod Block Monitor and Technical Specification Improvement (ARTS) Program. References have been renumbered, as required.

DB2 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific design analysis.

DB3 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific references.

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN THE ABOVE (X)

X1 NUREG-1433, Revision 1, Bases references to "NRC Policy Statement" have been replaced with 10 CFR 50.36(c)(2)(ii) in accordance with 60 FR 36953 effective August 18, 1995.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.1

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

3.2 POWER DISTRIBUTION LIMITS

3.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

LCO 3.2.1 All APLHGRs shall be less than or equal to the limits specified in the COLR.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Any APLHGR not within limits.	A.1	Restore APLHGR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify all APLHGRs are less than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP AND 24 hours thereafter

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

BASES

BACKGROUND

The APLHGR is a measure of the average LHGR of all the fuel rods in a fuel assembly at any axial location. Limits on the APLHGR are specified to ensure that the fuel design limits identified in Reference 1 are not exceeded during abnormal operational transients and that the peak cladding temperature (PCT) during the postulated Design Basis loss of coolant accident (LOCA) does not exceed the limits specified in 10 CFR 50.46.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the fuel design limits are presented in References 1 and 2. The analytical methods and assumptions used in evaluating Design Basis Accidents (DBAs), abnormal operational transients, and normal operation that determine the APLHGR limits are presented in References 1, 2, 3, 4, 5, 6, 7, and 8.

Fuel design evaluations are performed to demonstrate that the 1% limit on the fuel cladding plastic strain and other fuel design limits described in Reference 1 are not exceeded during abnormal operational transients for operation with LHGRs up to the operating limit LHGR. APLHGR limits are equivalent to the LHGR limit for each fuel rod divided by the local peaking factor of the fuel assembly. APLHGR limits are developed as a function of exposure to ensure adherence to fuel design limits during the limiting abnormal operational transients (Refs. 5, 6, and 7).

LOCA analyses are then performed to ensure that the above determined APLHGR limits are adequate to meet the PCT and maximum oxidation limits of 10 CFR 50.46. The analysis is performed using calculational models that are consistent with the requirements of 10 CFR 50, Appendix K. A complete discussion of the analysis code is provided in Reference 8. The PCT following a postulated LOCA is a function of the average heat generation rate of all the rods of a fuel assembly at any axial location and is not strongly influenced by the rod to rod power distribution within an

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

assembly. The APLHGR limits specified are equivalent to the LHGR of the highest powered fuel rod assumed in the LOCA analysis divided by its local peaking factor. A conservative multiplier is applied to the LHGR assumed in the LOCA analysis to account for the uncertainty associated with the measurement of the APLHGR.

For single recirculation loop operation, a conservative multiplier of 0.84 is applied to the exposure dependent APLHGR limits for two loop operation (Ref. 5, 7 and 8). This maximum limit is due to the conservative analysis assumption of an earlier departure from nucleate boiling with one recirculation loop available, resulting in a more severe cladding heatup during a LOCA.

The APLHGR satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii) (Ref. 9).

LCO

The APLHGR limits specified in the COLR are the result of the fuel design, and DBA and transient analyses. For two recirculation loops operating, the limit is determined for each lattice type as a function of average planar exposure and is approved by the NRC. With only one recirculation loop in operation, in conformance with the requirements of LCO 3.4.1, "Recirculation Loops Operating," the limit is determined by multiplying the exposure dependent APLHGR limit by a conservative multiplier determined by a specific single recirculation loop analysis (Ref. 5).

APPLICABILITY

The APLHGR limits are primarily derived from fuel design evaluations and analyses of LOCAs and transients that are assumed to occur at high power levels. Design calculations and operating experience have shown that as power is reduced, the margin to the required APLHGR limits increases. This trend continues down to the power range of 5% to 15% RTP when entry into MODE 2 occurs. When in MODE 2, the intermediate range monitor scram function provides prompt scram initiation during any significant transient, thereby effectively removing any APLHGR limit compliance concern in MODE 2. Therefore, at THERMAL POWER levels < 25% RTP, the reactor is operating with substantial margin to the APLHGR limits; thus, this LCO is not required.

(continued)

BASES (continued)

ACTIONS

A.1

If any APLHGR exceeds the required limits, an assumption regarding an initial condition of the DBA and transient analyses may not be met. Therefore, prompt action should be taken to restore the APLHGR(s) to within the required limits such that the plant operates within analyzed conditions and within design limits of the fuel rods. The 2 hour Completion Time is sufficient to restore the APLHGR(s) to within its limits and is acceptable based on the low probability of a transient or DBA occurring simultaneously with the APLHGR out of specification.

B.1

If the APLHGR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER must be reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1

APLHGRs are required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. They are compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on the recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

(continued)

BASES (continued)

REFERENCES

1. NEDE-24011-P-A-13, General Electric Standard Application for Reactor Fuel, August 1996.
2. UFSAR, Chapter 3.
3. UFSAR, Chapter 6.
4. UFSAR, Chapter 14.
5. NEDO-24281, FitzPatrick Nuclear Power Plant Single-Loop Operation, August 1980.
6. NEDO-24243, General Electric Boiling Water Reactor Load Line Limit Analysis For James A. FitzPatrick Nuclear Power Plant, February 1980.
7. NEDC-32016P, Power Uprate Safety Analysis For The James A. FitzPatrick Nuclear Power Plant, December, 1991.
8. NEDC-31317P, Revision 2, James A. FitzPatrick Nuclear Power Plant SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis, April 1993.
9. 10 CFR 50.36(c)(2)(ii).

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

MARKUP OF NUREG-1433, REVISION 1, SPECIFICATION

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1
MARKUP OF NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

Specification 3.2.2

A1

JAFNPP

3.1 (cont'd)

A1 — All MCPRs shall be greater than or equal to

3.2.2 → B. **Minimum Critical Power Ratio (MCPR)**

A2

[Applicability] During reactor power operation, the MCPR operating limit
[LCO 3.2.2] shall not be less than that shown in the Core Operating Limits Report. (Specified)

LA1

1. During Reactor power operation with core flow less than 100% of rated, the MCPR operating limit shall be multiplied by the appropriate K_f as specified in the Core Operating Limits Report.

[Applicability] 2. If anytime during reactor operation at greater than 25% of rated power it is determined that the operating limit MCPR is being exceeded, action shall then be initiated
LA2 within fifteen (15) minutes to restore operation to within the prescribed limits.
[ACTION A] If the MCPR is not returned to within the prescribed limits within two (2) hours, an orderly reactor power reduction shall begin immediately.
[ACTION B] The reactor power shall be reduced to less than 25% of rated power within the next four hours, or until the MCPR is returned to within the prescribed limits. A3

4.1 (cont'd)

See ITS 3.2.4

B. **Maximum Fraction of Limiting Power Density (MFLPD)**

The MFLPD shall be determined daily during reactor power operation at ≥25% rated thermal power and the APRM high flux scram and Rod Block trip settings adjusted if necessary as specified in the Core Operating Limits Report.

[SR 3.2.2.1] C. MCPR shall be determined daily during reactor power operation at ≥25% of rated thermal power and following any change in power level or distribution that would cause operation with a limiting control rod pattern as described in the bases for Specification 3.3.B.5. (once within 12 hours after ≥ 25% RTP AND) L1 M1

[SR 3.2.2.2] D. Verification (Determine) of the MCPR operating limits shall be performed as specified in the Core Operating Limits Report.

add Surveillances Frequencies M2

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

DISCUSSION OF CHANGES
ITS: 3.2.2 - MINIMUM CRITICAL POWER RATIO (MCPR)

ADMINISTRATIVE CHANGES

A1 In the conversion of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Current Technical Specification (CTS) to the proposed plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes. Editorial changes, reformatting, and revised numbering are adopted to make the ITS consistent with the conventions in NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 1 (i.e., Improved Standard Technical Specifications (ISTS)).

A2 CTS 3.1.B states that MCPR should be within limits of the COLR "during power operations". CTS 4.1.C requires the limit to be checked when thermal power is ≥ 25% RTP. In addition, consistent with these requirements, if MCPR is not within limits above 25% RTP, the current actions of CTS 3.1.B require power to be reduced to < 25% RTP. There are no current actions to take if MCPR is exceeding the limits below 25% RTP. Thus, the present applicability for MCPR is ≥ 25% RTP. ITS 3.2.2 Applicability for the MCPR Specification is for THERMAL POWER ≥ 25% RTP. Since the present applicability and the proposed applicability for MCPR are both ≥ 25% RTP, this change is considered administrative. This change also implements human factor considerations to ensure that the Applicability, Required Actions, and Surveillance Requirements are consistent with each other. This change is consistent with NUREG-1433, Revision 1.

A3 CTS 3.1.B requires the reactor power be reduced "to less than 25% of rated power within the next four hours or until the MCPR is returned to within the prescribed limits". The phrase "or until the MCPR is returned to within the prescribed limits" is being deleted, since it is redundant to ITS LCO 3.0.2 which states generically that Required Actions are not required to be continued once the LCO is met. Therefore, the elimination of this application in CTS 3.1.B is considered administrative. This change is consistent with NUREG-1433, Revision 1.

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 CTS 4.1.C requires that MCPR be determined "daily during reactor operation at ≥ 25% rated thermal power." ITS 3.2.2.1 Frequency is "within 12 hours after ≥ 25% RTP AND 24 hours thereafter". This change requires the first MCPR determination within 12 hours and the current specifications require the same determination be made within 24 hours after RTP ≥ 25% RTP. This change imposes added time restraints on operations consistent with the BWR Standard Technical Specifications, NUREG-1433, Revision 1, and is more restrictive. This change is

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 (continued)

necessary to ensure MCPRs are verified to be within limits in a timely manner upon entry into the Applicability.

M2 CTS 4.1.D requires the verification of the MCPR operating limits to be performed as specified in the Core Operating Limits Report. ITS SR 3.2.2.2 specifies the MCPR limits must be determined within 72 hours after each completion of ITS SR 3.1.4.1, SR 3.1.4.2 and SR 3.1.4.4 (control rod scram time testing). This new requirement is similar to current practice as specified in the COLR but imposes more specific Surveillance Frequencies. This change imposes added operational restraints on operations consistent with the BWR Standard Technical Specifications, NUREG-1433, Revision 1, and is more restrictive. This change is necessary to ensure MCPR limits are appropriately updated after scram time testing is complete.

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

LA1 CTS 3.1.B requires that during reactor power operation with core flow less than 100% of rated, the MCPR operating limit shall be multiplied by the appropriate K_f as specified in the COLR. This requirement is relocated to the ITS 3.2.2 Bases of the MCPR Specification. The actual value of K_f, for the fuel cycle, and instructions for its application are located in the COLR. The requirement in ITS LCO 3.2.2 that all MCPRs shall be greater than or equal to the MCPR operating limits specified in the COLR is sufficient to ensure that MCPR is evaluated correctly. In addition, the wording in the Bases ensures the K_f factor is considered in the MCPR limit at reduced flow rates. Therefore, these details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

LA2 The details in CTS 3.1.B require action be initiated within 15 minutes to restore operation to within prescribed limits. These details are not required in the LCO and are being relocated to the ITS 3.2.2 Bases of the MCPR Specification in the form of a discussion that "prompt action" should be taken to restore the parameter to within limits. A 15 minute action may not always be conservative to assure safety. The 2 hour Completion Time, in ITS 3.2.2 Required Action A.1, for restoration of the limit is the bounding requirement and allows appropriate actions to be evaluated by the operator and completed in a timely manner. Thus, the 15 minute requirement is not critical in assuring that the

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

LA2 (continued)

appropriate actions are taken. Therefore, these details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

L1 CTS 4.1.C requires that MCPR be determined following any change in power level or distribution that would cause operation with a limiting control rod pattern as described in the bases for Specification 3.3.B.5. The proposed change deletes this Surveillance Frequency, but retains the 24 hour Surveillance Frequency for determining the MCPR value. Since operation with a limiting control rod pattern is, in this case, operating on the operating limit MCPR, the condition is extremely unlikely and the Surveillance would seldom be required. Additionally, the Surveillance would be superfluous as it would not be evident that the plant is on an operating limit MCPR until a Surveillance had been performed. The existing 24 hour Surveillance Frequency is maintained and has been demonstrated through operating experience to be adequate for assuring operating limit MCPRs do not exceed limits. Therefore, the Surveillance Frequency is being deleted. This change is consistent with NUREG-1433, Revision 1.

TECHNICAL CHANGES - RELOCATIONS

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS: 3.2.2 - MINIMUM CRITICAL POWER RATIO (MCPR)

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

L1 CHANGE

New York Power Authority has evaluated the proposed Technical Specification change identified as "Technical Changes - Less Restrictive" and has determined that it does not involve a significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92. The bases for the determination that the proposed change does not involve a significant hazards consideration are discussed below.

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

   The proposed change will delete the surveillance frequency to determine MCPR is within limits following any change in power level or distribution that would cause operation with a limiting control rod pattern. Operation with a limiting control rod pattern means that there exists a MCPR that equals the limit specified in the COLR. Continuous operation with this control rod pattern is acceptable. The ITS will still have a requirement to verify all MCPRs are greater than or equal to the limits specified in the COLR every 24 hours when ≥ 25% RTP. The 24 hour Surveillance Frequency serves to ensure that the parameter does not exceed the limits, and has been demonstrated through operating experience to be adequate. Therefore, the proposed change does not change the requirement to operate with MCPR greater than or equal to the values given in the COLR. As such, the consequences of an accident previously evaluated has not changed. The proposed change eliminates a one time surveillance frequency for determining the MCPR values, but the 24 hour frequency is sufficient to assure that MCPR is within limits. Therefore, the probability of an accident previously evaluated has not changed. Therefore, no significant increase in the probability or consequences of an accident previously evaluated is involved in the proposed change.

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

   The proposed change does not introduce a new mode of plant operation and does not require physical modification to the plant. The remaining surveillance frequencies following the deletion of a one time special surveillance requirement are sufficient to assure that MCPR will remain within prescribed operating limits. Therefore, the change does not create the possibility of a new or different kind of accident from any previously evaluated.

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

L1 CHANGE

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

   This change has no impact on any safety analysis assumptions because operation at the parameter limit is consistent with those assumptions. The existing 24 hour Surveillance Frequency is maintained and has been demonstrated through operating experience to be adequate for assuring the parameter does not exceed limits. Therefore, this proposed change does not involve a significant reduction in a margin of safety.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

MARKUP OF NUREG-1433, REVISION 1 SPECIFICATION

3.2 POWER DISTRIBUTION LIMITS

3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

[3.1.B] LCO 3.2.2 All MCPRs shall be greater than or equal to the MCPR operating limits specified in the COLR.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
[3.1.B.2]	A. Any MCPR not within limits.	A.1 Restore MCPR(s) to within limits.	2 hours
[3.1.B.2]	B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
[4.1.C]	SR 3.2.2.1 Verify all MCPRs are greater than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP <u>AND</u> 24 hours thereafter

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.2.2	Determine the MCPR limits.	Once within 72 hours after each completion of SR 3.1.4.1 AND Once within 72 hours after each completion of SR 3.1.4.2

[4.1.D]
[M2]

AND
Once within 72 hours after each completion of SR 3.1.4.4

TA1

TSTF-229

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS: 3.2.2 - MINIMUM CRITICAL POWER RATIO (MCPR)

RETENTION OF EXISTING REQUIREMENT (CLB)

None

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

None

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

None

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

TSTF-229

TA1 The changes presented in Technical Specification Task Force (TSTF) Technical Specification Change Traveler Number 229, Revision 0, have been incorporated into the revised Improved Technical Specifications. The new Surveillance Frequency of ITS SR 3.2.2.2 was added in accordance with M2.

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE (X)

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

MARKUP OF NUREG-1433, REVISION 1, BASES

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

BASES

PA2

7

BACKGROUND

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 if the limit is not violated (refer to the Bases for SL 2.1.1.2). The operating limit MCPR is 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 experienced boiling transition (Ref. 1), the critical power at which boiling transition is calculated to occur has been adopted as a fuel design criterion.

PA1

abnormal operational transients

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, flow, and subcooling). 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.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the AOOs to establish the operating limit MCPR are presented in References 2, 3, 4, 5, 6, 7, and 8. To ensure that 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.

DB1

The MCPR operating limits derived from the transient analysis are dependent on the operating core flow and power

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

state (MCPR$_f$ and MCPR$_p$, respectively) to ensure adherence to fuel design limits during the worst transient that occurs with moderate frequency (Refs. 6, 7, and 8). Flow dependent MCPR limits are determined by steady state thermal hydraulic methods with key physics response inputs benchmarked using the three dimensional BWR simulator code (Ref. 9) to analyze slow flow runout transients. The operating limit is dependent on the maximum core flow limiter setting in the Recirculation Flow Control System.

Power dependent MCPR limits (MCPR$_p$) are determined mainly by the one dimensional transient code (Ref. 10). Due to the sensitivity of the transient response to initial core flow levels at power levels below those at which the turbine stop valve closure and turbine control valve fast closure scrams are bypassed, high and low flow MCPR$_p$ operating limits are provided for operating between 25% RTP and the previously mentioned bypass power level.

The MCPR satisfies Criterion 2 of the NRC Policy Statement.

core exposure PB1 INSERT ASA DB1 X1 10 CFR 50.36 (c)(2)(ii) (Ref. 9)

LCO

The MCPR operating limits specified in the COLR are the result of the Design Basis Accident (DBA) and transient analysis. The operating limit MCPR is determined by the larger of the MCPR$_f$ and MCPR$_p$ limits.

The MCPR values for each fuel assembly must remain above the operating limit MCPR. PA2 a function of exposure, control rod scram times and core flow. DB1

APPLICABILITY

The MCPR operating limits are primarily derived from transient analyses that are assumed to occur at high power levels. Below 25% RTP, the reactor is operating at a minimum recirculation pump speed and the moderator void ratio is small. Surveillance of thermal limits below 25% RTP is unnecessary due to the large inherent margin that ensures that the MCPR SL is not exceeded even if a limiting transient occurs. Statistical analyses indicate that the nominal value of the initial MCPR expected at 25% RTP is > 3.5. Studies of the variation of limiting transient behavior have been performed over the range of power and flow conditions. These studies encompass the range of key actual plant parameter values important to typically limiting transients. The results of these studies demonstrate that a margin is expected between performance and the MCPR requirements, and that margins increase as

the analyses of PA2 S actual values for key plant parameters PA2

(continued)

REVISION D

DB1

INSERT ASA

A generator load reject without bypass and a feedwater controller transient normally result in the worst case MCPR transients for a given fuel cycle. During operations at low core flows the MCPR operating limit must be increased by a factor of K_f (specified in the COLR) which is derived from the recirculation flow runout transient and is a function of core flow. This will ensure the MCPR safety limit is not exceeded during a recirculation flow runout event.

BASES

APPLICABILITY (continued)

power is reduced to 25% RTP. This trend is expected to continue to the 5% to 15% power range when entry into MODE 2 occurs. When in MODE 2, the intermediate range monitor provides rapid scram initiation for any significant power increase transient, which effectively eliminates any MCPR compliance concern. Therefore, at THERMAL POWER levels < 25% RTP, the reactor is operating with substantial margin to the MCPR limits and this LCO is not required.

ACTIONS

A.1

If any MCPR is outside the required limits, an assumption regarding an initial condition of the design basis transient analyses may not be met. Therefore, prompt action should be taken to restore the MCPR(s) to within the required limits such that the plant remains operating within analyzed conditions. The 2 hour Completion Time is normally sufficient to restore the MCPR(s) to within its limits and is acceptable based on the low probability of a transient or DBA occurring simultaneously with the MCPR out of specification.

B.1

If the MCPR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER must be reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1

The MCPR is required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. It is compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on ~~both engineering judgment and~~ the (PA3)

(continued)

REVISION D

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1 (continued)

recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

SR 3.2.2.2

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 3.2.2.2 determines the value of τ, which is a measure of the actual scram speed distribution compared with the assumed distribution. The MCPR operating limit is then determined based on an interpolation between the applicable limits for Option A (scram times of LCO 3.1.4, "Control Rod Scram Times") and Option B (realistic scram times) analyses. The parameter τ must be determined once within 72 hours after each set of scram time tests required by SR 3.1.4.1, and SR 3.1.4.2 (SR 3.1.4.4) 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 τ expected during the fuel cycle.

TA1 TSTF-229 TA1 PA2 DB2

Fuel Rod Failure as a Consequence of Departure From Nucleate Boiling or Dry Out

REFERENCES

1. NUREG-0562, June 1979. (-13)
2. NEDO-24011-P-A, "General Electric Standard Application for Reactor Fuel" (latest approved version). August 1996
3. FSAR, Chapter [14]. (3)
4. FSAR, Chapter [6].
5. FSAR, Chapter [15]. (14)
6. (Plant specific single loop operation). NEDO-24281, FitzPatrick Nuclear Power Plant Single-Loop Operation, August 1980.
7. (Plant specific load line limit analysis). NEDO-24243, General Electric Boiling Water Reactor Load Line Limit Analysis for James A. FitzPatrick Nuclear Power Plant, February 1980

all references except as indicated

PA1 (4)

(continued)

REVISION D

BASES

REFERENCES (continued)

8. [Plant specific Average Power Range Monitor, Rod Block Monitor and Technical Specification Improvements (ARTS) Program].

9. NEDO-30130-A, "Steady State Nuclear Methods," May 1985.

10. NEDO-24154, "Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors," October 1978.

DB1

DB2

NEDC-32016P, Power Uprate Analysis for the James A FitzPatrick Nuclear Power Plant, December 1991.

9. 10 CFR 50.36(c)(2)(ii).

X1

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS: 3.2.2 - MINIMUM CRITICAL POWER RATIO (MCPR)

RETENTION OF EXISTING REQUIREMENT (CLB)

None

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

None

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

None

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

TSTF-229

TA1 The changes presented in Technical Specification Task Force (TSTF) Technical Specification Change Traveler Number 229, Revision 0, have been incorporated into the revised Improved Technical Specifications. The new Surveillance Frequency of ITS SR 3.2.2.2 was added in accordance with M2.

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE (X)

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.2

MINIMUM CRITICAL POWER RATIO (MCPR)

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

3.2 POWER DISTRIBUTION LIMITS

3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

LCO 3.2.2 All MCPRs shall be greater than or equal to the MCPR operating limits specified in the COLR.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Any MCPR not within limits.	A.1 Restore MCPR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.2.1 Verify all MCPRs are greater than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP **AND** 24 hours thereafter

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.2.2	Determine the MCPR limits.	Once within 72 hours after each completion of SR 3.1.4.1 **AND** Once within 72 hours after each completion of SR 3.1.4.2 **AND** Once within 72 hours after each completion of SR 3.1.4.4

EDIT

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

BASES

BACKGROUND

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 if the limit is not violated (refer to the Bases for SL 2.1.1.2). The operating limit MCPR is established to ensure that no fuel damage results during abnormal operational transients. Although fuel damage does not necessarily occur if a fuel rod actually experienced boiling transition (Ref. 1), 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, flow, and subcooling). 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.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the abnormal operational transients to establish the operating limit MCPR are presented in References 2, 3, 4, 5, 6, 7, and 8. To ensure that 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.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The MCPR operating limits derived from the transient analysis are dependent on the operating core flow and core exposure to ensure adherence to fuel design limits during the worst transient that occurs with moderate frequency (Refs. 6, 7, and 8). A generator load reject without bypass and a feedwater controller transient normally result in the worst case MCPR transients for a given fuel cycle. During operations at low core flows the MCPR operating limit must be increased by a factor of K_f (specified in the COLR) which is derived from the recirculation flow runout transient and is a function of core flow. This will ensure the MCPR safety limit is not exceeded during a recirculation flow runout event.

The MCPR satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii) (Ref. 9).

LCO

The MCPR operating limits specified in the COLR are the result of the Design Basis Accident (DBA) and transient analysis. The operating limit MCPR is a function of exposure, control rod scram times and core flow. The MCPR values for each fuel assembly must remain above the operating limit MCPR.

APPLICABILITY

The MCPR operating limits are primarily derived from the analyses of transients that are assumed to occur at high power levels. Below 25% RTP, the reactor is operating at a minimum recirculation pump speed and the moderator void ratio is small. Surveillance of thermal limits below 25% RTP is unnecessary due to the large inherent margin that ensures that the MCPR SL is not exceeded even if a limiting transient occurs. Statistical analyses indicate that the nominal value of the initial MCPR expected at 25% RTP is > 3.5. Studies of the variation of limiting transient behavior have been performed over the range of power and flow conditions. These studies encompass the range of actual values for key plant parameters important to typically limiting transients. The results of these studies demonstrate that a margin is expected between performance and the MCPR requirements, and that margins increase as power is reduced to 25% RTP. This trend is expected to

(continued)

BASES

APPLICABILITY (continued)

continue to the 5% to 15% power range when entry into MODE 2 occurs. When in MODE 2, the intermediate range monitor provides rapid scram initiation for any significant power increase transient, which effectively eliminates any MCPR compliance concern. Therefore, at THERMAL POWER levels < 25% RTP, the reactor is operating with substantial margin to the MCPR limits and this LCO is not required.

ACTIONS

A.1

If any MCPR is outside the required limits, an assumption regarding an initial condition of the design basis transient analyses may not be met. Therefore, prompt action should be taken to restore the MCPR(s) to within the required limits such that the plant remains operating within analyzed conditions. The 2 hour Completion Time is normally sufficient to restore the MCPR(s) to within its limits and is acceptable based on the low probability of a transient or DBA occurring simultaneously with the MCPR out of specification.

B.1

If the MCPR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER must be reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1

The MCPR is required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. It is compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on the recognition of the slowness of changes in power distribution during normal operation.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.2.1 (continued)

The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

SR 3.2.2.2

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 3.2.2.2 determines the value of T, which is a measure of the actual scram speed distribution compared with the assumed distribution. The MCPR operating limit is then determined based on an interpolation between the applicable limits for Option A (scram times of LCO 3.1.4,"Control Rod Scram Times") and Option B (realistic scram times) analyses. The parameter T must be determined once within 72 hours after each set of scram time tests required by SR 3.1.4.1, SR 3.1.4.2, and SR 3.1.4.4 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 T expected during the fuel cycle.

REFERENCES

1. NUREG-0562, Fuel Rod Failure as a Consequence of Departure From Nucleate Boiling or Dry Out, June 1979.
2. NEDE-24011-P-A-13, General Electric Standard Application for Reactor Fuel, August 1996.
3. UFSAR, Chapter 3.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 14.
6. NEDO-24281, FitzPatrick Nuclear Power Plant Single-Loop Operation, August 1980.

(continued)

BASES

REFERENCES (continued)

7. NEDO-24243, General Electric Boiling Water Reactor Load Line Limit Analysis For James A. FitzPatrick Nuclear Power Plant, February 1980.

8. NEDC-32016P, Power Uprate Safety Analysis For The James A. FitzPatrick Nuclear Power Plant, December 1991.

9. 10 CFR 50.36(c)(2)(ii).

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

MARKUP OF NUREG-1433, REVISION 1, SPECIFICATION

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1
MARKUP OF NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

Specification 3.2.3

[3.2.3] 3.5 (cont'd)

[3.2.3] I. **Linear Heat Generation Rate (LHGR)** (LA1)

[LCO 3.2.3] The linear heat generation rate (LHGR) or any rod in any fuel assembly at any axial location shall not exceed the maximum allowable LHGR specified in the Core Operating Limits Report.

[Applicability] If anytime during reactor power operation greater than 25% of rated power

[Action A] it is determined that the limiting value for LHGR is being exceeded, action shall then be initiated within 15 minutes to restore operation to within the prescribed limits. (LA2) If the LHGR is not returned to within the prescribed limits within two (2) hours,

[ACTION B] the reactor power shall be reduced to less than 25% of rated power within the next four hours, or until the LHGR is returned to within the prescribed limits. (A2)

[3.2.3] 4.5 (cont'd)

I. **Linear Heat Generation Rate (LHGR)**

[SR 3.2.3.1] (Verify) The LHGR (are less than or equal to the limits specified in the COLR) (A1) shall be determined daily during reactor operation at ≥ 25% rated thermal power. [Applicability]

(M1) once within 12 hours after ≥ 25% RTP AND 24 hours thereafter

Page 1 of 1

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IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

DISCUSSION OF CHANGES
ITS: 3.2.3 - LINEAR HEAT GENERATION RATE (LHGR)

ADMINISTRATIVE CHANGES

A1 In the conversion of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Current Technical Specifications (CTS) to the proposed plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes. Editorial changes, reformatting, and revised numbering are adopted to make the ITS consistent with the conventions in NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 1 (i.e., Improved Standard Technical Specifications (ISTS)).

A2 CTS 3.5.I requires the reactor power be reduced "to less than 25% of rated power within the next four hours or until the LHGR is returned to within the prescribed limits". The phrase "or until the APLHGR is returned to within the prescribed limits" is being deleted, since it is redundant to ITS LCO 3.0.2 which states generically that Required Actions are not required to be continued once the LCO is met. Therefore, the elimination of this application in CTS 3.5.I is considered administrative.

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 CTS 4.5.I requires that LHGR be determined "daily during reactor operation at ≥ 25% rated thermal power." ITS 3.2.1.1 Frequency is "within 12 hours after ≥ 25% RTP AND 24 hours thereafter". This change requires the first LHGR determination within 12 hours and the current specifications require the same determination be made within 24 hours after RTP ≥ 25% RTP. This change imposes added time restraints on operations consistent with the BWR Standard Technical Specifications, NUREG-1433, Revision 1, and therefore is more restrictive. This change is necessary to ensure LHGRs are verified to be within limits in a timely manner upon entry into the Applicability.

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

LA1 The detail in CTS 3.5.I which specifies that the linear heat generation rate (LHGR) is at any rod in any fuel assembly at any axial location is proposed to be relocated to the Bases. The requirement in ITS LCO 3.2.3 that all LHGRs shall be less than or equal to the limits specified in the COLR, and the definition of LHGR in ITS Chapter 1.0 is sufficient to ensure all required LHGRs are calculated and compared to the limits. The CTS does not include a definition for LHGR in the ITS. A definition for LHGR has been added to the CTS as discussed in the Discussion of Changes for ITS Chapter 1.0. The definition explicitly defines the LHGR to be the heat generation rate per unit length of fuel rod and that it

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

LA1 (continued)

is the integral of the heat flux over the heat transfer area associated with the unit length. In addition, the Bases states that the LHGR is a measure of the heat generation rate of a fuel rod in a fuel assembly at any axial location. As such, these relocated details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

LA2 The details in CTS 3.5.I require that action be initiated within 15 minutes to restore operation to within prescribed limits. These details are not required in the LCO and are being relocated to the Bases of ITS 3.2.3 the LHGR Specification in the form of a discussion that "prompt action" should be taken to restore the parameter to within limits. A 15 minute action may not always be conservative to assure safety. The 2 hour Completion Time in ITS 3.2.3 Required Action A.1 for restoration of the limit is the bounding requirement and allows appropriate actions to be evaluated by the operator and completed in a timely manner. Thus, the 15 minute requirement is not critical in assuring that the appropriate actions are taken. Therefore, these details are not required to be in the ITS to provide adequate protection of the public health and safety. Changes to the Bases will be controlled by the provisions of the proposed Bases Control Program described in Chapter 5 of the Technical Specifications.

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

None

TECHNICAL CHANGES - RELOCATIONS

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

NO SIGNIFICANT HAZARDS CONSIDERATION
ITS: 3.2.3 - LINEAR HEAT GENERATION RATE (LHGR)

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

There are no plant specific less restrictive changes identified for this Specification.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

MARKUP OF NUREG-1433, REVISION 1 SPECIFICATION

3.2 POWER DISTRIBUTION LIMITS

3.2.3 LINEAR HEAT GENERATION RATE (LHGR) (Optional) CLB1

[3.5.I] LCO 3.2.3 All LHGRs shall be less than or equal to the limits specified in the COLR.

[3.5.I] APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
[3.5.I]	A. Any LHGR not within limits.	A.1 Restore LHGR(s) to within limits.	2 hours
[3.5.I]	B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
[4.5.I]	SR 3.2.3.1 Verify all LHGRs are less than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP **AND** 24 hours thereafter

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS: 3.2.3 - LINEAR HEAT GENERATION RATE (LHGR)

RETENTION OF EXISTING REQUIREMENT (CLB)

CLB1 The word "optional" in the title of this Specification has been deleted. This Specification is currently required for JAFNPP consistent with CTS 3.5.I.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

None

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

None

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE (X)

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

MARKUP OF NUREG-1433, REVISION 1, BASES

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3 LINEAR HEAT GENERATION RATE (LHGR) (Optional)

BASES

BACKGROUND

The LHGR is a measure of the heat generation rate of a fuel rod in a fuel assembly at any axial location. Limits on LHGR are specified to ensure that fuel design limits are not exceeded anywhere in the core during normal operation, including anticipated operational occurrences (AOOs). Exceeding the LHGR limit could potentially result in fuel damage and subsequent release of radioactive materials. Fuel design limits are specified to ensure that fuel system damage, fuel rod failure, or inability to cool the fuel does not occur during the anticipated operating conditions identified in Reference 1.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the fuel system design are presented in References 1 and 2. The fuel assembly is designed to ensure (in conjunction with the core nuclear and thermal hydraulic design, plant equipment, instrumentation, and protection system) that fuel damage will not result in the release of radioactive materials in excess of the guidelines of 10 CFR, Parts 20, 50, and 100. The mechanisms that could cause fuel damage during operational transients and that are considered in fuel evaluations are:

a. Rupture of the fuel rod cladding caused by strain from the relative expansion of the UO_2 pellet; and

b. Severe overheating of the fuel rod cladding caused by inadequate cooling.

A value of 1% plastic strain of the fuel cladding has been defined as the limit below which fuel damage caused by overstraining of the fuel cladding is not expected to occur (Ref. 3).

Fuel design evaluations have been performed and demonstrate that the 1% fuel cladding plastic strain design limit is not exceeded during continuous operation with LHGRs up to

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

the operating limit specified in the COLR. The analysis also includes allowances for short term transient operation above the operating limit to account for AOOs, plus an allowance for densification power spiking.

The LHGR satisfies Criterion 2 of the NRC Policy Statement.

LCO

The LHGR is a basic assumption in the fuel design analysis. The fuel has been designed to operate at rated core power with sufficient design margin to the LHGR calculated to cause a 1% fuel cladding plastic strain. The operating limit to accomplish this objective is specified in the COLR.

APPLICABILITY

The LHGR limits are derived from fuel design analysis that is limiting at high power level conditions. At core thermal power levels < 25% RTP, the reactor is operating with a substantial margin to the LHGR limits and, therefore, the Specification is only required when the reactor is operating at ≥ 25% RTP.

ACTIONS

A.1

If any LHGR exceeds its required limit, an assumption regarding an initial condition of the fuel design analysis is not met. Therefore, prompt action should be taken to restore the LHGR(s) to within its required limits such that the plant is operating within analyzed conditions. The 2 hour Completion Time is normally sufficient to restore the LHGR(s) to within its limits and is acceptable based on the low probability of a transient or Design Basis Accident occurring simultaneously with the LHGR out of specification.

B.1

If the LHGR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER is reduced to < 25% RTP within 4 hours. The allowed

(continued)

BASES

ACTIONS

B.1 (continued)

Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER TO < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

The LHGR is required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. It is compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on both engineering judgment and recognition of the slow changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at lower power levels.

REFERENCES

1. FSAR, Section [ ].
2. FSAR, Section [ ].
3. NUREG-0800, Section II.A.2(g), Revision 2, July 1981.

3. 10 CFR 50.36 (c)(2)(ii)

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS BASES: 3.2.3 - LINEAR HEAT GENERATION RATE (LHGR)

RETENTION OF EXISTING REQUIREMENT (CLB)

CLB1 The word "optional" in the title of this Specification has been deleted. This Specification is currently required for JAFNPP consistent with CTS 3.5.I.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

PA1 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific nomenclature.

PA2 Editorial changes have been made for enhanced clarity or to correct a grammatical/typographical error.

PA3 Editorial changes have been made with no change in intent.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

DB1 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific design analysis.

DB2 The brackets have been removed from the value of plastic strain and the value retained consistent with the ISTS since it reflects the bases for the current LHGR limits as documented in UFSAR, Section 3.2.

DB3 The brackets have been removed and the plant specific References included.

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN THE ABOVE (X)

X1 NUREG-1433, Revision 1, Bases references to "NRC Policy Statement" have been replaced with 10 CFR 50.36(c)(2)(ii) in accordance with 60 FR 36953 effective August 18, 1995.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.3

LINEAR HEAT GENERATION RATE (LHGR)

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

3.2 POWER DISTRIBUTION LIMITS

3.2.3 LINEAR HEAT GENERATION RATE (LHGR)

LCO 3.2.3 All LHGRs shall be less than or equal to the limits specified in the COLR.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Any LHGR not within limits.	A.1 Restore LHGR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.3.1 Verify all LHGRs are less than or equal to the limits specified in the COLR.	Once within 12 hours after ≥ 25% RTP **AND** 24 hours thereafter

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3 LINEAR HEAT GENERATION RATE (LHGR)

BASES

BACKGROUND

The LHGR is a measure of the heat generation rate of a fuel rod in a fuel assembly at any axial location. Limits on LHGR are specified to ensure that fuel design limits are not exceeded anywhere in the core during normal operation, including abnormal operational transients. Exceeding the LHGR limit could potentially result in fuel damage and subsequent release of radioactive materials. Fuel design limits are specified to ensure that fuel system damage, fuel rod failure, or inability to cool the fuel does not occur during the anticipated operating conditions identified in Reference 1.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the fuel system design are presented in Reference 2. The fuel assembly is designed to ensure (in conjunction with the core nuclear and thermal hydraulic design, plant equipment, instrumentation, and protection systems) that fuel damage will not result in the release of radioactive materials in excess of the guidelines of 10 CFR Parts 20, 50, and 100. The mechanisms that could cause fuel damage during abnormal operational transients and that are considered in fuel evaluations are:

a. Rupture of the fuel rod cladding caused by strain from the relative expansion of the UO_2 pellet; and

b. Severe overheating of the fuel rod cladding caused by inadequate cooling.

A value of 1% plastic strain of the fuel cladding has been defined as the limit below which fuel damage caused by overstraining of the fuel cladding is not expected to occur (Ref. 2).

Fuel design evaluations have been performed and demonstrate that the 1% fuel cladding plastic strain design limit is not exceeded during continuous operation with LHGRs up to

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

the operating limit specified in the COLR. The analysis also includes allowances for short term transient operation above the operating limit to account for abnormal operational transients, plus an allowance for densification power spiking.

The LHGR satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii) (Ref. 3).

LCO

The LHGR is a basic assumption in the fuel design analysis. The fuel has been designed to operate at rated core power with sufficient design margin to the LHGR calculated to cause a 1% fuel cladding plastic strain. The operating limit to accomplish this objective is specified in the COLR.

APPLICABILITY

The LHGR limits are derived from fuel design analysis that is limiting at high power level conditions. At core thermal power levels < 25% RTP, the reactor is operating with a substantial margin to the LHGR limits and, therefore, the Specification is only required when the reactor is operating at ≥ 25% RTP.

ACTIONS

A.1

If any LHGR exceeds its required limit, an assumption regarding an initial condition of the fuel design analysis is not met. Therefore, prompt action should be taken to restore the LHGR(s) to within its required limits such that the plant is operating within analyzed conditions. The 2 hour Completion Time is normally sufficient to restore the LHGR(s) to within its limits and is acceptable based on the low probability of a transient or Design Basis Accident occurring simultaneously with the LHGR out of specification.

B.1

If the LHGR cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the

(continued)

BASES

ACTIONS

B.1 (continued)

LCO does not apply. To achieve this status, THERMAL POWER is reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER TO < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

The LHGR is required to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. It is compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on the recognition of the slow changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at lower power levels.

REFERENCES

1. UFSAR, Section 14.5.
2. UFSAR, Section 3.2.
3. 10 CFR 50.36(c)(2)(ii).

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

DISCUSSION OF CHANGES (DOCs) TO THE CTS

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

MARKUP OF NUREG-1433, REVISION 1, SPECIFICATION

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1
MARKUP OF NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS (CTS)

Specification 3.2.4

A1

JAFNPP

3.2.4 APRM Gain and Setpoint

[3.1 (cont'd)]

[4.1 (cont'd)]

Once within 12 hours after ≥25% RTP and for SR 3.2.4.1 M1

B. Minimum Critical Power Ratio (MCPR) [Applicability]

During reactor power operation, the MCPR operating limit shall not be less than that shown in the Core Operating Limits Report.

1. During Reactor power operation with core flow less than 100% of rated, the MCPR operating limit shall be multiplied by the appropriate K_f as specified in the Core Operating Limits Report.

2. If anytime during reactor operation at greater than 25% of rated power it is determined that the operating limit MCPR is being exceeded, action shall then be initiated within fifteen (15) minutes to restore operation to within the prescribed limits. If the MCPR is not returned to within the prescribed limits within two (2) hours, an orderly reactor power reduction shall begin immediately. The reactor power shall be reduced to less than 25% of rated power within the next four hours, or until the MCPR is returned to within the prescribed limits.

See ITS: 3.2.2

B. Maximum Fraction of Limiting Power Density (MFLPD)

[SR 3.2.4.1] The MFLPD shall be determined daily during reactor power operation at ≥25% rated thermal power and [SR 3.2.4.2] the APRM high flux scram and Rod Block trip settings adjusted if necessary as specified in the Core Operating Limits Report. A3 R1

C. MCPR shall be determined daily during reactor power operation at ≥25% of rated thermal power and following any change in power level or distribution that would cause operation with a limiting control rod pattern as described in the bases for Specification 3.3.B.5.

D. Verification of the MCPR operating limits shall be performed as specified in the Core Operating Limits Report.

12 hours for SR 3.2.4.2 M1

RAI 3.2-1

add LCO 3.2.4 and ACTIONS L1

add SR 3.2.4.1 Note
add SR 3.2.4.2 Note A2

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

DISCUSSION OF CHANGES (DOCs) TO THE CTS

DISCUSSION OF CHANGES
ITS: 3.2.4 - AVERAGE POWER RANGE MONITOR (APRM) GAIN AND SETPOINT

ADMINISTRATIVE CHANGES

A1 In the conversion of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Current Technical Specification (CTS) to the proposed plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes. Editorial changes, reformatting, and revised numbering are adopted to make the ITS consistent with the conventions in NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 1 (i.e., Improved Standard Technical Specifications (ISTS)).

A2 Notes are added to CTS 4.1.B (ITS SR 3.2.4.1 and SR 3.2.4.2) which indicate the proper relationship with respect to when the SRs are required. These Notes provide clarification and do not change any technical requirement of the Specification. These changes are consistent with NUREG-1433, Revision 1, and are administrative.

RAI 3.2-1

A3 CTS 4.1.B requires the determination of MFLPD on a daily basis during reactor power operation at greater ≥ 25% RTP. The APRM high flux scram settings must be adjusted if necessary as specified in the Core Operating Limits Report (COLR). ITS SR 3.2.4.1 will require the verification that MFLPD is within limits (consistent with LCO 3.2.4.a). ITS SR 3.2.4.2 requires the verification that each required APRM Neutron Flux-High (Flow Biased) Allowable Value specified in the COLR is made applicable (i.e., LCO 3.3.1.1, "Reactor Protection System Instrumentation," Function 2.b of Table 3.3.1.1-1 Allowable Value is reduced by the ratio of FRTP to MFLPD) or that each required APRM gain be adjusted as specified in the COLR (i.e., such that the APRM readings are ≥ 100% times MFLPD). This change clarifies the option to adjust the APRM gains instead of lowering the APRM Neutron Flux (Flow Biased) Allowable Value since this adjustment will equally compensate for any local flux peaking when any MFLPD is greater than the FRTP. Both methods of adjustment have been found to be acceptable by the NRC as documented in the NRC Safety Evaluation to License Amendment 49 to the JAFNPP Facility Operating License, therefore this change is considered administrative. This change is consistent with NUREG-1433, Revision 1.

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 CTS 4.1.B requires that MFLPD be determined "daily during reactor power operation at ≥ 25% rated thermal power". ITS SR 3.2.4.1 establishes this Frequency as "within 12 hours after ≥ 25% RTP AND 24 hours thereafter". In addition, CTS 4.1.B for MFLPD also has requirements to adjust APRM setpoints if necessary in accordance with the COLR with the

TECHNICAL CHANGES - MORE RESTRICTIVE

M1 (continued)

same Frequency as the MFLPD determination. ITS SR 3.2.3.2 establishes a specific Frequency of every 12 hours. These changes require the first MFLPD determination within 12 hours and the current specifications require the same determination be made within 24 hours after RTP ≥ 25% RTP, and the APRM setpoint adjustment is required at a 12 hour Frequency and not the 24 hour Frequency presently permitted. This change imposes added time restraints on operations consistent with NUREG-1433, Revision 1, and therefore is more restrictive. This change has no adverse impact on safety.

TECHNICAL CHANGES - LESS RESTRICTIVE (GENERIC)

None

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

L1 CTS 4.1.B includes a daily surveillance requirement to determine MFLPD whenever reactor power is ≥ 25% RTP and to make any necessary adjustments to APRM high flux scram trip settings. When the surveillance is not met CTS 3.0.C must be entered and the plant must be in COLD SHUTDOWN within 24 hours since there is no specific LCO or action for not meeting CTS 4.1.B. ITS LCO 3.2.4 and ACTIONS A and B have been added to the current requirements in CTS 4.1.B. The requirements of ITS LCO 3.2.4 are consistent with the requirements in CTS 4.1.B (except as modified by A3, M1 and R1). ACTION A will allow 6 hours to satisfy the requirements of LCO 3.2.4. If this Required Action and associated Completion Time can not be met, ACTION B will require a reduction in power to < 25% RTP within 4 hours. Since an explicit time has been added to satisfy the LCO and since entry into CTS 3.0.C (or ITS LCO 3.0.3) is no longer required this change is considered less restrictive, but acceptable due to the low probability of a transient or Design Basis Accident during this 6 hour period. The 4 hour Completion Time to be < 25% RTP is reasonable, based on operating experience, to reduce THERMAL POWER TO < 25% RTP in an orderly manner and without challenging plant systems. The requirement to only reduce power to < 25% RTP is acceptable since it places the plant outside of the Applicability of CTS 4.1.B (ITS LCO 3.2.4). Therefore, this last portion of change may be considered administrative. These changes are consistent with NUREG-1433, Revision 1.

TECHNICAL CHANGES - RELOCATIONS

R1 The requirements in CTS 4.1.B concerning the APRM Rod Block Setpoints are being relocated to Technical Requirements Manual (TRM). The requirements of the APRM Neutron Flux—High (Flow Biased) Reactor Protection System Allowable Values will be retained in Technical Specifications. The APRM rod blocks are intended to prevent control rod withdrawal when plant conditions make such withdrawal imprudent. However, there are no safety analyses that depend upon these rod blocks to prevent, mitigate or establish initial conditions for design basis accidents or transients. The evaluation summarized in NEDO-31466 determined that the loss of the APRM rod block would be a non-significant risk contributor to core damage frequency and offsite releases. The results of this evaluation have been determined to be applicable to JAFNPP. Therefore, this function does not satisfy the NRC Policy Statement on Technical Specification Screening Criteria for inclusion in the Technical Specifications. As such, it is not required to be in the ITS to provide adequate protection of the public health and safety. At ITS implementation, the relocated requirements will be incorporated by reference into the UFSAR. As such, changes to the relocated requirements in the TRM will be controlled by provisions of 10 CFR 50.59.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC) FOR LESS RESTRICTIVE CHANGES

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

L1 CHANGE

New York Power Authority has evaluated the proposed Technical Specification change identified as "Technical Changes - Less Restrictive" and has determined that it does not involve a significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92. The bases for the determination that the proposed change does not involve a significant hazards consideration are discussed below.

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

   An explicit Required Action and associated Completion Time (6 hours) has been added to CTS 4.1.B to allow restoration of the APRM Neutron Flux-High (Flow Biased) scram Allowable Value (or APRM gain) or to exit the Applicability of the Specification instead of requiring entry into CTS 3.0.C (ITS LCO 3.0.3). Extending the Completion Times are not considered to cause an initiation to any design basis accident. Therefore, this change will not significantly increase the probability of any accident previously analyzed. The added Completion Time is considered acceptable due to the low probability of an event occurring during this 6 hour period allowed to restore compliance with the requirements. The 4 hour Completion Time to be < 25% RTP is reasonable, based on operating experience, to reduce THERMAL POWER TO < 25% RTP in an orderly manner and without challenging plant systems. The consequences of an event occurring during this extended period will be consistent with the consequences of an event occurring during the current allowance (during operation within CTS 3.0.C). Therefore, this change will not significantly increase the consequences of event previously evaluated.

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

   The possibility of a new or different kind of accident from any accident previously evaluated is not created because the proposed change does not introduce a new mode of plant operation and does not involve physical modification to the plant.

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

   An explicit Required Action and associated Completion Time (6 hours) has been added to CTS 4.1.B to allow restoration of the APRM Neutron Flux-High (Flow Biased) scram Allowable Value (or APRM gain) or to exit

TECHNICAL CHANGES - LESS RESTRICTIVE (SPECIFIC)

3. (continued)

the Applicability of the Specification instead of requiring entry into CTS 3.0.C (ITS LCO 3.0.3). Extending the Completion Times are not considered to cause an initiation to any design basis accident. Therefore, this change will not significantly increase the probability of any accident previously analyzed. The added Completion Time is considered acceptable due to the low probability of an event occurring during this 6 hour period allowed to restore compliance with the requirements. The 4 hour Completion Time to be < 25% RTP is reasonable, based on operating experience, to reduce THERMAL POWER TO < 25% RTP in an orderly manner and without challenging plant systems. The consequences of an event occurring during this extended period will be consistent with the consequences of event occurring during the current allowance (during operation within CTS 3.0.C). In addition, the explicit allowance to restore the compliance with the LCO instead of requiring an immediate entry into CTS 3.0.C may avoid a plant transient induced by an immediate plant shutdown. Therefore, this change this change does not involve a significant reduction in a margin of safety.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

MARKUP OF NUREG-1433, REVISION 1 SPECIFICATION

PA2 CLB1

3.2 POWER DISTRIBUTION LIMITS

3.2.4 Average Power Range Monitor (APRM) Gain and Setpoints (Optional)

[L1]

LCO 3.2.4

a. MFLPD shall be less than or equal to Fraction of RTP; or

b. Each required APRM setpoint specified in the COLR shall be made applicable; or

c. Each required APRM gain shall be adjusted ~~such that the APRM readings are ≥ 100% times MFLPD~~ as specified in the COLR PA1

RAI 3.2-1

[4.1.B]

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
[L1] A. Requirements of the LCO not met.	A.1 Satisfy the requirements of the LCO.	6 hours
[L1] B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

Neutron Flux - High (Flow Biased) Allowable Value PA1

RAI 3.2-1

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
[4.1.B] SR 3.2.4.1	-----NOTE----- Not required to be met if SR 3.2.4.2 is satisfied for LCO 3.2.4 Item b or c requirements. (LCO 3.2.4) ----- Verify MFLPD is within limits.	PA2 Once within 12 hours after ≥ 25% RTP **AND** 24 hours thereafter
[4.1.B] SR 3.2.4.2	-----NOTE----- Not required to be met if SR 3.2.4.1 is satisfied for LCO 3.2.4 Item a requirements. (PA2) ----- Verify APRM setpoints or gains are adjusted for the calculated MFLPD. [APRM Neutron Flux-High (Flow Biased) Allowable Value. PA1]	12 hours

RAI 3.2-1

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1

RETENTION OF EXISTING REQUIREMENT (CLB)

CLB1 The word "optional" in the title of this Specification has been deleted. This Specification is currently required for JAFNPP consistent with CTS 4.1.B.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

RAI 3.2-1

PA1 The only "APRM setpoint" requiring adjustment as specified in the COLR is the APRM Neutron Flux—High (Flow Biased). Therefore, references to "APRM setpoint" have been replaced with this JAF-specific nomenclature. Additionally, the JAFNPP COLR requires the Allowable Value to be modified (i.e., the value that reflects operability of the APRMs). The actual trip "setpoint" is not explicitly presented in ITS. As such, the appropriate terminology "allowable value" replaces "setpoint." It should be noted that with a reduction in the required Allowable Value, the actual in-plant trip setting would be required to be correspondingly reduced to maintain the appropriate margin.

PA2 Editorial changes have been made for enhanced clarity or to correct a grammatical/typographical error.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

None

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE (X)

None

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

MARKUP OF NUREG-1433, REVISION 1, BASES

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.4 Average Power Range Monitor (APRM) Gain and Setpoints (Optional)

BASES

BACKGROUND

The OPERABILITY of the APRMs and their setpoints is an initial condition of all safety analyses that assume rod insertion upon reactor scram. Applicable GDCs are GDC 10, "Reactor Design," GDC 13, "Instrumentation and Control," GDC 20, "Protection System Functions," and GDC 23, "Protection against Anticipated Operation Occurrences" (Ref. 1). This LCO is provided to require the APRM gain or APRM flow biased scram setpoints to be adjusted when operating under conditions of excessive power peaking to maintain acceptable margin to the fuel cladding integrity Safety Limit (SL) and the fuel cladding 1% plastic strain limit.

The condition of excessive power peaking is determined by the ratio of the actual power peaking to the limiting power peaking at RTP. This ratio is equal to the ratio of the core limiting MFLPD to the Fraction of RTP (FRTP), where FRTP is the measured THERMAL POWER divided by the RTP. Excessive power peaking exists when:

$$\frac{MFLPD}{FRTP} > 1,$$

indicating that MFLPD is not decreasing proportionately to the overall power reduction, or conversely, that power peaking is increasing. To maintain margins similar to those at RTP conditions, the excessive power peaking is compensated by a gain adjustment on the APRMs or adjustment of the APRM setpoints. Either of these adjustments has effectively the same result as maintaining MFLPD less than or equal to FRTP and thus maintains RTP margins for APLHGR and MCPR.

The normally selected APRM setpoints position the scram above the upper bound of the normal power/flow operating region that has been considered in the design of the fuel rods. The setpoints are flow biased with a slope that approximates the upper flow control line, such that an approximately constant margin is maintained between the flow biased trip level and the upper operating boundary for core flows in excess of about 45% of rated core flow. In the range of infrequent operations below 45% of rated core flow,

(continued)

BASES

BACKGROUND (continued)

the margin to scram is reduced because of the nonlinear core flow versus drive flow relationship. The normally selected APRM setpoints are supported by the analyses presented in References 1 and 2 that concentrate on events initiated from rated conditions. Design experience has shown that minimum deviations occur within expected margins to operating limits (APLHGR and MCPR), at rated conditions for normal power distributions. However, at other than rated conditions, control rod patterns can be established that significantly reduce the margin to thermal limits. Therefore, the flow biased APRM scram setpoints may be reduced during operation when the combination of THERMAL POWER and MFLPD indicates an excessive power peaking distribution.

The APRM neutron flux signal is also adjusted to more closely follow the fuel cladding heat flux during power transients. The APRM neutron flux signal is a measure of the core thermal power during steady state operation. During power transients, the APRM signal leads the actual core thermal power response because of the fuel thermal time constant. Therefore, on power increase transients, the APRM signal provides a conservatively high measure of core thermal power. By passing the APRM signal through an electronic filter with a time constant less than, but approximately equal to, that of the fuel thermal time constant, an APRM transient response that more closely follows actual fuel cladding heat flux is obtained, while a conservative margin is maintained. The delayed response of the filtered APRM signal allows the flow biased APRM scram levels to be positioned closer to the upper bound of the normal power and flow range, without unnecessarily causing reactor scrams during short duration neutron flux spikes. These spikes can be caused by insignificant transients such as performance of main steam line valve surveillances or momentary flow increases of only several percent.

APPLICABLE SAFETY ANALYSES

The acceptance criteria for the APRM gain or setpoint adjustments are that acceptable margins (to APLHGR and MCPR) be maintained to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit.

FSAR safety analyses (Refs. 2 and 3) concentrate on the rated power condition for which the minimum expected margin to the operating limits (APLHGR and MCPR) occurs.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," and LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," [and LCO 3.2.3, "Linear Heat Generation Rate (LHGR)," DB4] limit the initial margins to these operating limits at rated conditions so that specified acceptable fuel design limits are met during transients initiated from rated conditions. At initial power levels less than rated levels, the margin degradation of either the APLHGR or the MCPR [, or the LHGR DB4] during a transient can be greater than at the rated condition event. This greater margin degradation during the transient is primarily offset by the larger initial margin to limits at the lower than rated power levels. However, power distributions can be hypothesized that would result in reduced margins to the pre-transient operating limit. When combined with the increased severity of certain transients at other than rated conditions, the SLs could be approached. At substantially reduced power levels, highly peaked power distributions could be obtained that could reduce thermal margins to the minimum levels required for transient events. To prevent or mitigate such situations, either the APRM gain is adjusted upward by the ratio of the core limiting MFLPD to the FRTP, or the flow biased APRM scram level [Neutron Flux-High (Flow Biased) Function Allowable Value PA2] is required to be reduced by the ratio of FRTP to the core limiting MFLPD. Either of these adjustments effectively counters the increased severity of some events at other than rated conditions by proportionally increasing the APRM gain or proportionally lowering the flow biased APRM scram setpoints, dependent on the increased peaking that may be encountered. [Insert ASA DB2]

The APRM gain and setpoints satisfy Criteria 2 and 3 of the NRC Policy Statement. [10 CFR 50.36(c)(2)(ii) (Ref. 7) X1]

LCO

Meeting any one of the following conditions ensures acceptable operating margins for events described above:

a. Limiting excess power peaking;

b. Reducing the APRM flow biased neutron flux upscale scram setpoints by multiplying the APRM setpoints by the ratio of FRTP and the core limiting value of MFLPD; or [PA2]

(continued)

Insert ASA

DB2

The reactor thermal hydraulic stability analyses (Ref. 6) indicates that the APRM Neutron Flux—High (Flow Biased) Function will suppress power oscillations prior to exceeding the fuel safety limit (MCPR). This protection is provided at a high statistical confidence level for core wide mode oscillations and at a nominal statistical confidence level for regional mode oscillations. This protection is adequate since core wide oscillation is the dominant mode because the plant is designed with relatively tight fuel inlet orificing (Ref. 4).

BASES

LCO (continued)

c. Increasing APRM gains to cause the APRM to read greater than 100 times MFLPD (in %). This condition is to account for the reduction in margin to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit.

MFLPD is the ratio of the limiting LHGR to the LHGR limit for the specific bundle type. As power is reduced, if the design power distribution is maintained, MFLPD is reduced in proportion to the reduction in power. However, if power peaking increases above the design value, the MFLPD is not reduced in proportion to the reduction in power. Under these conditions, the APRM gain is adjusted upward or the APRM flow biased scram setpoints are reduced accordingly. When the reactor is operating with peaking less than the design value, it is not necessary to modify the APRM flow biased scram setpoints. Adjusting APRM gain or setpoints is equivalent to MFLPD less than or equal to FRTP, as stated in the LCO.

For compliance with LCO Item b (APRM setpoint adjustment) or Item c (APRM gain adjustment), only APRMs required to be OPERABLE per LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," are required to be adjusted. In addition, each APRM may be allowed to have its gain or setpoints adjusted independently of other APRMs that are having their gain or setpoints adjusted.

APPLICABILITY

The MFLPD limit, APRM gain adjustment, and APRM flow biased scram and associated setdowns are provided to ensure that the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit are not violated during design basis transients. As discussed in the Bases for LCO 3.2.1 and LCO 3.2.2, sufficient margin to these limits exists below 25% RTP and, therefore, these requirements are only necessary when the reactor is operating at ≥ 25% RTP.

ACTIONS

A.1

If the APRM gain or setpoints are not within limits while the MFLPD has exceeded FRTP, the margin to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit

(continued)

BASES

ACTIONS

A.1 (continued)

may be reduced. Therefore, prompt action should be taken to restore the MFLPD to within its required limit or make acceptable APRM adjustments such that the plant is operating within the assumed margin of the safety analyses.

The 6 hour Completion Time is normally sufficient to restore either the MFLPD to within limits or the APRM gain or setpoints to within limits and is acceptable based on the low probability of a transient or Design Basis Accident occurring simultaneously with the LCO not met.

B.1

If MFLPD cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER is reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 and SR 3.2.4.2

The MFLPD is required to be calculated and compared to FRTP or APRM gain or setpoints to ensure that the reactor is operating within the assumptions of the safety analysis. These SRs are only required to determine the MFLPD and, assuming MFLPD is greater than FRTP, the appropriate gain or setpoint, and is not intended to be a CHANNEL FUNCTIONAL TEST for the APRM gain or flow biased neutron flux scram circuitry. The 24 hour Frequency of SR 3.2.4.1 is chosen to coincide with the determination of other thermal limits, specifically those for the APLHGR (LCO 3.2.1). The 24 hour Frequency is based on both engineering judgment and recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

SR 3.2.4.1 and SR 3.2.4.2 have been modified by Notes which clarify that the respective SR does not have to be met if the alternate requirement demonstrated by the other SR is satisfied.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 and SR 3.2.4.2 (continued)

The 12 hour Frequency of SR 3.2.4.2 requires a more frequent verification than if MFLPD is less than or equal to fraction of rated power (FRP). When MFLPD is greater than FRP, more rapid changes in power distribution are typically expected.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10, GDC 13, GDC 20, and GDC 23. UFSAR, Section 16.6
2. UFSAR, Section [ ] 14.5
3. FSAR, Section [ ].

Insert Ref

Insert Ref

REFERENCES

3. NEDE-24011-PA-13, General Electric Standard Application for Reactor Fuel, August 1996.

4. NEDO-31960-A, BWR Owners' Group Long Term Stability Solutions Licensing Methodology, June 1991.

5. NEDO-31960-A, Supplement 1, BWR Owners' Group Long-Term Stability Solutions Licensing Methodology, March 1992.

6. GENE-637-004-0295, Application Of The "Regional Exclusion With Flow-Biased APRM Neutron Flux Scram" Stability Solution (Option I-D) To The James A. FitzPatrick Nuclear Power Plant, February 1995.

7. 10 CFR 50.36(c)(2)(ii).

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

JUSTIFICATION FOR DIFFERENCES (JFDs) FROM NUREG-1433, REVISION 1, BASES

JUSTIFICATION FOR DIFFERENCES FROM NUREG-1433, REVISION 1
ITS BASES: 3.2.4 - AVERAGE POWER RANGE MONITOR (APRM) GAIN AND SETPOINT

RETENTION OF EXISTING REQUIREMENT (CLB)

CLB1 The word "optional" in the title of this Specification has been deleted. This Specification is currently required for JAFNPP consistent with CTS 4.1.B.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT (PA)

PA1 Changes have been made for enhanced clarity or to correct a grammatical/typographical error.

PA2 The only "APRM setpoint" requiring adjustment as specified in the COLR is the APRM Neutron Flux—High (Flow Biased). Therefore, references to "APRM setpoint" have been replaced with this JAF-specific nomenclature. Additionally, the JAFNPP COLR requires the Allowable Value to be modified (i.e., the value that reflects operability of the APRMs). The actual trip "setpoint" is not explicitly presented in ITS. As such, the appropriate terminology "allowable value" replaces "setpoint." It should be noted that with a reduction in the required Allowable Value, the actual in-plant trip setting would be required to be correspondingly reduced to maintain the appropriate margin.

PA3 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific nomenclature.

PA4 Change made to be consistent with change made to the Specification.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

DB1 ITS 3.2.4 has been revised to reflect the specific JAFNPP reference requirements. JAFNPP was designed and under construction prior to the promulgation of Appendix A to 10 CFR 50 - General Design Criteria for Nuclear Power Plants. The JAFNPP Construction Permit was issued on May 20, 1970. The proposed General Design Criteria (GDC) were published in the Federal Register on July 11, 1967 (32 FR 10213) and became effective on February 20, 1971 (36 FR 3256). UFSAR Section 16.6, Conformance to AEC Design Criteria, describes the JAFNPP current licensing basis with regard to the GDC. ISTS statements concerning the GDC are modified in the ITS to reference UFSAR Section 16.6.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN (DB)

DB2 ITS 3.2.4 Bases has been revised to reflect the specific design of JAFNPP. Since the APRM signals are no longer filtered to simulate thermal flux as a result of the implementation of the Stability Modification Solution (Option I-D) at JAFNPP, portions of the Bases have been deleted. A summary of the stability analysis has been included where appropriate. References have been included, as required.

DB3 Changes have been made (additions, deletions, and/or changes to the NUREG) to reflect the plant specific references.

DB4 Reference to LHGR has been included since APRM gain or flow biased adjustment helps to ensure similar margins to this limit as well.

DIFFERENCE BASED ON AN APPROVED TRAVELER (TA)

None

DIFFERENCE BASED ON A SUBMITTED, BUT PENDING TRAVELER (TP)

None

DIFFERENCE FOR ANY REASON OTHER THAN THE ABOVE (X)

X1 NUREG-1433, Revision 1, Bases references to "NRC Policy Statement" have been replaced with 10 CFR 50.36(c)(2)(ii) in accordance with 60 FR 36953 effective August 18, 1995.

JAFNPP

IMPROVED STANDARD TECHNICAL SPECIFICATIONS (ISTS) CONVERSION

ITS: 3.2.4

Average Power Range Monitor (APRM) Gain and Setpoint

RETYPED PROPOSED IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

3.2 POWER DISTRIBUTION LIMITS

3.2.4 Average Power Range Monitor (APRM) Gain and Setpoint

LCO 3.2.4

a. MFLPD shall be less than or equal to Fraction of RTP (FRTP); or

b. Each required APRM Neutron Flux−High (Flow Biased) Allowable Value specified in the COLR shall be made applicable; or

c. Each required APRM gain shall be adjusted as specified in the COLR.

RAI 3.2-01

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Requirements of the LCO not met.	A.1	Satisfy the requirements of the LCO.	6 hours
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.4.1	------------------NOTE------------------ Not required to be met if SR 3.2.4.2 is satisfied for LCO 3.2.4.b or LCO 3.2.4.c requirements. --------------------------------------- Verify MFLPD is within limits.	Once within 12 hours after ≥ 25% RTP **AND** 24 hours thereafter
SR 3.2.4.2	------------------NOTE------------------ Not required to be met if SR 3.2.4.1 is satisfied for LCO 3.2.4.a requirements. --------------------------------------- Verify required APRM Neutron Flux—High (Flow Biased) Allowable Value or ARPM gains are adjusted for the calculated MFLPD.	12 hours

RA1 3.2-1

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.4 Average Power Range Monitor (APRM) Gain and Setpoint

BASES

BACKGROUND

The OPERABILITY of the APRMs and their setpoints is an initial condition of all safety analyses that assume rod insertion upon reactor scram. Applicable design criteria is discussed in UFSAR, Section 16.6 (Ref. 1). This LCO is provided to require the APRM gain or APRM Neutron Flux-High (Flow Biased) Function Allowable Value (LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation", Function 2.b) to be adjusted when operating under conditions of excessive power peaking to maintain acceptable margin to the fuel cladding integrity Safety Limit (SL) and the fuel cladding 1% plastic strain limit.

The condition of excessive power peaking is determined by the ratio of the actual power peaking to the limiting power peaking at RTP. This ratio is equal to the ratio of the core limiting MFLPD to the Fraction of RTP (FRTP), where FRTP is the measured THERMAL POWER divided by the RTP. Excessive power peaking exists when:

$$\frac{\text{MFLPD}}{\text{FRTP}} > 1,$$

indicating that MFLPD is not decreasing proportionately to the overall power reduction, or conversely, that power peaking is increasing. To maintain margins similar to those at RTP conditions, the excessive power peaking is compensated by a gain adjustment on the APRMs or adjustment of the APRM Neutron Flux–High (Flow Biased) Function Allowable Value. Either of these adjustments has effectively the same result as maintaining MFLPD less than or equal to FRTP and thus maintains RTP margins for APLHGR, MCPR, and LHGR.

The normally selected APRM Neutron Flux–High (Flow-Biased) Function Allowable Value positions the scram above the upper bound of the normal power/flow operating region that has been considered in the design of the fuel rods. The Allowable Value is flow biased with a slope that approximates the upper flow control line, such that an approximately constant margin is maintained between the flow biased trip level and the upper operating boundary for core

(continued)

BASES

BACKGROUND (continued)

flows in excess of about 45% of rated core flow. In the range of infrequent operations below 45% of rated core flow, the margin to scram is reduced because of the nonlinear core flow versus drive flow relationship. The normally selected APRM Allowable Value is supported by the analyses presented in References 2 and 3 that concentrate on events initiated from rated conditions. Design experience has shown that minimum deviations occur within expected margins to operating limits (APLHGR, MCPR, and LHGR), at rated conditions for normal power distributions. However, at other than rated conditions, control rod patterns can be established that significantly reduce the margin to thermal limits. Therefore, the APRM Neutron Flux—High (Flow Biased) Function Allowable Value may be reduced during operation when the combination of THERMAL POWER and MFLPD indicates an excessive power peaking distribution. In addition, the APRM Neutron Flux—High (Flow Biased) Function provides protection from reactor thermal hydraulic instability consistent with Boiling Water Reactors Owners' Group Long-Term Solution, Option I-D (Refs. 4, 5 and 6).

APPLICABLE SAFETY ANALYSES

The acceptance criteria for the APRM gain or setpoint adjustments are that acceptable margins (to APLHGR, MCPR, and LHGR) be maintained to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit.

The safety analyses (Refs. 2 and 3) concentrate on the rated power condition for which the minimum expected margin to the operating limits (APLHGR, MCPR, and LHGR) occurs. LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," and LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)", and LCO 3.2.3, "Linear Heat Generation Rate (LHGR)", limit the initial margins to these operating limits at rated conditions so that specified acceptable fuel design limits are met during transients initiated from rated conditions. At initial power levels less than rated levels, the margin degradation of either the APLHGR, the MCPR, or the LHGR during a transient can be greater than at the rated condition event. This greater margin degradation during the transient is primarily offset by the larger initial margin to limits at the lower than rated power levels. However, power distributions can be hypothesized that would result in reduced margins to the pre-transient operating limit. When combined with the increased severity of certain transients

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

at other than rated conditions, the SLs could be approached. At substantially reduced power levels, highly peaked power distributions could be obtained that could reduce thermal margins to the minimum levels required for transient events. To prevent or mitigate such situations, either the APRM gain is adjusted upward by the ratio of the core limiting MFLPD to the FRTP, or the APRM Neutron Flux-High (Flow Biased) Function Allowable Value is required to be reduced by the ratio of FRTP to the core limiting MFLPD. Either of these adjustments effectively counters the increased severity of some events at other than rated conditions by proportionally increasing the APRM gain or proportionally lowering the APRM Neutron Flux-High (Flow Biased) Function Allowable Value, dependent on the increased peaking that may be encountered.

The reactor thermal hydraulic stability analyses (Ref. 6) indicates that the APRM Neutron Flux-High (Flow Biased) Function will suppress power oscillations prior to exceeding the fuel safety limit (MCPR). This protection is provided at a high statistical confidence level for core wide mode oscillations and at a nominal statistical confidence level for regional mode oscillations. This protection is adequate since core wide oscillation is the dominant mode because the plant is designed with relatively tight fuel inlet orificing (Ref. 4).

The APRM gain and setpoints satisfy Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii) (Ref. 7).

LCO

Meeting any one of the following conditions ensures acceptable operating margins for events described above:

a. Limiting excess power peaking;

b. Reducing the APRM Neutron Flux-High (Flow Biased) Function Allowable Value by multiplying the APRM Neutron Flux-High (Flow Biased) Function Allowable Value by the ratio of FRTP and the core limiting value of MFLPD; or

(continued)

BASES

LCO (continued)

c. Increasing APRM gains to cause the APRM to read greater than 100% times MFLPD. This condition is to account for the reduction in margin to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit.

MFLPD is the ratio of the limiting LHGR to the LHGR limit for the specific bundle type. As power is reduced, if the design power distribution is maintained, MFLPD is reduced in proportion to the reduction in power. However, if power peaking increases above the design value, the MFLPD is not reduced in proportion to the reduction in power. Under these conditions, the APRM gain is adjusted upward or the APRM Neutron Flux-High (Flow Biased) Function Allowable Value is reduced accordingly. When the reactor is operating with peaking less than the design value, it is not necessary to modify the APRM Neutron Flux-High (Flow Biased) Function Allowable Value. Adjusting APRM gain or modifying the Neutron Flux-High (Flow Biased) Function Allowable Value is equivalent to maintaining MFLPD less than or equal to FRTP, as stated in the LCO.

For compliance with LCO Item b (APRM Neutron Flux-High (Flow Biased) Function Allowable Value modification) or Item c (APRM gain adjustment), only APRMs required to be OPERABLE per LCO 3.3.1.1, Function 2.b are required to be modified or adjusted. In addition, each APRM may be allowed to have its gain or Allowable Value adjusted or modified independently of other APRMs that are having their gain or Allowable Value adjusted.

APPLICABILITY

The MFLPD limit, APRM gain adjustment, and APRM Neutron Flux-High (Flow Biased) Function Allowable Value modification is provided to ensure that the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit are not violated during design basis transients. As discussed in the Bases for LCO 3.2.1 and LCO 3.2.2, sufficient margin to these limits exists below 25% RTP and, therefore, these requirements are only necessary when the reactor is operating at ≥ 25% RTP.

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BASES (continued)

ACTIONS

A.1

If the APRM gain or Neutron Flux–High (Flow Biased) Function Allowable Value is not within limits while the MFLPD has exceeded FRTP, the margin to the fuel cladding integrity SL and the fuel cladding 1% plastic strain limit may be reduced. Therefore, prompt action should be taken to restore the MFLPD to within its required limit or make acceptable APRM adjustments such that the plant is operating within the assumed margin of the safety analyses.

The 6 hour Completion Time is normally sufficient to restore either the MFLPD to within limits or the APRM gain or Neutron Flux–High (Flow Biased) Function Allowable Value to within limits and is acceptable based on the low probability of a transient or Design Basis Accident occurring simultaneously with the LCO not met.

B.1

If MFLPD, APRM gain, or Neutron Flux–High (Flow Biased) Function Allowable Value cannot be restored to within its required limits within the associated Completion Time, the plant must be brought to a MODE or other specified condition in which the LCO does not apply. To achieve this status, THERMAL POWER is reduced to < 25% RTP within 4 hours. The allowed Completion Time is reasonable, based on operating experience, to reduce THERMAL POWER to < 25% RTP in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 and SR 3.2.4.2

The MFLPD is required to be calculated and compared to FRTP or APRM gain or Neutron Flux–High (Flow Biased) Function Allowable Value to ensure that the reactor is operating within the assumptions of the safety analysis. These SRs are only required to determine the MFLPD and, assuming MFLPD is greater than FRTP, the appropriate gain or Neutron Flux–High (Flow Biased) Function Allowable Value, and is not intended to be a CHANNEL FUNCTIONAL TEST for the APRM gain or Neutron Flux–High (Flow Biased) Function

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1 and SR 3.2.4.2 (continued)

circuitry. SR 3.2.4.1 and SR 3.2.4.2 have been modified by Notes which clarify that the respective SR does not have to be met if the alternate requirement demonstrated by the other SR is satisfied. The 24 hour Frequency of SR 3.2.4.1 is chosen to coincide with the determination of other thermal limits, specifically those for the APLHGR (LCO 3.2.1) and LHGR (LCO 3.2.3). The 24 hour Frequency is based on the recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER ≥ 25% RTP is achieved is acceptable given the large inherent margin to operating limits at low power levels.

The 12 hour Frequency of SR 3.2.4.2 requires a more frequent verification than if MFLPD is less than or equal to FRTP. When MFLPD is greater than FRTP, more rapid changes in power distribution are typically expected.

REFERENCES

1. UFSAR, Section 16.6.
2. UFSAR, Section 14.5.
3. NEDE-24011-PA-13, General Electric Standard Application for Reactor Fuel, August 1996.
4. NEDO-31960-A, BWR Owners' Group Long Term Stability Solutions Licensing Methodology, June 1991.
5. NEDO-31960-A, Supplement 1, BWR Owners' Group Long-Term Stability Solutions Licensing Methodology, March 1992.
6. GENE-637-044-0295, Application Of The "Regional Exclusion With Flow-Biased APRM Neutron Flux Scram" Stability Solution (Option I-D) To The James A. FitzPatrick Nuclear Power Plant, February 1995.
7. 10 CFR 50.36(c)(2)(ii).