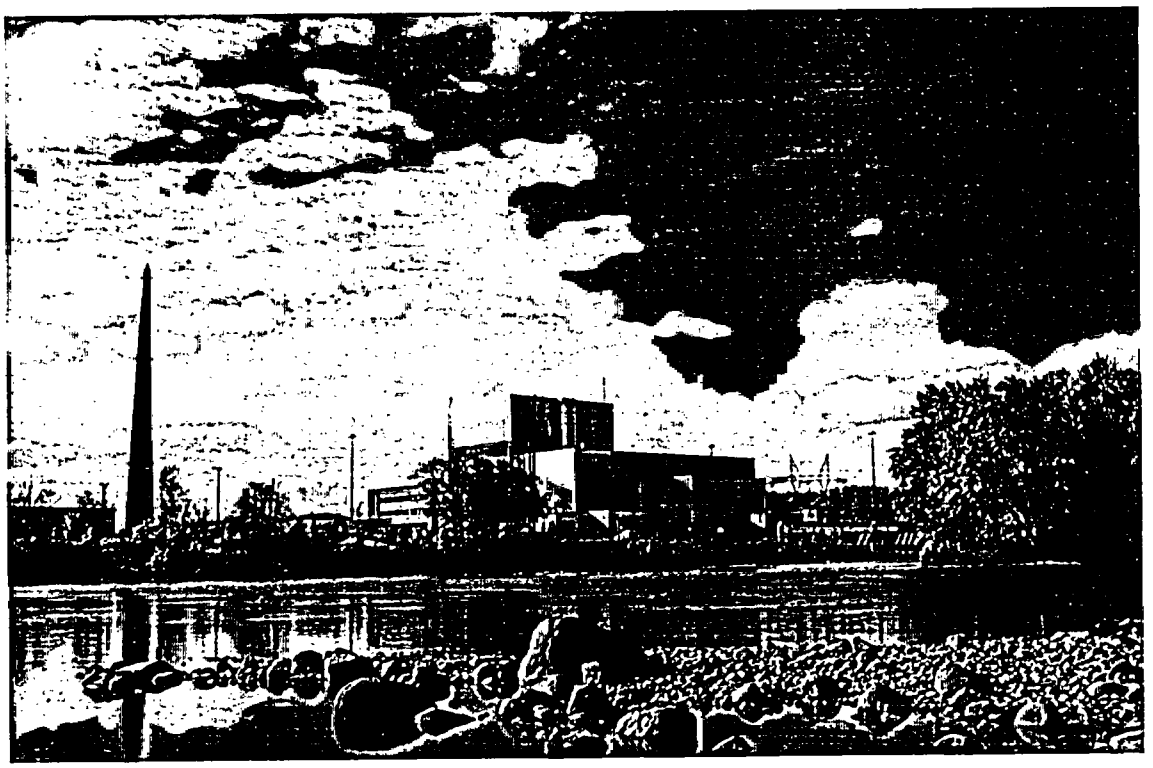
IMPROVED TECHNICAL SPECIFICATIONS



MONTICELLO NUCLEAR GENERATING PLANT

VOLUME 7

ITS Section 3.2,
Power Distribution Limits

NMC
Committed to Nuclear Excellence

ATTACHMENT 1

VOLUME 7

MONTICELLO IMPROVED TECHNICAL SPECIFICATIONS CONVERSION

ITS SECTION 3.2 POWER DISTRIBUTION LIMITS

Revision 0

LIST OF ATTACHMENTS

1. ITS 3.2.1
2. ITS 3.2.2
3. ITS 3.2.3
4. Improved Standard Technical Specifications (ISTS) not adopted in the Monticello ITS

ATTACHMENT 1

ITS 3.2.1, AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

A.1

ITS

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
3.11 REACTOR FUEL ASSEMBLIES	**4.11 REACTOR FUEL ASSEMBLIES**
Applicability: The Limiting Conditions for Operation associated with the fuel rods apply to those parameters which monitor the fuel rod operating conditions.	Applicability: The Surveillance Requirements apply to the parameters which monitor the fuel rod operating conditions.
Objective: The objective of the Limiting Conditions for Operation is to assure the performance of the fuel rods.	Objective: The objective of the Surveillance Requirements is to specify the type and frequency of surveillance to be applied to the fuel rods.
Specifications:	Specifications:
A. Average Planar Linear Heat Generation Rate (APLHGR)	A. Average Planar Linear Heat Generation Rate (APLHGR)
LCO 3.2.1 During two recirculation loop power operation, the APLHGR for each type of fuel as a function of average planar exposure shall not exceed the applicable limiting values specified in the Core Operating Limits Report.	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.
When hand calculations are required, the APLHGR for each type of fuel as a function of average planar exposure shall not exceed the limiting value for the most limiting lattice (excluding natural uranium) provided in the Core Operating Limits Report.	
During one recirculation loop power operation, the APLHGR limiting condition for operation for each type of fuel shall not exceed the most limiting of:	
a. The above values multiplied by 0.80 for GE11 and GE12 fuel and 0.90 for GE14 fuel, or	
b. The above values multiplied by the appropriate flow and power dependent correction factors provided in the Core Operating Limits Report.	

LA.1 A.2 LA.2 A.2 LA.1 LA.1 Add proposed SR 3.2.1.1 first Frequency L.1

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A.1

ITS

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
ACTION A ACTION B If at any time during power operation, it is determined that the APLHGR limiting condition for operation is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. If the APLHGR is not returned to within the prescribed limits within two hours, reduce thermal power to less than 25% within the next four hours.	LA.3 A.3
B. Linear Heat Generation Rate (LHGR) During power operation, the LHGR shall be less than or equal to the limits specified in the Core Operating Limits Report. If at any time during operation it is determined that the limiting value for LHGR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. If the LHGR is not returned to within the prescribed limits within 2 hours, reduce thermal power to less than 25% within the next 4 hours.	B. Linear Heat Generation Rate (LHGR) The LHGR shall be checked daily during reactor operation at ≥25% of rated thermal power. See ITS 3.2.3

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

ADMINISTRATIVE CHANGES

A.1 In the conversion of the Monticello Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1433, Rev. 3, "Standard Technical Specifications General Electric Plants, BWR/4" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.11.A states that the APLHGR should not exceed limits during "power operation," which is defined in CTS 1.0.O as "above 1% rated thermal power." However, CTS 3.11.A only states to reduce thermal power to "less than 25%" if the APLHGR LCO is being exceeded and the APLHGRs are not returned to within limits within the specified time. ITS LCO 3.2.1 is applicable at THERMAL POWER ≥ 25% RTP. ITS 3.2.1 ACTION B requires a THERMAL POWER reduction to < 25% RTP if the APLHGR(s) are not restored to within limits within the specified time limit of ACTION A. This changes the CTS by changing the Applicability from > 1% rated thermal power to ≥ 25% RTP.

The purpose of the CTS 3.11.A is to ensure the APLHGRs are within limits when required. This changes the CTS by changing the Applicability from "power operation" to "≥ 25% RTP." This change is acceptable because at THERMAL POWER levels < 25% RTP the reactor is operating with substantial margin to the APLHGR limits. For this reason there is no need to monitor APLHGRs when THERMAL POWER is < 25% RTP. This is also consistent with the Surveillance Frequency in CTS 4.11.A, which states to monitor APLHGR at ≥ 25% rated thermal power. This change simply aligns the Applicability with the CTS default action and Surveillance Frequency, and is therefore considered administrative. Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

A.3 CTS 3.11.A states "Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits." ITS 3.2.1 does not include this statement. This changes the CTS by deleting this statement.

The purpose of this CTS 3.11.A statement is to identify the importance of monitoring the APLGHRs to verify they are restored to prescribed limits. After they are within limits, it is obvious that the action can be exited. This change is acceptable because ITS LCO 3.0.1 and LCO 3.0.2 have been added to the TS as indicated in the Discussion of Changes for ITS Section 3.0. ITS LCO 3.0.1 states "LCOs shall be met during the MODES or other specified conditions in the Applicability," and LCO 3.0.2 states "Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met" and "If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required." The CTS 3.11.A guidance is provided in the ITS generic guidelines of LCO 3.0.1 and LCO 3.0.2. In addition, the only way to confirm the APLHGRs have been restored to within limits is to perform a Surveillance; thus, it is not necessary to

be specifically stated. Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.11.A specifies the limits for APLHGRs for "two loop" and "one loop" operation. For two loop operation, the APLGHR limits are specified "for each type of fuel as a function of average planar exposure." For one loop operation, the APLGHR limits are specified "for each type of fuel" and shall not exceed "the most limiting of a. The above values multiplied by 0.80 for GE11 and GE12 fuel and 0.90 for GE14 fuel, or b. The above values multiplied by the appropriate flow and power dependent correction factors provided in the Core Operating Limits Report." In addition CTS 4.11.A states the APLHGR "for each type of fuel as a function of average planar exposure" shall be determined. ITS 3.2.1 states "All APLHGRs shall be less than or equal to the limits specified in the COLR." ITS SR 3.2.1.1 requires verification of all APLGHRs are less than or equal to the limits specified in the COLR. This changes the CTS by relocating the details that the APLHGRs limits are specified for "one" and "two" loop operation, that the two loop APLHGR limits are specified "for each type of fuel as a function of average planar exposure," and that the single loop APLHGRs limits "for each type of fuel" shall not exceed "the most limiting of a. The above values multiplied by 0.80 for GE11 and GE12 fuel and 0.90 for GE14 fuel, or b. The above values multiplied by the appropriate flow and power dependent correction factors provided in the Core Operating Limits Report" to the Bases.

The removal of these details for evaluating APLGHR Surveillance Requirements from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS LCO 3.2.1 still retains the requirement that "All APLHGRs shall be less than or equal to the limits specified in the COLR" and ITS SR 3.2.1.1 requires verification that "all APLHGRs are less than or equal to the limits specified in the COLR." Also, this change is acceptable because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail

change because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA.2 *(Type 5 – Removal of Cycle-Specific Parameter Limits from the Technical Specifications to the Core Operating Limits Report)* CTS 3.11.A states "When hand calculations are required, the APLHGR for each type of fuel as a function of average planar exposure shall not exceed the limiting value for the most limiting lattice (excluding natural uranium) provided in the Core Operating Limits Report." ITS LCO 3.2.1 states "All APLHGRs shall be less than or equal to the limits specified in the COLR." This changes the CTS by relocating the hand calculation APLHGR limits to the COLR.

The removal of these cycle-specific parameter limits from the Technical Specifications and their relocation into the COLR is acceptable because these limits are developed or utilized under NRC-approved methodologies. The NRC documented in Generic Letter 88-16, Removal of Cycle-Specific Parameter Limits From the Technical Specifications, that this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains requirements and Surveillances that verify that the cycle-specific parameter limits are being met. ITS 3.2.1 LCO requires, "All APLHGRs shall be less than or equal to the limits specified in the COLR," and ITS SR 3.2.1.1 requires verification that "all APLHGRs are less than or equal to the limits specified in the COLR." Also, this change is acceptable because the removed information will be adequately controlled in the COLR under the requirements provided in ITS 5.6.3, "Core Operating Limits Report." ITS 5.6.3 ensures the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits) of the safety analysis are met. This change is designated as a less restrictive removal of detail change because information relating to cycle-specific parameter limits is being removed from the Technical Specifications.

LA.3 *(Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.11.A states that if at any time during power operation it is determined that the APLHGR limiting condition for operation is being exceeded, "action shall be initiated within 15 minutes to restore operation to within the prescribed limits." ITS 3.2.1 does not include this 15 minute action. This changes the CTS by relocating the procedural detail that "action shall be initiated within 15 minutes to restore operation to within the prescribed limits" to the Bases in the form of a discussion that "prompt action should be taken to restore the APLHGR(s) to within the required limits."

The removal of this detail for performing actions from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to restore the APLHGRs to within limits in 2 hours, consistent with the CTS actions. Also, this change is acceptable because this type of procedural detail will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly

controlled. This change is designated as a less restrictive removal of detail change because a procedural detail for meeting Technical Specification requirements is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 7 – Relaxation Of Surveillance Frequency, Non-24 Month Type Change)* CTS 4.11.A requires the APLHGR to be determined daily during reactor operation at ≥ 25% rated thermal power. ITS SR 3.2.1.1 requires the same verification "once within 12 hours after ≥ 25% RTP and 24 hours thereafter." This changes the CTS by allowing the reactor to reach and exceed a THERMAL POWER level of 25% RTP without completing the Surveillance.

The purpose of CTS 4.11.A is to ensure all APLHGRs are within limits before THERMAL POWER is ≥ 25% RTP. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of fuel reliability. This change allows the plant to increase THERMAL POWER ≥ 25% RTP without completing the Surveillance. However, after 25% RTP is achieved the verification must be performed within 12 hours and every 24 hours thereafter. 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. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

CTS

3.2 POWER DISTRIBUTION LIMITS

3.2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

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

3.11.A APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

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

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY
4.11.A	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

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

None

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Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

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 node 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. 4

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~~ 7, 8, 9, and 10. 1

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.~~ 1 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~~ 7, 8, 9, and 10). 1 Flow dependent APLHGR limits are determined using the three dimensional 11 BWR simulator code (Ref. ~~8~~) to analyze slow flow runout transients. 1 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.

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 which turbine stop valve closure and turbine control valve fast closure scram trips are bypassed, both high and low core flow $MAPFAC_p$ 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~~ 12. 1

All changes are "1" unless otherwise noted

BASES

APPLICABLE SAFETY ANALYSES (continued)

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. 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.

13

14

INSERT 1

For single recirculation loop operation, the MAPFAC multiplier is limited to a maximum of 0.75 (Ref. 5). 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).

for each type of fuel as a function of average planar exposure

LCO

The APLHGR limits specified in the COLR are the result of the fuel design, DBA, and transient analyses. 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. 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 the smaller of either $MAPFAC_p$, $MAPFAC_f$, and 0.75, where 0.75 has been determined by a specific single recirculation loop analysis (Ref. 5).

0.80 and 0.90

ve

INSERT 2

3

or

APPLICABILITY

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. 7) 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.

10

NEDC-30492-P

1

INSERT 1

0.80 for GE11 and GE12 fuel and 0.90 for GE14 fuel

1

INSERT 2

0.80 for GE11 and GE12 fuel and 0.90 for GE14 fuel

BASES

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 ~~in~~ 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. (3)

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. NED~~O~~-24011-P-A "General Electric Standard Application for Reactor Fuel" ~~(latest approved version)~~. (revision specified in Specification 5.6.3) (3) (4)
2. ~~F~~SAR, Chapter ~~[4]~~. (3) (2)
3. ~~F~~SAR, ~~Chapter [6]~~. Section 6.2.6 Section 14.7.2 (2)
4. ~~F~~SAR, ~~Chapter [15]~~. 5. USAR, Section 14.3. 6. USAR, Chapter 14A. (1)
5. ~~[Plant specific single loop operation]~~. INSERT 3 (2)
6. ~~[Plant specific load line limit analysis]~~. INSERT 4

2

INSERT 3

7. NEDE-23785-P (A) Revision 1, "The GESTR-LOCA and SAFER Models for Evaluation of the Loss-of-Coolant Accident (Volume III), SAFER/GESTR Application Methodology," October 1984.

2

INSERT 4

8. NEDC-30515, "GE BWR Extended Load Line Limit Analysis for Monticello Nuclear Generating Plant, Cycle 11," March 1984.

9. NEDC-31849P, including Supplement 1, "Maximum Extended Load Line Limit Analysis for Monticello Nuclear Generating Plant Cycle 15," June 1992.

BASES

REFERENCES (continued)

INSERT 5

7. [Plant Specific Average Power Range Monitor, Rod Block Monitor and Technical Specification Improvements (ARTS) Program]. (2)

(1) 11 ~~8~~. NEDO-30130-A, "Steady State Nuclear Methods," May 1985.

(1) 12 ~~9~~. NEDO-24154, "Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors," October 1978.

INSERT 6

10. [Plant specific loss of coolant accident analysis]. (2)

2 **INSERT 5**

10. NEDC-30492-P, "Average Power Range Monitor, Rod Block Monitor and Technical Specification Improvement (ARTS) Program for Monticello Nuclear Generating Plant," April 1984.

2 **INSERT 6**

13. GE-NE-187-02-0392, "Monticello Nuclear Generating Plant SAFER/GESTR-LOCA Analysis Basis Documentation," July 1993.

14. Supplemental Reload Licensing Report for Monticello Nuclear Generation Plant (version specified in the COLR).

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1 BASES, AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

1. Changes are made (additions, deletions, and/or changes) to the ISTS Bases, which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. The brackets are removed and the proper plant specific information/value is provided.

3. Typographical/grammatical error corrected.

4. Editorial change made for clarity.

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Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.1, AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

There are no specific NSHC discussions for this Specification.

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ATTACHMENT 2

ITS 3.2.2, MINIMUM CRITICAL POWER RATIO (MCPR)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

ITS

ITS

A.1

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
C. Minimum Critical Power Ratio (MCPR)	C. Minimum Critical Power Ratio (MCPR) Add proposed ITS SR 3.2.2.1 first Frequency (L.1)
LCO 3.2.2 All MCPRs shall be greater than or equal to the MCPR Operating limits provided in the Core Operating Limits Report.	SR 3.2.2.1 MCPR shall be determined daily during reactor power operation at ≥25% rated thermal power and following any change in power level or distribution which has the potential of bringing the core to its operating MCPR Limit. (L.2)
Add proposed Applicability (A.2)	
ACTION A: If at any time during operation it is determined that the limiting value for MCPR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. (LA.1) Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. (A.3) If the steady state MCPR is not returned to within the prescribed limits within two hours, reduce thermal power to less than 25% within the next four hours.	Add proposed ITS SR 3.2.2.2 (M.1)
ACTION B	

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

ADMINISTRATIVE CHANGES

A.1 In the conversion of the Monticello Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1433, Rev. 3, "Standard Technical Specifications General Electric Plants, BWR/4" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.11.C does not state when the MCPR LCO is required to be met, however CTS 3.11.C states "reduce thermal power to less than 25%" if the limiting value for MCPR is being exceeded and the MCPR is not returned to within limits within the specified time. ITS LCO 3.2.2 is applicable at THERMAL POWER ≥ 25% RTP. ITS 3.2.2 ACTION B requires a THERMAL POWER reduction to < 25% RTP if the MCPR(s) are not restored to within limits within specified time limit of ACTION A. This changes the CTS by clearly specifying the Applicability as ≥ 25% RTP.

The purpose of the CTS 3.11.C is to ensure the MCPRs are within limits when required. This changes the CTS by adding the explicit Applicability of "THERMAL POWER ≥ 25% RTP." This change is acceptable because at THERMAL POWER levels < 25% RTP the reactor is operating with substantial margin to the MCPR limits. For this reason there is no need to monitor MCPRs when THERMAL POWER is < 25% RTP. This is also consistent with the Surveillance Frequency in CTS 4.11.C, which states to monitor MCPR at ≥ 25% rated thermal power. This change states the Applicability consistent with the CTS default action and Surveillance Frequency. Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

A.3 CTS 3.11.C states "Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits." ITS 3.2.2 does not include this statement. This changes the CTS by deleting this statement.

The purpose of this CTS 3.11.C statement is to identify the importance of monitoring the MCPRs to verify they are restored to prescribed limits. After the MCPRs are within limits, it is obvious that the action can be exited. This change is acceptable because ITS LCO 3.0.1 and LCO 3.0.2 have been added to the Technical Specifications as described in the Discussion of Changes for ITS Section 3.0. ITS LCO 3.0.1 states "LCOs shall be met during the MODES or other specified conditions in the Applicability," and LCO 3.0.2 states "Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met" and "If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required." The CTS 3.11.C guidance is provided in the ITS generic guidelines of LCO 3.0.1 and LCO 3.0.2. In addition, the only way to confirm the MCPRs have been restored to within limits and the LCO is being met is to perform a Surveillance; thus, it is not necessary to be specifically stated.

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

Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

MORE RESTRICTIVE CHANGES

M.1 CTS 4.11.C does not specify a Surveillance Requirement to determine the MCPR limits after completion of scram time testing. ITS SR 3.2.2.2 requires the determination of the MCPR limits once within 72 hours after each completion of SR 3.1.4.1, 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 (scram time testing Surveillances). This changes the CTS by adding ITS SR 3.2.2.2 to the Technical Specifications.

The purpose of ITS SR 3.2.2.2 is to determine the MCPR limits after performance of the scram time tests, since scram times can affect the MCPR limit. This change is acceptable because the transient analysis is allowed to take credit for conservatism in the scram speed performance, thus it must be demonstrated that the specific scram speed distribution is consistent with that used in the transient analysis. ITS 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, 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 τ expected during the fuel cycle. This change is more restrictive because it adds a Surveillance Requirement that prescribes explicit requirements to determine MCPR limits at the specified times.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.11.C states that if at any time during power operation it is determined that the limiting value for MCPR is being exceeded, "action shall be initiated within 15 minutes to restore operation to within the prescribed limits." ITS 3.2.2 does not include this 15 minute action. This changes the CTS by relocating the procedural detail that "action shall be initiated within 15 minutes to restore operation to within the prescribed limits" to the Bases in the form of a discussion that "prompt action should be taken to restore the MCPR(s) to within the required limits."

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

The removal of this detail for performing actions from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to restore the MCPRs to within limits in 2 hours, consistent with the CTS actions. Also, this change is acceptable because this type of procedural detail will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because a procedural detail for meeting Technical Specification requirements is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 7 – Relaxation Of Surveillance Frequency, Non-24 Month Type Change)* CTS 4.11.C requires the MCPR to be determined daily during reactor operation at ≥ 25% rated thermal power. ITS SR 3.2.2.1 requires the same verification "once within 12 hours after ≥ 25% RTP and 24 hours thereafter." This changes the CTS by allowing the reactor to reach and exceed a THERMAL POWER level of 25% RTP without completing the Surveillance.

The purpose of CTS 4.11.C is to ensure all MCPRs are within limits before THERMAL POWER is ≥ 25% RTP. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of fuel reliability. This change allows the plant to increase THERMAL POWER ≥ 25% RTP without completing the Surveillance. However, after 25% RTP is achieved the verification must be performed within 12 hours and every 24 hours thereafter. 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. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L.2 *(Category 7 – Relaxation Of Surveillance Frequency, Non-24 Month Type Change)* CTS 4.11.C states MCPR shall be determined daily and "following any change in power level or distribution which has the potential of bringing the core to its operating MCPR." ITS SR 3.2.2.1 requires a similar daily verification, but does not include the additional Frequency based on a change in power level or distribution. This changes the CTS by deleting the requirement to verify MCPRs are within limits "following any change in power level or distribution which has the potential of bringing the core to its operating MCPR."

The purpose of the above described CTS 4.11.C Surveillance Frequency is to ensure MCPR is within limits when there is a potential for bringing the core to its operating MCPR limit. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of fuel reliability. This condition is unlikely and the Surveillance would seldom be required. Therefore, the Surveillance Frequency has been deleted. This change

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is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

CTS

3.2 POWER DISTRIBUTION LIMITS

3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

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

3.11.C APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
4.11.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 AND 24 hours thereafter

CTS

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY
DOC M.1	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

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JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2, MINIMUM CRITICAL POWER RATIO (MCPR)

None

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Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

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 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. 3 3 3

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 (8, and 9). 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. 1

The MCPR operating limits derived from the transient analysis are dependent on the operating core flow and power 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) (7, 8, 9, and 10). 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. 1 11 1

BASES

APPLICABLE SAFETY ANALYSES (continued)

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

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.

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 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.

BASES

ACTIONS (continued)

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 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, 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 τ expected during the fuel cycle.

BASES

REFERENCES

1. NUREG-0562, June 1979.
2. NEDO-24011-P-A, "General Electric Standard Application for Reactor Fuel" (latest approved version).
3. FSAR, Chapter [4].
4. FSAR, Chapter [6].
5. FSAR, Chapter [15].
6. [Plant specific single loop operation].
7. [Plant specific load line limit analysis].
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.

E 1 U U U 11 12 (revision specified in Specification 5.6.3) Section 3.2.4 Section 6.2.6 14 6. USAR, Chapter 14A. INSERT 1 INSERT 2 INSERT 3 1 2 3 4

2

INSERT 1

7. NEDE-23785-P (A), Revision 1, "The GESTR-LOCA and SAFER Models for Evaluation of the Loss-of-Coolant Accident (Volume III), SAFER/GESTR Application Methodology," October 1984.

2

INSERT 2

8. NEDC-30515, "GE BWR Extended Load Line Limit Analysis for Monticello Nuclear Generating Plant, Cycle 11," March 1984.

9. NEDC-31849P, including Supplement 1, "Maximum Extended Load Line Limit Analysis for Monticello Nuclear Generating Plant Cycle 15," June 1992.

2

INSERT 3

10. NEDC-30492-P, "Average Power Range Monitor, Rod Block Monitor and Technical Specification Improvement (ARTS) Program for Monticello Nuclear Generating Plant," April 1984.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2 BASES, MINIMUM CRITICAL POWER RATIO (MCPR)

1. Changes are made (additions, deletions, and/or changes) to the ISTS Bases, which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. The brackets are removed and the proper plant specific information/value is provided.

3. Typographical/grammatical error corrected.

4. Editorial change made for clarity.

5. Changes made to be consistent with changes made to the Specification.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.2, MINIMUM CRITICAL POWER RATIO (MCPR)

There are no specific NSHC discussions for this Specification.

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ATTACHMENT 3

ITS 3.2.3, LINEAR HEAT GENERATION RATE (LHGR)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

A.1

ITS | ITS

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
If at any time during power operation, it is determined that the APLHGR limiting condition for operation is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. If the APLHGR is not returned to within the prescribed limits within two hours, reduce thermal power to less than 25% within the next four hours.	See ITS 3.2.1
A.2	
B. Linear Heat Generation Rate (LHGR)	B. Linear Heat Generation Rate (LHGR) — Add proposed SR 3.2.3.1 first Frequency — L.1
LCO 3.2.3 During power operation, the LHGR shall be less than or equal to the limits specified in the Core Operating Limits Report.	SR 3.2.3.1 The LHGR shall be checked daily during reactor operation at ≥25% of rated thermal power.
ACTION A If at any time during operation it is determined that the limiting value for LHGR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. If the LHGR is not returned to within the prescribed limits within 2 hours, reduce thermal power to less than 25% within the next 4 hours.	LA.1 A.3
ACTION B	

3.11/4.11

212 2/16/00
Amendment No. ~~13, 54, 70,~~ 109

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

ADMINISTRATIVE CHANGES

A.1 In the conversion of the Monticello Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1433, Rev. 3, "Standard Technical Specifications General Electric Plants, BWR/4" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.11.B states that the LHGR should not exceed limits during "power operation," which is defined in CTS 1.0.O as "above 1% rated thermal power." However, CTS 3.11.B only states to reduce THERMAL POWER to "less than 25%" if the limiting values for LHGR is being exceeded and the LHGRs are not returned to within limits within the specified time. ITS LCO 3.2.3 is applicable at THERMAL POWER ≥ 25% RTP. ITS 3.2.3 ACTION B requires a THERMAL POWER reduction to < 25% RTP if the LHGR(s) are not restored to within limits within the specified time limit of ACTION A. This changes the CTS by changing the Applicability from > 1% RATED THERMAL POWER ≥ 25% RTP.

The purpose of the CTS 3.11.B is to ensure the LHGRs are within limits when required. This changes the CTS by changing the Applicability from "power operation" to "≥ 25% RTP." This change is acceptable since at THERMAL POWER levels < 25% RTP the reactor is operating with substantial margin to the LHGR limits. For this reason there is no need to monitor LHGRs when THERMAL POWER < 25% RTP. This is also consistent with the Surveillance Frequency in CTS 4.11.B, which states to monitor LHGR at ≥ 25% RATED THERMAL POWER. This change simply aligns the Applicability with the CTS default action and Surveillance Frequency. Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

A.3 CTS 3.11.B states "Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits." ITS 3.2.3 does not include this statement. This changes the CTS by deleting this statement.

The purpose of this CTS 3.11.B statement is to identify the importance of monitoring the LGHRs to verify they are restored to prescribed limits. After they are within limits, it is obvious that the action can be exited. ITS LCO 3.0.1 and LCO 3.0.2 have been added to the Technical Specifications as indicated in the Discussion of Changes for ITS Section 3.0. ITS LCO 3.0.1 states " LCOs shall be met during the MODES or other specified conditions in the Applicability," and LCO 3.0.2 states "Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met" and "If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not require." The CTS 3.11.B guidance is provided in the ITS generic guidelines of LCO 3.0.1 and LCO 3.0.2. In addition, the only way to confirm the LHGRs have been restored to within limits is to perform a Surveillance; thus, it is not necessary to be specifically stated.

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

Therefore, this change is considered a presentation preference change only and, as such, is considered an administrative change.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.11.B states that if at any time during power operation it is determined that the limiting value for LHGR limiting condition for operation is being exceeded, "action shall be initiated within 15 minutes to restore operation to within the prescribed limits." ITS 3.2.3 does not include this 15 minute action. This changes the CTS by relocating the procedural detail that "action shall be initiated within 15 minutes to restore operation to within the prescribed limits" to the Bases in the form of a discussion that "prompt action should be taken to restore the LHGR(s) to within the required limits."

The removal of this detail for performing actions from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to restore the LHGRs to within limits in 2 hours, consistent with the CTS actions. Also, this change is acceptable because this type of procedural detail will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because a procedural detail for meeting Technical Specification requirements is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 7 – Relaxation Of Surveillance Frequency, Non-24 Month Type Change)* CTS 4.11.B requires the LHGR to be determined daily during reactor operation at ≥ 25% rated thermal power. ITS SR 3.2.3.1 requires the same verification "once within 12 hours after ≥ 25% RTP and 24 hours thereafter." This changes the CTS by allowing the reactor to reach and exceed a THERMAL POWER level of 25% RTP without completing the Surveillance.

The purpose of CTS 4.11.B is to ensure all LHGRs are within limits before THERMAL POWER is ≥ 25% RTP. This change is acceptable because the new

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

Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of fuel reliability. This change allows the plant to increase THERMAL POWER ≥ 25% RTP without completing the Surveillance. However, after 25% RTP is achieved the verification must be performed within 12 hours and every 24 hours thereafter. 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. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

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Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

CTS

3.2 POWER DISTRIBUTION LIMITS

3.2.3 LINEAR HEAT GENERATION RATE (LHGR) ~~(Optional)~~ (1)

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

3.11.B APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

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

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY
4.11.B	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

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3, LINEAR HEAT GENERATION RATE (LHGR)

1. This reviewer's type of note has been deleted. This is not meant to be retained in the final version of the plant specific submittal.

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Improved Standard Technical Specifications (ISTS) Bases Markup and Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3 LINEAR HEAT GENERATION RATE (LHGR) (Optional) 1

BASES

BACKGROUND

node 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. normal operations and 5 3

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 ; 6

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). 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 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. 2

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

BASES

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 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 (s) required (are) to be initially calculated within 12 hours after THERMAL POWER is ≥ 25% RTP and then every 24 hours thereafter. It (They are) is (s) 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. 4

BASES

REFERENCES

1. FSAR, Section [ ]. (2) Chapter 14
2. FSAR, Section [ ]. (2) Chapter 3
3. NUREG-0800, Section II.A.2(g), Revision 2, July 1981.

(3) U

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3 BASES, LINEAR HEAT GENERATION RATE (LHGR)

1. This reviewer's type of note has been deleted. This is not meant to be retained in the final version of the plant specific submittal.

2. The brackets are removed and the proper plant specific information/value is provided.

3. Changes are made (additions, deletions, and/or changes) to the ISTS Bases, which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

4. Change made to be consistent with the Specification.

5. Editorial change made for clarity.

6. These punctuation corrections have been made consistent with the Writer's Guide for the Improved Standard Technical Specifications, NEI 01-03, Section 5.1.3.

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Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.3, LINEAR HEAT GENERATION RATE (LHGR)

There are no specific NSHC discussions for this Specification.

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ATTACHMENT 4

Improved Standard Technical Specifications (ISTS) not adopted in the Monticello ITS

ISTS 3.2.4, Average Power Range Monitor (APRM) Gain and Setpoints

ISTS 3.2.4 Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS

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

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.

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

1

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 Item b or 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 Item a requirements. ---------- Verify APRM setpoints or gains are adjusted for the calculated MFLPD.	12 hours

1

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JUSTIFICATION FOR DEVIATIONS
ISTS 3.2.4, AVERAGE POWER RANGE MONITOR (APRM) GAIN AND SETPOINTS

1. ISTS 3.2.4 has not been adopted since it is not applicable to Monticello. The requirements for Average Power Range Monitor (APRM) Gain and Setpoints have been previously deleted from the Monticello Technical Specifications as a result of License Amendment 29, dated November 16, 1984.

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ISTS 3.2.4 Bases Markup and Justification for Deviations (JFDs)

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:

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

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 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, 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

BASES

BACKGROUND (continued)

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. (1)

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. LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," and LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," 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 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

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APPLICABLE SAFETY ANALYSES (continued)

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 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.

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

LCO

Meeting any one of the following conditions ensures acceptable operating margins for events described above: 1

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

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.

BASES

LCO (continued)

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 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. 1

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.

BASES

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.

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.
2. FSAR, Section [ ].
3. FSAR, Section [ ].

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JUSTIFICATION FOR DEVIATIONS
ISTS 3.2.4 BASES, AVERAGE POWER RANGE MONITOR (APRM) GAIN AND SETPOINTS

1. Changes are made to be consistent with changes made to the Specification.

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