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July 31, 2007

BVY 07-052

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Revision of Technical Specification Bases Pages

Dear Sir or Madam,

This letter provides revised Technical Specification (TS) Bases pages.

Bases pages 227 and 227a have been revised to clarify the Bases for TS Section 3.11, "Reactor Fuel Assemblies," due to changes in reactor core analytical capability.

These changes to the TS Bases have been determined to not require prior NRC approval in accordance with 10CFR50.59.

For your information and records, a marked-up copy of the Bases pages as well as a re-typed copy are included as Attachments 1 and 2.

Should you have any questions concerning this matter, please contact Mr. David Mannai at (802) 258-5422.

Sincerely,

Ted A. Sullivan
Site Vice President
Vermont Yankee Nuclear Power Station

Attachments (2)
cc listing (next page)

A001

NRR

cc: Mr. Samuel J. Collins
Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
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Attachment 1

Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Revision of Technical Specification Bases Pages

Marked-up Version of Bases Pages

BASES:

3.11 FUEL RODS

A. Average Planar Linear Heat Generation Rate (APLHGR)

Refer to the appropriate topical reports listed in Specification 6.6.C for analyses methods.

(Note: All exposure increments in this Technical Specification section are expressed in terms of megawatt-days per short ton.)

The MAPLHGR reduction factor for single recirculation loop operation is based on the assumption that the coastdown flow from the unbroken recirculation loop would not be available during a postulated large break in the active recirculation loop. See Core Operating Limits Report for the cycle-specific reduction factor.

INSERT 1

Flow dependent MAPLHGR limits, MAPFAC(F), were designed to assure adherence to all fuel thermal-mechanical design bases. The same transient events used to support the MCPR(F) operating limits were analyzed, and the resulting overpowers were statistically evaluated as a function of the initial and maximum core flow. From the bounding overpowers, the MAPFAC(F) limits were derived such that the peak transient LHGR would not exceed fuel mechanical limits. The flow-dependent MAPLHGR limits are cycle-independent and are specified in terms of multipliers, MAPFAC(F), to be applied to the rated MAPLHGR values.

Power-dependent MAPLHGR limits, expressed in terms of a MAPLHGR multiplier, MAPFAC(P), are substituted to assure adherence to the fuel thermal-mechanical design bases. Both incipient centerline melting of fuel and plastic strain of the cladding are considered in determining the power dependent MAPLHGR limit. Generally, the limiting criterion is incipient centerline melting. The power-dependent MAPFAC(P) multipliers were generated using the same database as used to determine the MCPR multiplier (Kp). Appropriate MAPFAC(P) multipliers are selected based on plant-specific transient analyses with suitable margin to assure applicability to future reloads. These limits are derived to assure that the peak transient MAPLHGR for any transient is not increased above the fuel design bases values.

B. Linear Heat Generation Rate (LHGR)

INSERT 2

Refer to the appropriate topical reports listed in Specification 6.6.C for analyses methods.

Power and flow dependent LHGR limits are implemented using LHGRFAC multipliers on the standard LHGR limits. The LHGRFAC multipliers are identical to the MAPFAC multipliers.

C. Minimum Critical Power Ratio (MCPR)

Operating Limit MCPR

1. The MCPR operating limit is a cycle-dependent parameter which can be determined for a number of different combinations of operating modes, initial conditions, and cycle exposures in order to provide reasonable assurance against exceeding the Fuel Cladding Integrity Safety Limit (FCISL) for potential abnormal occurrences. The MCPR operating limits are justified by the analyses, the results of which are presented in the current cycle's Supplemental Reload

Insert 1

APLHGR is the average LHGR of all the fuel rods in a fuel assembly at any axial location. APLHGR limits ensure that the peak cladding temperature (PCT) during a design basis loss-of-coolant accident (LOCA) does not exceed 2200°F. LOCA analyses are performed to verify this.

APLHGR limits are specified in the cycle-specific COLR.

Insert 2

LHGR is the linear heat generation rate of a fuel rod at a given nodal plane in a bundle. LHGR limits are bundle type dependent and monitored to assure all mechanical design requirements are met.

Flow dependent LHGR limits were designed to assure adherence to all fuel thermal-mechanical design bases. The same transient events used to support the MCPR(F) operating limits were analyzed, and the resulting overpowers were statistically evaluated as a function of the initial and maximum core flow. From the bounding overpowers, the LHGRFAC(F) limits were derived such that the peak transient LHGR would not exceed fuel mechanical limits. The flow-dependent LHGR limits are cycle-independent and are specified in terms of multipliers, LHGRFAC(F), to be applied to the rated LHGR values.

Power-dependent LHGR limits, expressed in terms of a LHGR multiplier, LHGRFAC(P), are applied to assure adherence to the fuel thermal-mechanical design bases. Both incipient centerline melting of fuel and plastic strain of the cladding are considered in determining the power dependent LHGR limit. The power-dependent LHGRFAC(P) multipliers were generated using the same database as used to determine the MCPR multiplier (Kp). Appropriate LHGRFAC(P) multipliers are selected based on plant-specific transient analyses with suitable margin to assure applicability to future reloads. These limits are derived to assure that the peak transient LHGR for any transient is not increased above the fuel design bases values.

The LHGRFAC multipliers also provide adequate protection for the off-rated LOCA conditions since a constant local peaking factor is used in the LOCA evaluation.

LHGR limits are specified in the cycle-specific COLR.

BVY 07-052

Attachment 2

Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Revision of Technical Specification Bases Pages

Re-typed Version of Bases Pages

BASES:

3.11 FUEL RODS

A. Average Planar Linear Heat Generation Rate (APLHGR)

Refer to the appropriate topical reports listed in Specification 6.6.C for analyses methods.

(Note: All exposure increments in this Technical Specification section are expressed in terms of megawatt-days per short ton.)

The MAPLHGR reduction factor for single recirculation loop operation is based on the assumption that the coastdown flow from the unbroken recirculation loop would not be available during a postulated large break in the active recirculation loop. See Core Operating Limits Report for the cycle-specific reduction factor.

APLHGR is the average LHGR of all the fuel rods in a fuel assembly at any axial location. APLHGR limits ensure that the peak cladding temperature (PCT) during a design basis loss-of-coolant accident (LOCA) does not exceed 2200°F. LOCA analyses are performed to verify this.

APLHGR limits are specified in the cycle-specific COLR.

B. Linear Heat Generation Rate (LHGR)

Refer to the appropriate topical reports listed in Specification 6.6.C for analyses methods.

LHGR is the linear heat generation rate of a fuel rod at a given nodal plane in a bundle. LHGR limits are bundle type dependent and monitored to assure all mechanical design requirements are met.

Flow dependent LHGR limits were designed to assure adherence to all fuel thermal-mechanical design bases. The same transient events used to support the MCPR(F) operating limits were analyzed, and the resulting overpowers were statistically evaluated as a function of the initial and maximum core flow. From the bounding overpowers, the LHGRFAC(F)limits were derived such that peak transient LHGR would not exceed fuel mechanical limits. The flow-dependent LHGR limits are cycle-independent and are specified in terms of multipliers, LHGRFAC(F), to be applied to the rated LHGR values.

Power-dependent LHGR limits, expressed in terms of a LHGR multiplier, LHGRFAC(P), are applied to assure adherence to the fuel thermal-mechanical design bases. Both incipient centerline melting of fuel and plastic strain of the cladding are considered in determining the power dependent LHGR limit. The power-dependent LHGRFAC(P) multipliers were generated using the same database as used to determine the MCPR multiplier (Kp). Appropriate LHGRFAC(P) multipliers are selected based on plant-specific transient analyses with suitable margin to assure applicability to future reloads. These limits are derived to assure that the peak transient LHGR for any transient is not increased above the fuel design bases values.

The LHGRFAC multipliers also provide adequate protection for the off-rated LOCA conditions since a constant local peaking factor is used in the LOCA evaluation.

LHGR limits are specified in the cycle-specific COLR.

BASES:

3.11 FUEL RODS (Continued)

C. Minimum Critical Power Ratio (MCPR)

Operating Limit MCPR

1. The MCPR operating limit is a cycle-dependent parameter which can be determined for a number of different combinations of operating modes, initial conditions, and cycle exposures in order to provide reasonable assurance against exceeding the Fuel Cladding Integrity Safety Limit (FCISL) for potential abnormal occurrences. The MCPR operating limits are justified by the analyses, the results of which are presented in the current cycle's Supplemental Reload Licensing Report. Refer to the appropriate topical reports listed in Specification 6.6.C for analysis methods. The increase in MCPR operating limits for single loop operation accounts for increased core flow measurement and TIP reading uncertainties.

   Flow-dependent MCPR limits, MCPR(F), are necessary to assure that the Safety Limit MCPR (SLMCPR) is not violated during recirculation flow increase events. The design basis flow increase event is a slow (maximum two pump runout rate of 1%/second) recirculation flow increase event which is not terminated by scram, but which stabilizes at a new core power corresponding to the maximum possible core flow. Flow runout events were analyzed along a constant xenon, constant feedwater temperature flow control line assuming a quasi steady-state plant heat balance. The ARTS-based MCPR(F) limit is specified as an absolute value and is cycle-independent. The operating limit is based on the maximum core flow limiter setting of 109.5% in the Recirculation Flow Control System.

   Above the power at which the scram is bypassed (P_{bypass}), bounding power-dependent trend functions have been developed. This trend function, Kp, is used as multiplier to the rated MCPR operating limits to obtain the power-dependent MCPR limits, MCPR(P). Below the power at which the scram is automatically bypassed (Below P_{bypass}), the MCPR(P) limits are actual absolute Operating Limit MCPR (OLMCPR) values, rather than multipliers on the rated power OLMCPR.