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October 18, 2000

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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
CORE OPERATING LIMITS REPORT - REVISION 8

Revision 8 of the Palisades Core Operating Limits Report (COLR) is attached. This revision contains the limits for fuel cycle 15 and future cycles. This report is submitted in accordance with the requirements of Palisades Technical Specification 5.6.5.

Palisades will be implementing Improved Technical Specifications (ITS) on or before October 31, 2000. Revision 8 of the COLR will become effective upon implementation of the ITS; prior to that time, revision 6 of the COLR will be in effect.

SUMMARY OF COMMITMENTS

This letter contains no new commitments and no revisions to existing commitments.

NL Haskell
Director, Licensing and Performance Assessment

CC Administrator, Region III, USNRC
Project Manager, NRR, USNRC
NRC Resident Inspector - Palisades

Enclosure

A001

ENCLOSURE

CONSUMERS ENERGY COMPANY
PALISADES PLANT
DOCKET 50-255

PALISADES CORE OPERATING LIMITS REPORT
Revision 8

PALISADES NUCLEAR PLANT

TITLE: CORE OPERATING LIMITS REPORT

APPLICABLE TO ITS ONLY

Rob Hackbarth for Gary Pratt / 10/4/2000
Preparer Date

Gary E Jeuken 10/4/2000
Technical Reviewer Date

j a menke / 10/4/2000 / SDR 2000-1183
PRC Reviewed Date Reference #

/ 10/4/2000
Nuclear Engineering Manager Approval Date

Consumers Energy Company
Docket No. 50-255
License No. DPR-20

Core Operating Limits Report

1.0 INTRODUCTION

This Core Operating Limits Report for Palisades has been prepared in accordance with the requirements of Technical Specification 5.6.5. The Technical Specifications LCOs affected by this report are listed below:

Section	Title	LCO
2.1	SHUTDOWN MARGIN (SDM)	3.1.1
		3.1.6
		3.9.1
2.2	Regulating Rod Group Position Limits	3.1.6
2.3	Linear Heat Rate (LHR)	3.2.1
2.4	Radial Peaking Factors	3.2.2
2.5	AXIAL SHAPE INDEX (ASI)	3.2.4

2.0 OPERATING LIMITS

The cycle specific parameter limits for the specifications listed in Section 1 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in Section 3.0.

2.1 SHUTDOWN MARGIN (SDM)

2.1.1 MODES 1 and 2 (LCO 3.1.6 Regulating Rod Group Position Limits) - The minimum SDM requirement is 2% with the most reactive rod fully withdrawn. The rod insertion limit (PDIL) is discussed in Section 2.2 and shown in Figure 2.2-1.

2.1.2 MODES 3, 4 and 5, Loops Filled (LCO 3.1.1 SHUTDOWN MARGIN) - The SDM requirements are given in the following table for normal cooldowns and heatups, i.e., non-emergency conditions.

Average PCS Temperature	Reactor Core Flow	SDM Requirements
≥525 °F	4 PCPs	≥2%
≥525 °F	<4 PCPs	≥3.5%
<525 °F	≥2810 gpm	≥2%[1]
<525 °F	<2810 gpm	≥3.5%[1]

NOTE:

1. SDM assuming T_{ave} of 60°F.

2.1.3 MODE 5, Loops Not Filled (LCO 3.1.1 SHUTDOWN MARGIN) - The SDM requirement is ≥ 3.5% assuming T_{ave} of 60°F for normal cooldowns and heatups, i.e., non-emergency conditions.

2.1.4 MODE 6 (LCO 3.9.1 Boron Concentration) - The SDM requirement is specified in the definition of REFUELING BORON CONCENTRATION.

2.2 Regulating Rod Group Position Limits

a. To implement the limits on SHUTDOWN MARGIN, individual rod worth and hot channel factors, the limits on control rod regulating group insertion shall be established as shown on Figure 2.2-1.

b. The sequence of withdrawal of the regulating groups shall be 1, 2, 3, 4.

c. An overlap of control banks in excess of 40% shall not be permitted.

d. If the reactor is subcritical, the rod position at which criticality could be achieved if the control rods were withdrawn in normal sequence shall not be lower than Group 2 at 72 inches (i.e. ~ 45% control rod insertion)

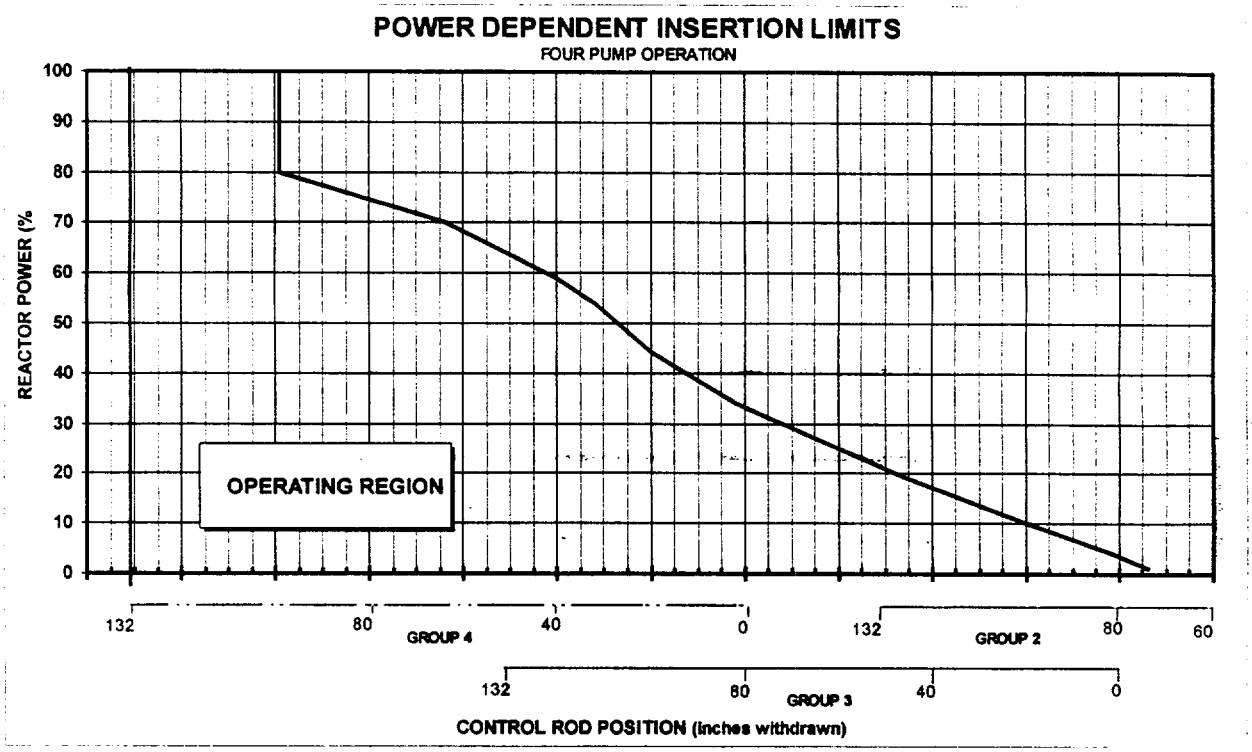

Figure 2.2-1 Regulating Rod Group Position Limits

2.3 Linear Heat Rate (LHR)

The LHR in the peak powered fuel rod shall not exceed the following:

$$LHR \leq LHR_{TS} x F_A(z)$$

Where:

LHR_{TS} = Maximum allowable LHR shown in Table 2.3-1.

$F_A(z)$ = Allowable LHR as a function of peak power location shown in Figure 2.3-1.

Table 2.3-1 - Linear Heat Rate Limit

Peak Rod	15.28 (kW/ft)

To ensure that the design margin of safety is maintained, the determination of both the incore alarm setpoints and the APL takes into account the local LHGR measurement uncertainty factors given in Table 2.4-2, an engineering uncertainty factor and a thermal power measurement uncertainty factor (values given in B 3.2.1).

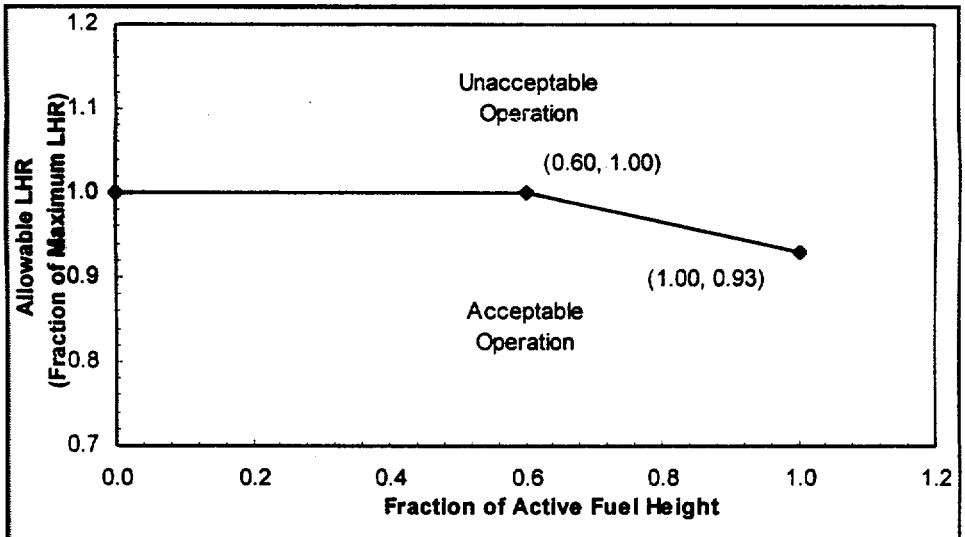

Figure 2.3-1 - Allowable LHR as a Function of Peak Power Location

2.4 Radial Peaking Factors

The radial peaking factor shall not exceed the following:

for $P \geq 0.5$

$$F_r = F_r^{TS} x [1.0 + 0.3x(1-P)]$$

and for $P < 0.5$,

$$F_r = F_r^{TS} x 1.15$$

Where:

F_r = Measured F_r^A or F_r^T,

F_r^{TS} = Maximum allowable F_r^A or F_r^T (Table 2.4-1),

P = Fraction of rated power.

Table 2.4-1 - Peaking Factor Limits, F_r^{TS}

Peaking Factor	Reload N	Reload O to S
Peak Rod F_r^T	1.92	2.04

Assembly F_r^A Peaking Factor is 1.915 for all Cycle 15 Fuel Types.

To ensure that the design margin of safety is maintained, the determination of radial peaking factors takes into account the appropriate measurement uncertainty factors given in Table 2.4-2.

TABLE 2.4-2 POWER DISTRIBUTION MEASUREMENT UNCERTAINTY FACTORS

LHR/Peaking Factor Parameter	Measurement Uncertainty[a]	Measurement Uncertainty[b]	Measurement Uncertainty[c]
LHR	0.0623	0.0664	0.0795
F_r^A	0.0401	0.0490	0.0695
F_r^T	0.0455	0.0526	0.0722

(a) Measurement uncertainty for reload cores using all fresh incore detectors.

(b) Measurement uncertainty for reload cores using a mixture of fresh and once-burned incore detectors.

(c) Measurement uncertainty when quadrant power tilt, as determined using incore measurements and an incore analysis computer program, exceeds 2.8% but is less than or equal to 5%.

2.5 AXIAL SHAPE INDEX (ASI)

The ASI limit for the T_{inlet} function is shown in Figure 2.5-1.

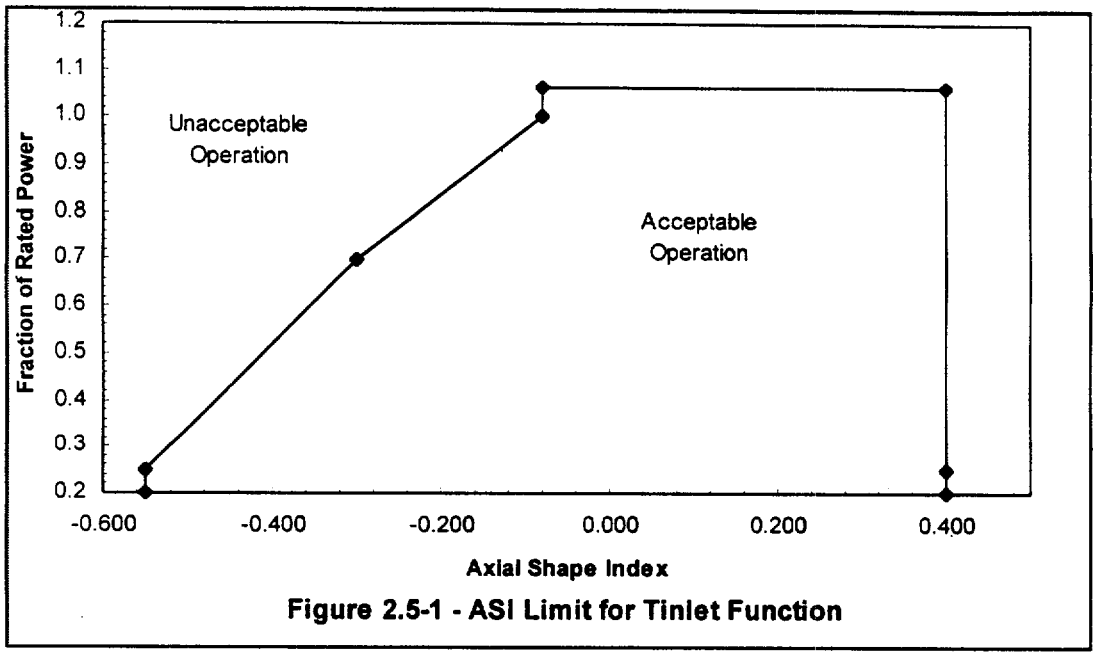

Figure 2.5-1 - ASI Limit for Tinlet Function

Break Points:

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-0.550,    0.250
-0.300,    0.700
-0.080,    1.000
-0.080,    1.065
+0.400,    1.065
+0.400,    0.250
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3.0 ANALYTICAL METHODS

The analytical methods used to determine the core operating limits are those previously reviewed and approved by the NRC, specifically those described in the Technical Specification Section 5.6.5 list of methodology documents. Specific application of these methodologies to Palisades is described in the cycle's most current safety analysis reports.

The analytical methods used to determine the radial peaking factor measurement uncertainty factors are described in FSAR, Section 3.3.2.5.