

May 15, 2003

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

PALISADES NUCLEAR PLANT  
DOCKET NO. 50-255  
LICENSE DPR-20  
CORE OPERATING LIMITS REPORT – REVISION 11

Nuclear Management Company, LLC is providing revision 11 of the Palisades Core Operating Limits Report (COLR). This report is submitted in accordance with the requirements of Palisades Technical Specification 5.6.5.d. Attachment 1 contains a summary of changes from the previous revision and attachment 2 contains revision 11 of the COLR.

SUMMARY OF COMMITMENTS

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



Douglas E. Cooper  
Site Vice-President, Palisades

cc: Regional Administrator, USNRC, Region III  
Project Manager, USNRC, NRR  
NRC Resident Inspector, Palisades

Attachments

**ATTACHMENT 1**

**NUCLEAR MANAGEMENT COMPANY  
PALISADES NUCLEAR PLANT  
DOCKET 50-255**

**May 15, 2003**

**PALISADES CORE OPERATING LIMITS REPORT  
Revision 11**

**Summary of Changes**

**1 Page Follows**

# **PALISADES CORE OPERATING LIMITS REPORT**

## **Revision 11**

### **Summary of Changes**

Section 1.0 "LCOs" is spelled out as Limiting Conditions for Operation.

The title of section 2.4 is changed to "Total Radial Peaking Factor."

Section 2.1.2 and table are changed to a single shutdown margin (SDM) requirement of 2%. The note below this table is removed.

Section 2.1.2 and Section 2.1.3, the words "ie, non-emergency conditions" are removed.

A note is added to figure 2.2-1 to indicate that a regulating rod is considered fully withdrawn at  $\geq 128$  inches.

Below Table 2.3-1, "APL" is spelled out as Allowable Power Level and linear heat generation rate (LHGR) is changed to linear heat rate (LHR). Technical Specifications Basis is added before B 3.2.1.

In section 2.4, the definition of "maximum allowable" is changed to "Peaking Factor Limits."

Table 2.4-1 updates the peaking factor limits for Cycle 17.

Section 3.0 corrects a typographical error "cycle's."

**ATTACHMENT 2**

**NUCLEAR MANAGEMENT COMPANY  
PALISADES PLANT  
DOCKET 50-255**

**May 15, 2003**

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Revision 11**

**8 Pages Follow**

PALISADES NUCLEAR PLANT

**TITLE: CORE OPERATING LIMITS REPORT**

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Consumers Energy Company  
Docket No 50-255  
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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 Limiting Conditions for Operation (LCOs) affected by this report are listed below:

| <u>Section</u> | <u>Title</u>                         | <u>LCO</u>              |
|----------------|--------------------------------------|-------------------------|
| 2.1            | SHUTDOWN MARGIN (SDM)                | 3.1.1<br>3.1.6<br>3.9.1 |
| 2.2            | Regulating Rod Group Position Limits | 3.1.6                   |
| 2.3            | Linear Heat Rate (LHR)               | 3.2.1                   |
| 2.4            | Total Radial Peaking Factor          | 3.2.2                   |
| 2.5            | AXIAL SHAPE INDEX (ASI)              | 3.2.4                   |

## 2.0 OPERATING LIMITS

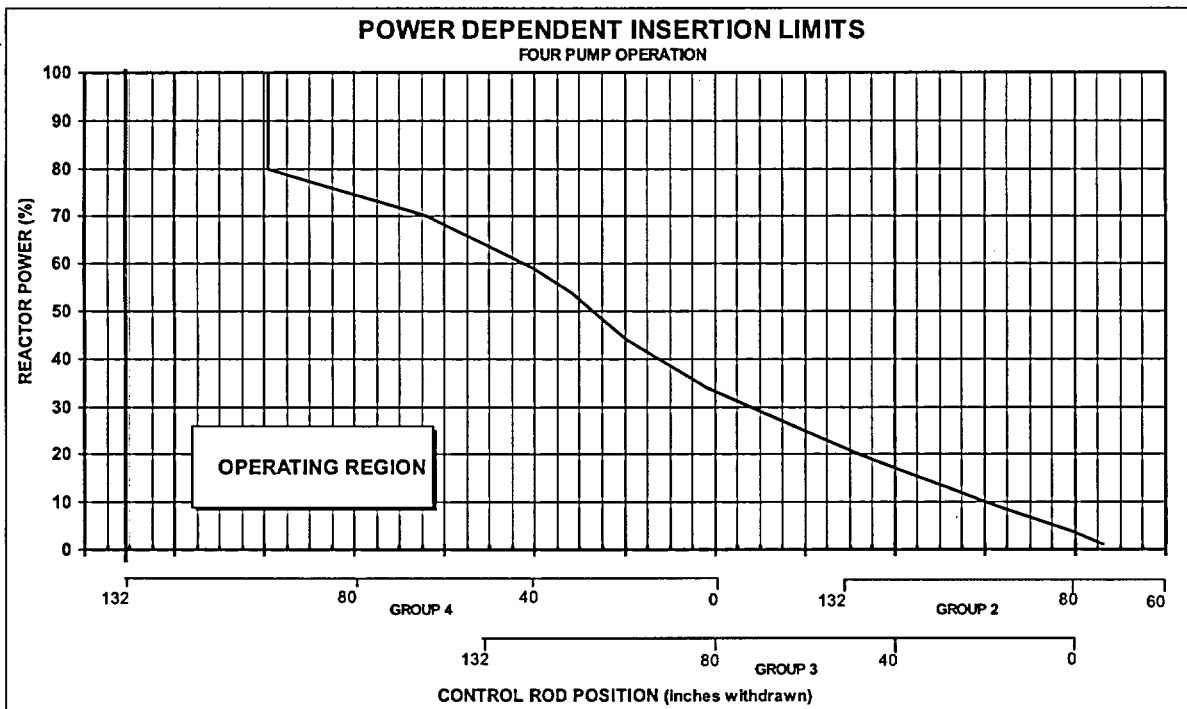
The cycle specific parameter limits for the specifications listed in Section 1 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in Section 3.0.

### 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 requirement is  $\geq 2\%$  for normal cooldowns and heatups.
- 2.1.3 MODE 5, Loops Not Filled (LCO 3.1.1 SHUTDOWN MARGIN) - The SDM requirement is  $\geq 3.5\%$  assuming  $T_{ave}$  of 60°F for normal cooldowns and heatups.
- 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. If the reactor is critical, 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. 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 (ie, ~ 45% control rod insertion)
- c. The sequence of withdrawal of the regulating groups shall be 1, 2, 3, 4.
- d. An overlap of control banks in excess of 40% shall not be permitted.



**Figure 2.2-1 Regulating Rod Group Position Limits**

**NOTE:** A regulating rod is considered fully withdrawn at  $\geq 128$  inches.



## 2.3 Linear Heat Rate (LHR)

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

$$\text{LHR} \leq \text{LHR}_{\text{TS}} \times F_A(z)$$

Where:

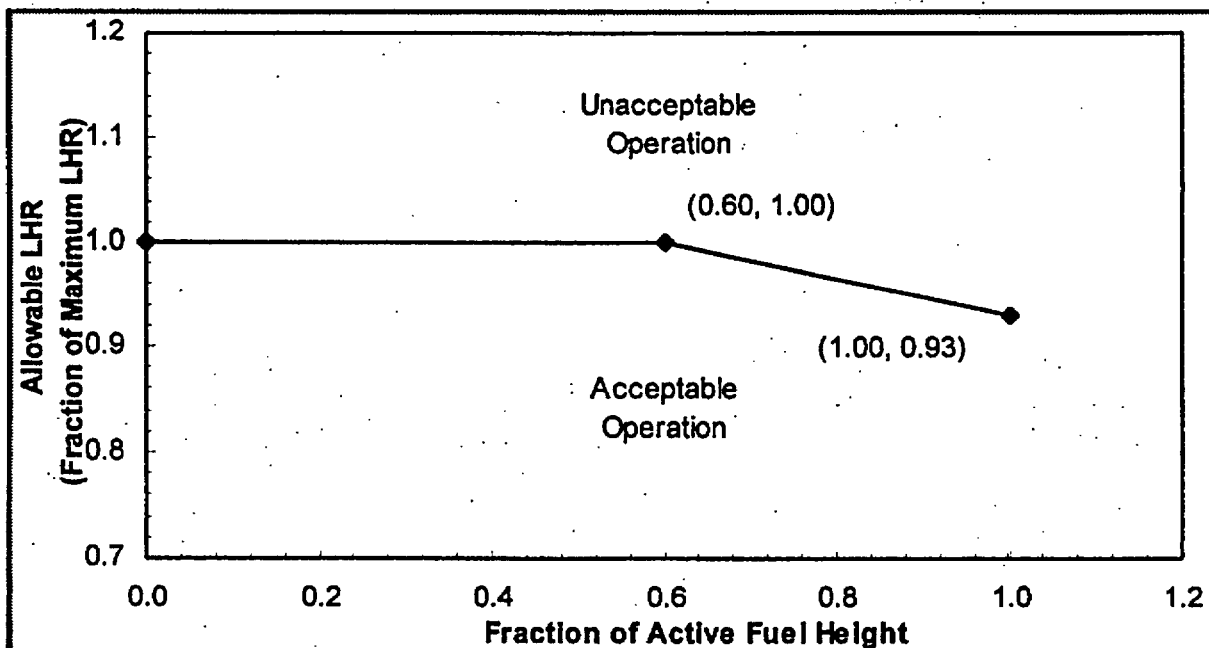
$\text{LHR}_{\text{TS}}$  = Maximum allowable LHR shown in Table 2.3-1.

$F_A(z)$  = 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 Allowable Power Level takes into account the local LHR measurement uncertainty factors given in Table 2.4-2, an engineering uncertainty factor and a thermal power measurement uncertainty factor (values given in Technical Specification Basis B 3.2.1).



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

## 2.4 Total Radial Peaking Factor

The radial peaking factor shall not exceed the following:

for  $P \geq 0.5$

$$F_r \leq F_r^{TS} \times [1.0 + 0.3 \times (1 - P)]$$

and for  $P < 0.5$ ,

$$F_r \leq F_r^{TS} \times 1.15$$

Where:

$F_r$  = Measured  $F_r^T$ ,

$F_r^{TS}$  = Peaking Factor Limits (Table 2.4-1),

$P$  = Fraction of rated power.

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

| Reload N | All Other Fuel Types<br>(Based on Cycle 17 cycle average burnup)    |
|----------|---------------------------------------------------------------------|
| 1.92     | 2.02 (BOC 17 to 12,000 MWd/MTU)<br>1.965 (12,000 to 16,020 MWd/MTU) |

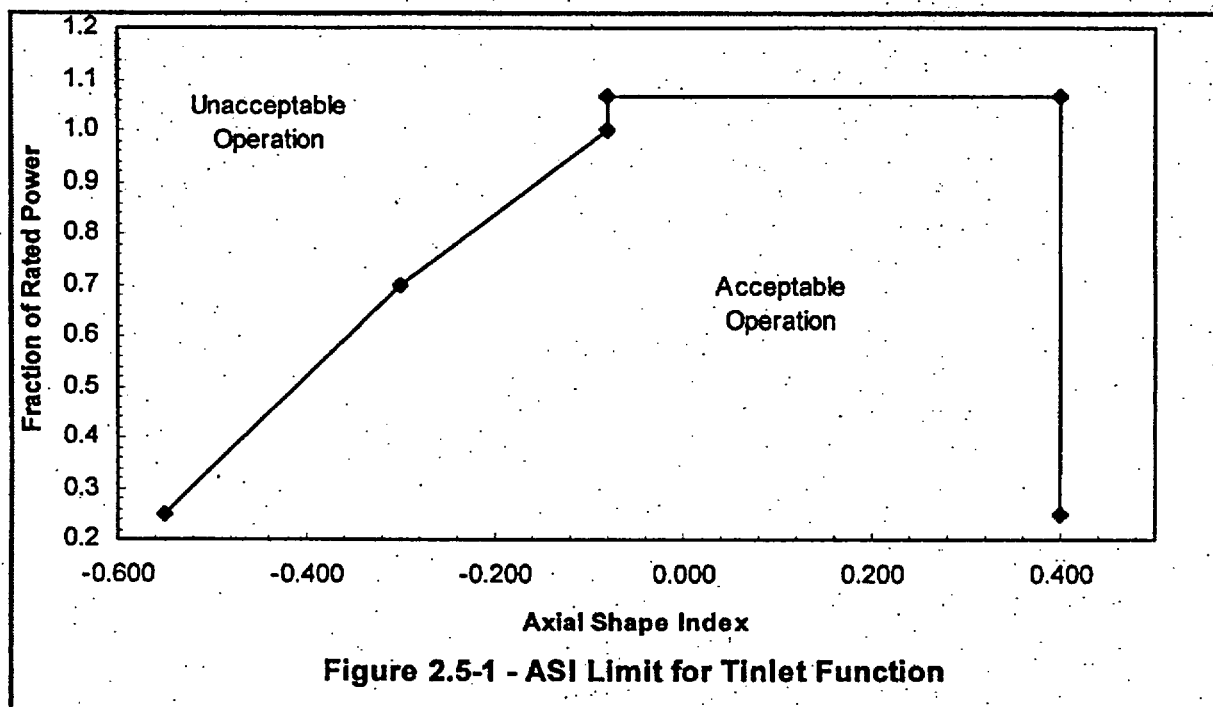
To ensure that the design margin of safety is maintained, the determination of radial peaking factors takes into account the appropriate measurement uncertainty factors given in Table 2.4-2.

**TABLE 2.4-2 POWER DISTRIBUTION MEASUREMENT UNCERTAINTY FACTORS**

|                         | LHR    | $F_r^T$ |
|-------------------------|--------|---------|
| Measurement Uncertainty | 0.0500 | 0.0425  |

## 2.5 AXIAL SHAPE INDEX (ASI)

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



Break Points:

|         |       |
|---------|-------|
| -0.550, | 0.250 |
| -0.300, | 0.700 |
| -0.080, | 1.000 |
| -0.080, | 1.065 |
| +0.400, | 1.065 |
| +0.400, | 0.250 |

### **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.