Entergy Nuclear Northeast
Indian Point Energy Center
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Patric W. Conroy
Manager, Licensing
Tel 914 734 6668

May 11, 2005

Re: Indian Point Unit 2
Docket No. 50-286
NL-05-069

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: Indian Point Unit 3 Cycle 14 Core Operating Limit Report (COLR)

Dear Sir:

This letter transmits the COLR as required by Technical Specification 5.6.5. Enclosed is Indian Point 3 Plant Operating Procedure 3-POP-2.3, Revision 14 that contains the core operating limits for Cycle 14.

There are no new commitments being made in this submittal.

If you have any questions or require additional information, please contact Patric Conroy, Manager, Licensing at (914) 734-6668.

Sincerely,

Patric W. Conroy
Manager, Licensing
Indian Point Energy Center

Enclosure #1 – Indian Point 3 COLR – Cycle 14

cc: see next page

A001

cc: Mr. Patrick D. Milano
Senior Project Manager, Project Directorate I

Mr. Samuel J. Collins
Regional Administrator, Region 1

Resident Inspector's Office
Indian Point Unit 3

ENCLOSURE 1 TO NL-05-069

Indian Point 3 Cycle 14 COLR

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

Entergy
Nuclear Northeast

Procedure Use Is:
☑ Continuous
☐ Reference
☐ Information

Control Copy: _____

Effective Date: 4/2/05

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3-POP-2.3, Revision: 14

CORE OPERATING LIMITS FOR CYCLE 14

Indian Point Operations

Approved By:

J. Seabold 3-31-05

Procedure Sponsor, DM/Designee — Date

Team 3B

Procedure Owner

PARTIAL REVISION

REVISION SUMMARY

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1.0 REASON FOR REVISION

1.1 Revised to incorporate Cycle 14 reactor core information per Core Operating Limits Report for Cycle 14, Rev. 0.

1.2 Converted procedure number to IPEC format with no change in unit applicability.

2.0 SUMMARY OF CHANGES

2.1 Changed the title of this procedure to reflect Cycle 14 core.

2.2 Updated the following for the Cycle 14 reactor core:

- Hot Channel Factor at Rated Thermal Power, FQ (Z)
- Hot Channel Factor at Rated Thermal Power, FΔH N
- Power Factor Multiplier for FΔH = PFΔH

2.3 Deleted the following from Table 4.1 for the Cycle 14 reactor core:

- Power Factor Multiplier for FΔH = PFΔH, PFΔH for P < 0.5

2.4 Added the following to Table 4.1 for the Cycle 14 reactor core:

- Reactor Core Safety Limits
- Overtemperature ΔT Limit
- Overpower ΔT Limit
- RCS Pressure Limit
- RCS Temperature Limit
- Flow Departure from Nucleate Boiling (DNB) Limit

2.5 Changed the Reactor Coolant System and Refueling Cavity Boron Concentration in Table 4.1: (SDM of 5% ΔK/ K value) from1865 ppm to 2050 ppm) for the cycle 14 reactor core.

2.6 Updated 6.0, References for the Cycle 14 reactor core.

2.7 Added Attachment 4, REACTOR CORE SAFETY LIMIT – FOUR LOOPS IN OPERATION, and Attachment 5, OVERTEMPERATURE ΔT/ OVERPOWER ΔT, which are now part of the COLR.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure establishes the cycle specific safety limits for the reactor fuel.

1.2 This procedure applies to Cycle 14 fuel.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 The data presented in this report applies to Cycle 14 Only and SHALL NOT be used for other operating cycles.

2.2 This data is applicable from completion of cycle 14 core reload until initiation of the cycle 15 core reload.

NOTE

The *Core Operating Limits Report (COLR)*, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

2.3 IF a part of this procedure is changed which affects information contained in the COLR **{Definition 5.1}**, THEN SUBMIT a copy of this approved procedure to the Site Licensing Manager for transmittal to the NRC per TS: 5.6.5 **{Reference 6.1.1}**

2.4 COLR data is provided by Reactor Engineering per procedure RA-25, Control of Core Operating Limits Report.

3.0 PREREQUISITES

None

4.0 PROCEDURE

4.1 The following are Core Operating Limits for the Cycle 14 reactor fuel:

Table 4.1
CORE OPERATING LIMITS FOR CYCLE 14 REACTOR FUEL

PARAMETER	VALUE	CORRESPONDING T.S.	APPLICABILITY
Hot Channel Factor at Rated Thermal Power, $F_Q(Z)$ (Measured via flux mapping)	2.5	3.2.1 (B.3.2.1 for mathematical formula, error tolerances, and measurement by flux mapping)	Mode 1
Height Dependent $F_Q(Z)$ Multiplier K (Z), referred to as "fraction"	Refer to Attachment 2	3.2.1	Mode 1
Hot Channel Factor at Rated Thermal Power, $F_{\Delta H}^N$ for Vantage + for 15x15 Upgrade	 1.70 1.70	3.2.2	Mode 1
Power Factor Multiplier for $F_{\Delta H} = PF_{\Delta H}$ $PF_{\Delta H}$ for $0.00 \leq P \leq 1.0$	 0.3	3.2.2	Mode 1
Equation for $F_{\Delta H}^N$ (Measured via flux mapping)	$F_{\Delta H}^N \leq F_{\Delta H}^{RTP}(1+ PF_{\Delta H}(1-P))$	3.2.2, B3.2.2, B2.1.1 for variable definitions and error tolerances	Mode 1
Axial Flux Difference Band Width	±5% Refer to Attachment 3	3.2.3 3.2.3	Mode 1 with Thermal Power > 15%

Table 4.1

CORE OPERATING LIMITS FOR CYCLE 14 REACTOR FUEL

PARAMETER	VALUE	CORRESPONDING T.S.	APPLICABILITY
Axial Flux Difference Envelope Limits at 90% power	-11%, +11% Refer to Attachment 3	3.2.3	Mode 1 with Thermal Power > 15%
Axial Flux Difference Envelope Increase for each 2% of rated thermal power < 90% RTP but ≥ 50% RTP	±1% Refer to Attachment 3	3.2.3	Mode 1 with Thermal Power > 15%
Shutdown Bank Insertion Limits	≥ 225 Steps withdrawn (Indicated)	3.1.5	Mode 1 Mode 2 with any Control bank not fully inserted. N/A during SR 3.1.4.2
Control Bank Insertion Limits	Refer to Attachment 1	3.1.6	Mode 1 Mode 2 with K_{eff} ≥ 1.0 N/A during SR 3.1.4.2
Control Bank Overlap Pattern	Withdraw: A, B, C, D Insert: D, C B, A	3.1.6, B3.1.6	Mode 1 Mode 2 with K_{eff} ≥ 1.0
Control Bank Overlap	104 Steps	3.1.6, B3.1.6	Mode 1 Mode 2 with K_{eff} ≥ 1.0
Control Bank Fully Withdrawn Position	230 Steps	3.1.6, B3.1.6	Mode 1 Mode 2 with K_{eff} ≥ 1.0
Shutdown Margin	≥ 1.3% ΔK/ K	3.1.1, 3.1.8	Mode 2 during physics tests Mode 2 with K_{eff} < 1.0 Modes 3, 4, 5

Table 4.1

CORE OPERATING LIMITS FOR CYCLE 14 REACTOR FUEL

PARAMETER	VALUE	CORRESPONDING T.S.	APPLICABILITY
Reactor Coolant System and Refueling Cavity Boron Concentration	More restrictive of : ≥ 2050 ppm OR concentration that provides a SDM ≥ 5% ΔK/ K	3.9.1	Mode 6
Moderator Temperature Coefficient Limits Lower:	@ 300 ppm ≥ - 38.0 pcm/°F @ 60 ppm ≥ - 44.5 pcm/°F @ LCO ≥ - 47.0 pcm/°F	3.1.3	Modes 1, 2, 3 for lower limit
Upper:	≤ 0.0 ΔK/ K °F		Mode 1 and Mode 2 with Keff ≥ 1.0 for upper limit
Reactor Core Safety Limits	Refer to Attachment 4	2.1.1	Modes 1 and 2
Overtemperature ΔT Limit and Overpower ΔT Limit	Refer to Attachment 5	3.3.1	Modes 1 and 2
RCS Pressure	Indicated Pressurizer Pressure ≥ 2204 psig	3.4.1	Mode 1
Temperature	Indicated RCS average loop temperature ≤ 576.7°F for full power Tavg = 572.0°F		
Flow Departure from Nucleate Boiling (DNB) Limits	Minimum measured RCS total flow rate ≥ 364,700 gpm.		

5.0 DEFINITIONS

5.1 **Core Operating Limits Report (COLR)** - the parts of this procedure which satisfy the requirements of T.S. 1.1, 5.6.5.

6.0 REFERENCES

6.1 Commitment Documents

6.1.1 Technical Specification 5.6.5.

6.2 Development Documents

6.2.1 NRC Generic Letter 88-16

6.2.2 Indian Point Unit 3 Cycle 14 Reload Safety Evaluation, March 2005

6.2.3 Core Operating Limits Report for Cycle 14, Rev. 0.

6.2.4 Technical Specification 2.1.1, 3.1.1, 3.1.3, 3.1.5, 3.1.6, 3.1.8, 3.2.1, 3.2.2, 3.2.3, 3.3.1, 3.4.1, 3.9.1, B.2.1.1, B3.4.1.

6.2.5 Technical Specification 5.6.5.

6.2.6 NRC Safety Evaluation Report for T.S. Amendment 103.

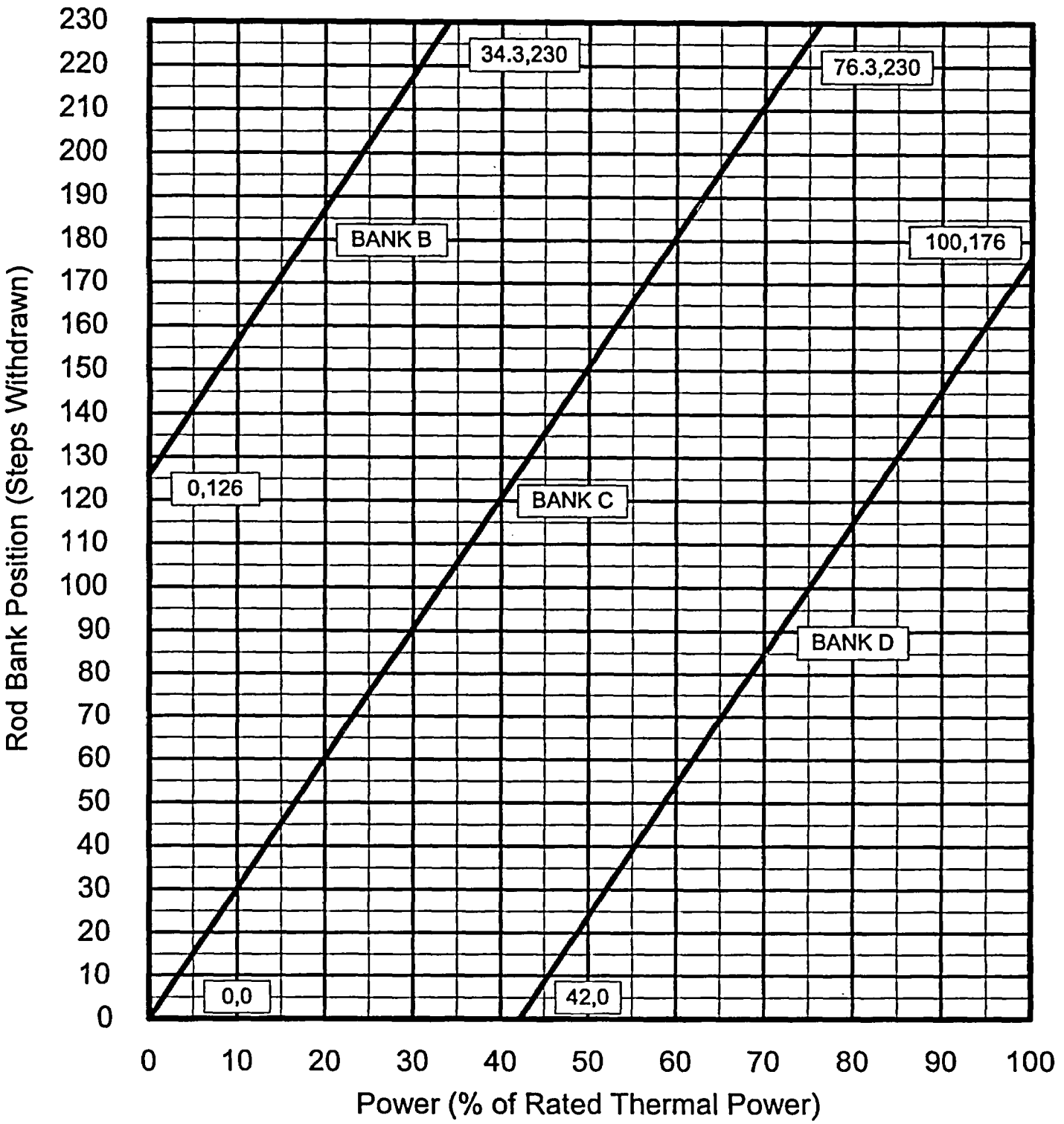
6.3 Interface Documents

RA-25, Control of Core Operating Limits Report

7.0 RECORDS AND DOCUMENTATION

None

ATTACHMENT 1
CONTROL ROD INSERTION LIMITS vs RATED THERMAL POWER
(Page 1 of 1)



ATTACHMENT 2

K(z) NORMALIZED $F_Q(z)$ AS A FUNCTION OF CORE HEIGHT

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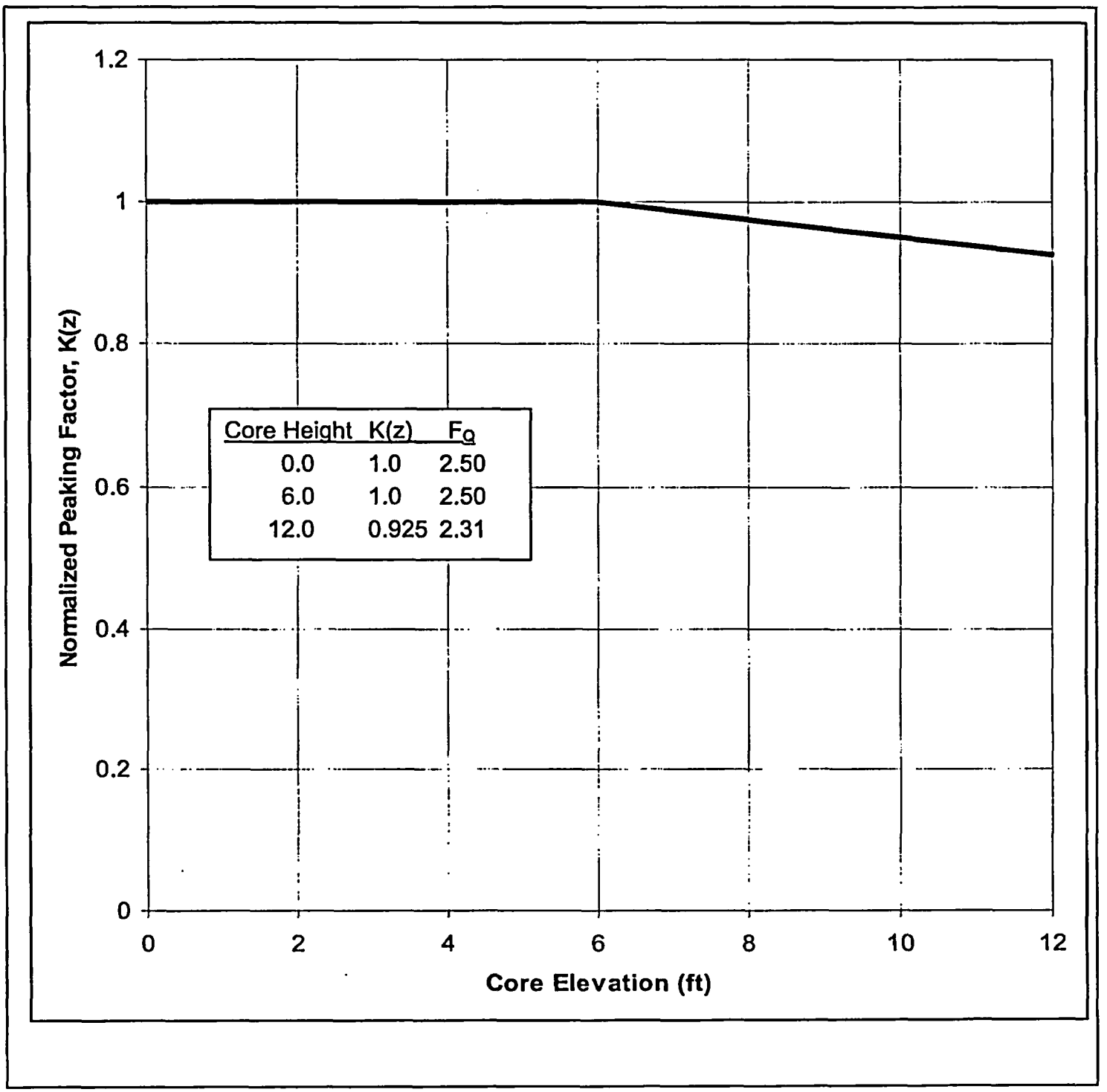
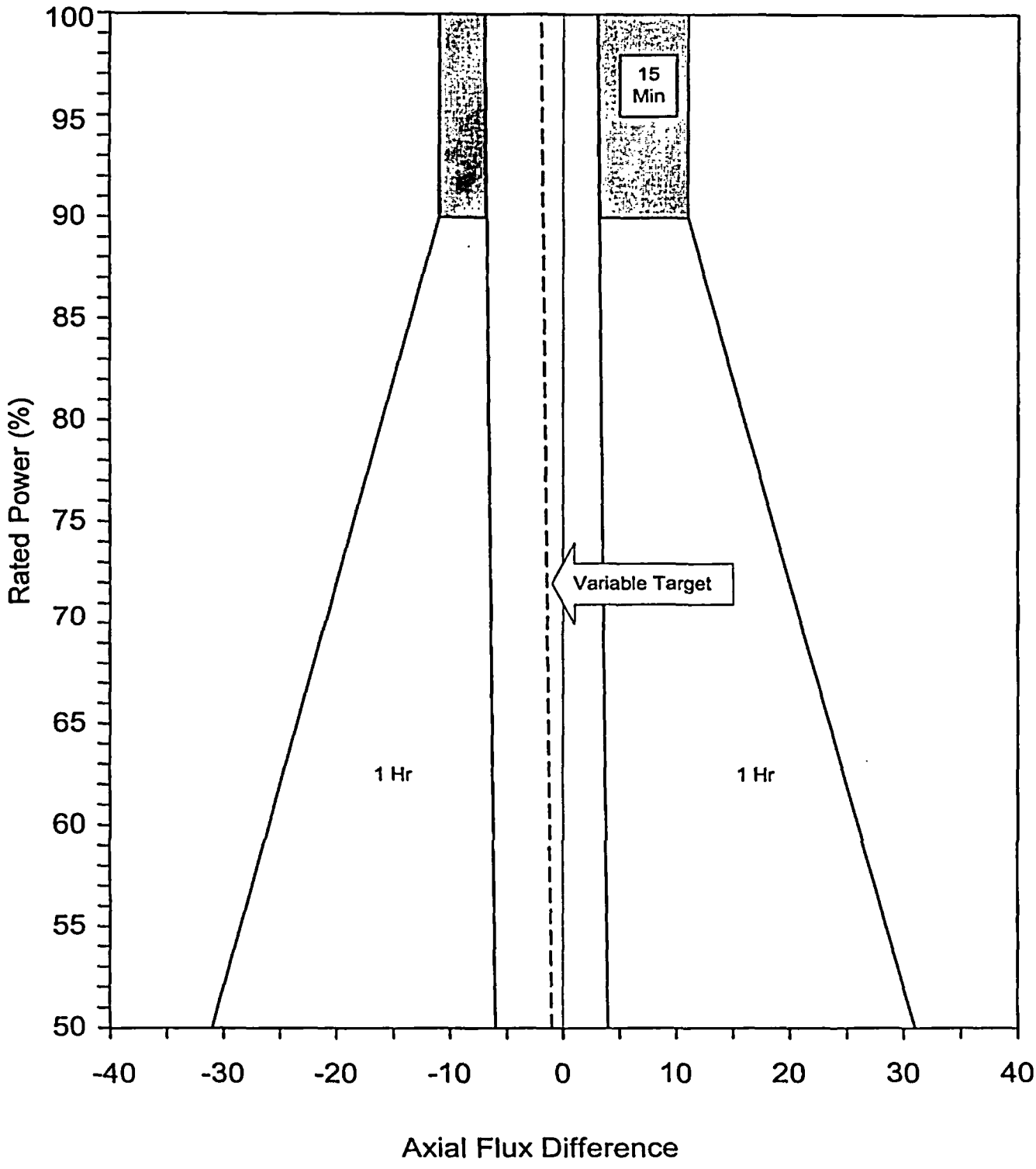
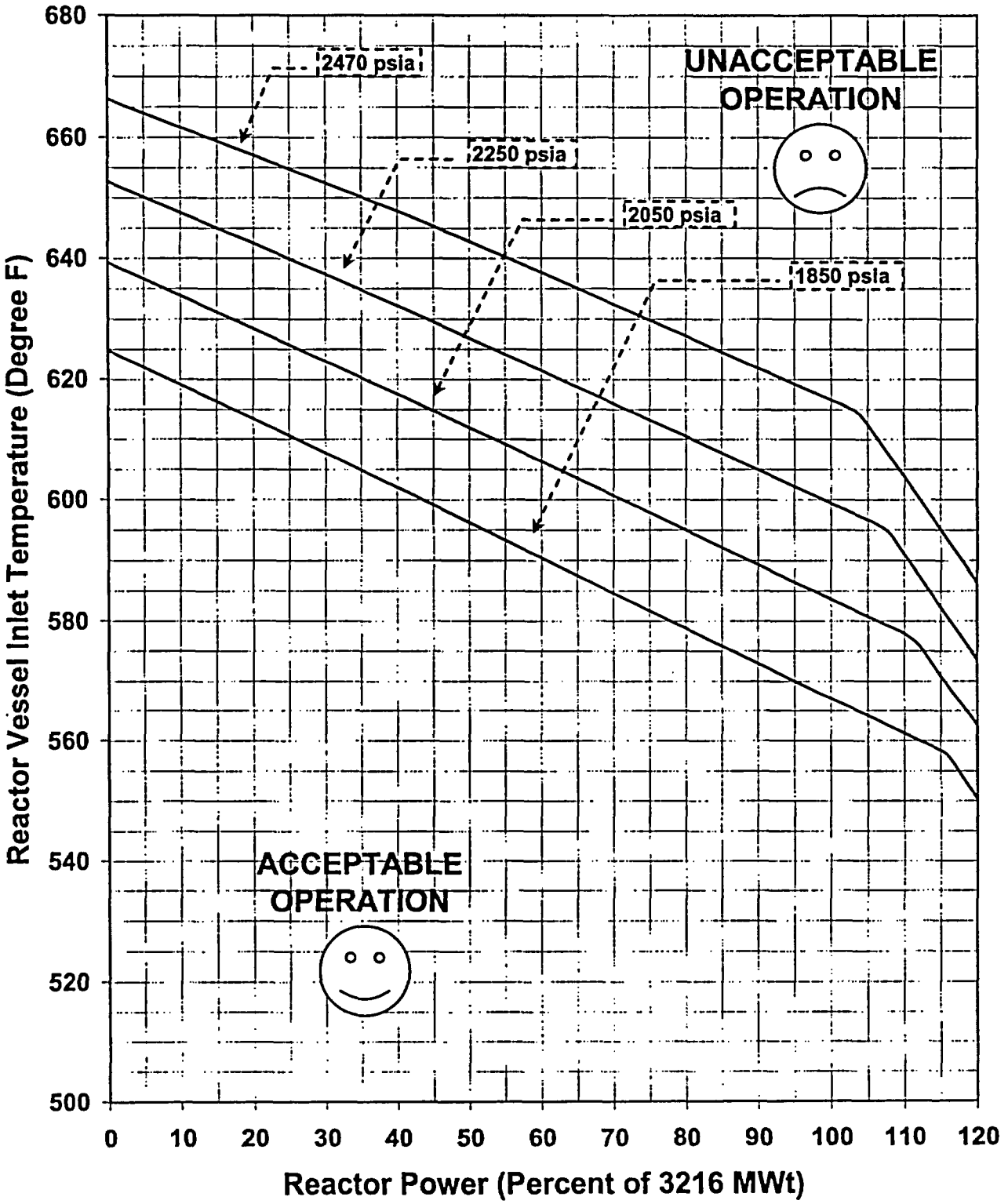


ATTACHMENT 3
AXIAL FLUX DIFFERENCE ENVELOPE LIMITS
(Page 1 of 1)



ATTACHMENT 4
REACTOR CORE SAFETY LIMIT – FOUR LOOPS IN OPERATION
(Page 1 of 1)



ATTACHMENT 5
OVERTEMPERATURE ΔT/ OVERPOWER ΔT
(Page 1 of 2)

The Overtemperature ΔT Function Allowable Value SHALL not exceed the following:

NOTE

For limitations on the maximum trip Setpoint, see Technical Specification 3.3.1.

$$\Delta T \leq \Delta T_o [K_1 - K_2 [(1 + \tau_1 s)/(1 + \tau_2 s)] (T_{avg} - T') + K_3 (P - P') - f_1(\Delta I)]$$

Where: ΔT is measured RCS ΔT, °F (measured by hot leg and cold leg RTDs).
ΔT_o is the loop specific indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T_{avg} is the measured RCS average temperature, °F.
T′ is the loop specific indicated T_{avg} at RTP, °F ≤ 572.0 °F.
P is the measured pressurizer pressure, psig
P′ is the nominal RCS operating pressure, ≥ 2235 psig

$K_1 \leq 1.26$ $K_2 \geq 0.022/°F$ $K_3 \geq 0.00070/psi$
$\tau_1 \geq 25.0$ sec $\tau_2 \leq 3.0$ sec

$f_1(\Delta I) =$ -4.00{15.75 + (qt - qb)} when qt - qb < - 15.75% RTP
0% of RTP when -15.75% RTP ≤ qt - qb ≤ 6.9% RTP
+3.33{(qt - qb) – 6.9} when qt - qb > 6.9% RTP

Where qt and qb are percent RTP in the upper and lower halves of the core, respectively, and qt + qb is the total THERMAL POWER in percent RTP.

ATTACHMENT 5
OVERTEMPERATURE ΔT/ OVERPOWER ΔT
(Page 2 of 2)

The Overpower ΔT Function Allowable Value SHALL not exceed the following:

$$\Delta T \leq \Delta T_o (K_4 - K_5 [(\tau_3 s)/(1 + \tau_3 s)](T_{avg}) - K_6(T_{avg} - T^{"})) - f_2(\Delta I)$$

Where: ΔT is measured RCS ΔT, °F (measured by hot leg and cold leg RTDs).
ΔT_o is the loop specific indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T_{avg} is the measured RCS average temperature, °F.
$T^{"}$ is the loop specific indicated T_{avg} at RTP, °F ≤ 572.0 °F.

$K_4 \leq 1.10$ $K_5 \geq 0.0175/°F$ for increasing T_{avg} $K_6 \geq 0.0015/°F$ when $T_{avg} > T^{"}$
$0/°F$ for decreasing T_{avg} $0/°F$ when $T_{avg} \leq T^{"}$

$\tau_3 \leq 10$ sec
$f_2(\Delta I) = 0$