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February 16, 2005

Re: Indian Point Unit 2
Docket No. 50-247
NL-05-022

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

Subject: Indian Point Unit 2 Cycle 17 Core Operating Limit Report (COLR)

Dear Sir:

In accordance with the Indian Point 2 Technical Specifications 5.6.5.d, enclosed is the Indian Point 2 COLR for Cycle 17.

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 Conroy
Manager, Licensing
Indian Point Energy Center

Enclosure #1 – Indian Point 2 COLR – Cycle 17

cc: next page

A001

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ENCLOSURE 1 TO NL-05-022

Indian Point 2 Cycle 17 COLR

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

Entergy
Nuclear Northeast

One Site, One Team, One Fleet
Indian Point Energy Center

Procedure Use Is:

- ☐ Continuous
- ☐ Reference
- ☑ Information

Control Copy: _____

Effective Date: 12/30/04

2-GRAPH-RPC-6, Revision: 08

CORE OPERATING LIMITS REPORT (COLR)

This procedure is excluded from further 1-100 Reviews

Approved By:

Procedure Sponsor, DM/Designee Date

Team Staff

Procedure Owner

Indian Point Operations

PARTIAL REVISION

Revision Summary

1.0 REASON FOR REVISION

1.1 Update document to reflect new Cycle 17 Core Operating Limits Report Revision 1 per Reactor Engineering request.

2.0 SUMMARY OF CHANGES

2.1 Modified Attachment 1 (Page 1 of 2) per Reactor Engineering Markup.

2.2 Modified Attachment 1 (Page 2 of 2) per Reactor Engineering Markup

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NOTE

The Technical Specification references shown next to each Factor OR Limit in this COLR, are there to identify the corresponding sections in the Technical Specifications, that refer to the COLR.

The data presented in this report applies to **Cycle 17 ONLY** and may **NOT** be used for other cycles of operation. Any technical change to this document requires a Safety Evaluation to be performed in accordance with 10 CFR 50.59.

TS 2.0 Safety Limits (SLs)

In MODE 1 AND 2, the combination of thermal power level, pressurizer pressure, and highest loop average coolant temperature SHALL NOT exceed the limits shown in Figure 1. The safety limit is exceeded IF the point defined by the combination of Reactor Coolant System average temperature AND power level is at any time above the appropriate pressure line.

TS 3.1.1 Shutdown Margin (SDM)

The shutdown margin SHALL be greater than OR equal to 1.3% Δk/k.

TS 3.1.3 Moderator Temperature Coefficient (MTC)

The MTC upper limit SHALL be < 0.0 Δk/k/°F at hot zero power.

The MTC lower limit SHALL be ≥ -36.5 pcm/F @ 300 ppm
≥ -43.0 pcm/F @ 60 ppm
≥ -45.5 pcm/F @ 0 ppm

Reference Graph RV-12 for cycle specific predicted MTC.

TS 3.1.5 Shutdown Bank Insertion Limits

The Shutdown Banks SHALL be fully withdrawn WHEN the Reactor is in MODE 1 AND MODE 2. Shutdown Banks with a group step counter demand position ≥ 221 steps are considered fully withdrawn because the bank demand position is above the top of the active fuel.

TS 3.1.6 Control Bank Insertion Limits

The Control Bank Insertion Limits for MODE 1 AND MODE 2 with $k_{eff} \geq 1.0$ are as indicated in Figure 2. Control Bank Insertion Limits apply to the step counter demand position.

TS 3.2.1 Heat Flux Hot Channel Factor (FQ(Z))

> **NOTE**
>
> K(Z) is the fraction given in Figure 3 AND Z is the core height location of F_Q.

IF $P > .5$, $F_Q(Z) \leq (2.50 / P) \times K(Z)$

IF $P \leq .5$, $F_Q(Z) \leq (5.00) \times K(Z)$

TS 3.2.2 Nuclear Enthalpy Rise Hot Channel Factor $F^N_{\Delta H}$

> **NOTE**
>
> P is the fraction of Rated Thermal Power (RTP) at which the core is operating.

$F^N_{\Delta H} \leq 1.70 \{ 1 + 0.3 (1 - P) \}$

TS 3.2.3 Axial Flux Difference (AFD) (Constant Axial Offset Control (CAOC) Methodology

The Indicated Axial Flux Difference limit is the Target Band; i.e., the Target ± 5%

The Axial Flux Difference Envelope Limits at 90 percent power are –11%, + 11% AND increase by –1% and +1%, for each 2% of rated power below 90% power, as indicated by Graph RV-10, Unit 2 Target Flux Values.

TS 3.3.1 RPS Instrumentation

1. Overtemperature ΔT — Allowable Value as referenced in Technical Specifications Table 3.3.1-1, Function 5, Note 1. Refer to Attachment 1

2. Overpower ΔT — Allowable Value as referenced in Technical Specifications Table 3.3.1-1, Function 6, Note 2. Refer to Attachment 1

TS 3.4.1 RCS Pressure, Temperature and Flow Departure From Nucleate Boiling (DNB) Limits

The following DNB related parameters are applicable in MODE 1:

a. Reactor Coolant System average $T_{avg} \leq 565.1°F$ and highest loop $T_{avg} < 568.1°F$

b. Pressurizer Pressure ≥ 2216 psia

c. Reactor Coolant System Total Flow Rate ≥ 348,300 gpm

TS 3.9.1 Refueling Boron Concentration

WHEN required by Technical Specification 3.9.1, the minimum boron concentration in the RCS, Refuel Canal AND Reactor Cavity SHALL be the more restrictive of either ≥ 2050 ppm OR that which is sufficient to provide a shutdown margin ≥ 5% Δk/k.

Attachment 1
(Page 1 of 2)

Overtemperature ΔT

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

NOTE

For limitations on the maximum trip setpoint see Tech Spec 3.3.1

$$\Delta T \le \Delta T_0 \left\{ K_1 - K_2 \frac{(1+\tau_1 s)}{(1+\tau_2 s)}[T - T'] + K_3 (P - P') - f_1(\Delta I) \right\}$$

Where: ΔT is measured RCS ΔT, °F (measured by hot leg and cold leg RTDs).
ΔT_0 is the loop specific indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T′ is the loop specific indicated T_{avg} at RTP, °F.

P is the measured pressurizer pressure, psig
P′ is the nominal RCS operating pressure, ≥ 2235 psig

$K_1 \le 1.22$ $K_2 \ge 0.020/°F$ $K_3 \ge 0.00070/psig$
$\tau_1 \ge 25$ sec $\tau_2 \le 3$ sec

$f_1(\Delta I) =$ $-1.97\ \{30 + (q_t - q_b)\}$ when $q_t - q_b \le -30\%$ RTP
0% of RTP when -30% RTP $< q_t - q_b \le 7\%$ RTP
$2.25\ \{(q_t - q_b) - 7\}$ when $q_t - q_b > 7\%$ RTP

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

Attachment 1
(Page 2 of 2)

Overpower ΔT

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

NOTE

For limitations on the maximum trip setpoint see Tech Spec 3.3.1

$$\Delta T \leq \Delta T_0 \left\{ K_4 - K_5 \frac{\tau_3 s}{(1+\tau_3 s)} T - K_6 (T - T'') - f_2(\Delta I) \right\}$$

Where: ΔT is measured RCS ΔT, °F.
ΔT_0 is the loop specific indicated ΔT at RTP, °F.
s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T'' is the loop specific indicated T_{avg} at RTP, °F.

$K_4 \leq 1.074$

$K_5 \geq 0.0188$/°F for increasing T_{avg}
0/°F for decreasing T_{avg}

$K_6 \geq 0.0015$/°F when $T > T''$
0/°F when $T \leq T''$

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

Figure 1
Reactor Core Safety Limit – Four Loops in Operation

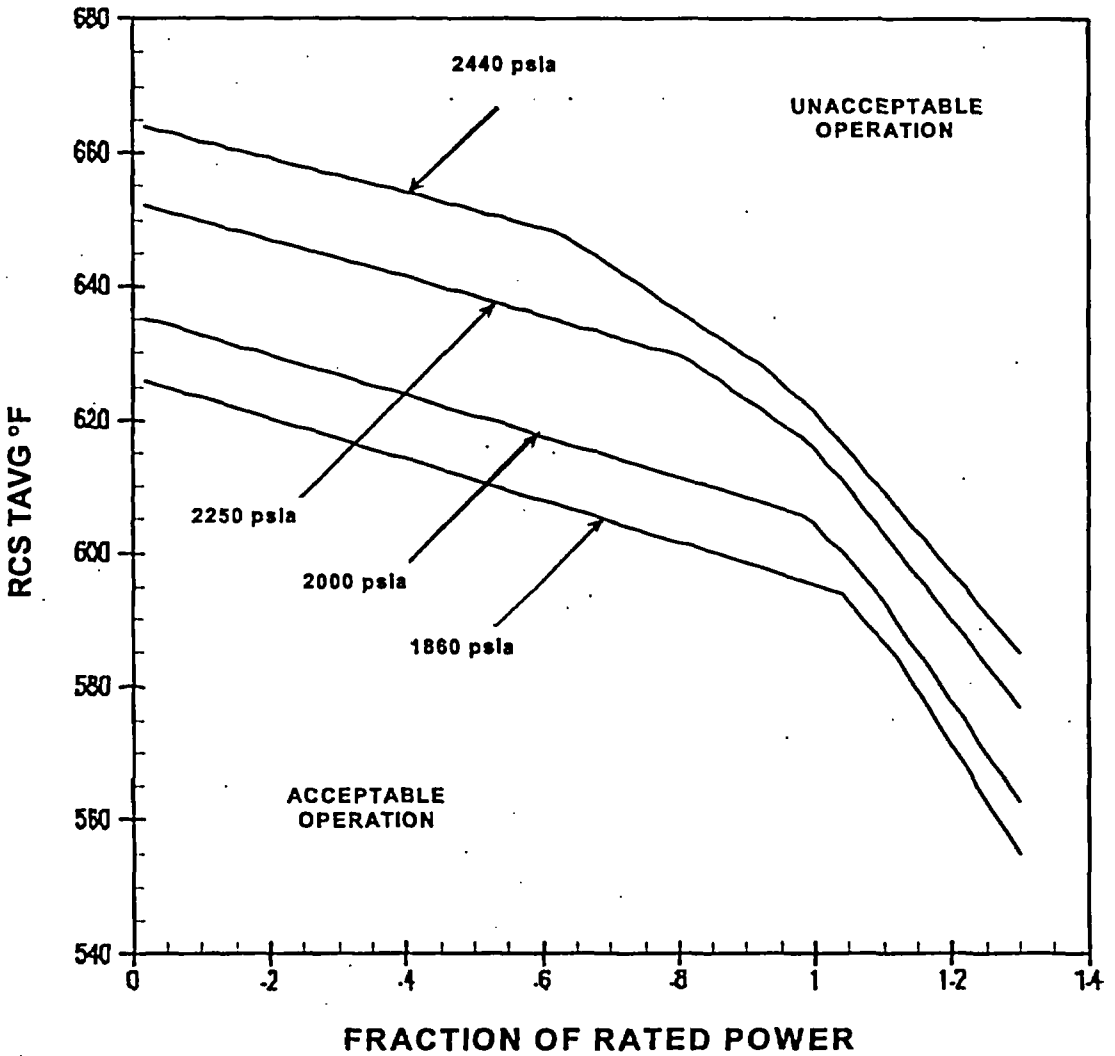

Figure 2
Rod Bank Insertion Limits
(Four Loop Operation)
100 Step Overlap

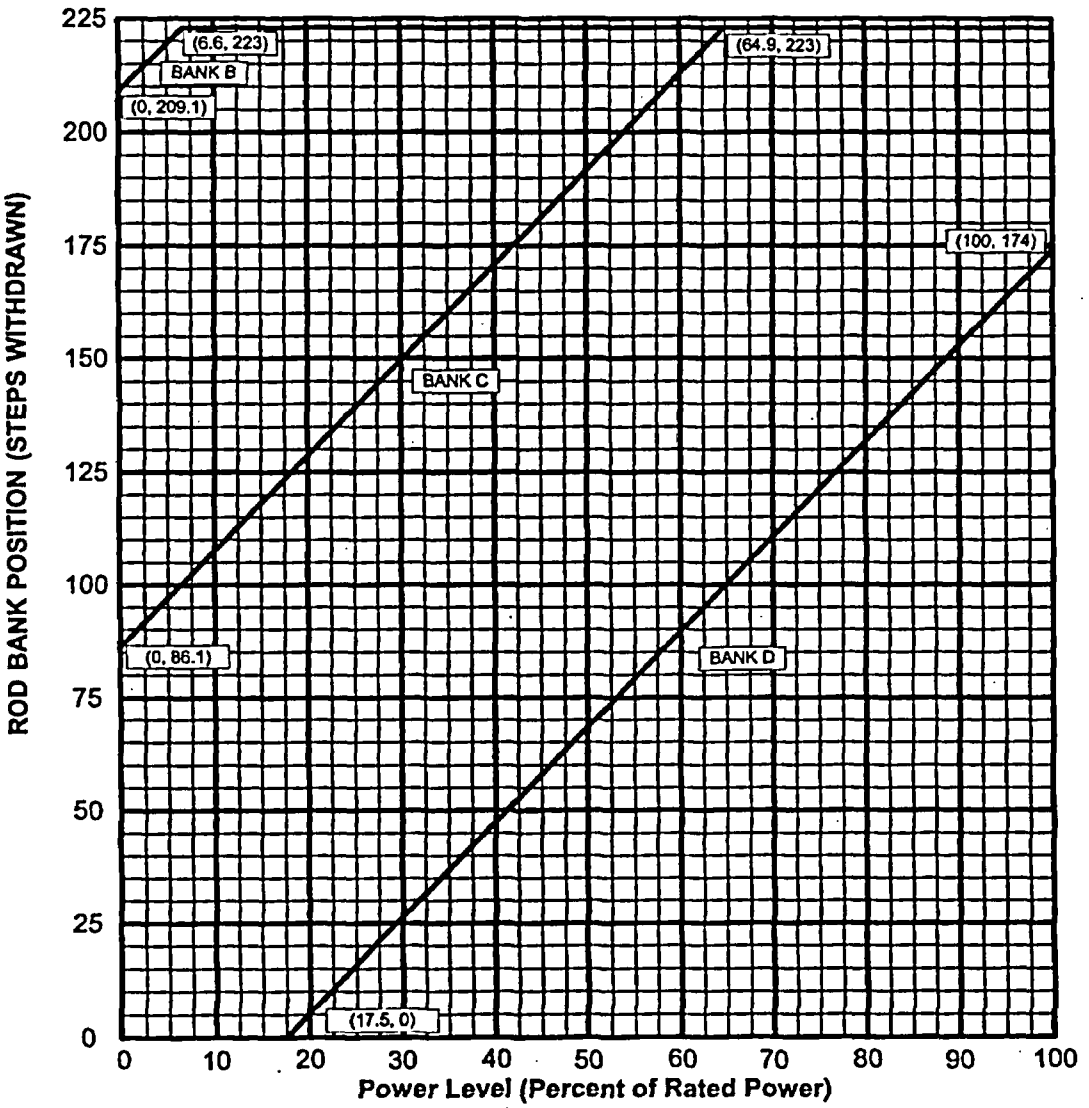
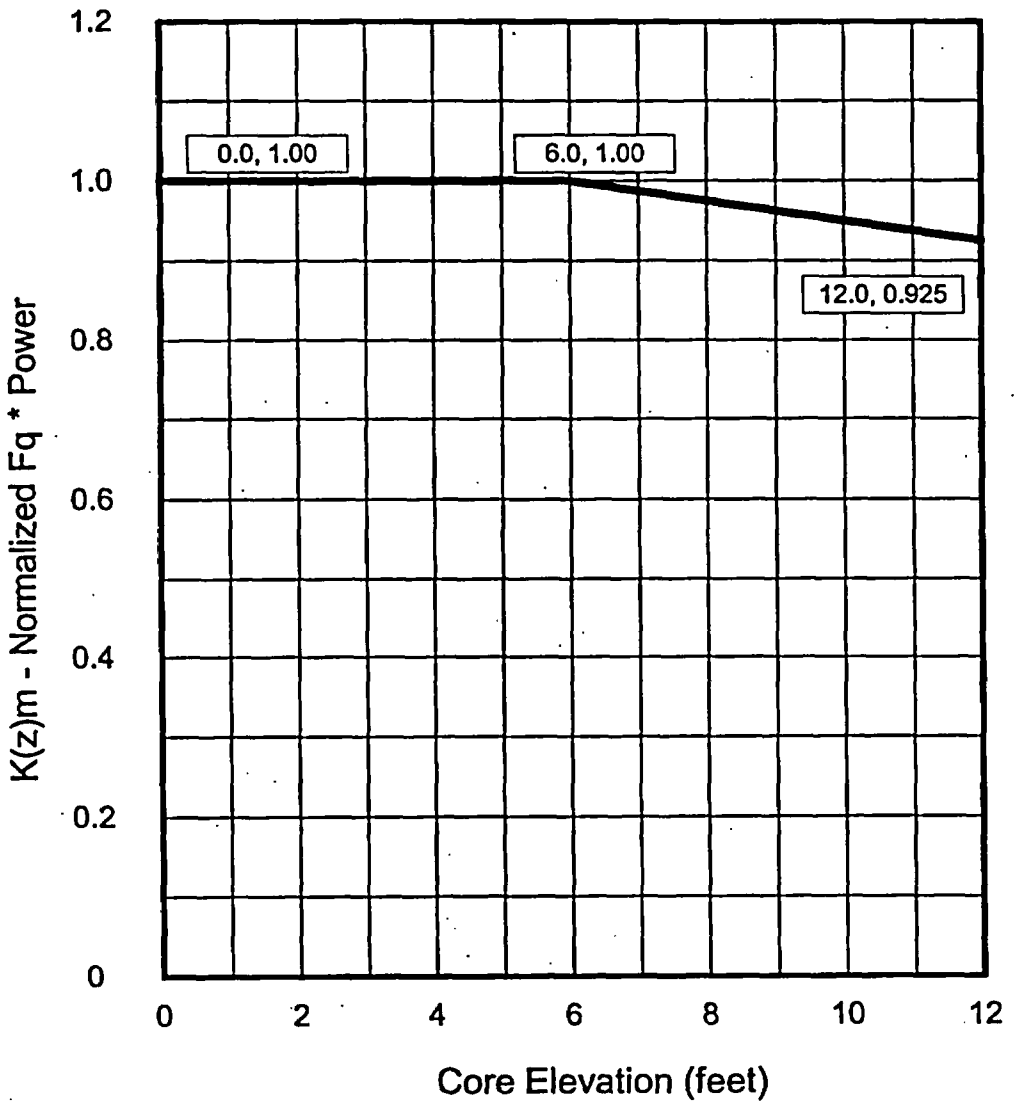
Figure 3
Hot Channel Factor Normalized Operating Envelope
(For SG Tube Plugging up to 10%)