FPL

APR 1 4 2016

L-2016-081
10 CFR 50.36

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Unit 4
Docket No. 50-251
Core Operating Limits Report

In accordance with Technical Specification 6.9.1.7, the attached Core Operating Limits Report (COLR) is provided for Turkey Point Unit 4. The COLR is applicable for Unit 4 Cycle 29.

Should there be any questions, please contact Mr. Mitch Guth, Licensing Manager, at 305-246-6698.

Sincerely,

Thomas Summers
Site Vice President
Turkey Point Nuclear Plant

Attachment

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

A001
NRR

# Turkey Point Unit 4 Cycle 29
# Core Operating Limits Report (COLR)

# TURKEY POINT UNIT 4 CYCLE 29 COLR

## 1.0 INTRODUCTION

This Core Operating Limits Report (COLR) for Turkey Point Unit 4 Cycle 29 has been prepared in accordance with the requirements of Technical Specification 6.9.1.7.

The Technical Specifications (TS) affected by this report are listed below with the section and page for each one of the TS addressed in this COLR document.

# TURKEY POINT UNIT 4 CYCLE 29 COLR

## 2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in the Introduction are presented below and listed sequentially by Technical Specification (TS). These limits have been developed using the NRC-approved methodologies specified in TS 6.9.1.7.

### 2.1 Reactor Core Safety Limits – Three Loops in Operation (TS 2.1.1)

- Figure A1(page 14B-A7) — In Modes 1 and 2, the combination of Thermal Power, reactor coolant system highest loop average temperature and pressurizer pressure shall not exceed the limits in Figure A1.

### 2.2 Reactor Trip System Instrumentation Setpoints (TS 2.2.1)

NOTE 1 on TS Table 2.2-1 Overtemperature $\Delta T$

- $\tau_1 = 0s$, $\tau_2 = 0s$ — Lead/Lag compensator on measured $\Delta T$
- $\tau_3 = 2s$ — Lag compensator on measured $\Delta T$
- $K_1 = 1.31$
- $K_2 = 0.023/°F$
- $\tau_4 = 25s$, $\tau_5 = 3s$ — Time constants utilized in the lead-lag compensator for $T_{avg}$
- $\tau_6 = 2s$ — Lag compensator on measured $T_{avg}$
- $T' \leq 583.0\ °F$ — Indicated Loop $T_{avg}$ at RATED THERMAL POWER
- $K_3 = 0.00116/psi$
- $P' \geq 2235$ psig — Nominal RCS operating pressure
- $f_1(\Delta I) = 0$ for $q_t - q_b$ between – 18% and + 7%

  For each percent that the magnitude of $q_t - q_b$ exceeds – 18%, the $\Delta T$ Trip Setpoint shall be automatically reduced by 3.51% of its value at RATED THERMAL POWER; and

  For each percent that the magnitude of $q_t - q_b$ exceeds + 7%, the $\Delta T$ Trip Setpoint shall be automatically reduced by 2.37% of its value at RATED THERMAL POWER.

  Where $q_t$ and $q_b$ are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER.

**TURKEY POINT UNIT 4 CYCLE 29 COLR**

NOTE 2 on TS Table 2.2-1 Overtemperature ΔT (Not affected by COLR, included for completeness)

The Overtemperature ΔT function Allowable Value shall not exceed the nominal trip setpoint by more than 0.5% ΔT span for the ΔT channel, 0.2% ΔT span for the Pressurizer Pressure channel, and 0.4% ΔT span for the f(ΔI) channel. No separate Allowable Value is provided for $T_{avg}$ because this function is part of the ΔT value.

NOTE 3 on TS Table 2.2-1 Overpower ΔT

- $K_4 = 1.10$
- $K_5 \geq 0.0/°F$ For increasing average temperature
- $K_5 = 0.0$ For decreasing average temperature
- $\tau_7 \geq 0$ s Time constants utilized in the lead-lag compensator for $T_{avg}$
- $K_6 = 0.0016/°F$ For T > T"
- $K_6 = 0.0$ For T ≤ T"
- T" ≤ 583.0°F Indicated Loop $T_{avg}$ at RATED THERMAL POWER
- $f_2(\Delta I) = 0$ For all ΔI

NOTE 4 on TS Table 2.2-1 Overpower ΔT (Not affected by COLR, included for completeness)
The Overpower ΔT function Allowable Value shall not exceed the nominal trip setpoint by more than 0.5% ΔT span for the ΔT channel. No separate Allowable Value is provided for $T_{avg}$ because this function is part of the ΔT value.

## 2.3 Shutdown Margin Limit for MODES 1, 2, 3 and 4 (TS 3.1.1.1)

- Figure A2 (page 14B-A8)

## 2.4 Shutdown Margin Limit for MODE 5 (TS 3.1.1.2)

- ≥ 1.77% Δk/k

# TURKEY POINT UNIT 4 CYCLE 29 COLR

## 2.5 Moderator Temperature Coefficient (MTC) (TS 3.1.1.3)

- $\leq + 5.0 \times 10^{-5}$ Δk/k/°F — BOL, HZP, ARO, and from HZP to 70% Rated Thermal Power (RTP)
- From 70% RTP to 100% RTP the MTC decreasing linearly from $\leq + 5.0 \times 10^{-5}$ Δk/k/°F to $\leq 0.0 \times 10^{-5}$ Δk/k/°F
- Less negative than $- 41.0 \times 10^{-5}$ Δk/k/°F — EOL, RTP, ARO

## 2.6 MTC Surveillance at 300 ppm (TS 4.1.1.3)

- Less negative than $- 35.0 \times 10^{-5}$ Δk/k/°F — Within 7 EFPD of reaching equilibrium boron concentration of 300 ppm.

## 2.7 Analog Rod Position Indication System (TS 3.1.3.2)

- Figure A3 (page 14B-A9) — The All Rods Out (ARO) position for all shutdown Banks and Control Banks is defined to be 229 steps withdrawn.

## 2.8 Control Rod Insertion Limits (TS 3.1.3.6)

- Figure A3 (page 14B-A9) — The control rod banks shall be limited in physical insertion as specified in Figure A3 for ARO =229 steps withdrawn.

## 2.9 Axial Flux Difference (TS 3.2.1)

- Figure A4 (page 14B-A10)

## 2.10 Heat Flux Hot Channel Factor $F_Q(Z)$ (TS 3.2.2)

- $[F_Q]^L = 2.30$
- K(z) = 1.0 — For 0' $\leq$ z $\leq$ 12' where z is core height in ft

## 2.11 Nuclear Enthalpy Rise Hot Channel Factor (TS 3.2.3)

- $F_{\Delta H}^{RTP} = 1.600$ — $PF_{\Delta H} = 0.3$

## TURKEY POINT UNIT 4 CYCLE 29 COLR

### 2.12 DNB Parameters (TS 3.2.5)

- RCS $T_{avg} \leq 585.0^{\circ}F$
- Pressurizer Pressure $\geq$ 2204 psig

## TURKEY POINT UNIT 4 CYCLE 29 COLR

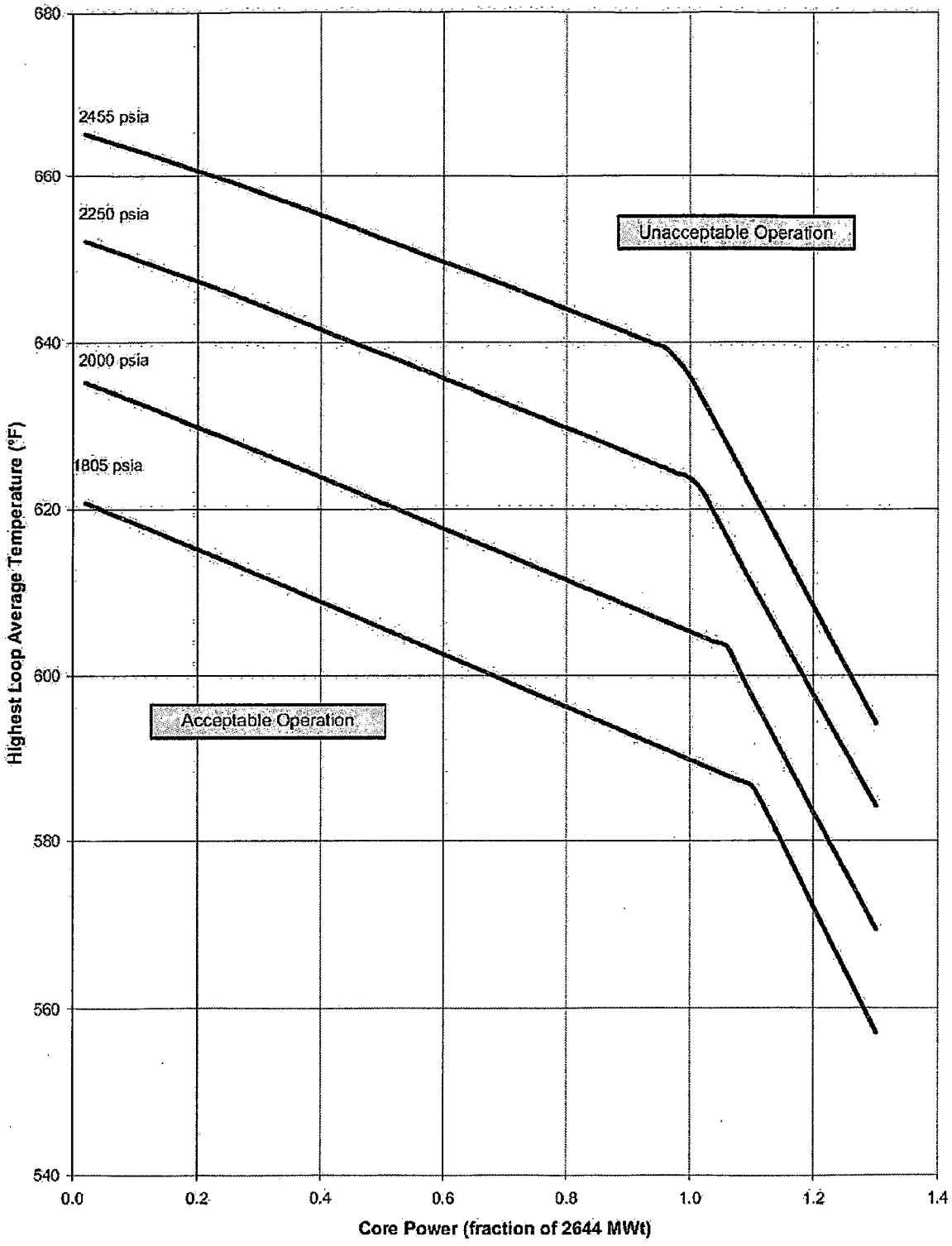
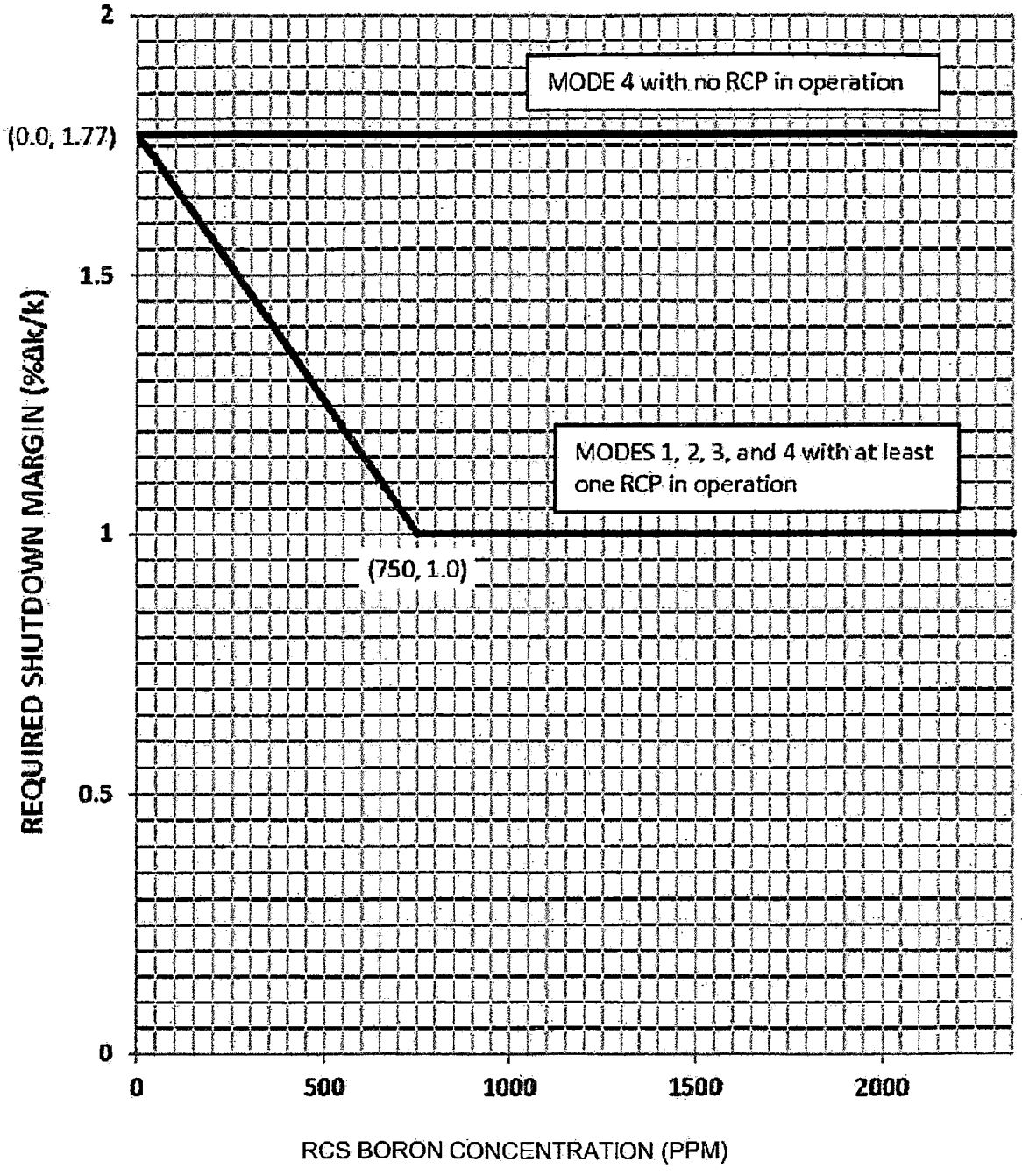



**FIGURE A1 Reactor Core Safety Limit – Three Loops in Operation**

## TURKEY POINT UNIT 4 CYCLE 29 COLR

## FIGURE A2

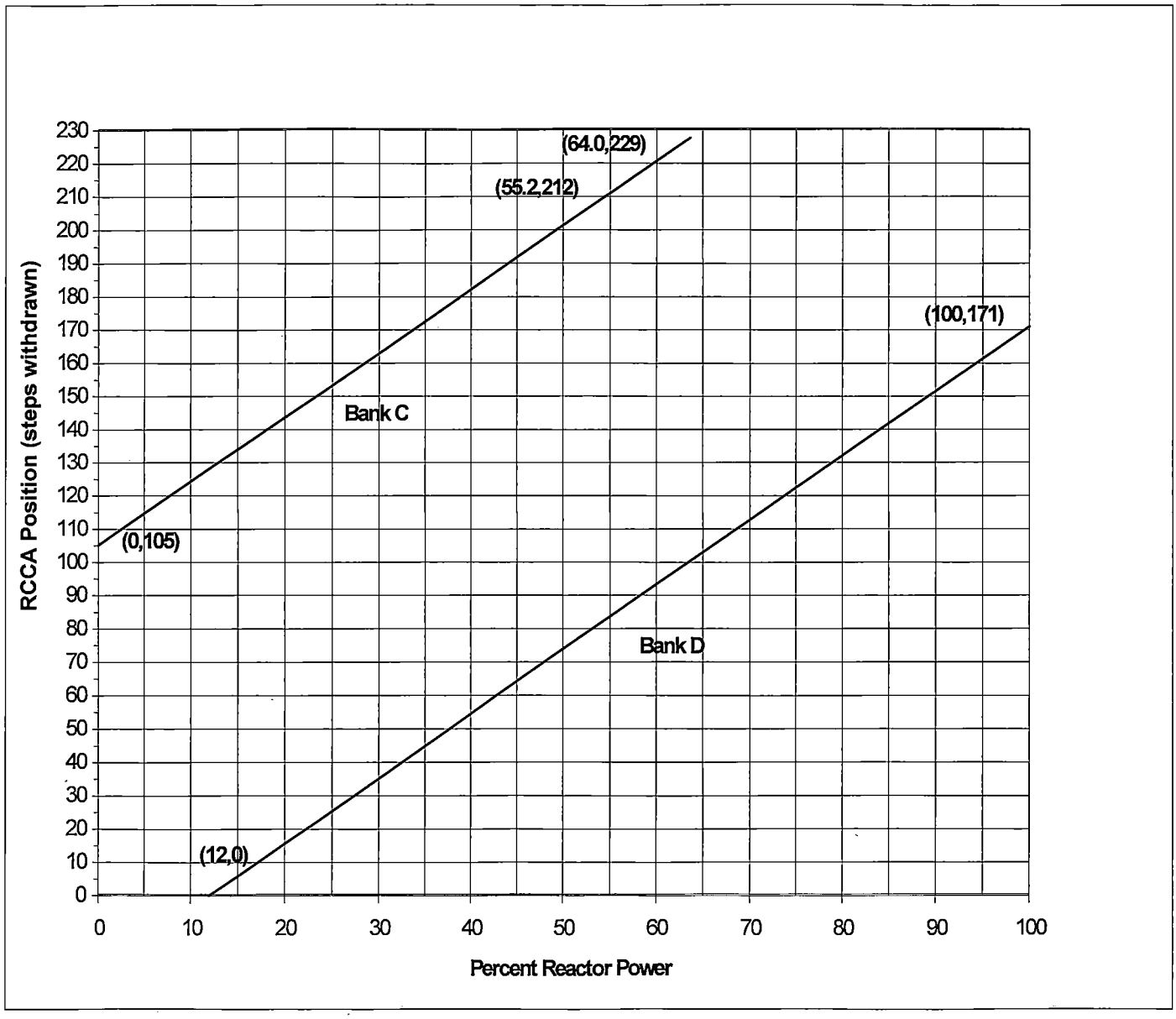
**Required Shutdown Margin vs Reactor Coolant Boron Concentration**



TURKEY POINT UNIT 4 CYCLE 29 COLR

## FIGURE A3

### Turkey Point Unit 4 Cycle 29 Rod Insertion Limits vs Thermal Power
### ARO = 229 Steps Withdrawn, Overlap = 101 Steps



TURKEY POINT UNIT 4 CYCLE 29 COLR

## FIGURE A4

### Axial Flux Difference as a Function of Rated Thermal Power
### Turkey Point Unit 4 Cycle 29