

Fifth Edition

**ASME
STEAM
TABLES**

CALVERT CLIFFS NUCLEAR POWER PLANT

CORE OPERATING LIMITS REPORT

for

UNIT 1, CYCLE 15

REVISION 1

Timothy A. Scheerer 4/12/00
RESPONSIBLE ENGINEER / DATE

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PRINCIPAL ENGINEER - NEU / DATE

CYCLE SPECIFIC LIMITS FOR UNIT 1, CYCLE 15

3.1.1 Shutdown Margin (SDM) (SR 3.1.1.1)

T_{avg} > 200 °F - Modes 3 and 4:

The shutdown margin shall be equal to or greater than the limit line of COLR Figure 3.1.1.

T_{avg} ≤ 200 °F - Mode 5:

The shutdown margin shall be $\geq 3.0\% \Delta\rho$.

3.1.3 Moderator Temperature Coefficient (MTC) (SR 3.1.3.2)

The Moderator Temperature Coefficient (MTC) shall be less negative than $-3.0 \times 10^{-4} \Delta\rho/^\circ\text{F}$ at rated thermal power.

3.1.4 Control Element Assembly (CEA) Alignment (Action 3.1.4.B.1)

The allowable time to realign a CEA may be provided by the full core power distribution monitoring system (Better Axial Shape Selection System - BASSS) or COLR Figure 3.1.4, "Allowable Time to Realign CEA Versus Initial Total Integrated Radial Peaking Factor (F_r^T)."

If COLR Figure 3.1.4 is used, the pre-misaligned F_r^T value used to determine the allowable time to realign the CEA shall be the latest measurement taken within 5 days prior to the CEA misalignment. If no measurements have been taken within 5 days prior to the misalignment and the full core power distribution monitoring system is unavailable then the time to realign is zero (0) minutes.

3.1.6 Regulating Control Element Assembly (CEA) Insertion Limits (SR 3.1.6.1 and SR 3.1.6.2)

The regulating CEA groups insertion limits are shown on COLR Figure 3.1.6.

3.2.1 Linear Heat Rate (LHR) (SR 3.2.1.2 and SR 3.2.1.4)

The linear heat rate shall not exceed the limits shown on COLR Figure 3.2.1-1.

The axial shape index power dependent control limits are given in COLR Figure 3.2.1-2.

When using the excore detector monitoring system (SR 3.2.1.2):

The alarm setpoints are equal to the ASI limits, therefore when the alarms are adjusted, they provide indication to the operator when ASI is not with the limits.

The maximum allowable fraction of rated thermal power vs. F_{xy}^T is shown in COLR Figure 3.2.1-3.

The axial shape index alarm setpoints are shown on COLR Figure 3.2.1-2.

When using the incore detector monitoring system (SR 3.2.1.4):

The alarm setpoints are adjusted to protect the Linear Heat Rate limits shown on COLR Figure 3.2.1-1 and uncertainty factors are appropriately included in the setting of these alarms.

CYCLE SPECIFIC LIMITS FOR UNIT 1, CYCLE 15

The uncertainty factors for the incore detector monitoring system are:

1. A measurement-calculational uncertainty factor of 1.062,
2. An engineering uncertainty factor of 1.03,
3. A linear heat rate uncertainty factor of 1.002 due to axial fuel densification and thermal expansion, and
- 4.a For measured thermal power less than or equal to 50 percent but greater than 20 percent of rated full core power a thermal power measurement uncertainty factor of 1.035.
- 4.b For measured thermal power greater than 50 percent of rated full core power a thermal power measurement uncertainty factor of 1.020.

3.2.2 Total Planar Radial Peaking Factor (F_{xy}^T) (SR 3.2.1.1 and SR 3.2.2.1)

The calculated value of F_{xy}^T shall be limited to ≤ 1.65 .

The allowable combination of thermal power and F_{xy}^T are shown on COLR Figure 3.2.2.

3.2.3 Total Integrated Radial Peaking Factor (F_r^T) (SR 3.2.3.1)

The calculated value of F_r^T shall be limited to ≤ 1.65 .

The allowable combinations of thermal power and F_r^T are shown on COLR Figure 3.2.3.

3.2.5 Axial Shape Index (ASI) (SR 3.2.5.1)

The axial shape index and thermal power shall be maintained within the limits established by the Better Axial Shape Selection System (BASSS) for CEA insertions of the lead bank of < 55% when BASSS is operable, or within the limits of COLR Figure 3.2.5 for CEA insertions specified by COLR Figure 3.1.6.

3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Reactor Trip Setpoints) (TS Table 3.3.1-1)

The Axial Power Distribution - High trip setpoint and allowable values are given in COLR Figure 3.3.1-1.

The Thermal Margin/Low Pressure (TM/LP) trip setpoint is given in COLR Figures 3.3.1-2 and 3.3.1-3. The allowable values are to be not less than the larger of (1) 1875 psia or (2) the value calculated from COLR Figures 3.3.1-2 and 3.3.1-3.

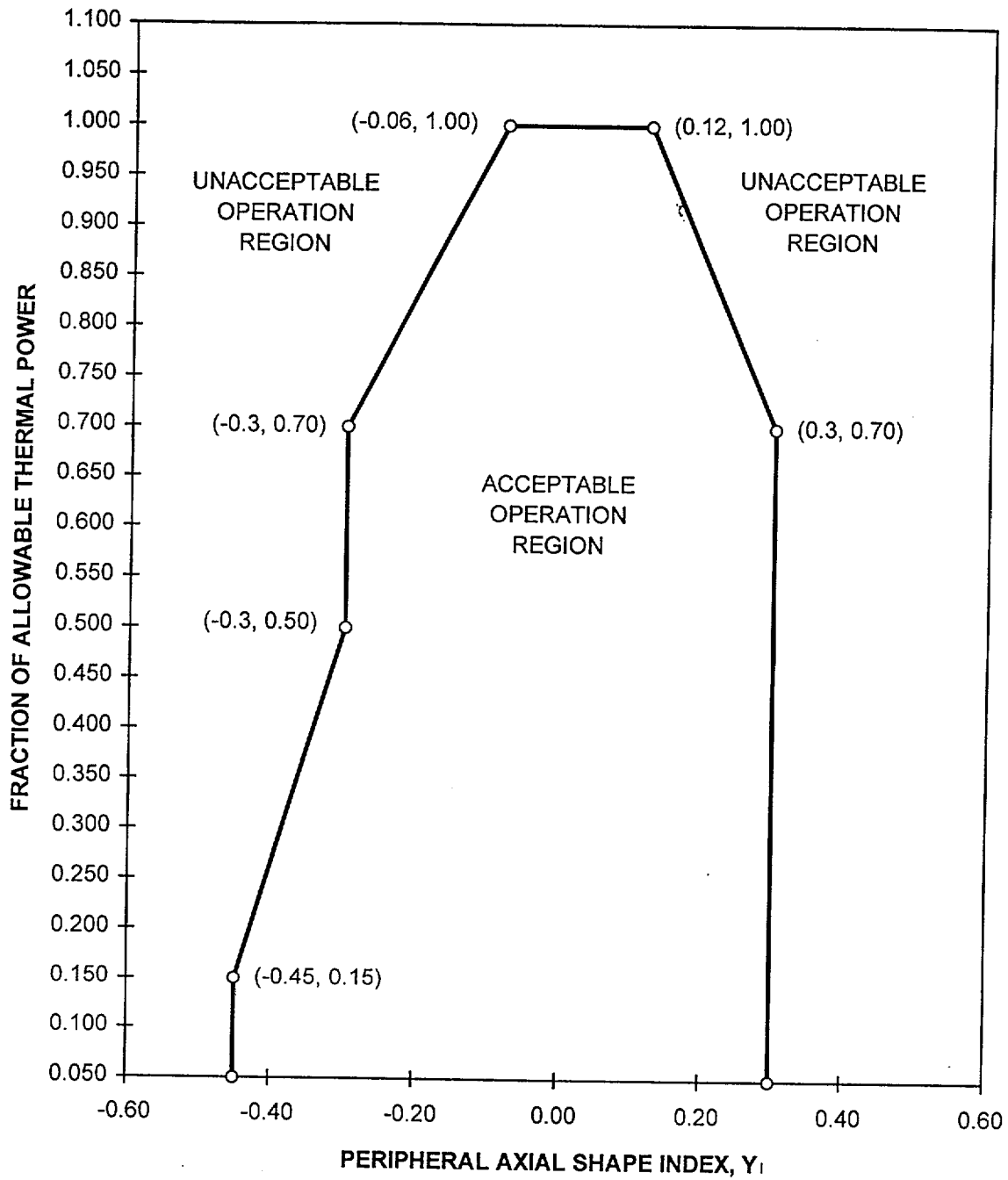


Figure 3.2.1-2
Linear Heat Rate Axial Flux Offset Control Limits

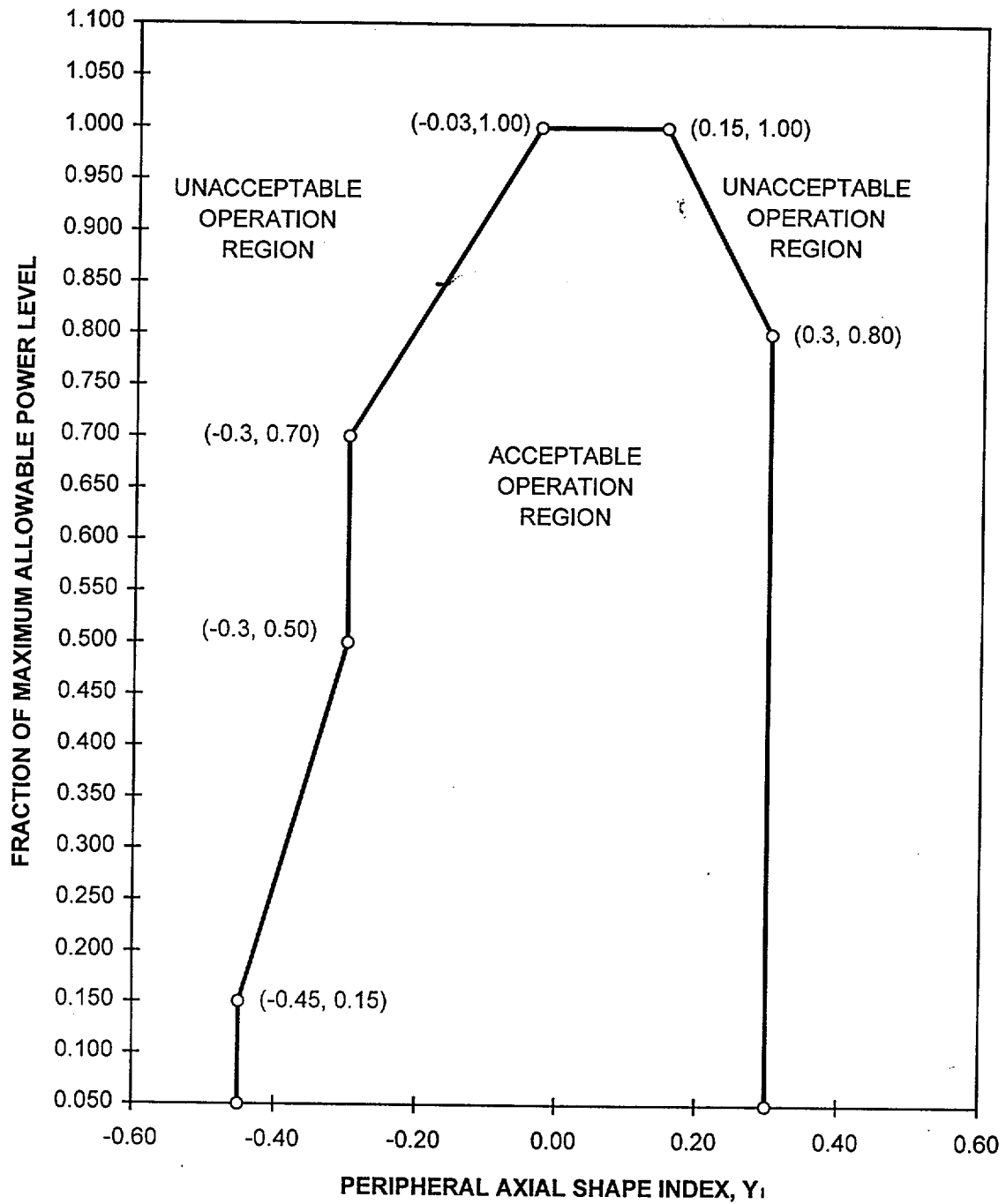


Figure 3.2.5
DNB Axial Flux Offset Control Limits

CALVERT CLIFFS NUCLEAR POWER PLANT

UNIT ONE AND TWO

OI-2B

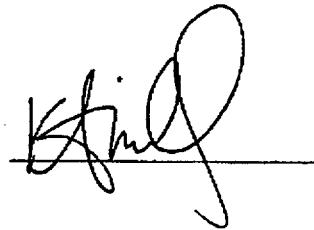
CVCS BORATION, DILUTION AND MAKEUP OPERATIONS

REVISION 23

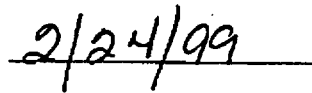
SAFETY RELATED

MULTIPLE USE

Approval Authority:

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Effective Date:

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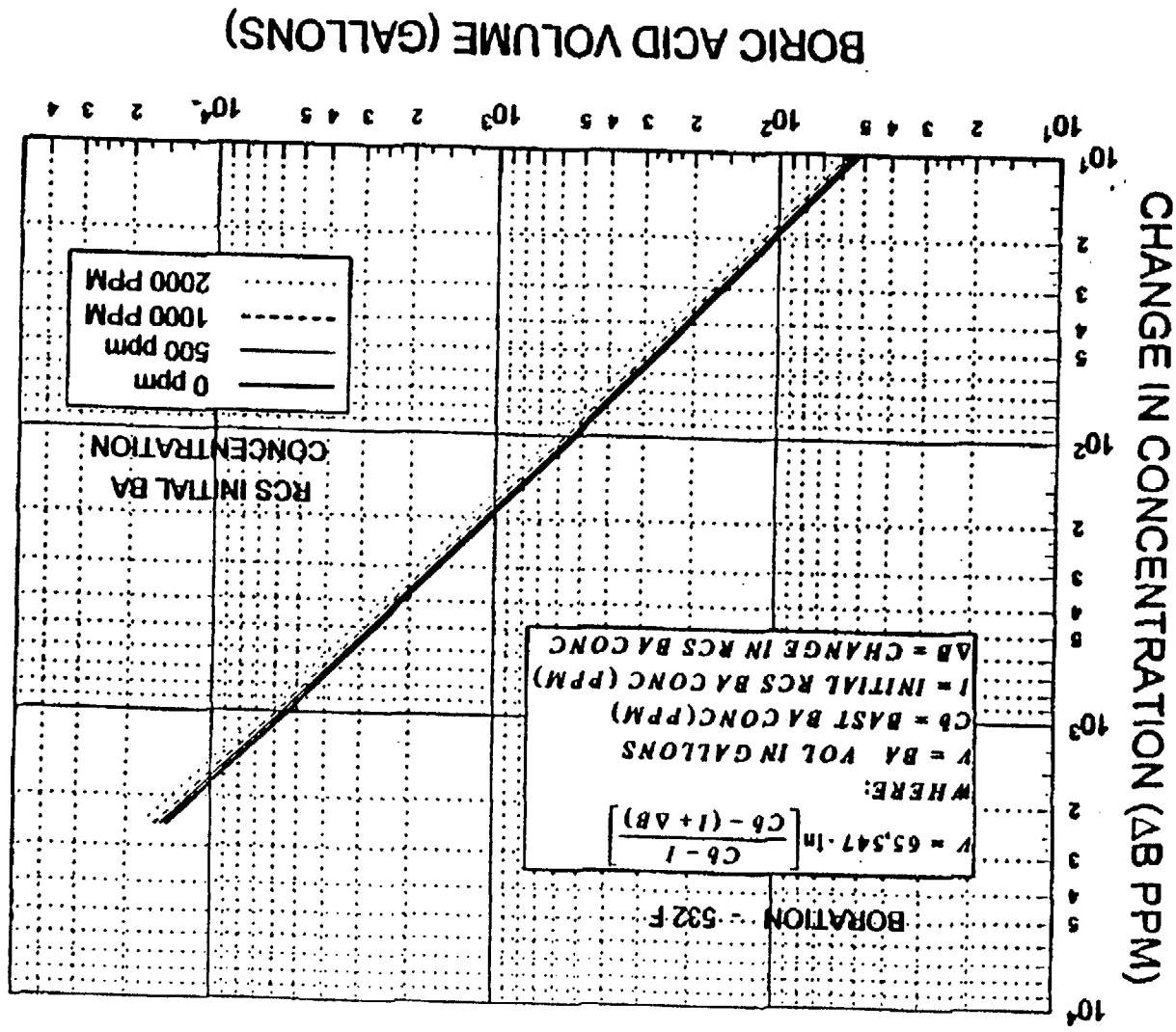
CVCS BORATION, DILUTION AND MAKEUP OPERATIONS

BORATION VOLUME (GREATER THAN or EQUAL TO 532° F)

NOTE

Based on 7 1/4 % in BAST.

To convert BAST boron concentration from % to PPM, multiply the % by 1748.41.

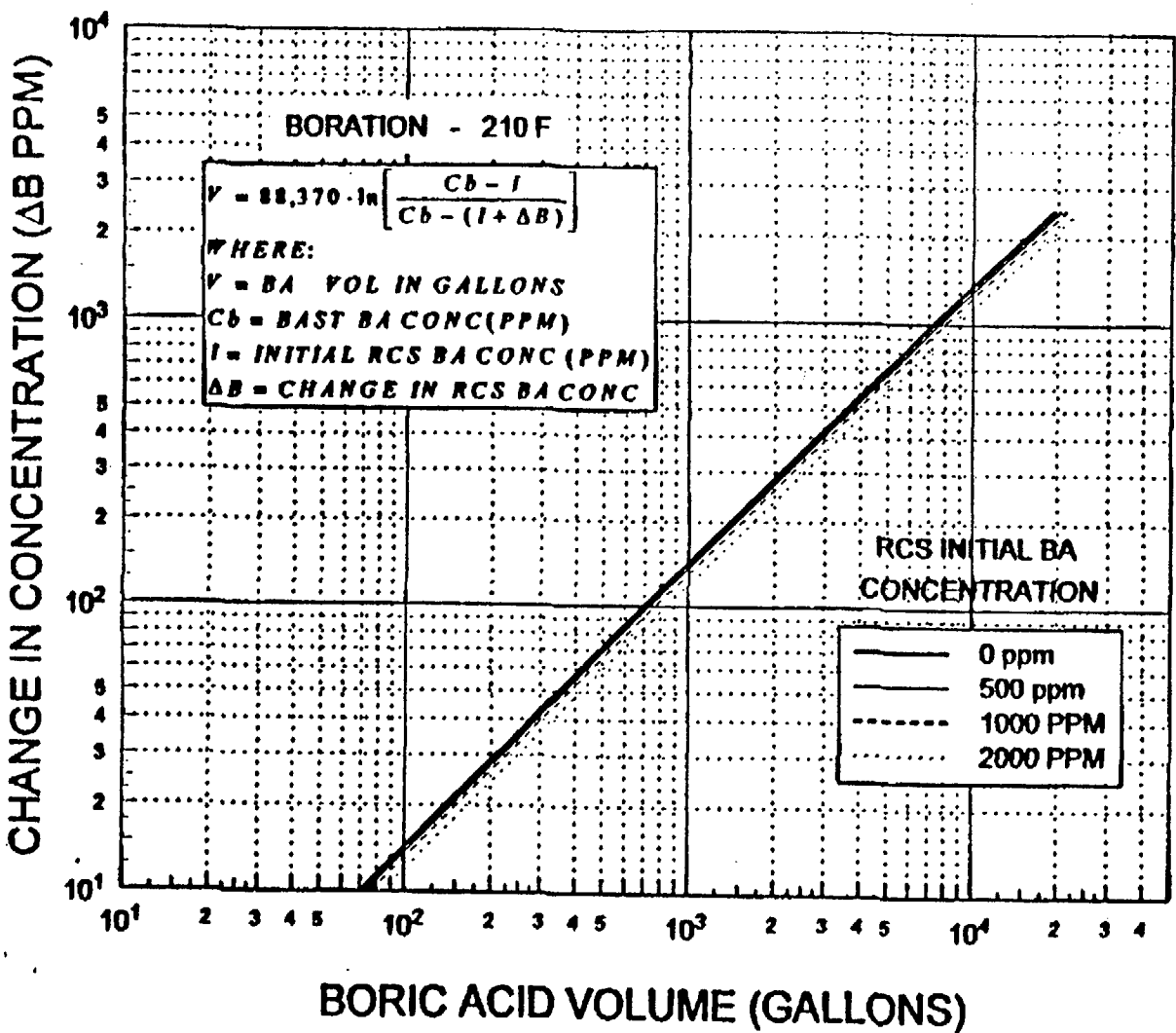


BORATION VOLUME (LESS THAN 532° F)

NOTE

Based on 7 1/4 % in BAST.

To convert BAST boron concentration from % to PPM, multiply the % by 1748.41.



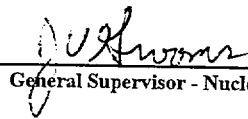
Calvert Cliffs Nuclear Power Plant

TECHNICAL REQUIREMENTS MANUAL (TRM)

Revision 3

Sponsor: General Supervisor - Nuclear Operations Support

Approved



General Supervisor - Nuclear Operations Support

13/20/00

Date

15.1.4 CONTROL ELEMENT ASSEMBLY (CEA) POSITION INDICATION**NORMAL
CONDITION****TNC 15.1.4** Two CEA position indicator channels shall be operable for each shutdown and regulating CEA.

Any two of the following three CEA position indication channels are allowed to be operable to satisfy this TNC:

- a. Control element assembly voltage divider reed switch position indicator channel;
- b. Control element assembly "Full Out" or "Full In" reed switch position indicator channel as verified by actuation of the applicable position indicator;
- c. Control element assembly pulse counting position indicator channel.

The only time the CEA "Full In" or "Full Out" reed switch position indicator channels can be considered operable for one of the three CEA Position Indicator Channels is when the CEAs are either fully withdrawn or fully inserted.

APPLICABILITY Modes 1 and 2.**CONTINGENCY MEASURES**

Nonconformance	Contingency Measures	Restoration Time
A. One or more CEA(s) per group having its voltage divider reed switch position indicator channel inoperable and either the "Full out" <u>OR</u> "Full in" reed switch position indicator channel inoperable.	A.1 Restore the position indicator channel(s) to operable status. <u>OR</u> A.2.1 Reduce thermal power to $\leq 70\%$ rated thermal power. If negative reactivity insertion is required to reduce thermal power, boration shall be used. <u>AND</u> after power is reduced $\leq 70\%$ rated thermal power.	6 hours
A. continued	A.2.2.1 Fully withdraw CEA group(s) with inoperable position indicator(s) and verify the CEA(s) to be fully withdrawn via a "Full Out" indicator. <u>OR</u>	10 hours

15.1.4 CONTROL ELEMENT ASSEMBLY (CEA) POSITION INDICATION - Continued

CONTINGENCY MEASURES - Continued

Nonconformance	Contingency Measures	Restoration Time
A. continued	A.2.2.2 Fully insert CEA group(s) with inoperable position indicator(s) and verify the CEA(s) to be fully inserted via a "Full In" indicator. <u>OR</u>	10 hours
	A.3 If the failure existed before entry into Mode 2 or occurs prior to an "all CEAs out" configuration, the CEA group(s) with an inoperable position indicator channel(s) must be moved to the "Full Out" position and verified to be fully withdrawn via a "Full Out" indicator. <u>AND</u> Prior to exceeding 70% of rated thermal power.	Within 10 hours of entry into Mode 2
B. One or more CEA(s) per group having its CEA pulse counting position indicator channel inoperable and either the "Full Out" or "Full In" reed switch position indicator or the voltage divider reed switch position indicator channel inoperable.	B.1 Verify that either the CEA voltage divider reed switch position indicator channel or the "Full Out" or "Full In" reed switch position indicator channel for the affected CEAs is operable. <u>AND</u> B.2 Restore the position indicator channel(s) to operable status	1 hour 24 hours
C. Contingency measures and associated restoration times of Nonconformance A or B are not met.	C.1 See Section 15.0.3.	

15.1.4 CONTROL ELEMENT ASSEMBLY (CEA) POSITION INDICATION - Continued

VERIFICATION REQUIREMENTS

TVR	Verification	Frequency
15.1.4.1	Verify CEA position indicator channels agree within 4.5 inches.	Every 12 hours <u>AND</u> Every 4 hours when deviation circuit is inoperable
	This shall be accomplished by the following: (1) Verifying the CEA pulse counting position indicator channels and the CEA voltage divider reed switch position indicator channels agree within 4.5 inches; <u>or</u> (2) Verifying the CEA pulse counting position indicator channels and the CEA "Full Out" or "Full In" reed switch position indicator channels agree within 4.5 inches; <u>or</u> (3) Verifying the CEA voltage divider reed switch position indicator channels and the CEA "Full Out" or "Full In" reed switch position indicator channels agree within 4.5 inches.	

CALVERT CLIFFS NUCLEAR POWER PLANT
TECHNICAL PROCEDURE

UNIT ONE

EOP ATTACHMENTS

REVISION 11

Safety Related

Approval Authority:

 6/26/00
signature/date

Effective Date:

6/29/00

LIST OF EFFECTIVE PAGES

PAGE NUMBERS

1-2

REVISION

11

ATTACHMENT

PAGE NUMBERS

REVISION

1	1-9	11
2	1-5	11
3	1	11
4	1-2	11
5	1	11
6	1	11
7	1	11
8	1-5	11
9	1-5	11
10	1	11
11	1	11
12	1	11
13	1	11
14	1	11
15	1	11
16	1-24	11
17	1	11

PROCEDURE ALTERATIONS

REVISION/CHANGE

1100

PAGE NUMBERS

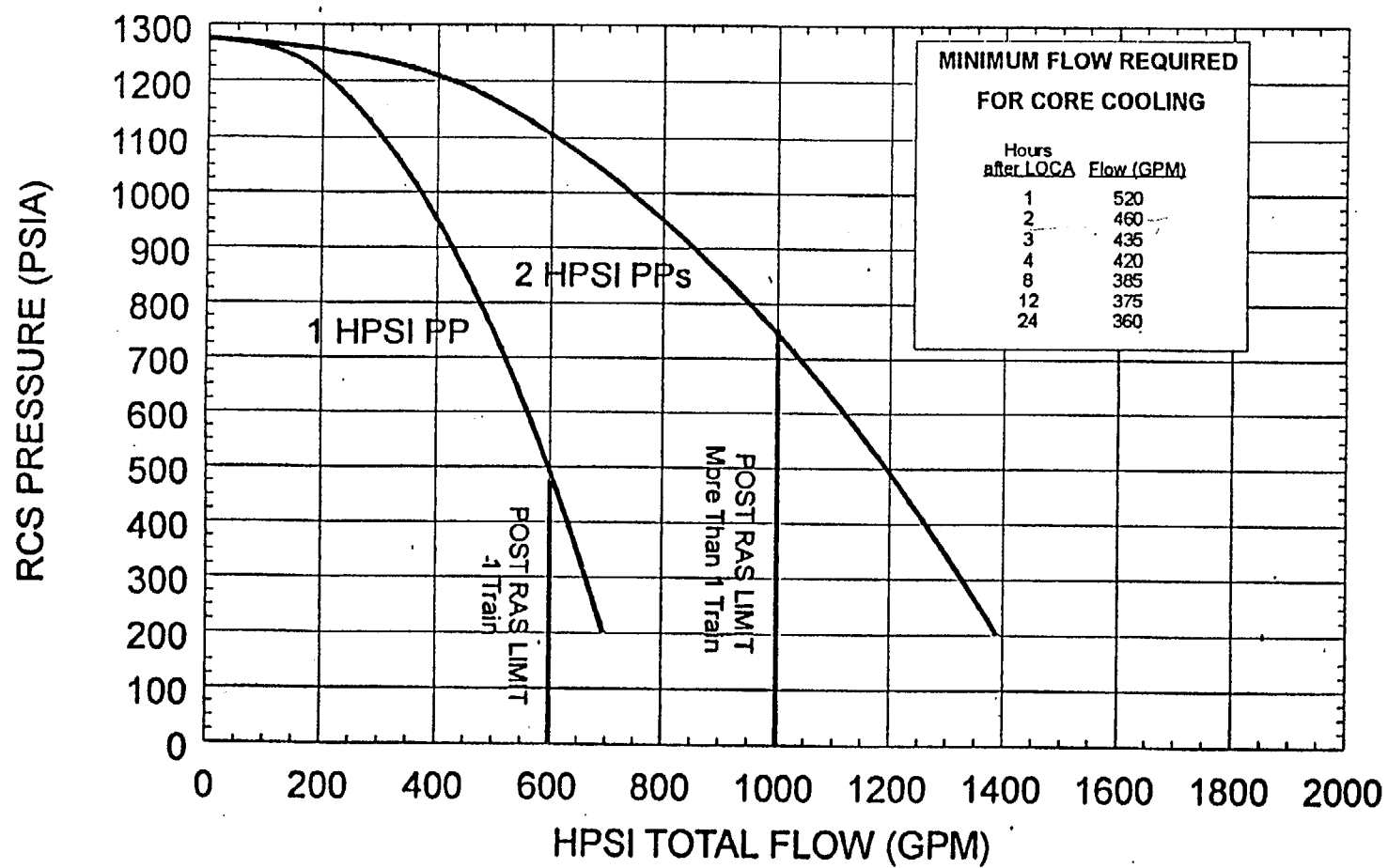
Att. 13 pg. 1

HIGH PRESSURE SAFETY INJECTION FLOW

ATTACHMENT(10)
Page 1 of 1

EOP ATTACHMENTS
Rev 11/Unit 1

RCS PRESSURE vs. HPSI TOTAL FLOW



LOW PRESSURE SAFETY INJECTION FLOW

RCS PRESSURE vs. LPSI FLOW

