Sharon W. Peavyhouse
H. B. Robinson Steam
Electric Plant Unit 2
Dir – Nuc Org Effectiveness

Duke Energy Progress
3581 West Entrance Road
Hartsville, SC 29550

O: 843 857 1584
F: 843 857 1319

Sharon.Peavyhouse@duke-energy.com

TS 5.6.5.d

Serial: RNP-RA/15-0048

JUN 16 2015

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

TRANSMITTAL OF CORE OPERATING LIMITS REPORT

Ladies and Gentlemen:

In accordance with Technical Specifications 5.6.5.d, Duke Energy Progress, Inc., is transmitting Revision 0 to the H. B. Robinson Steam Electric Plant, Unit No. 2, Core Operating Limits Report (COLR) for Cycle 30. A summary of the changes is provided on Page 2 of the attached revision to FMP-001, "Core Operating Limits Report (COLR)." The COLR is Attachment 10.1 to FMP-001.

There are no commitments associated with this letter.

If you have any questions concerning this matter, please contact Richard Hightower at (843) 857-1329.

Sincerely,

Sharon W. Peavyhouse

Sharon W. Peavyhouse
Dir – Nuc Org Effectiveness

SWP/cac

Attachment

c: Mr. V.M. McCree, NRC, Region II
NRC Resident Inspector, HBRSEP
Ms. Martha Barillas, NRC Project Manager, NRR

United States Nuclear Regulatory Commission
Attachment to Serial: RNP-RA/15-0048
26 pages including cover page

H. B. ROBINSON STEAM ELECTRIC PLANT (HBRSEP), UNIT NO. 2
CYCLE 30 CORE OPERATING LIMITS REPORT, REVISION 0

Note: This report is Attachment 10.1 to HBRSEP, Unit No. 2,
Fuel Management Procedure (FMP) - 001

DUKE ENERGY

I
Information Use

H. B. ROBINSON NUCLEAR PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 6
PART 5

FUEL MANAGEMENT PROCEDURE

FMP-001

CORE OPERATING LIMITS REPORT (COLR)

REVISION 31

SUMMARY OF CHANGES
PRR 725866, EC 94784
FMP-001 Revision 31

Section/Step	REVISION COMMENTS
Revised procedure for the following per EC 94784	
Throughout	Where applicable Updated from Cycle 29 to Cycle 30
2.5, Att. 10.1 Step 1.0	Replaced Cycle 29 reload EC 87447 with Cycle 30 reload EC 94784
2.6, 5.1.2, 8.5.2	Replaced PRO-NGGC-0204 with new procedure; AD-DC-ALL-0201
2.11	Replaced RNP-F/NFSA-0224 with this calculation; RNP-F/NFSA-0239
2.12	Updated title of Reference
Attachment 10.1 Step 1.0	Updated applicable limit on burnup from 545 EFPD (18,976 MWD/MTU) to 609 EFPD (21,190 MWd/MTU)
Attachment 10.1 Figure 3.1	Updated the V(z) applicability upper burnup from 18,976 MWD/MTU to 21,190 MWD/MTU.
Attachment 10.1 Step 2.1.2	Updated 300 ppm Surveillance limit in 2.1.2 from -39.57 to -39.66
Attachment 10.1 Step 2.2.3	Updated 60 ppm Surveillance limit in 2.1.3 from -43.81 to -43.85
Attachment 10.1 Step 2.4.1	Deleted batch ROB2-27 and added ROB2-26 and ROB2-30
Attachment 10.1 Step 2.5.2	Deleted batch ROB2-27 and added ROB2-26 and ROB2-30
Attachment 10.1 Step 3.19	Updated Reference Date to align with SAR
Attachment 10.1 Step 3.22	Updated title of Reference to align with SAR
Attachment 10.1 Step 3.24	Added "Revision 0" to Reference to align with SAR
Attachment 10.1 Step Figure 1.0	Update the breakpoint burnup in the note of Figure 1.0 from 273 EFPDs (9,500 MWD/MTU) to 305 EFPDs (10,600 MWd/MTU)

TABLE OF CONTENTS

SECTION PAGE

1.0 PURPOSE

1.1 To present the cycle-specific Core Operating Limits Report (COLR) for HBRSEP Unit No. 2

1.2 To provide a means of incorporating the COLR into the Plant Operating Manual (POM). The COLR is placed in the POM to ensure that it resides in a controlled location, and that references are provided that ensure that the requirements specified in NRC Generic Letter 88-16 and Improved Technical Specification 5.6.5 are met.

2.0 REFERENCES

2.1 Improved Technical Specifications 1.1, 3.1.1, 3.1.3, 3.1.5, 3.1.6, 3.2.1, 3.2.2, 3.2.3, 3.4.5, 3.4.6, 3.9.1, and 5.6.5

2.2 PLP-100, Technical Requirements Manual (TRM)

2.3 NRC Generic Letter 88-16, Removal of Cycle-Specific Parameter Limits from Technical Specifications, October 4, 1988.

2.4 License Amendment No. 141 - Regarding Removal of Cycle-Specific Parameter Limits to Core Operating Limits Report

2.5 EC 94784, RNP Cycle 30 Reload Core Design and Safety Analysis

2.6 AD-DC-ALL-0201, Development and Maintenance of Controlled Procedure Manual Procedures

2.7 PLP-001, Plant Nuclear Safety Committee (PNSC)

2.8 REG-NGGC-0010, 10 CFR 50.59 and Selected Regulatory Reviews

2.9 Self Assessment # 108207, Technical Specifications 5.0, Administrative Controls

2.10 UFSAR Section 17.3, RNP Quality Assurance Program Description

2.11 Calculation RNP-F/NFSA-0239, RNP Cycle 30 COLR Update

2.12 NFP-NGGC-0018, Core Operating Limits Report Generation for HNP and RNP

3.0 RESPONSIBILITIES

3.1 RES Reactor Systems and/or Nuclear Fuel Engineering (NFE) is responsible for revising this procedure as changes to the COLR are required. At a minimum, revisions are required once per cycle, at Beginning of Cycle, to make the COLR cycle-specific.

3.2 The Plant Nuclear Safety Committee (PNSC) is responsible for reviewing revisions to the COLR and providing concurrence prior to implementation of COLR revisions (UFSAR Section 17.3, RNP Quality Assurance Program Description, Appendix A Item A.1.6.6.j).

3.3 RES Reactor Systems and Operations are responsible for monitoring plant conditions to ensure the Core Operating Limits specified in this procedure are met.

3.4 Licensing/Regulatory Programs is responsible for providing prompt notification of COLR revisions to the NRC in accordance with ITS 5.6.5.d within 30 days upon procedure approval.

4.0 PREREQUISITES

4.1 None

5.0 PRECAUTIONS and LIMITATIONS

5.1 Requirements for Revision of the COLR

5.1.1 The COLR is cycle-specific, this procedure will be revised at least once per cycle, that is, at the beginning of the cycle.

5.1.2 The methods and requirements established by this procedure for revision of the COLR supplement those of AD-DC-ALL-0201, Development and Maintenance of Controlled Procedure Manual Procedures.

5.1.3 Changes to the COLR will require a 10CFR 50.59 Evaluation as well as PNSC concurrence and notification of the NRC per TS 5.6.5.d as part of the revision process.

5.2 Core Operating Limits Report (COLR)

5.2.1 The current cycle-specific Core Operating Limits Report is provided in Attachment 10.1.

5.2.2 The titles for the Methodology references in attachments 10.1.3 have been altered to match what is currently listed in the RNP Technical Specifications. These report titles may differ slightly from current report titles.

6.0 SPECIAL TOOLS and EQUIPMENT

6.1 None.

7.0 ACCEPTANCE CRITERIA

7.1 None.

8.0 PROCEDURE

8.1 Definitions

8.1.1 $F_Q^V(Z)$ - the Heat Flux Hot Channel Factor is the maximum local heat flux on the surface of a fuel rod divided by the average fuel rod heat flux and including the V (z) penalty and measurement uncertainties.

8.1.2 $CFQ = F_Q^{RTP}$ - the cycle-specific F_Q limit at Rated Thermal Power (RTP).

8.1.3 K(Z) - the normalized axial dependence factor for F_Q versus core elevation.

8.1.4 $F_{\Delta H}^N$ - the Nuclear Enthalpy Rise Hot Channel Factor is the integral of linear power along the rod with the highest integrated power divided by the average rod power.

8.1.5 $F_{\Delta H}^{RTP}$ - the cycle-specific $F_{\Delta H}$ limit at Rated Thermal Power (RTP).

8.1.6 $PF_{\Delta H}$ - the Power Factor Multiplier for $F_{\Delta H}$.

8.1.7 AFD - the Axial Flux Difference is the difference in normalized flux signals between the top and bottom halves of a two-section excore neutron detector.

8.1.8 V(Z) - the ratio of the maximum $F_Q(Z)$ produced during and following transient maneuvers to the equilibrium $F_Q(Z)$ value at target axial offset conditions.

8.1.9 P - the fraction of rated power (2339 MWt) at which the core is operating.

8.1.10 RTP - Rated Thermal Power is a total reactor core heat transfer rate to the reactor coolant of 2339 MWt.

8.2 Abbreviations

8.2.1 POM - Plant Operating Manual

8.2.2 PNSC - Plant Nuclear Safety Committee

8.2.3 COLR - Core Operating Limits Report

8.2.4 MTC - Moderator Temperature Coefficient

8.2.5 ITS - Improved Technical Specifications

8.2.6 RIL - Rod Insertion Limits

8.2.7 EFPD - Effective Full Power Day

8.2.8 HBRSEP – H.B. Robinson Steam Electric Plant

8.2.9 NRC – Nuclear Regulatory Commission

8.2.10 RES – Robinson Engineering Section

8.2.11 ARO – All Rods Out

8.2.12 SDM – Shutdown Margin

8.3 Background Information

8.3.1 HBRSEP Unit No. 2, like all other commercial nuclear power plants, is required to operate within the specific core operating limits and restrictions as specified in the Technical Specifications. Examples of these limits/restrictions include power dependent rod insertion limits, and limits of $F_Q(Z)$ and $F_{\Delta H,}$ among others. Technical Specification changes and NRC approval were required as specific numerical values for these limits/restrictions were revised. If these changes were frequent, e.g. on a cycle-specific basis, or if they were needed on accelerated schedules, considerable administrative burdens were placed on both the NRC and on utility personnel.

8.3.2 To reduce this burden, the COLR concept was developed in which specific numerical values for certain core operating limits and/or restrictions would be removed from the Technical Specifications and relocated to a COLR document. Using NRC approved methodologies, numerical values for these operating limits and/or restrictions can be updated on an as-needed basis (e.g. each cycle) by simply revising the COLR with appropriate review and notification to the NRC. Hence, revisions to the Technical Specifications are not required.

8.3.3 The NRC endorsed the COLR concept by encouraging licensees to develop such a document in Generic Letter 88-16 which provided guidance for relocation of specific numerical values for various core operating limits and/or restrictions to a COLR and indicated that these values could be changed without prior NRC approval so long as an NRC-approved methodology is followed. Future changes and updates would be allowable provided an Evaluation is performed in accordance with the provisions of 10CFR 50.59, the COLR is suitably revised, and the NRC is promptly informed of the revision.

8.3.4 The use of a COLR at H. B. Robinson was accepted by the NRC per License Amendment 141. The amendment established requirements for a cycle-specific COLR and for notification of the NRC (ITS 5.6.5.d) when any revisions or supplements (beginning of cycle or midcycle) are made. Since the COLR is cycle-specific, the COLR will be revised at least once per cycle, that is, at the beginning of the cycle.

8.4 Contents of the H.B. Robinson Unit 2 COLR

8.4.1 Technical Specification ITS 5.6.5.a requires the following cycle-specific core operating limits be established and documented in the Core Operating Limits Reports

1. Moderator Temperature Coefficient (MTC) Limits
2. Shutdown Bank Insertion Limits
3. Control Bank Insertion Limits
4. Heat Flux Hot Channel Factor ($F_Q(Z)$) Limit, CFQ
5. K(Z) Curve
6. Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}^N$) Limit, $F_{\Delta H}^{RTP}$
7. $F_{\Delta H}$ Power Factor Multiplier ($PF_{\Delta H}$)
8. Axial Flux Difference (AFD) Limits
9. V(Z) Curve(s)
10. Shutdown Margin
11. Refueling Boron Concentration

8.4.2 The COLR will also contain a listing of the specific methodologies used to support the core operating limits per TS 5.6.5.b.

8.4.3 The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met (TS 5.6.5.c).

8.5 Revisions to The COLR

8.5.1 Nuclear Fuel Engineering (NFE) shall review and recommend for implementation any changes to the COLR. The review is normally documented in an EC including any required Owner's Reviews, calculations and other reviews. The use of NRC approved methodologies is also confirmed in the EC. Changes recommended by NFE are normally transmitted to the plant via a Design Calculation.

8.5.2 Once NFE recommends a revision to the COLR, a Reactor Engineer shall prepare a revision to FMP-001 in accordance with the requirements of AD-DC-ALL-0201, Development and Maintenance of Controlled Procedure Manual Procedures.

8.5.3 Other plant procedures shall be reviewed to determine if they require revision in order to implement the revised COLR. At a minimum, the procedures listed in Attachment 10.2 shall be reviewed.

8.5.4 Any required procedure revisions or new procedures necessary to incorporate the change to the COLR shall be completed by the effective date of the COLR change.

8.5.5 The proposed revision of the COLR shall be submitted to the PNSC for review.

8.5.6 The PNSC shall review the proposed revision to the COLR and concur with the changes prior to their implementation in accordance with UFSAR Section 17.3 Appendix A Item A.1.6.6.j.

8.5.7 Upon approval of the COLR revision, Licensing/Regulatory Programs shall notify the NRC per ITS 5.6.5.d within 30 days.

9.0 RECORDS

9.1 This procedure does not generate any records.

10.0 ATTACHMENTS

10.1 HBRSEP Unit No. 2 Cycle 30 Core Operating Limits Report, Revision 0

10.2 Procedures Potentially Affected By COLR Revisions

ATTACHMENT 10.1
Page 1 of 13
HBRSEP UNIT NO. 2, CYCLE 30
CORE OPERATING LIMITS REPORT
REVISION 0

1.0 OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for HBRSEP Unit No. 2, Cycle 30 has been prepared per EC 94784 in accordance with the requirements of ITS 5.6.5 and is applicable to 609 EFPD (21,190 MWD/MTU).

The Improved Technical Specifications affected by this report and the methodologies used for the various parameters are listed below.

Parameter	ITS Reference	Applicable Methodology (Section 3.0 Number)
MTC	3.1.3	18, 19, 22, 23, 25
Shutdown Bank RILs	3.1.5	8, 18, 19, 22, 23, 25
Control Bank RILs	3.1.6	8, 18, 19, 22, 23, 25
$F_Q^V(Z)$	3.2.1, 3.2.3	5, 8, 11, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27
$F_{\Delta H}$	3.2.2, 3.2.3	3, 5, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
AFD	3.2.1, 3.2.3	16, 18, 19, 21, 22, 23, 24, 25, 27
Shutdown Margin Requirements	3.1.1, 3.4.5, 3.4.6	8, 18, 19, 22, 23, 25
Refueling Boron Requirements	3.9.1	8, 18, 19, 22, 23
COLR	5.6.5	None

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in ITS 5.6.5 and the COLR Section 3.0.

2.1 Moderator Temperature Coefficient (ITS 3.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a) The Positive MTC (ARO) shall be less than or equal to +5.0 pcm/°F for power levels less than 50% RTP, and

b) The Positive MTC (ARO) shall be less than or equal to 0.0 pcm/°F at 50% RTP and above.

c) The Negative MTC (ARO/RTP) shall be less negative than -45.0 pcm/°F.

2.1.2 The 300 ppm Surveillance limit is:

At an equilibrium RTP-ARO boron concentration of 300 ppm the MTC shall be less negative than or equal to -39.66 pcm/°F.

2.1.3 The 60 ppm Surveillance limit is:

At an equilibrium RTP-ARO boron concentration of 60 ppm the MTC shall be less negative than or equal to -43.85 pcm/°F.

2.2 Shutdown Banks Insertion Limits (ITS 3.1.5)

2.2.1 The shutdown banks shall be withdrawn to at least 225 steps.

2.3 Control Bank Insertion Limits (ITS 3.1.6)

2.3.1 The control banks shall be limited in physical insertion as shown in Figure 1.0

2.4 Heat Flux Hot Channel Factor - $F_Q^V(Z)$ (ITS 3.2.1, 3.2.3)

$F_Q^V(Z) \leq (CFQ/P) \times K(Z)$ for $P > 0.5$

$F_Q^V(Z) < (CFQ/0.5) \times K(Z)$ for $P \leq 0.5$

Where: P = (Thermal Power / Rated Thermal Power)

2.4.1 CFQ = 2.46 for ROB2-25, ROB2-26, ROB2-28, ROB2-29, and ROB2-30 reload batches

2.4.2 K(Z) is specified in Figure 2.0

2.5 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}$ (ITS 3.2.2, 3.2.3)

$F_{\Delta H} < F_{\Delta H}^{RTP} (1 + PF_{\Delta H} (1-P))$

Where: P = (Thermal Power / Rated Thermal Power)

2.5.1 $F_{\Delta H}$ is the measured $F_{\Delta H}^N$ multiplied by the measurement uncertainty (1.04)

2.5.2 $F_{\Delta H}^{RTP}$ = 1.80 for ROB2-25, ROB2-26, ROB2-28, ROB2-29, ROB2-30 reload batches

2.5.3 $PF_{\Delta H}$ = 0.2

2.6 Axial Flux Difference (ITS 3.2.1, 3.2.3)

2.6.1 The axial flux difference target bands are ±3% and ±5% about the target AFD.

2.6.2 V(Z) values for the ±3% and ±5% target bands are specified in Figures 3.1 and 3.2

2.6.3 The AFD Acceptable Operation Limits are specified in Figure 4.0

2.7 **Shutdown Margin Requirements (SDM) (ITS 3.1.1, 3.1.4, 3.1.5, 3.1.6, 3.1.8, 3.4.5, 3.4.6, 3.9.1)**

2.7.1 The Mode 1 and Mode 2 required SDM versus RCS boron concentration is presented in Figure 5.0.

2.7.2 The Mode 3 SDM requirements are as follows:

a) With at least 2 reactor coolant pumps in operation, the SDM shall be greater than or equal to that specified in Figure 5.0.

b) With less than 2 reactor coolant pumps in operation and the rod control system capable of rod withdrawal, the SDM shall be greater than or equal to 6% $\Delta k/k$. This shutdown margin requirement shall be met with a minimum boron concentration of 1950 ppm.

c) With less than 2 reactor coolant pumps in operation and with the rod control system not capable of rod withdrawal, the SDM shall be greater than or equal to that specified in Figure 5.0.

2.7.3 The Mode 4 SDM requirements are as follows:

a) With at least 2 reactor coolant pumps in operation, the SDM shall be greater than or equal to 2.6% $\Delta k/k$.

b) With less than 2 reactor coolant pumps in operation and the rod control system capable of rod withdrawal, the SDM shall be greater than or equal to 6% $\Delta k/k$. This shutdown margin requirement shall be met with a minimum boron concentration of 1950 ppm.

c) With less than 2 reactor coolant pumps in operation and with the rod control system not capable of rod withdrawal, the SDM shall be greater than or equal to 2.6% $\Delta k/k$.

2.7.4 The minimum required SDM for Mode 5 is 2.6% $\Delta k/k$.

2.7.5 The minimum required SDM for Mode 6 is 6% $\Delta k/k$.

2.8 **Refueling Boron Concentration (ITS 3.9.1)**

2.8.1 In Mode 6 the minimum boron concentration shall be 1950 ppm.

3.0 METHODOLOGY REFERENCES

1) Deleted

2) Not Used for Cycle 30

3) XN-NF-82-21(A), Revision 1, Application of Exxon Nuclear Company PWR Thermal Margin Methodology to Mixed Core Configurations, Exxon Nuclear Company, September 1983

4) Deleted

5) XN-75-32(A) Supplements 1, 2, 3, and 4, Computational Procedure for Evaluating Rod Bow, Exxon Nuclear Company, October 1983

6) Deleted

7) Deleted

8) XN-NF-78-44(A), Generic Control Rod Ejection Analysis, Exxon Nuclear Company, October 1983

9) Not Used For Cycle 30

10) Deleted

11) XN-NF-82-06(A), Revision 1 and Supplements 2, 4, and 5, Qualification of Exxon Nuclear Fuel for Extended Burnup, Exxon Nuclear Company, October 1986

12) Deleted

13) Deleted

14) Deleted

15) Deleted

16) ANF-88-054(P), PDC-3: Advanced Nuclear Fuels Corporation Power Distribution Control for Pressurized Water Reactors and Application of PDC-3 to H.B. Robinson Unit 2, Advanced Nuclear Fuels Corporation, October 1990

17) ANF-88-133(P) (A), and Supplement 1, Qualification of Advanced Nuclear Fuels PWR Design Methodology for Rod Burnups of 62 GWd/MTU, Advanced Nuclear Fuels Corporation, December 1991

18) ANF-89-151(A), Revision 0, ANF-RELAP Methodology for Pressurized Water Reactors: Analysis of Non-LOCA Chapter 15 Events, Advanced Nuclear Fuels Corporation, May 1992

19) EMF-92-081(A), Revision 1, Statistical Setpoint/Transient Methodology for Westinghouse Type Reactors, Siemens Power Corporation, July 2000

20) EMF-92-153(P) (A), Revision 1, HTP: Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel, Siemens Power Corporation, January 2005

21) XN-NF-85-92(P) (A), Exxon Nuclear Uranium Dioxide/Gadolinia Irradiation Examination and Thermal Conductivity Results, Exxon Nuclear Company, November 1986

22) EMF-96-029(P) (A), Volumes 1 and 2, Reactor Analysis System for PWRs Volume 1 - Methodology Description, Volume 2 - Benchmarking Results, Siemens Power Corporation, January 1997

23) EMF-92-116, Revision 0, Generic Mechanical Design Criteria for PWR Fuel Designs, Siemens Power Corporation, February 1999

24) EMF-2103(P) (A), Revision 0, Realistic Large Break LOCA Methodology for Pressurized Water Reactors, Framatome ANP, April 2003

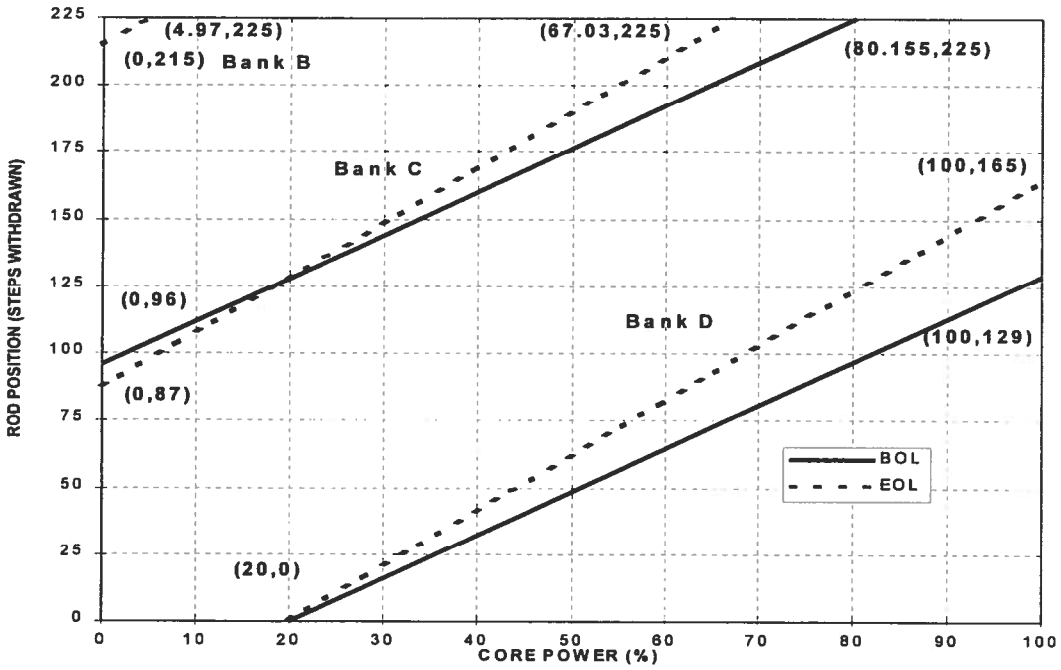
25) EMF-2310(P) (A) Revision 1, SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors, May 2004

26) BAW-10240(P) (A), Revision 0, Incorporation of M5 Properties in Framatome ANP Approved Methods, Framatome ANP, May 2004

27) EMF-2328(P) (A), Revision 0, PWR Small Break LOCA Evaluation Model, S-RELAP5 Based, Framatome ANP Richland, Inc., March 2001 and Errata, January 2008

HBRSEP UNIT NO. 2, CYCLE 30
CORE OPERATING LIMITS REPORT
REVISION 0

Figure 1.0, Control Group Insertion Limits for Three Loop Operation



NOTE: The breakpoint between BOL and EOL RIL occurs at 50% of the cycle as defined by burnup. For Cycle 30, this burnup occurs at 305 EFPDs (10,600 MWD/MTU).

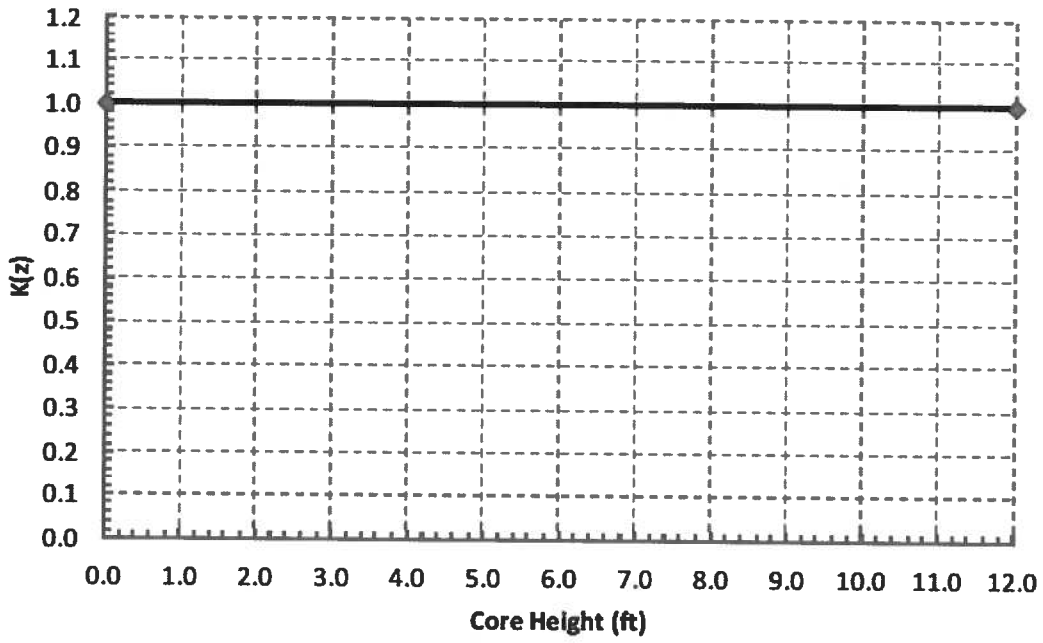
Control rod banks shall always be withdrawn and inserted in the prescribed sequence. For withdrawal, the sequence is Control "A", Control "B", Control "C", and Control "D". The insertion sequence is the reverse of the withdrawal sequence.

Overlap of consecutive control banks shall not exceed the prescribed setpoint for automatic overlap. The setpoint is 97 steps.

Control bank A must be withdrawn from the core prior to power operation.

At BOL and 0% core power, Control bank B will be at or above step 224.

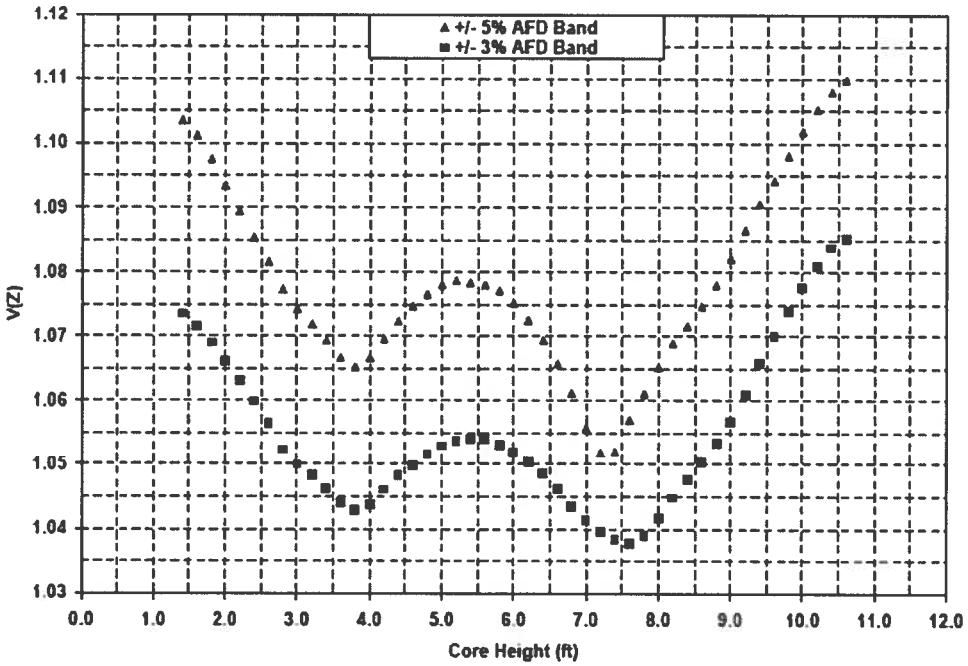
Figure 2.0, Normalized Axial Dependence Factor K(z) for Fq Versus Elevation



NOTE: For all power levels the K(z) at all axial levels is 1.0.

HBRSEP UNIT NO. 2, CYCLE 30
CORE OPERATING LIMITS REPORT
REVISION 0

Figure 3.1 V(z) as a Function of Core Height



Height (feet)	+/-5% V(z)	+/-3% V(z)
*0.0	1.0000	1.0000
*0.2	1.0000	1.0000
*0.4	1.0000	1.0000
*0.6	1.0000	1.0000
*0.8	1.0000	1.0000
*1.0	1.0000	1.0000
*1.2	1.0000	1.0000
1.4	1.1035	1.0735
1.6	1.1012	1.0716
1.8	1.0976	1.0690
2.0	1.0935	1.0661
2.2	1.0894	1.0630
2.4	1.0852	1.0599
2.6	1.0815	1.0564
2.8	1.0773	1.0524
3.0	1.0742	1.0500
3.2	1.0718	1.0483
3.4	1.0693	1.0463
3.6	1.0666	1.0441
3.8	1.0652	1.0429
4.0	1.0666	1.0438
4.2	1.0695	1.0460
4.4	1.0723	1.0482
4.6	1.0747	1.0499
4.8	1.0765	1.0516
5.0	1.0780	1.0530
5.2	1.0786	1.0538
5.4	1.0783	1.0540
5.6	1.0780	1.0540
5.8	1.0771	1.0532
6.0	1.0752	1.0519
6.2	1.0725	1.0504
6.4	1.0694	1.0487
6.6	1.0658	1.0461
6.8	1.0611	1.0436
7.0	1.0558	1.0412
7.2	1.0519	1.0395
7.4	1.0521	1.0385
7.6	1.0570	1.0378
7.8	1.0611	1.0390
8.0	1.0652	1.0417
8.2	1.0689	1.0448
8.4	1.0716	1.0476
8.6	1.0747	1.0503
8.8	1.0780	1.0534
9.0	1.0821	1.0569
9.2	1.0864	1.0610
9.4	1.0905	1.0657
9.6	1.0943	1.0700
9.8	1.0981	1.0739
10.0	1.1019	1.0775
10.2	1.1052	1.0808
10.4	1.1079	1.0838
10.6	1.1098	1.0852
*10.8	1.0000	1.0000
*11.0	1.0000	1.0000
*11.2	1.0000	1.0000
*11.4	1.0000	1.0000
*11.6	1.0000	1.0000
*11.8	1.0000	1.0000
*12.0	1.0000	1.0000

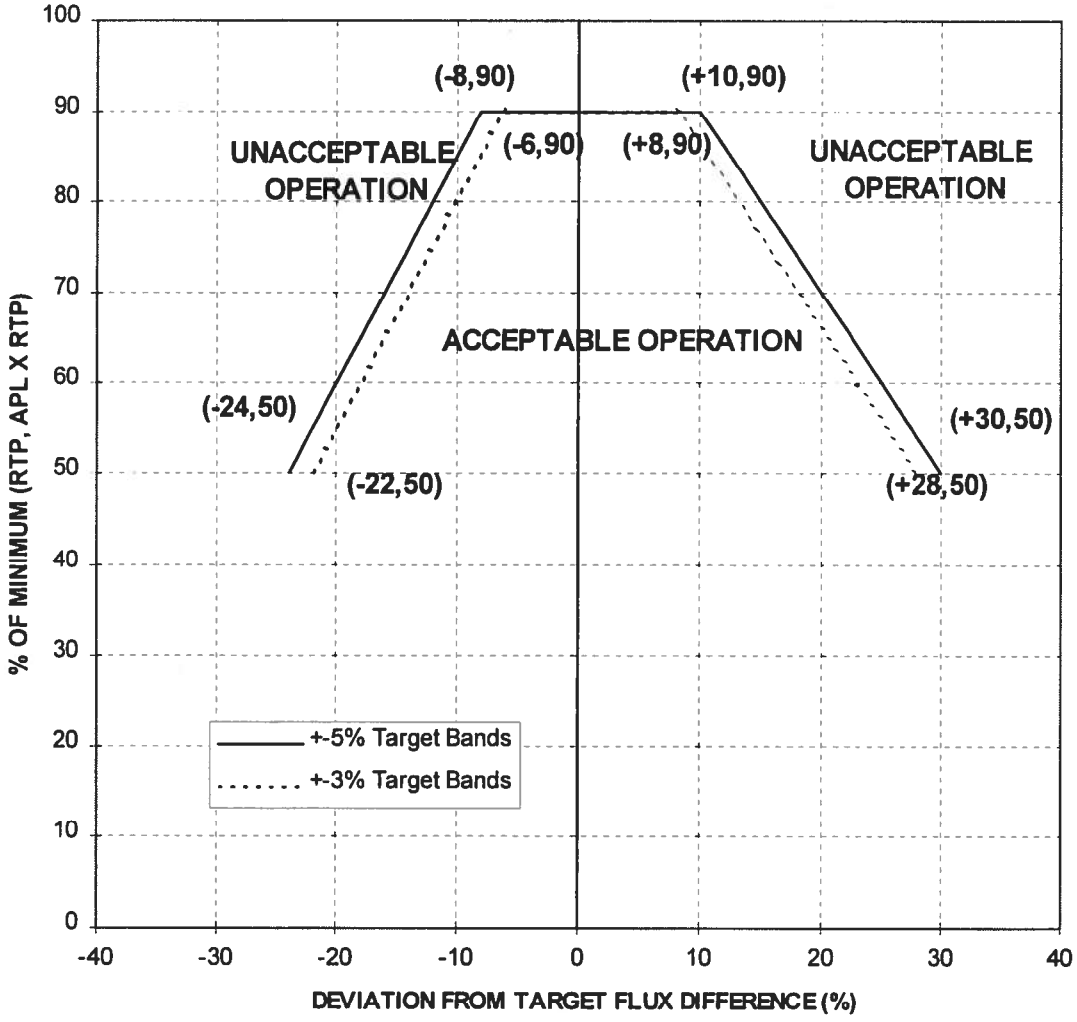
NOTE: V(z) data applicable for 0 ≤ burnup ≤ 21,190 MWD/MTU.

For power levels below 50% RTP, the V(z) data at all axial levels is 1.0. It is conservative to apply the above figure to power levels below 50% RTP.

Figure 3.2 V(z) as a Function of Core Height

Figure 3.2 is not required for Cycle 30

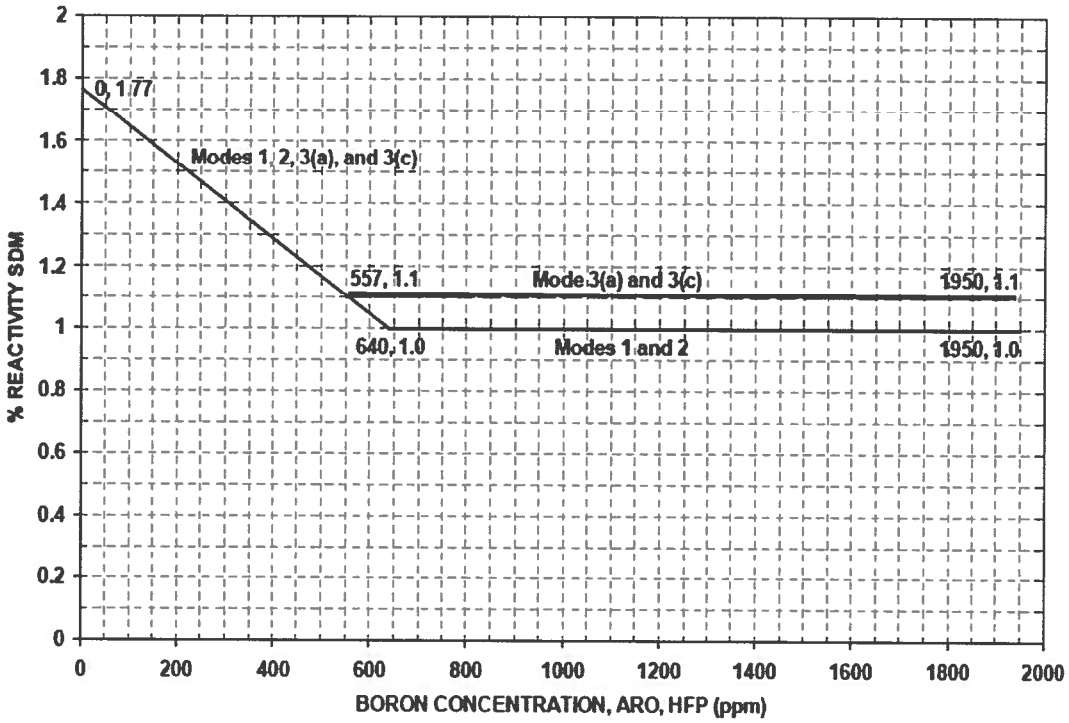
Figure 4.0, Allowable Deviation from Target Flux Difference



NOTE: For power levels above 90%, power operation is allowed within the target bands (±3% and ±5%).

HBRSEP UNIT NO. 2, CYCLE 30
CORE OPERATING LIMITS REPORT
REVISION 0

Figure 5.0, Shutdown Margin Versus Boron Concentration



ATTACHMENT 10.2
Page 1 of 1

PROCEDURES POTENTIALLY AFFECTED BY COLR REVISIONS

Revisions to the COLR may require that revisions be made to other plant procedures. At a minimum the following procedures should be reviewed to determine if they must be revised:

APP-005	GP-002
CP-010	GP-003
EST-002	GP-006-1
EST-003	AOP-038
EST-028	GP-009-1
EST-048	GP-009-2
EST-049	GP-009-3
EST-050	GP-009-4
EST-105	GP-009-5
EST-146	GP-010
FMP-009	LP-551
FMP-012	LP-552
FMP-014	OP-003
FMP-019	OP-910
FHP-003	OMP-003
Station Curve Book	PLP-100
ERFIS CAOC Software	NFP-NGGC-0018

The procedures listed above are those that are typically affected by COLR revisions; however, other procedures may also be affected.