T. PRESTON GILLESPIE, Jr.
Vice President
Oconee Nuclear Station

Duke Energy
ON01VP / 7800 Rochester Hwy.
Seneca, SC 29672

864-873-4478
864-873-4208 fax
T.Gillespie@duke-energy.com

November 1, 2010

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Site Docket Number 50-287
Core Operating Limits Report (COLR)

Attached, pursuant to Oconee Technical Specification 5.6.5.d, is an information copy of a revision to the Core Operating Limits Report for Oconee Unit 3, Cycle 26, Revision 31.

If you have any questions, please direct them to Judy Smith at 864-873-4309.

Sincerely,

T Gillespie

T. Preston Gillespie, Jr.
Vice President
Oconee Nuclear Station

Attachment

A001
NRR

xc w/att: Mr. Luis Reyes
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Ga. 30303-1257

Mr. John Stang
Project Manager
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Mail Stop 8 G9A
Washington, DC 20555

Mr. Andrew Sabisch
Senior Resident Inspector
Oconee Nuclear Site

PRIORITY SuperRush

DISPOSITION OF THE ORIGINAL DOCUMENT WILL BE TO THE TRANSMITTAL SIGNATURE UNLESS RECIPIENT IS OTHERWISE IDENTIFIED BELOW

1) 00813 DOC MGMT EC04T ORIGINAL
2) 06358 ONS REGUL COMPLIANCE ON03RC
3) 06700 ONS MANUAL MASTER FILE ON03DM
4) 06937 R R ST CLAIR EC08G

INFORMATION ONLY

Duke Energy
DOCUMENT TRANSMITTAL FORM

REFERENCE

NUCLEAR GENERAL OFFICE

OCONEE NUCLEAR STATION

RECORD RETENTION: 421734

OCONEE 3 CYCLE 26

CORE OPERATING LIMITS REPORT

T1 COPIES ONLY

Page 1 of 1

Date: 10/28/10

Document Transmittal #: DUK103010029

QA CONDITION ■ Yes ☐ No

OTHER ACKNOWLEDGEMENT REQUIRED ☐ Yes

IF QA OR OTHER ACKNOWLEDGEMENT REQUIRED, PLEASE ACKNOWLEDGE RECEIPT BY RETURNING THIS FORM TO:

Duke Energy
P.O. Box 1006
Energy Center
EC04T
Charlotte, N.C. 28201-1006

Rec'd By _____

Date _____

DOCUMENT NO	QA COND	REV #/ DATE	DISTR CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
ONEI-0400-070	1	031 10/28/10	NOMD-27	X	V1	V1	V1												3
.		/ /																	
SEE REMARKS		/ /																	
.		/ /																	
T1 COPIES ONLY		/ /																	

REMARKS: DUKE
CORRECTIONAL TRANSMITTAL TO CORRECT UNIT NUMBER
THE DOCUMENT REVISION WILL REMAIN THE SAME.

T1 COPIES ONLY

DAVID A BAXTER
VICE PRESIDENT
NUCLEAR ENGINEERING

BY:
L C JAMES LCJ/JAK EC08G

Duke Energy

Oconee 3 Cycle 26

Core Operating Limits Report

QA Condition 1

Prepared By : L. C. James II Date : 07 Oct 2010

Checked By: J. M. Sanders Date : 07 Oct 2010

CDR By : A. R. Bingham Date : 07 Oct 2010

Approved By : R. R. St.Clair Date : 07 Oct 2010

INSPECTION OF ENGINEERING INSTRUCTIONS

Inspection Waived By: R.R. H. Clair (Sponsor) Date: 10/7/2010

CATAWBA

	Inspection Waived	
MCE (Mechanical & Civil)	☐	Inspected By/Date:
RES (Electrical Only)	☐	Inspected By/Date:
RES (Reactor)	☐	Inspected By/Date:
MOD	☐	Inspected By/Date:
Other (_____)	☐	Inspected By/Date:

OCONEE

	Inspection Waived	
MCE (Mechanical & Civil)	☒	Inspected By/Date:
RES (Electrical Only)	☒	Inspected By/Date:
RES (Reactor)	☒	Inspected By/Date:
MOD	☒	Inspected By/Date:
Other (_____)	☐	Inspected By/Date:

MCGUIRE

	Inspection Waived	
MCE (Mechanical & Civil)	☐	Inspected By/Date:
RES (Electrical Only)	☐	Inspected By/Date:
RES (Reactor)	☐	Inspected By/Date:
MOD	☐	Inspected By/Date:
Other (_____)	☐	Inspected By/Date:

Oconee 3 Cycle 26

Core Operating Limits Report

Insertion Sheet for Revision 31

This revision is not valid until the end of operation for Oconee 3 Cycle 25.

Remove these Revision 30 pages	Insert these Revision 31 pages
1 - 33	1 - 33

Revision Log

Revision	Effective Date	Pages Revised	Pages Added	Pages Deleted	Total Effective Pages
Oconee 3 Cycle 26 revision below					
31	Oct 2010	1 - 33	-	-	33
Oconee 3 Cycle 25 revisions below					
30	May 2009	1 - 33	-	-	33
29	May 2009	1 - 33	-	-	33
28	Apr 2009	1 - 33	-	-	33
Oconee 3 Cycle 24 revisions below					
27	Mar 2009	1 - 33	-	-	33
26	Nov 2007	1 - 33	-	-	33
25	Nov 2007	1 - 33	-	-	33
Oconee 3 Cycle 23 revisions below					
24	May 2006	1 - 33	-	-	33
Oconee 3 Cycle 22 revisions below					
23	Mar 2006	1 - 4, 6, 15 - 16, 21, 27, 31	-	-	33
22	Mar 2005	1 - 5	-	-	33
21	Nov 2004	1 - 33	-	-	33

Oconee 3 Cycle 26

1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O3C26 has been prepared in accordance with the requirements of TS 5.6.5. The core operating limits within this report have been developed using NRC approved methodology reports identified in References 1 through 11. See the discussion below pertaining to References 2 through 8.

The RPS protective limits and maximum allowable setpoints are documented in References 12 through 14. These limits are validated for use in O3C26 by References 15 through 17. The O3C26 analyses assume a design flow of 108.5% of of 88,000 gpm per RCS pump, a radial local peaking ($F\Delta h$) of 1.714, an axial peaking factor (Fz) of 1.5, and an EOC (< 100 ppmB) Tavg reduction for up to 10°F provided 4 RCPs are in operation and Tavg does not decrease below 569 °F.

The error adjusted core operating limits included in section 1 of the report incorporate all necessary uncertainties and margins required for operation of the O3C26 reload core.

1.1 References

1. Nuclear Design Methodology Using CASMO-3 / SIMULATE-3P, DPC-NE-1004-A, Revision 1A, January 2009.

2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002-A, Revision 3b, June 2009.

3. Oconee Nuclear Station Reload Design Methodology, NFS-1001A, Revision 6a, June 2009.

4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003-PA, Revision 2a, December 2008.

5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005-PA, Revision 4a, December 2008.

6. Fuel Mechanical Reload Analysis Methodology Using TACO3, DPC-NE-2008-PA, Revision 1a, December 2008.

7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, Revision 3b, July 2009.

8. Thermal Hydraulic Transient Analysis Methodology, DPC-NE-3000-PA, Rev. 4a, July 2009.

9. BAW-10192-PA, BWNT LOCA - BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants, Rev. 0, SER dated February 18, 1997.

10. BAW-10164P-A, Rev. 4 and 6, RELAP5/MOD2-B&W - An Advanced Computer Program for Light Water Reactor LOCA and Non-LOCA Transient Analysis, SERs dated April 9, 2002 and June 25, 2007, respectively.

11. BAW-10227-PA, Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel, Rev. 1, June 2003 (SER to BAW-10186P-A dated June 18, 2003).

12. RPS RCS Pressure & Temperature Trip Function Uncertainty Analyses and Variable Low Pressure Safety Limit, OSC-4048, Revision 6, September 2010.

13. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 3, July 2009.

14. ΔTc and EOC Reduced Tavg Operation, OSC-7265, Rev. 1, Duke Power Co., June 2002.

15. O3C26 Maneuvering Analysis, OSC-9958, Revision 1, October 2010.

16. O3C26 Specific DNB Analysis, OSC-9969, Revision 0, May 2010.

17. O3C26 Reload Safety Evaluation, OSC-9999, Revision 0, October 2010.

Oconee 3 Cycle 26

Miscellaneous Setpoints

BWST boron concentration shall be greater than **2220** ppm and less than **3000** ppm.
Referred to by TS 3.5.4.

Spent fuel pool boron concentration shall be greater than **2220** ppm.
Referred to by TS 3.7.12.

The equivalent of at least **1100** cubic feet of **11,000** ppm boron shall be maintained in the CBAST.
Referred to by TS SLC 16.5.13.

CFT boron concentration shall be greater than 1835 ppm. The average boron concentration in the CFT's shall be less than 4000 ppm. Referred to by TS 3.5.1.

RCS and Refueling canal boron concentration shall be greater than **2220** ppm.
Referred to by TS 3.9.1.

Shutdown Margin (SDM) shall be greater than **1%** Δk/k.
Referred to by TS 3.1.1.

Moderator Temperature Coefficient (MTC) shall be less than:
Linear interpolation is valid within the table provided.
Referred to by TS 3.1.3.

MTC x 10-4	
Δρ / °F	% FP
+0.70	0
+0.525	20
0.00	80
0.00	100
0.00	120

Departure from Nucleate Boiling (DNB) parameter for RCS loop pressure shall be
Referred to by TS 3.4.1.

4 RCP: measured hot leg pressure ≥ 2125 psig
3 RCP: measured hot leg pressure ≥ 2125 psig

DNB parameter for RCS loop average temperature shall be:
Referred to by TS 3.4.1.

The measured Tavg must be less than COLR limits minus instrument uncertainty. ΔTc is the setpoint value selected by the operators. Values are expanded by linear interpolation on page 33 of this document **without** instrument uncertainty.

	Max Loop Tavg (Incl 2°F unc)		
ΔTc, °F	4 RCP Op	3 RCP Op	
0	581.0	581.0	*
1	581.4	581.2	
2	581.8	581.4	
3	582.1	581.7	
4	582.5	581.9	
5	582.9	582.1	

* This limit is applied to the loop with the lowest loop average temperature consistent with the NOTE in SR 3.4.1.2. All other temperature limits apply to the maximum loop Tavg.

DNB parameter for RCS loop total flow shall be:
Referred to by TS 3.4.1.

4 RCP: Measured ≥ **108.5** %df
3 RCP: Measured ≥ **74.7** % of 4 RCP min flow

Regulating rod groups shall be withdrawn in sequence starting with group 5, group 6, and finally group 7.
Referred to by TS 3.2.1.

Regulating rod group overlap shall be 25% ± 5% between two sequential groups.
Referred to by TS 3.2.1.

Misaligned, dropped, or inoperable rods may be excluded from control rod group average calculations when determining if overlap requirements are met as these situations are explicitly addressed by TS 3.1.4 (Control Rod Group Alignment Limits), TS 3.1.5 (Safety Rod Position Limits), and TS 3.2.3 (Quadrant Power Tilt).

Oconee 3 Cycle 26

Steady State Operating Band

	Rod Index		APSR %WD	
EFPD	Min	Max	Min	Max
0 to 439	292 ± 5	300	30	40
439 to EOC	292 ± 5	300	100	100

Quadrant Power Tilt Setpoints

	Steady State		Transient		Maximum
Core Power Level, %FP	30 - 100	0 - 30	30 - 100	0 - 30	0 - 100
Full Incore	3.50	7.56	7.07	9.36	16.51
Out of Core	2.39	6.09	5.63	7.72	14.22
Backup Incore	2.27	3.87	3.63	4.81	10.07

Referred to by TS 3.2.3

Correlation Slope (CS)

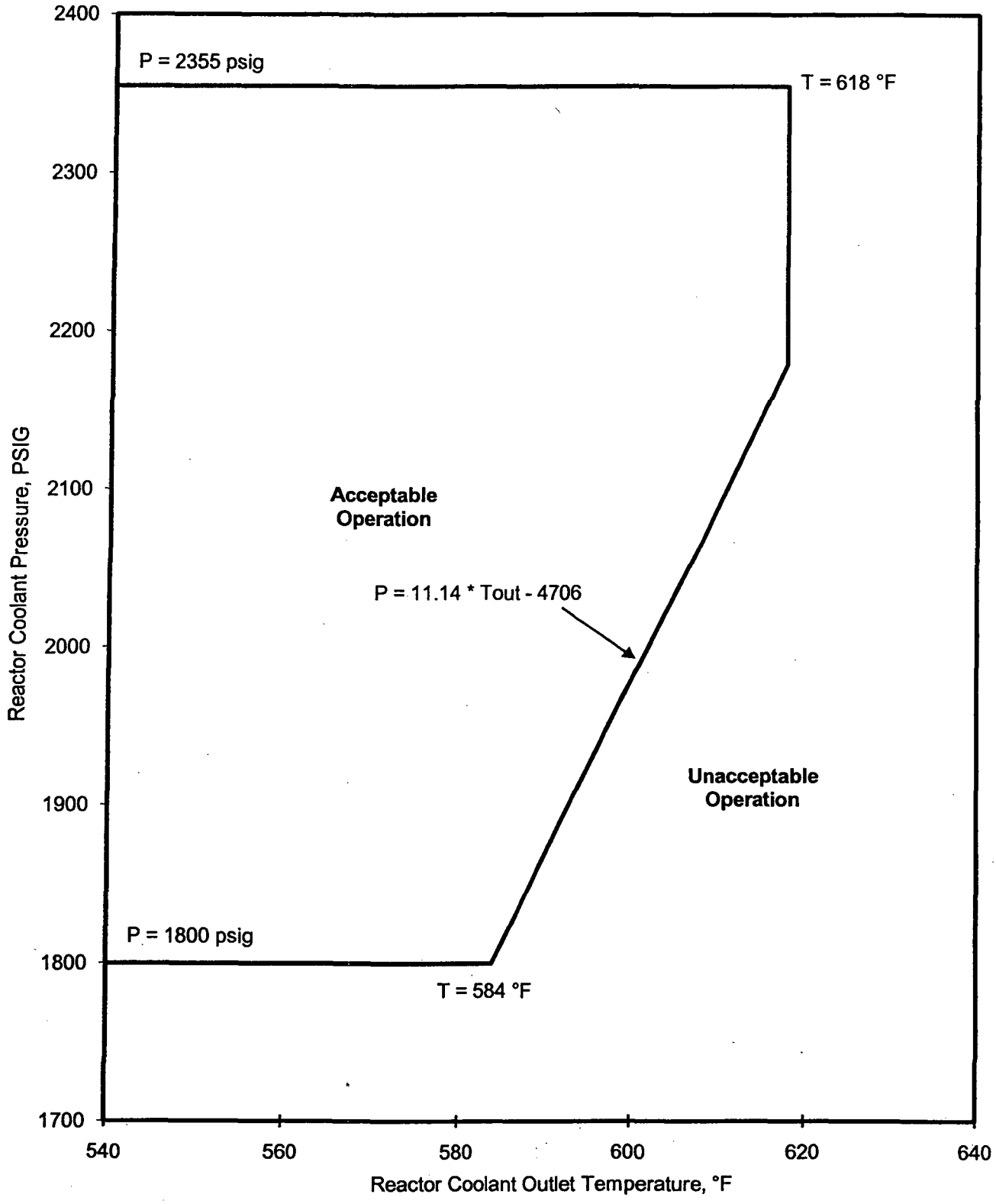
1.15

Referred to by TS 3.3.1 (SR 3.3.1.3).

Oconee 3 Cycle 26

Variable Low RCS Pressure RPS Setpoints

Referred to by TS 3.3.1



Oconee 3 Cycle 26

RPS Power Imbalance Setpoints

	% FP	% Imbalance
4 Pumps	0.0	-33.0
	90.4	-33.0
	107.9	-14.4
	107.9	14.4
	90.4	33.0
	0.0	33.0
3 Pumps	0.0	-33.0
	63.1	-33.0
	80.6	-14.4
	80.6	14.4
	63.1	33.0
	0.0	33.0

Maximum Allowable RPS Power Imbalance Limits

	% FP	% Imbalance
4 Pumps	0.0	-35.0
	90.0	-35.0
	109.4	-14.4
	109.4	14.4
	90.0	35.0
	0.0	35.0
3 Pumps	0.0	-35.0
	62.3	-35.0
	81.7	-14.4
	81.7	14.4
	62.3	35.0
	0.0	35.0

Oconee 3 Cycle 26

Operational Power Imbalance Setpoints

	%FP	Full Incore	Backup Incore	Out of Core
4 Pumps	0.0	-28.0	-28.0	-28.0
	80.0	-28.0	-28.0	-28.0
	90.0	-28.0	-28.0	-28.0
	100.0	-17.8	-17.8	-17.8
	102.0	-15.7	-15.7	-15.7
	102.0	15.7	15.7	15.7
	100.0	17.8	17.8	17.8
	90.0	28.0	28.0	28.0
	80.0	28.0	28.0	28.0
	0.0	28.0	28.0	28.0
3 Pumps	0.0	-28.0	-28.0	-28.0
	63.1	-28.0	-	-28.0
	63.1	-	-28.0	-
	77.0	-13.2	-13.2	-13.2
	77.0	13.2	13.2	13.2
	63.1	-	28.0	-
	63.1	28.0	-	28.0
	0.0	28.0	28.0	28.0

Oconee 3 Cycle 26

Operational Power Imbalance Setpoints

Operation with 4 RCS Pumps, BOC to EOC

% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	
107.9	-14.4	14.4				
107.0	-15.4	15.4				
106.0	-16.4	16.4				
105.0	-17.5	17.5				
104.0	-18.5	18.5				
103.0	-19.6	19.6				
102.0	-20.7	20.7	-15.7	15.7	-15.7	15.7
101.0	-21.7	21.7	-16.7	16.7	-16.7	16.7
100.0	-22.8	22.8	-17.8	17.8	-17.8	17.8
99.0	-23.9	23.9	-18.8	18.8	-18.8	18.8
98.0	-24.9	24.9	-19.8	19.8	-19.8	19.8
97.0	-26.0	26.0	-20.9	20.9	-20.9	20.9
96.0	-27.0	27.0	-21.9	21.9	-21.9	21.9
95.0	-28.1	28.1	-22.9	22.9	-22.9	22.9
94.0	-29.2	29.2	-23.9	23.9	-23.9	23.9
93.0	-30.2	30.2	-24.9	24.9	-24.9	24.9
92.0	-31.3	31.3	-26.0	26.0	-26.0	26.0
91.0	-32.3	32.3	-27.0	27.0	-27.0	27.0
90.4	-33.0	33.0	-27.6	27.6	-27.6	27.6
90.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
89.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
88.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
87.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
86.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
85.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
84.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
83.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
82.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
81.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
80.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
0.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	

Oconee 3 Cycle 26

Operational Power Imbalance Setpoints

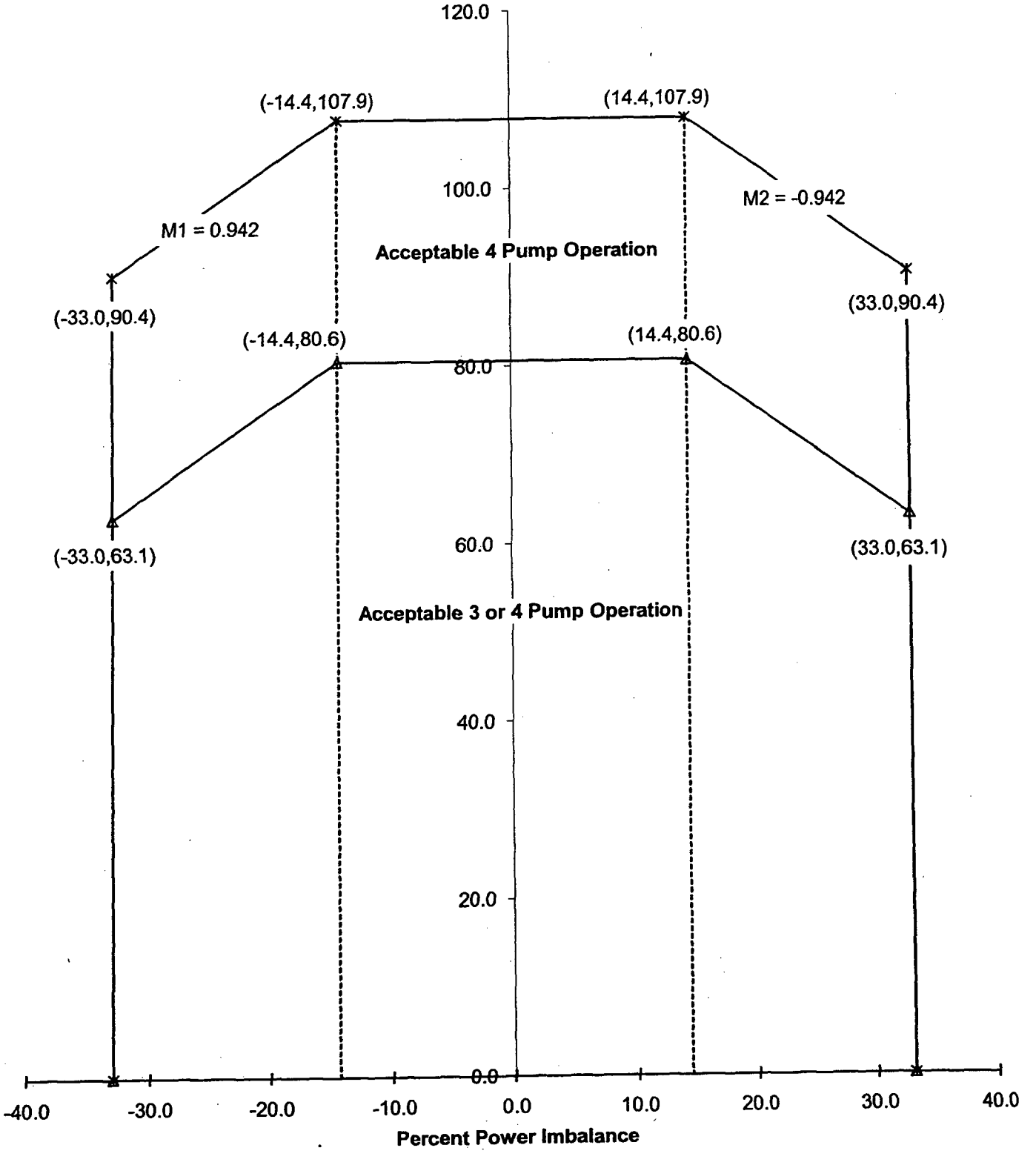
Operation with 3 RCS Pumps, BOC to EOC

% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	
80.6	-14.4	14.4				
80.0	-15.0	15.0				
79.0	-16.1	16.1				
78.0	-17.1	17.1				
77.0	-18.2	18.2	-13.2	13.2	-13.2	13.2
76.0	-19.3	19.3	-14.3	14.3	-14.3	14.3
75.0	-20.3	20.3	-15.3	15.3	-15.3	15.3
74.0	-21.4	21.4	-16.4	16.4	-16.4	16.4
73.0	-22.4	22.4	-17.4	17.4	-17.4	17.4
72.0	-23.5	23.5	-18.5	18.5	-18.5	18.5
71.0	-24.6	24.6	-19.6	19.6	-19.6	19.6
70.0	-25.6	25.6	-20.6	20.6	-20.6	20.6
69.0	-26.7	26.7	-21.7	21.7	-21.7	21.7
68.0	-27.8	27.8	-22.8	22.8	-22.8	22.8
67.0	-28.8	28.8	-23.8	23.8	-23.8	23.8
66.0	-29.9	29.9	-24.9	24.9	-24.9	24.9
65.0	-30.9	30.9	-25.9	25.9	-25.9	25.9
64.0	-32.0	32.0	-27.0	27.0	-27.0	27.0
63.1	-33.0	33.0	-28.0	28.0	-28.0	28.0
63.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
62.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
61.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
60.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
0.0	-33.0	33.0	-28.0	28.0	-28.0	28.0
% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	

Oconee 3 Cycle 26

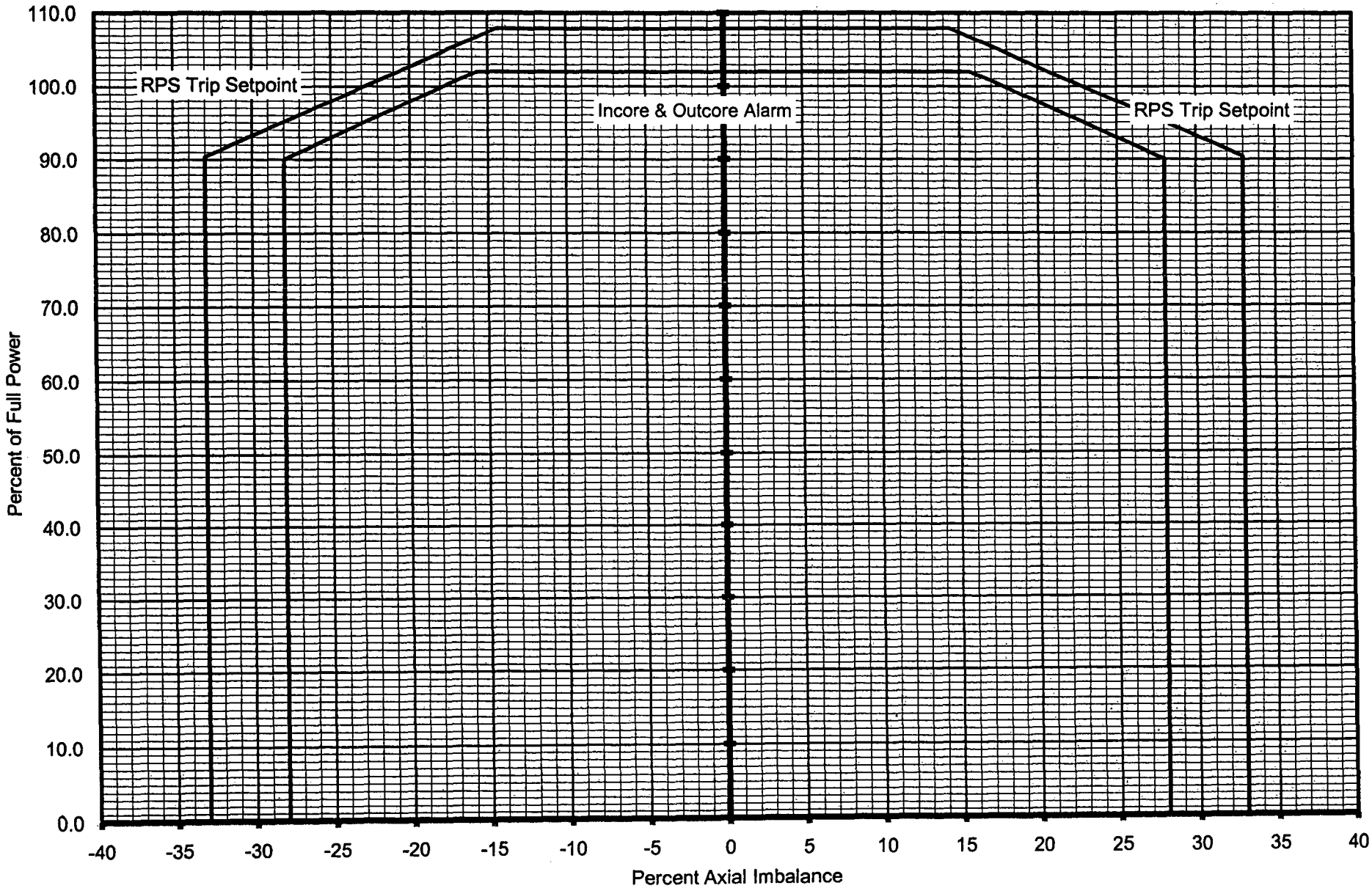
RPS Power Imbalance Setpoints

Referred to by TS 3.3.1



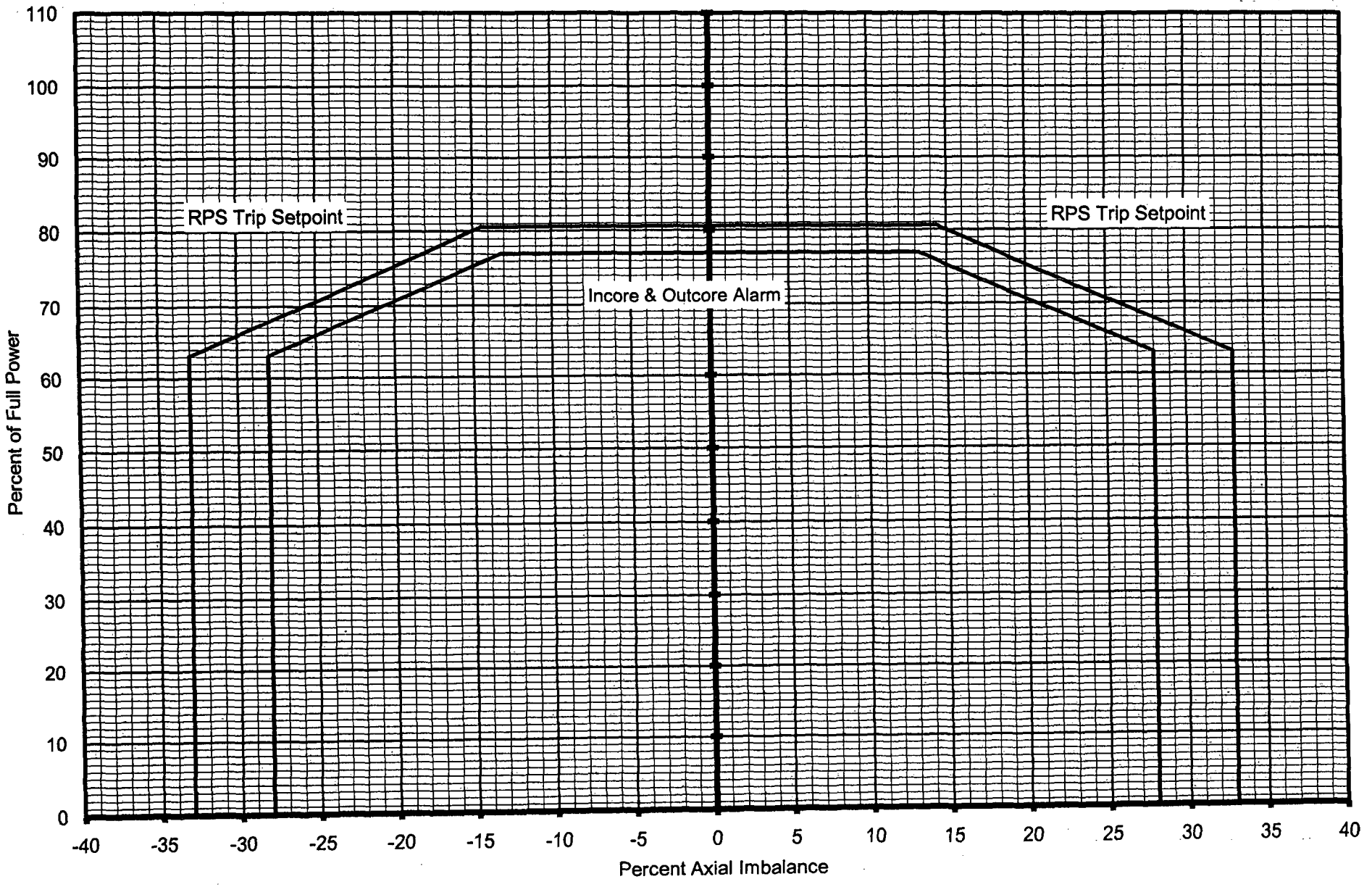
Oconee 3 Cycle 26

Imbalance Setpoints for 4 Pump Operation, BOC to EOC



Oconee 3 Cycle 26

Imbalance Setpoints for 3 Pump Operation, BOC to EOC



Oconee 3 Cycle 26

Operational Rod Index Setpoints

	%FP	RI Insertion Setpoint No Inop Rod	RI Insertion Setpoint 1 Inop Rod	RI Withdrawal Setpoint
4 Pumps	102.0	263.5	283.4	300
	100.0	261.5	281.5	300
	90.0	251.5	271.9	300
	80.0	241.5	262.3	300
	50.0	201.5	233.4	300
	48.0	195.2	231.5	300
	15.0	91.5	165.5	300
	13.0	76.5	161.5	300
	5.0	16.5	93.5	300
	3.0	1.5	76.5	300
	2.8	0.0	74.8	300
	0.0	0.0	51.0	300
3 Pumps	77.0	237.5	285.2	300
	75.0	234.8	281.5	300
	50.0	201.5	235.2	300
	48.0	195.2	231.5	300
	15.0	91.5	165.5	300
	13.0	76.5	161.5	300
	5.0	16.5	93.5	300
	3.0	1.5	76.5	300
	2.8	0.0	74.8	300
	0.0	0.0	51.0	300

Oconee 3 Cycle 26

Shutdown Margin Rod Index Setpoints

	%FP	RI Insertion Setpoint No Inop Rod	RI Insertion Setpoint 1 Inop Rod	RI Withdrawal Setpoint
4 Pumps	102.0	224.6	283.4	300
	100.0	221.5	281.5	300
	48.0	141.5	231.5	300
	13.0	76.5	161.5	300
	3.0	1.5	76.5	300
	2.8	0.0	74.8	300
	0.0	0.0	51.0	300
3 Pumps	77.0	227.4	285.2	300
	75.0	221.5	281.5	300
	48.0	141.5	231.5	300
	13.0	76.5	161.5	300
	3.0	1.5	76.5	300
	2.8	0.0	74.8	300
	0.0	0.0	51.0	300

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
102	100	99.8	24.8	100	100	63.5
101	100	99.0	24.0	100	100	62.5
100	100	98.2	23.2	100	100	61.5
99	100	97.5	22.5	100	100	60.5
98	100	96.7	21.7	100	100	59.5
97	100	95.9	20.9	100	100	58.5
96	100	95.2	20.2	100	100	57.5
95	100	94.4	19.4	100	100	56.5
94	100	93.6	18.6	100	100	55.5
93	100	92.9	17.9	100	100	54.5
92	100	92.1	17.1	100	100	53.5
91	100	91.3	16.3	100	100	52.5
90	100	90.6	15.6	100	100	51.5
89	100	89.8	14.8	100	100	50.5
88	100	89.0	14.0	100	100	49.5
87	100	88.2	13.2	100	100	48.5
86	100	87.5	12.5	100	100	47.5
85	100	86.7	11.7	100	100	46.5
84	100	85.9	10.9	100	100	45.5
83	100	85.2	10.2	100	100	44.5
82	100	84.4	9.4	100	100	43.5
81	100	83.6	8.6	100	100	42.5
80	100	82.9	7.9	100	100	41.5
79	100	82.1	7.1	100	100	40.2
78	100	81.3	6.3	100	100	38.8
77	100	80.6	5.6	100	100	37.5
76	100	79.8	4.8	100	100	36.2
75	100	79.0	4.0	100	100	34.8
74	100	78.2	3.2	100	100	33.5
73	100	77.5	2.5	100	100	32.2
72	100	76.7	1.7	100	100	30.8
71	100	75.9	0.9	100	100	29.5
70	100	75.2	0.2	100	100	28.2
69.8	100	75.0	0	100	100	27.9
69	100	73.8	0	100	100	26.8
68	100	72.3	0	100	100	25.5
67.6	100	71.7	0	100	100	25.0
67	100	70.7	0	100	99.6	24.6
66	100	69.2	0	100	98.9	23.9
65	100	67.7	0	100	98.2	23.2
64	100	66.1	0	100	97.6	22.6
63	100	64.6	0	100	96.9	21.9
62	100	63.0	0	100	96.2	21.2
61	100	61.5	0	100	95.6	20.6
60	100	60.0	0	100	94.9	19.9
59	100	58.4	0	100	94.2	19.2
58	100	56.9	0	100	93.6	18.6
57	100	55.3	0	100	92.9	17.9
56	100	53.8	0	100	92.2	17.2
55	100	52.3	0	100	91.6	16.6
54	100	50.7	0	100	90.9	15.9
53	100	49.2	0	100	90.2	15.2
52	100	47.7	0	100	89.6	14.6
51	100	46.1	0	100	88.9	13.9
50	100	44.6	0	100	88.2	13.2
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

Continued on next page.

Rod Index Setpoints

4 Pump Operation, No Inoperable Rods, BOC to EOC

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
49	100	43.0	0	100	86.7	11.7
48	100	41.5	0	100	85.1	10.1
47	100	39.6	0	100	83.5	8.5
46	100	37.8	0	100	82.0	7.0
45	100	35.9	0	100	80.4	5.4
44	100	34.1	0	100	78.8	3.8
43	100	32.2	0	100	77.2	2.2
42	100	30.4	0	100	75.7	0.7
41.6	100	29.6	0	100	75.0	0
41	100	28.5	0	100	73.2	0
40	100	26.6	0	100	70.1	0
39.1	100	25.0	0	100	67.3	0
39	99.9	24.9	0	100	66.9	0
38	99.0	24.0	0	100	63.8	0
37	98.0	23.0	0	100	60.6	0
36	97.1	22.1	0	100	57.5	0
35	96.2	21.2	0	100	54.3	0
34	95.2	20.2	0	100	51.2	0
33	94.3	19.3	0	100	48.1	0
32	93.4	18.4	0	100	44.9	0
31	92.5	17.5	0	100	41.8	0
30	91.5	16.5	0	100	38.6	0
29	90.6	15.6	0	100	35.5	0
28	89.7	14.7	0	100	32.4	0
27	88.8	13.8	0	100	29.2	0
26	87.8	12.8	0	100	26.1	0
25.7	87.5	12.5	0	100	25.0	0
25	86.9	11.9	0	99.0	24.0	0
24	86.0	11.0	0	97.4	22.4	0
23	85.0	10.0	0	95.8	20.8	0
22	84.1	9.1	0	94.2	19.2	0
21	83.2	8.2	0	92.7	17.7	0
20	82.2	7.2	0	91.1	16.1	0
19	81.3	6.3	0	89.5	14.5	0
18	80.4	5.4	0	88.0	13.0	0
17	79.5	4.5	0	86.4	11.4	0
16	78.5	3.5	0	84.8	9.8	0
15	77.6	2.6	0	83.2	8.2	0
14	76.7	1.7	0	79.5	4.5	0
13	75.8	0.8	0	75.8	0.8	0
12.8	75.0	0	0	75.0	0	0
12	69.0	0	0	69.0	0	0
11	61.5	0	0	61.5	0	0
10	54.0	0	0	54.0	0	0
9	46.5	0	0	46.5	0	0
8	39.0	0	0	39.0	0	0
7	31.5	0	0	31.5	0	0
6	24.0	0	0	24.0	0	0
5	16.5	0	0	16.5	0	0
4	9.0	0	0	9.0	0	0
3	1.5	0	0	1.5	0	0
2.8	0	0	0	0	0	0
2	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

Oconee 3 Cycle 26
Rod Index Setpoints
3 Pump Operation, No Inoperable Rods, BOC to EOC

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
77	100	100	27.4	100	100	37.5
76.2	100	100	25.0	100	100	36.4
76	100	99.7	24.7	100	100	36.1
75	100	98.2	23.2	100	100	34.8
74	100	96.8	21.8	100	100	33.5
73	100	95.3	20.3	100	100	32.1
72	100	93.8	18.8	100	100	30.8
71	100	92.3	17.3	100	100	29.5
70	100	90.8	15.8	100	100	28.1
69	100	89.4	14.4	100	100	26.8
68	100	87.9	12.9	100	100	25.5
67.6	100	87.4	12.4	100	100	25.0
67	100	86.4	11.4	100	99.6	24.6
66	100	84.9	9.9	100	98.9	23.9
65	100	83.4	8.4	100	98.2	23.2
64	100	82.0	7.0	100	97.6	22.6
63	100	80.5	5.5	100	96.9	21.9
62	100	79.0	4.0	100	96.2	21.2
61	100	77.5	2.5	100	95.6	20.6
60	100	76.0	1.0	100	94.9	19.9
59.3	100	75.0	0	100	94.4	19.4
59	100	74.1	0	100	94.2	19.2
58	100	71.1	0	100	93.6	18.6
57	100	68.2	0	100	92.9	17.9
56	100	65.2	0	100	92.2	17.2
55	100	62.2	0	100	91.6	16.6
54	100	59.3	0	100	90.9	15.9
53	100	56.3	0	100	90.2	15.2
52	100	53.4	0	100	89.6	14.6
51	100	50.4	0	100	88.9	13.9
50	100	47.4	0	100	88.2	13.2
49	100	44.5	0	100	86.7	11.7
48	100	41.5	0	100	85.1	10.1
47	100	39.6	0	100	83.5	8.5
46	100	37.8	0	100	82.0	7.0
45	100	35.9	0	100	80.4	5.4
44	100	34.1	0	100	78.8	3.8
43	100	32.2	0	100	77.2	2.2
42	100	30.4	0	100	75.7	0.7
41.6	100	29.6	0	100	75.0	0
41	100	28.5	0	100	73.2	0
40	100	26.6	0	100	70.1	0
39.1	100	25.0	0	100	67.3	0
39	99.9	24.9	0	100	66.9	0
38	99	24.0	0	100	63.8	0
37	98	23.0	0	100	60.6	0
36	97.1	22.1	0	100	57.5	0
35	96.2	21.2	0	100	54.3	0
34	95.2	20.2	0	100	51.2	0
33	94.3	19.3	0	100	48.1	0
32	93.4	18.4	0	100	44.9	0
31	92.5	17.5	0	100	41.8	0
30	91.5	16.5	0	100	38.6	0
29	90.6	15.6	0	100	35.5	0
28	89.7	14.7	0	100	32.4	0
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

Continued on next page.

Rod Index Setpoints

3 Pump Operation, No Inoperable Rods, BOC to EOC

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
27	88.8	13.8	0	100	29.2	0
26	87.8	12.8	0	100	26.1	0
25.7	87.5	12.5	0	100	25.0	0
25	86.9	11.9	0	99.0	24.0	0
24	86.0	11.0	0	97.4	22.4	0
23	85.0	10.0	0	95.8	20.8	0
22	84.1	9.1	0	94.2	19.2	0
21	83.2	8.2	0	92.7	17.7	0
20	82.2	7.2	0	91.1	16.1	0
19	81.3	6.3	0	89.5	14.5	0
18	80.4	5.4	0	88.0	13.0	0
17	79.5	4.5	0	86.4	11.4	0
16	78.5	3.5	0	84.8	9.8	0
15	77.6	2.6	0	83.2	8.2	0
14	76.7	1.7	0	79.5	4.5	0
13	75.8	0.8	0	75.8	0.8	0
12.8	75.0	0	0	75.0	0	0
12	69.0	0	0	69.0	0	0
11	61.5	0	0	61.5	0	0
10	54.0	0	0	54.0	0	0
9	46.5	0	0	46.5	0	0
8	39.0	0	0	39.0	0	0
7	31.5	0	0	31.5	0	0
6	24.0	0	0	24.0	0	0
5	16.5	0	0	16.5	0	0
4	9.0	0	0	9.0	0	0
3	1.5	0	0	1.5	0	0
2.8	0	0	0	0	0	0
2	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

Rod Index Setpoints

4 Pump Operation, 1 Inoperable Rod, BOC to EOC

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
102	100	100	83.4	100	100	83.4
101	100	100	82.5	100	100	82.5
100	100	100	81.5	100	100	81.5
99	100	100	80.5	100	100	80.5
98	100	100	79.6	100	100	79.6
97	100	100	78.6	100	100	78.6
96	100	100	77.7	100	100	77.7
95	100	100	76.7	100	100	76.7
94	100	100	75.7	100	100	75.7
93	100	100	74.8	100	100	74.8
92	100	100	73.8	100	100	73.8
91	100	100	72.8	100	100	72.9
90	100	100	71.9	100	100	71.9
89	100	100	70.9	100	100	70.9
88	100	100	70.0	100	100	70.0
87	100	100	69.0	100	100	69.0
86	100	100	68.0	100	100	68.1
85	100	100	67.1	100	100	67.1
84	100	100	66.1	100	100	66.1
83	100	100	65.2	100	100	65.2
82	100	100	64.2	100	100	64.2
81	100	100	63.2	100	100	63.3
80	100	100	62.3	100	100	62.3
79	100	100	61.3	100	100	61.3
78	100	100	60.3	100	100	60.4
77	100	100	59.4	100	100	59.4
76	100	100	58.4	100	100	58.4
75	100	100	57.5	100	100	57.5
74	100	100	56.5	100	100	56.5
73	100	100	55.5	100	100	55.6
72	100	100	54.6	100	100	54.6
71	100	100	53.6	100	100	53.6
70	100	100	52.7	100	100	52.7
69	100	100	51.7	100	100	51.7
68	100	100	50.7	100	100	50.7
67	100	100	49.8	100	100	49.8
66	100	100	48.8	100	100	48.8
65	100	100	47.8	100	100	47.8
64	100	100	46.9	100	100	46.9
63	100	100	45.9	100	100	45.9
62	100	100	45.0	100	100	45.0
61	100	100	44.0	100	100	44.0
60	100	100	43.0	100	100	43.0
59	100	100	42.1	100	100	42.1
58	100	100	41.1	100	100	41.1
57	100	100	40.2	100	100	40.2
56	100	100	39.2	100	100	39.2
55	100	100	38.2	100	100	38.2
54	100	100	37.3	100	100	37.3
53	100	100	36.3	100	100	36.3
52	100	100	35.3	100	100	35.3
51	100	100	34.4	100	100	34.4
50	100	100	33.4	100	100	33.4
49	100	100	32.5	100	100	32.5
48	100	100	31.5	100	100	31.5
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

Continued on next page.

Rod Index Setpoints

4 Pump Operation, 1 Inoperable Rod, BOC to EOC

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
47	100	100	29.5	100	100	29.5
46	100	100	27.5	100	100	27.5
45	100	100	25.5	100	100	25.5
44.8	100	100	25.0	100	100	25.0
44	100	99.2	24.2	100	99.2	24.2
43	100	98.2	23.2	100	98.2	23.2
42	100	97.2	22.2	100	97.2	22.2
41	100	96.2	21.2	100	96.2	21.2
40	100	95.2	20.2	100	95.2	20.2
39	100	94.2	19.2	100	94.2	19.2
38	100	93.2	18.2	100	93.2	18.2
37	100	92.2	17.2	100	92.2	17.2
36	100	91.2	16.2	100	91.2	16.2
35	100	90.2	15.2	100	90.2	15.2
34	100	89.2	14.2	100	89.2	14.2
33	100	88.2	13.2	100	88.2	13.2
32	100	87.2	12.2	100	87.2	12.2
31	100	86.2	11.2	100	86.2	11.2
30	100	85.2	10.2	100	85.2	10.2
29	100	84.2	9.2	100	84.2	9.2
28	100	83.2	8.2	100	83.2	8.2
27	100	82.2	7.2	100	82.2	7.2
26	100	81.2	6.2	100	81.2	6.2
25	100	80.2	5.2	100	80.2	5.2
24	100	79.2	4.2	100	79.2	4.2
23	100	78.2	3.2	100	78.2	3.2
22	100	77.2	2.2	100	77.2	2.2
21	100	76.2	1.2	100	76.2	1.2
20	100	75.2	0.2	100	75.2	0.2
19.8	100	75.0	0	100	75.0	0
19	100	73.5	0	100	73.5	0
18	100	71.5	0	100	71.5	0
17	100	69.5	0	100	69.5	0
16	100	67.5	0	100	67.5	0
15	100	65.5	0	100	65.5	0
14	100	63.5	0	100	63.5	0
13	100	61.5	0	100	61.5	0
12	100	53.0	0	100	53.0	0
11	100	44.5	0	100	44.5	0
10	100	36.0	0	100	36.0	0
9	100	27.5	0	100	27.5	0
8.7	100	25.0	0	100	25.0	0
8	97.0	22.0	0	97.0	22.0	0
7	92.8	17.8	0	92.8	17.8	0
6	88.5	13.5	0	88.5	13.5	0
5	84.2	9.2	0	84.2	9.2	0
4	80.0	5.0	0	80.0	5.0	0
3	75.8	0.8	0	75.8	0.8	0
2.8	75	0	0	75	0	0
2	68	0	0	68	0	0
1	59.5	0	0	59.5	0	0
0	51	0	0	51	0	0
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
77	100	100	85.2	100	100	85.2
76	100	100	83.4	100	100	83.4
75	100	100	81.5	100	100	81.5
74	100	100	79.6	100	100	79.6
73	100	100	77.8	100	100	77.8
72	100	100	75.9	100	100	75.9
71	100	100	74.1	100	100	74.1
70	100	100	72.2	100	100	72.2
69	100	100	70.4	100	100	70.4
68	100	100	68.5	100	100	68.5
67	100	100	66.7	100	100	66.7
66	100	100	64.8	100	100	64.8
65	100	100	63.0	100	100	63.0
64	100	100	61.1	100	100	61.1
63	100	100	59.3	100	100	59.3
62	100	100	57.4	100	100	57.4
61	100	100	55.6	100	100	55.6
60	100	100	53.7	100	100	53.7
59	100	100	51.9	100	100	51.9
58	100	100	50.0	100	100	50.0
57	100	100	48.2	100	100	48.2
56	100	100	46.3	100	100	46.3
55	100	100	44.5	100	100	44.5
54	100	100	42.6	100	100	42.6
53	100	100	40.8	100	100	40.8
52	100	100	38.9	100	100	38.9
51	100	100	37.1	100	100	37.1
50	100	100	35.2	100	100	35.2
49	100	100	33.4	100	100	33.4
48	100	100	31.5	100	100	31.5
47	100	100	29.5	100	100	29.5
46	100	100	27.5	100	100	27.5
45	100	100	25.5	100	100	25.5
44.8	100	100	25.0	100	100	25.0
44	100	99.2	24.2	100	99.2	24.2
43	100	98.2	23.2	100	98.2	23.2
42	100	97.2	22.2	100	97.2	22.2
41	100	96.2	21.2	100	96.2	21.2
40	100	95.2	20.2	100	95.2	20.2
39	100	94.2	19.2	100	94.2	19.2
38	100	93.2	18.2	100	93.2	18.2
37	100	92.2	17.2	100	92.2	17.2
36	100	91.2	16.2	100	91.2	16.2
35	100	90.2	15.2	100	90.2	15.2
34	100	89.2	14.2	100	89.2	14.2
33	100	88.2	13.2	100	88.2	13.2
32	100	87.2	12.2	100	87.2	12.2
31	100	86.2	11.2	100	86.2	11.2
30	100	85.2	10.2	100	85.2	10.2
29	100	84.2	9.2	100	84.2	9.2
28	100	83.2	8.2	100	83.2	8.2
27	100	82.2	7.2	100	82.2	7.2
26	100	81.2	6.2	100	81.2	6.2
25	100	80.2	5.2	100	80.2	5.2
24	100	79.2	4.2	100	79.2	4.2
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

RI = 300 is withdrawal limit at all power levels.

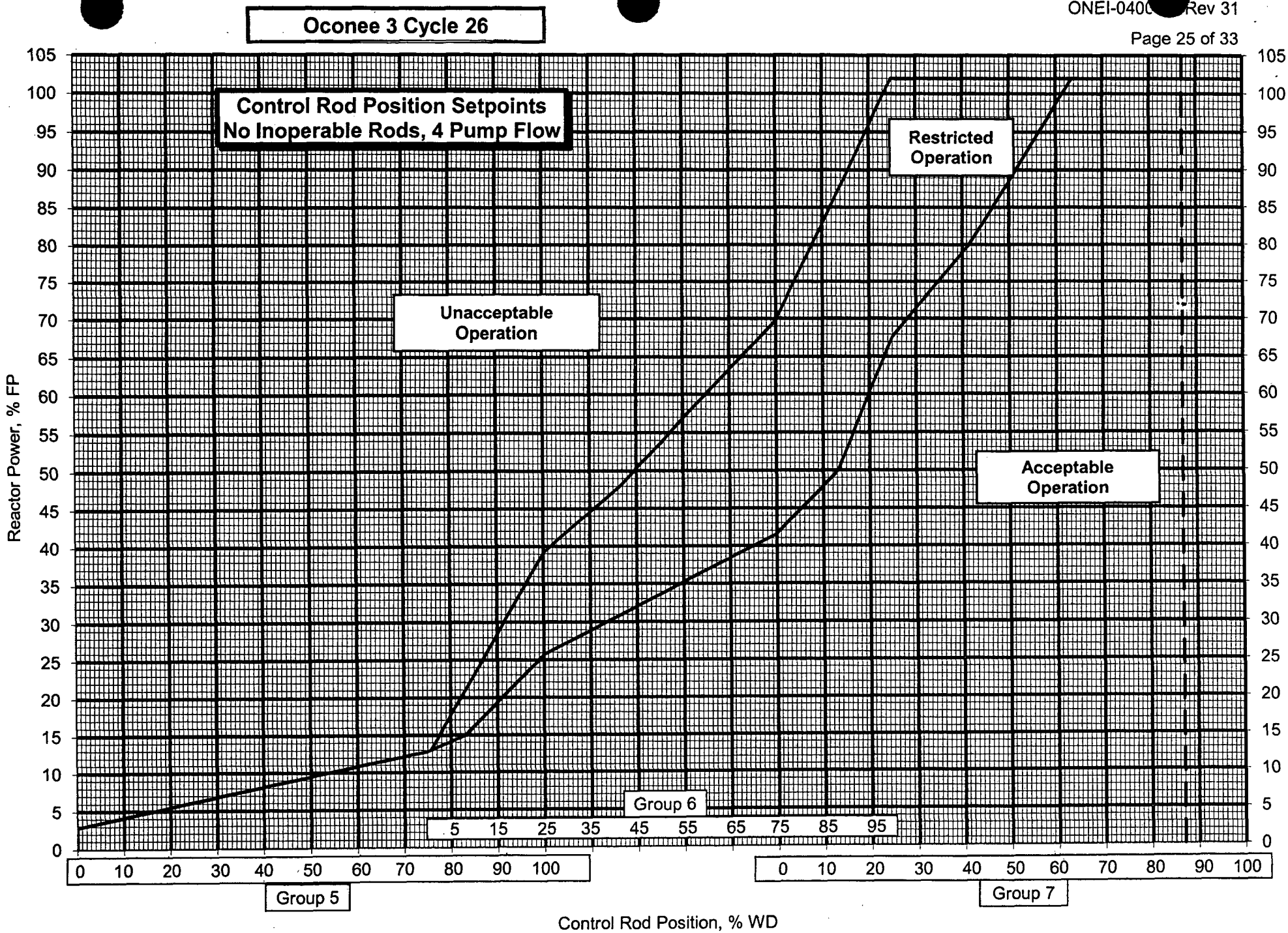
Continued on next page.

Rod Index Setpoints

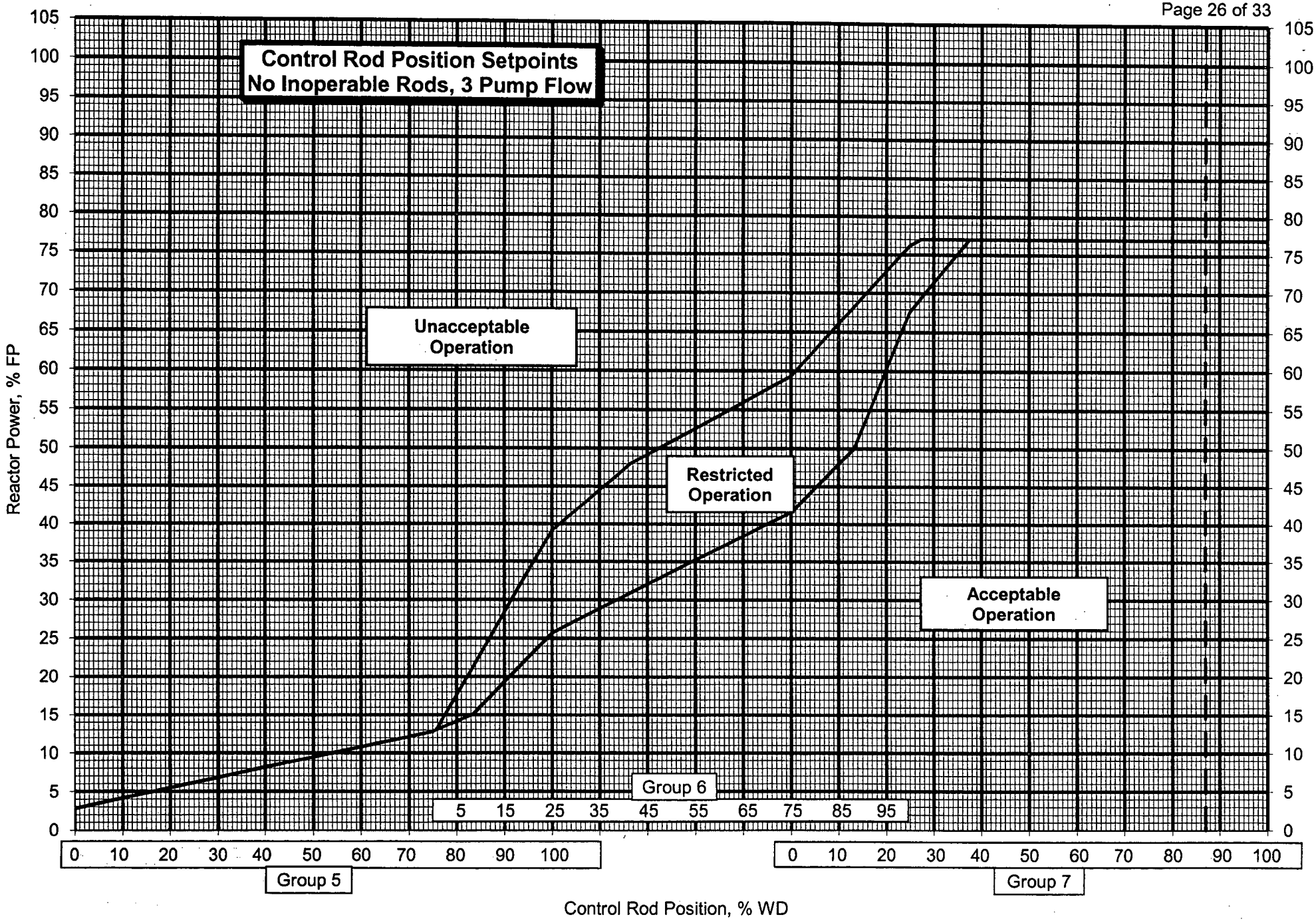
3 Pump Operation, 1 Inoperable Rod, BOC to EOC

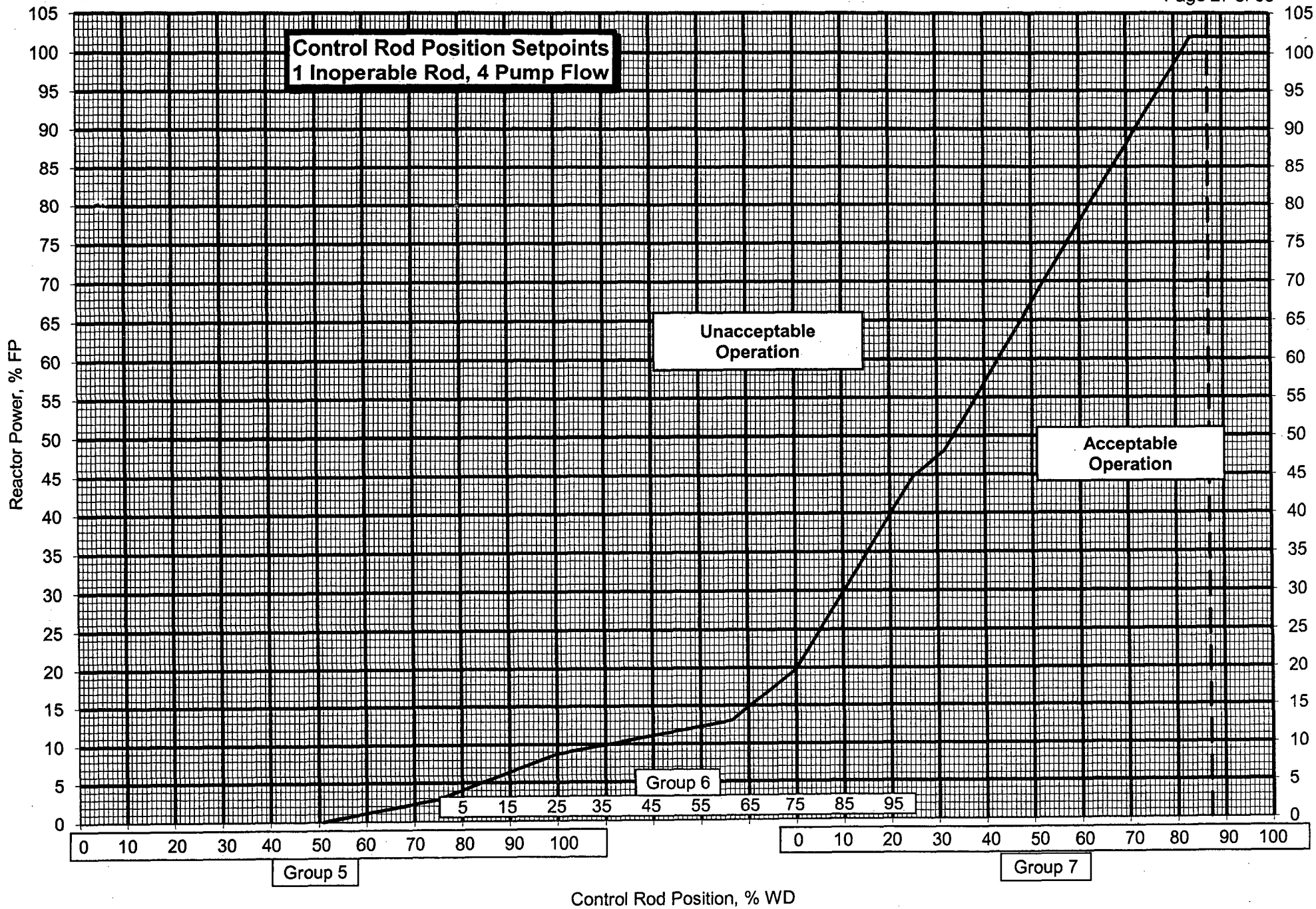
% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
23	100	78.2	3.2	100	78.2	3.2
22	100	77.2	2.2	100	77.2	2.2
21	100	76.2	1.2	100	76.2	1.2
20	100	75.2	0.2	100	75.2	0.2
19.8	100	75.0	0	100	75.0	0
19	100	73.5	0	100	73.5	0
18	100	71.5	0	100	71.5	0
17	100	69.5	0	100	69.5	0
16	100	67.5	0	100	67.5	0
15	100	65.5	0	100	65.5	0
14	100	63.5	0	100	63.5	0
13	100	61.5	0	100	61.5	0
12	100	53.0	0	100	53.0	0
11	100	44.5	0	100	44.5	0
10	100	36.0	0	100	36.0	0
9	100	27.5	0	100	27.5	0
8.7	100	25.0	0	100	25.0	0
8	97.0	22.0	0	97.0	22.0	0
7	92.8	17.8	0	92.8	17.8	0
6	88.5	13.5	0	88.5	13.5	0
5	84.2	9.2	0	84.2	9.2	0
4	80.0	5.0	0	80.0	5.0	0
3	75.8	0.8	0	75.8	0.8	0
2.8	75.0	0	0	75.0	0	0
2	68	0	0	68	0	0
1	59.5	0	0	59.5	0	0
0	51	0	0	51	0	0
% FP	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
	Shutdown Margin Setpoint			Operational Alarm Setpoint		

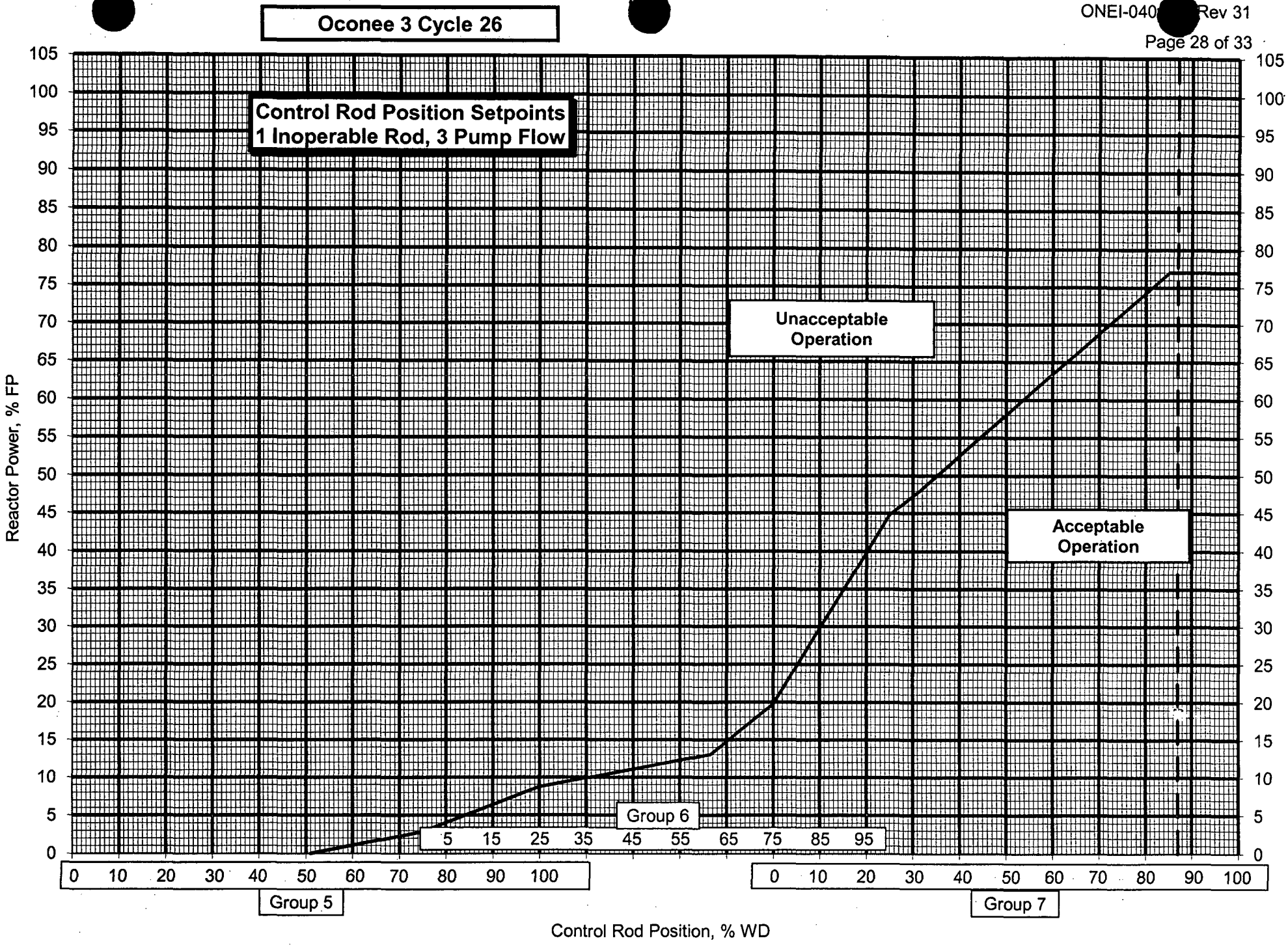
RI = 300 is withdrawal limit at all power levels.


Oconee 3 Cycle 26
Control Rod Position Setpoints
No Inoperable Rods, 4 Pump Flow
Restricted Operation
Unacceptable Operation
Acceptable Operation
Reactor Power, % FP
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Group 6
5 15 25 35 45 55 65 75 85 95
0 10 20 30 40 50 60 70 80 90 100
Group 5
0 10 20 30 40 50 60 70 80 90 100
Group 7
Control Rod Position, % WD

Oconee 3 Cycle 26




Control Rod Position Setpoints
1 Inoperable Rod, 4 Pump Flow
Unacceptable Operation
Acceptable Operation
Reactor Power, % FP
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Group 6
5 15 25 35 45 55 65 75 85 95
0 10 20 30 40 50 60 70 80 90 100
Group 5
0 10 20 30 40 50 60 70 80 90 100
Group 7
Control Rod Position, % WD


Oconee 3 Cycle 26
Control Rod Position Setpoints
1 Inoperable Rod, 3 Pump Flow
Unacceptable Operation
Acceptable Operation
Reactor Power, % FP
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Group 6
5 15 25 35 45 55 65 75 85 95
0 10 20 30 40 50 60 70 80 90 100
Group 5
0 10 20 30 40 50 60 70 80 90 100
Group 7
Control Rod Position, % WD

Oconee 3 Cycle 26

2.0 Core Operating Limits -- Not Error Adjusted

The data provided on the following pages satisfies a licensing commitment to identify specific parameters before instrumentation uncertainties are incorporated.

References provided in section 1 of this COLR identify the sources for the data which follows.

Information provided in this section should not be used in plant procedures.

Quadrant Power Tilt Limits

Referred to by TS 3.2.3

	Steady State		Transient		Maximum
Core Power Level, %FP	30 - 100	0 - 30	30 - 100	0 - 30	0 - 100
Quadrant Power Tilt, %	5.45	10.00	9.44	12.00	20.00

Variable Low RCS Pressure Protective Limits

Referred to by TS 2.1.1

Core Outlet Pressure psia	Reactor Coolant Outlet Temperature, °F 3 RCS Pumps	4 RCS Pumps
1800	581.0	578.3
1900	590.0	587.3
2000	598.9	596.3
2100	607.9	605.2
2200	616.9	614.2
2300	625.9	623.2

Oconee 3 Cycle 26

Axial Power Imbalance Protective Limits

Referred to by TS 2.1.1

Not for Plant Use

	%FP	RPS	Operational
4 Pumps	0.0	-35.0	-39.5
	80.0	-	-39.5
	90.0	-35.0	-
	90.0	-	-39.5
	100.0	-	-28.4
	109.4	-14.4	-
	109.4	14.4	-
	100.0	-	28.4
	90.0	35.0	39.5
	80.0	-	39.5
	0.0	35.0	39.5
3 Pumps	0.0	-35.0	-39.5
	62.3	-35.0	-
	77.0	-	-39.5
	81.7	-14.4	-
	81.7	14.4	-
	77.0	-	39.5
	62.3	35.0	-
	0.0	35.0	39.5

Oconee 3 Cycle 26

Rod Index Limits

Referred to by TS 3.2.1

Not for Plant Use

	%FP	Operational RI Insertion Limit	Shutdown Margin RI Insertion Limit No Inop Rod	1 Inop Rod	RI Withdrawal Limit
4 Pumps	102	262	220	280	300
	100	260	-	-	300
	90	250	-	-	300
	80	240	-	-	300
	50	200	140	230	300
	15	90	75	160	300
	5	0	0	75	300
3 Pumps	77	236	220	280	300
	50	200	140	230	300
	15	90	75	160	300
	5	0	0	75	300

Oconee 3 Cycle 26

LOCA Limits

Not for Plant Use

	Core Elevation Feet	LOCA LHR kw/ft Limit Versus Burnup			
Mk-B11 Fuel		0 GWd/mtU	23 GWd/mtU	40 GWd/mtU	62 GWd/mtU
	0.000	16.6	16.6	16.6	12.2
	2.506	17.5	17.5	17.5	12.2
	4.264	17.6	17.6	17.6	12.2
	6.021	17.7	17.7	17.7	12.2
	7.779	17.6	17.6	17.6	12.2
	9.536	17.5	17.5	17.5	12.2
	12.00	16.6	16.6	16.6	12.2
Mk-B-HTP		0 GWd/mtU	23 GWd/mtU	40 GWd/mtU	62 GWd/mtU
	0.000	16.7	16.7	16.7	12.5
	2.506	17.6	17.6	17.6	13.2
	4.264	17.8	17.8	17.8	13.2
	6.021	17.8	17.8	17.8	13.2
	7.779	17.8	17.8	17.8	13.2
	9.536	17.3	17.3	17.0	13.2
	12.00	16.4	16.4	16.1	12.5
WH-177		0 GWd/mtU	23 GWd/mtU	40 GWd/mtU	62 GWd/mtU
	0.000	14.9	14.9	14.9	11.0
	2.506	15.7	15.7	15.7	11.0
	4.264	15.8	15.8	15.8	11.0
	6.021	15.9	15.9	15.9	11.0
	7.779	15.8	15.8	15.8	11.0
	9.536	15.7	15.7	15.7	11.0
	12.00	14.9	14.9	14.9	11.0

Oconee 3 Cycle 26

Not for Plant Use
Instrument uncertainties are not included in the values shown.

ΔTcold, °F	4 RCP Operation - Loop Average Temp., °F	3 RCP Operation - Loop Average Temp., °F
	Tavg (Analytical)	Tavg (Analytical)
0.0	<581.0	<581.0
0.1	<581.0	<581.0
0.2	<581.1	<581.0
0.3	<581.1	<581.1
0.4	<581.2	<581.1
0.5	<581.2	<581.1
0.6	<581.2	<581.1
0.7	<581.3	<581.2
0.8	<581.3	<581.2
0.9	<581.3	<581.2
1.0	<581.4	<581.2
1.1	<581.4	<581.2
1.2	<581.5	<581.3
1.3	<581.5	<581.3
1.4	<581.5	<581.3
1.5	<581.6	<581.3
1.6	<581.6	<581.4
1.7	<581.6	<581.4
1.8	<581.7	<581.4
1.9	<581.7	<581.4
2.0	<581.8	<581.4
2.1	<581.8	<581.5
2.2	<581.8	<581.5
2.3	<581.9	<581.5
2.4	<581.9	<581.5
2.5	<582.0	<581.6
2.6	<582.0	<581.6
2.7	<582.0	<581.6
2.8	<582.1	<581.6
2.9	<582.1	<581.6
3.0	<582.1	<581.7
3.1	<582.2	<581.7
3.2	<582.2	<581.7
3.3	<582.3	<581.7
3.4	<582.3	<581.7
3.5	<582.3	<581.8
3.6	<582.4	<581.8
3.7	<582.4	<581.8
3.8	<582.4	<581.8
3.9	<582.5	<581.9
4.0	<582.5	<581.9
4.1	<582.6	<581.9
4.2	<582.6	<581.9
4.3	<582.6	<581.9
4.4	<582.7	<582.0
4.5	<582.7	<582.0
4.6	<582.7	<582.0
4.7	<582.8	<582.0
4.8	<582.8	<582.1
4.9	<582.9	<582.1
5.0	<582.9	<582.1