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November 18, 2003

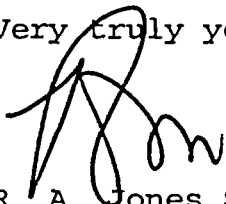
U. S. Nuclear Regulatory Commission  
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Subject: Oconee Nuclear Site Docket No. 50-269  
Core Operating Limits Report (COLR)

Gentlemen:

Attached, pursuant to Oconee Technical Specifications 5.6.5, is an information copy of a revision to the Core Operating Limits Report for Oconee Unit 1, Cycle 22, Rev. 20.

Very truly yours,



R. A. Jones Site, Vice President  
Oconee Nuclear Site

Attachment

A001

NRC Document Control Desk  
November 18, 2003  
Page 2

xc w/att: Mr. L. A. Reyes, Regional Administrator  
U. S. Nuclear Regulatory Commission, Region II

Mr. L. N. Olshan, Project Manager  
Office of Nuclear Reactor Regulation

Mr. Mel Shannon  
Senior Resident Inspector  
Oconee Nuclear Site

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Page 3

bxc wo/att: M. R. Wilder  
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- 4) 06700 ONS MANUAL MASTER FILE ON03DM
- 5) 06937 R R ST CLAIR EC08G

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**REFERENCE**

NUCLEAR GENERAL OFFICE  
OCONEE NUCLEAR STATION  
EXEMPTION CODE: M-5  
RESP GROUP: N/E  
OCONEE UNIT 1 CYCLE 22  
COLR

Page 1 of 1

Date: **11/12/03**

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MANAGER  
NUCLEAR ENGINEERING

BY:  
J W SIMMONS JWS/AYB EC08H

**Duke Power Company**

**Oconee 1 Cycle 22**

**Core Operating Limits Report**

**QA Condition 1**

Prepared By: J. D. Forster J. D. Forster

Date: 13 Nov 2003

Checked By: L. D. McClain L. D. McClain

Date: 13 Nov 2003

CDR By: S. G. Siry S. G. Siry

Date: 13 Nov 2003

Approved By: R. R. St. Clair R. R. St. Clair

Date: 13 Nov 2003

## INSPECTION OF ENGINEERING INSTRUCTIONS

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R. R. H. Clark  
(Sponsor)

Date:

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RES (Electrical Only)

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RES (Reactor)

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Inspected By/Date: \_\_\_\_\_

MOD

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Waived

MCE (Mechanical &amp; Civil)

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RES (Electrical Only)

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RES (Reactor)

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Oconee 1 Cycle 22  
Core Operating Limits Report

Insertion Sheet for Revision 20

This revision is not valid until the end of operation for Oconee 1 Cycle 21.

Remove these revision 19 pages

1-32

Insert these revision 20 pages

1-33

Revision Log

Revision	Effective Date	Pages Revised	Pages Added	Pages Deleted	Total Effective Pages
Oconee 1 Cycle 22 revisions below					
20	Nov 2003	1 - 32	33	-	33
Oconee 1 Cycle 21 revisions below					
19	Aug 2003	1, 2, 3	1a	-	32
18	Apr 2002	1, 2, 4	-	-	32
17	Mar 2002	1-31	32	-	32
Oconee 1 Cycle 20 revisions below					
16	May 2001	1-4	-	-	31
15	Nov 2000	1-31	-	-	31

## Oconee 1 Cycle 22

### 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O1C22 has been prepared in accordance with the requirements of ITS 5.6.5. The core operating limits within this report have been developed using NRC approved methodology identified in references 1 through 11. The RPS protective limits and maximum allowable setpoints are documented in references 12 through 14. These limits are validated for use in O1C22 by references 15 through 17. The O1C22 analyses assume a design flow of 107.5% of 88,000 gpm per RCS pump, radial local peaking ( $F_{\Delta h}$ ) of 1.714, and axial peaking factor ( $F_z$ ) of 1.5, and an EOC ( $< 100$  ppmB) Tavg reduction of 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 O1C22 reload core.

### 1.1 References

1. Nuclear Design Methodology Using CASMO-3 / SIMULATE-3P, DPC-NE-1004P-A, Revision 0, SER dated November 23, 1992.
2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002A, Revision 1, SER dated October 1, 1985.
3. Oconee Nuclear Station Reload Design Methodology, NFS-1001A, Revision 5, SER dated December 8, 2000.
4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003P-A, Revision 1, SER dated June 23, 2000.
5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005P-A, Revision 2, SER dated June 8, 1999.
6. Fuel Mechanical Reload Analysis Methodology Using TACO3, DPC-NE-2008P-A, Revision 0, SER dated April 3, 1995.
7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, Revision 2, SER dated September 24, 2003.
8. DPC-NE-3000P-A, Thermal Hydraulic Transient Analysis Methodology, Rev. 3, SER dated September 24, 2003.
9. BAW-10192-PA, BWNT LOCA - BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants, SER dated February 18, 1997.
10. BAW-10164P-A, Rev. 4, "RELAP5/MOD2-B&W - An Advanced Computer Program for Light Water Reactor LOCA and Non-LOCA Transient Analysis", SER dated April 9, 2002.
11. BAW-10227-PA, Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel, SER dated February 4, 2000.
12. RPS RCS Pressure & Temperature Trip Function Uncertainty Analyses and Variable Low Pressure Safety Limit, OSC-4048, Revision 4, January 2001.
13. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 2, October 2001.
14.  $\Delta T_c$  and EOC Reduced Tavg Operation, OSC-7265, Rev. 1, Duke Power Co., June 2002.
15. O1C22 Maneuvering Analysis, OSC-8413, Revision 2, November 2003.
16. O1C22 Specific DNB Analysis, OSC-8460, Revision 1, September 2003.
17. O1C22 Reload Safety Evaluation, OSC-8471, Revision 0, November 2003.



## Oconee 1 Cycle 22

### Miscellaneous Setpoints

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

Spent fuel pool boron concentration shall be greater than 2220 ppm.  
Referred to by ITS 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 ITS 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 ITS 3.5.1.

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

Shutdown Margin (SDM) shall be greater than 1%  $\Delta k/k$ .  
Referred to by ITS 3.1.1.

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

MTC x 10 <sup>-4</sup>	% FP
$\Delta p / ^\circ F$	
+0.90	0
+0.73	15
0.00	80
0.00	100
0.00	120

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

4 RCP:	measured hot leg pressure $\geq$ 2125 psig
3 RCP:	measured hot leg pressure $\geq$ 2125 psig

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

The measured Tav<sub>g</sub> must be less than COLR limits minus Instrument uncertainty.  $\Delta T_c$  is the setpoint value selected by the operators. Values are expanded by linear interpolation on page 33 of this document without Instrument uncertainty.

$\Delta T_c, ^\circ F$	Max Loop Tav <sub>g</sub> (Incl 2°F unc)	
	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 Tav<sub>g</sub>.

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

4 RCP:	Measured $\geq$ 108.5 %df
3 RCP:	Measured $\geq$ 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 ITS 3.2.1.

Regulating rod group overlap shall be 25%  $\pm$  5% between two sequential groups.  
Referred to by ITS 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 1 Cycle 22

## Steady State Operating Band

EFPD	Rod Index		APSR %WD	
	Min	Max	Min	Max
0 to 433	292 ± 5	300	30	40
433 to EOC	292 ± 5	300	100	100

## Quadrant Power Tilt Setpoints

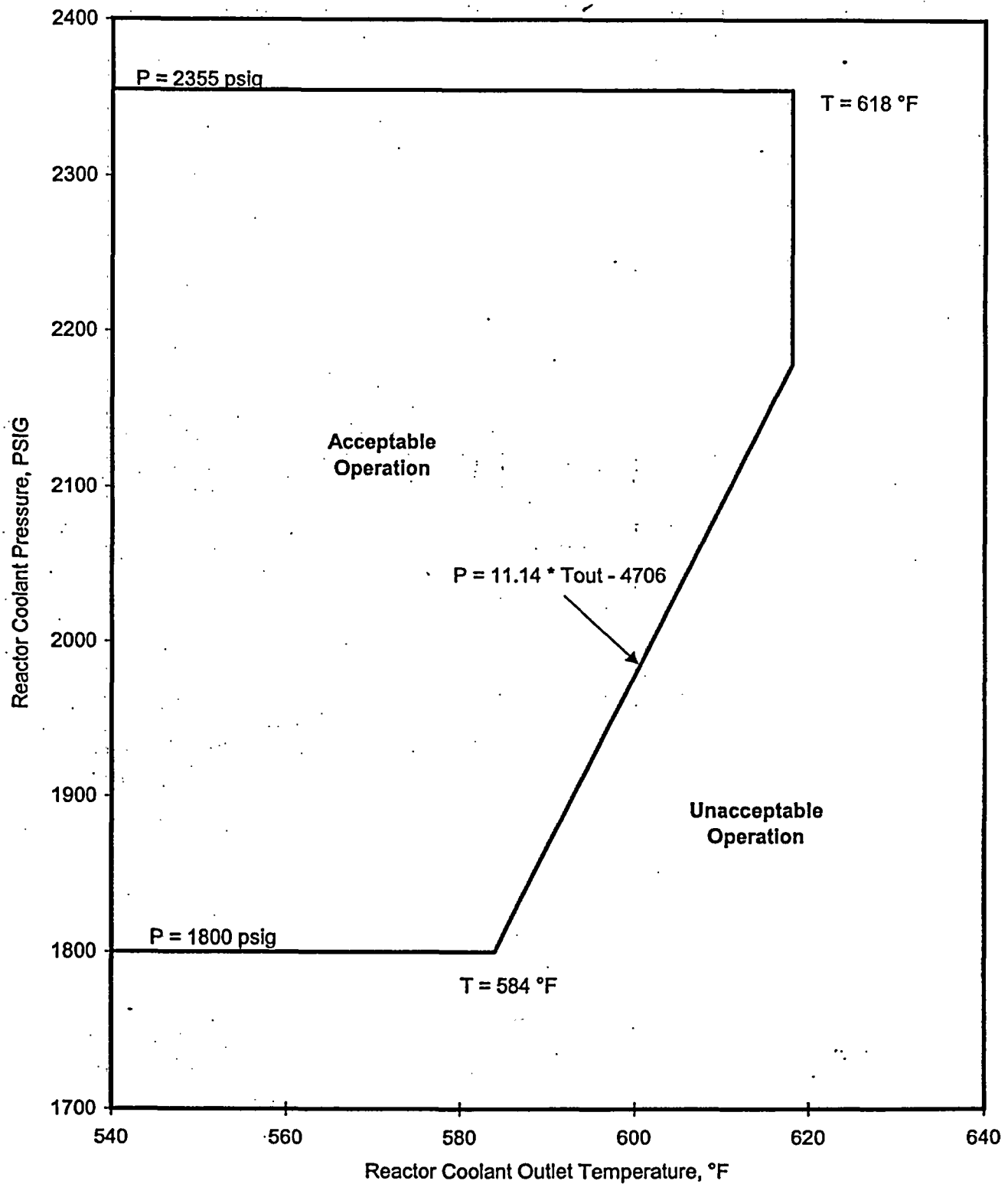
Core Power Level, %FP	Steady State		Transient		Maximum 0 - 100
	30 - 100	0 - 30	30 - 100	0 - 30	
Full Incore	3.50	7.60	7.10	9.39	16.54
Out of Core	2.36	6.09	5.63	7.72	14.22
Backup Incore	2.26	3.87	3.63	4.81	10.07

Referred to by ITS 3.2.3.

## Oconee 1 Cycle 22

## Variable Low RCS Pressure RPS Setpoints

Referred to by ITS 3.3.1



Oconee 1 Cycle 22

RPS Power Imbalance Setpoints

	% FP	% Imbalance
4 Pumps	0	-33.0
	85.66	-33.0
	107.9	-9.40
	107.9	14.4
	90.4	33.0
	0	33.0
3 Pumps	0	-33.0
	58.3	-33.0
	80.6	-9.40
	80.6	14.4
	63.1	33.0
	0	33.0

Maximum Allowable RPS Power Imbalance Setpoints

	% FP	% Imbalance
4 Pumps	0	-35.0
	85.28	-35.0
	109.4	-9.40
	109.4	14.4
	90	35.0
	0	35.0
3 Pumps	0	-35.0
	57.58	-35.0
	81.7	-9.40
	81.7	14.4
	62.3	35.0
	0	35.0

# Oconee 1 Cycle 22

## Operational Power Imbalance Setpoints

	%FP	Full Incore	Backup Incore	Out of Core
4 Pumps	0	-30.4	-29.8	-30.4
	80	-30.4	-29.8	-30.4
	90	-24.7	-24.7	-24.7
	100	-14.1	-14.1	-14.1
	102	-12.0	-12.0	-12.0
	102	17.0	16.6	17.0
	100	19.1	18.7	19.1
	90	28.8	28.2	28.8
	80	28.8	28.2	28.8
	0	28.8	28.2	28.8
3 Pumps	0.0	-30.4	-29.8	-30.4
	59.64	-30.4	-	-30.4
	60.20	-	-29.8	-
	77.0	-12.0	-12.0	-12.0
	77.0	17.0	16.6	17.0
	66.46	-	28.2	-
	65.86	28.8	-	28.8
	0.0	28.8	28.2	28.8

Oconee 1 Cycle 22  
Operational Power Imbalance Setpoints  
Operation with 4 RCS Pumps, BOC to EOC

% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	
107.9	-9.40	14.40				
107	-10.36	15.36				
106	-11.42	16.42				
105	-12.48	17.48				
104	-13.54	18.55				
103	-14.60	19.61				
102	-15.66	20.67	-12.00	17.00	-12.00	17.00
101	-16.72	21.73	-13.05	18.05	-13.05	18.05
100	-17.78	22.80	-14.10	19.10	-14.10	19.10
99	-18.84	23.86	-15.16	20.07	-15.16	20.07
98	-19.91	24.92	-16.22	21.04	-16.22	21.04
97	-20.97	25.99	-17.28	22.01	-17.28	22.01
96	-22.03	27.05	-18.34	22.98	-18.34	22.98
95	-23.09	28.11	-19.40	23.95	-19.40	23.95
94	-24.15	29.17	-20.46	24.92	-20.46	24.92
93	-25.21	30.24	-21.52	25.89	-21.52	25.89
92	-26.27	31.30	-22.58	26.85	-22.58	26.85
91	-27.33	32.36	-23.64	27.82	-23.64	27.82
90.4	-27.97	33.00	-24.28	28.41	-24.28	28.41
90	-28.39	33.00	-24.70	28.79	-24.70	28.79
89	-29.46	33.00	-25.27	28.79	-25.27	28.79
88	-30.52	33.00	-25.84	28.79	-25.84	28.79
87	-31.58	33.00	-26.41	28.79	-26.41	28.79
86	-32.64	33.00	-26.98	28.79	-26.98	28.79
85.66	-33.00	33.00	-27.17	28.79	-27.17	28.79
85	-33.00	33.00	-27.55	28.79	-27.55	28.79
84	-33.00	33.00	-28.12	28.79	-28.12	28.79
83	-33.00	33.00	-28.69	28.79	-28.69	28.79
82	-33.00	33.00	-29.26	28.79	-29.26	28.79
81	-33.00	33.00	-29.83	28.79	-29.83	28.79
80	-33.00	33.00	-30.40	28.79	-30.40	28.79
0	-33.00	33.00	-30.40	28.79	-30.40	28.79
% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	

## Oconee 1 Cycle 22

## Operational Power Imbalance Setpoints

Operation with 3 RCS Pumps, BOC to EOC

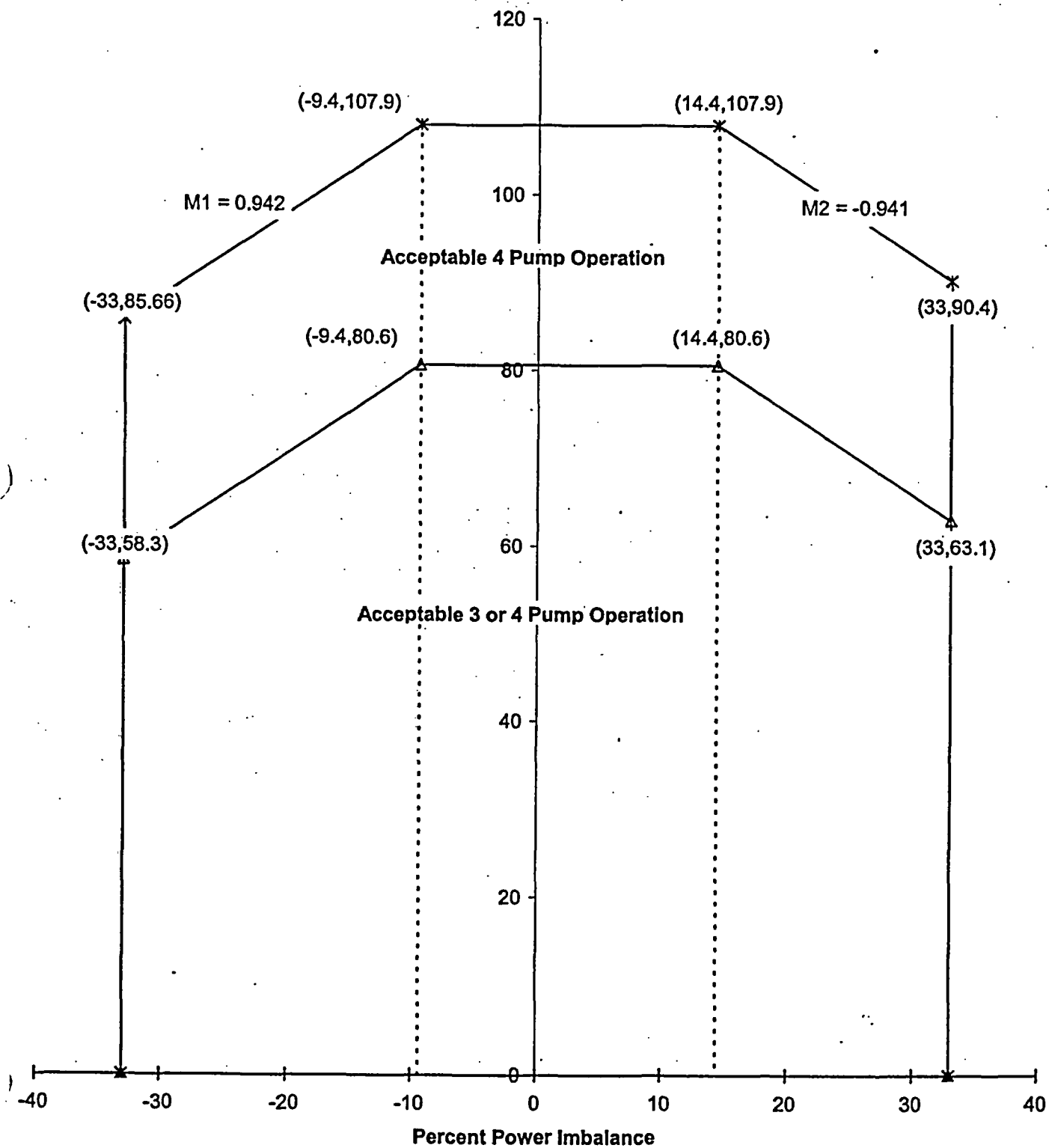
% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	
80.6	-9.40	14.40				
80	-10.03	15.04				
79	-11.09	16.10				
78	-12.15	17.16				
77.0	-13.21	18.23	-12.00	17.00	-12.00	17.00
76	-14.27	19.29	-13.06	18.06	-13.06	18.06
75	-15.33	20.35	-14.12	19.12	-14.12	19.12
74	-16.38	21.41	-15.18	20.18	-15.18	20.18
73	-17.44	22.48	-16.24	21.23	-16.24	21.23
72	-18.50	23.54	-17.30	22.29	-17.30	22.29
71	-19.56	24.60	-18.36	23.35	-18.36	23.35
70	-20.62	25.67	-19.42	24.41	-19.42	24.41
69	-21.68	26.73	-20.48	25.47	-20.48	25.47
68	-22.73	27.79	-21.54	26.53	-21.54	26.53
67	-23.79	28.85	-22.60	27.58	-22.60	27.58
66	-24.85	29.92	-23.66	28.64	-23.66	28.64
65.86	-25.00	30.07	-23.81	28.79	-23.81	28.79
65	-25.91	30.98	-24.72	28.79	-24.72	28.79
64	-26.97	32.04	-25.78	28.79	-25.78	28.79
63.10	-27.92	33.00	-26.73	28.79	-26.73	28.79
63	-28.03	33.00	-26.84	28.79	-26.84	28.79
62	-29.08	33.00	-27.90	28.79	-27.90	28.79
61	-30.14	33.00	-28.96	28.79	-28.96	28.79
60	-31.20	33.00	-30.02	28.79	-30.02	28.79
59.6	-31.58	33.00	-30.40	28.79	-30.40	28.79
58.3	-33.00	33.00	-30.40	28.79	-30.40	28.79
0	-33.00	33.00	-30.40	28.79	-30.40	28.79
% FP	RPS Trip		Full Incore Alarm		Out of Core Alarm	

## Oconee 1 Cycle 22

## RPS Power Imbalance Setpoints

Referred to by ITS 3.3.1

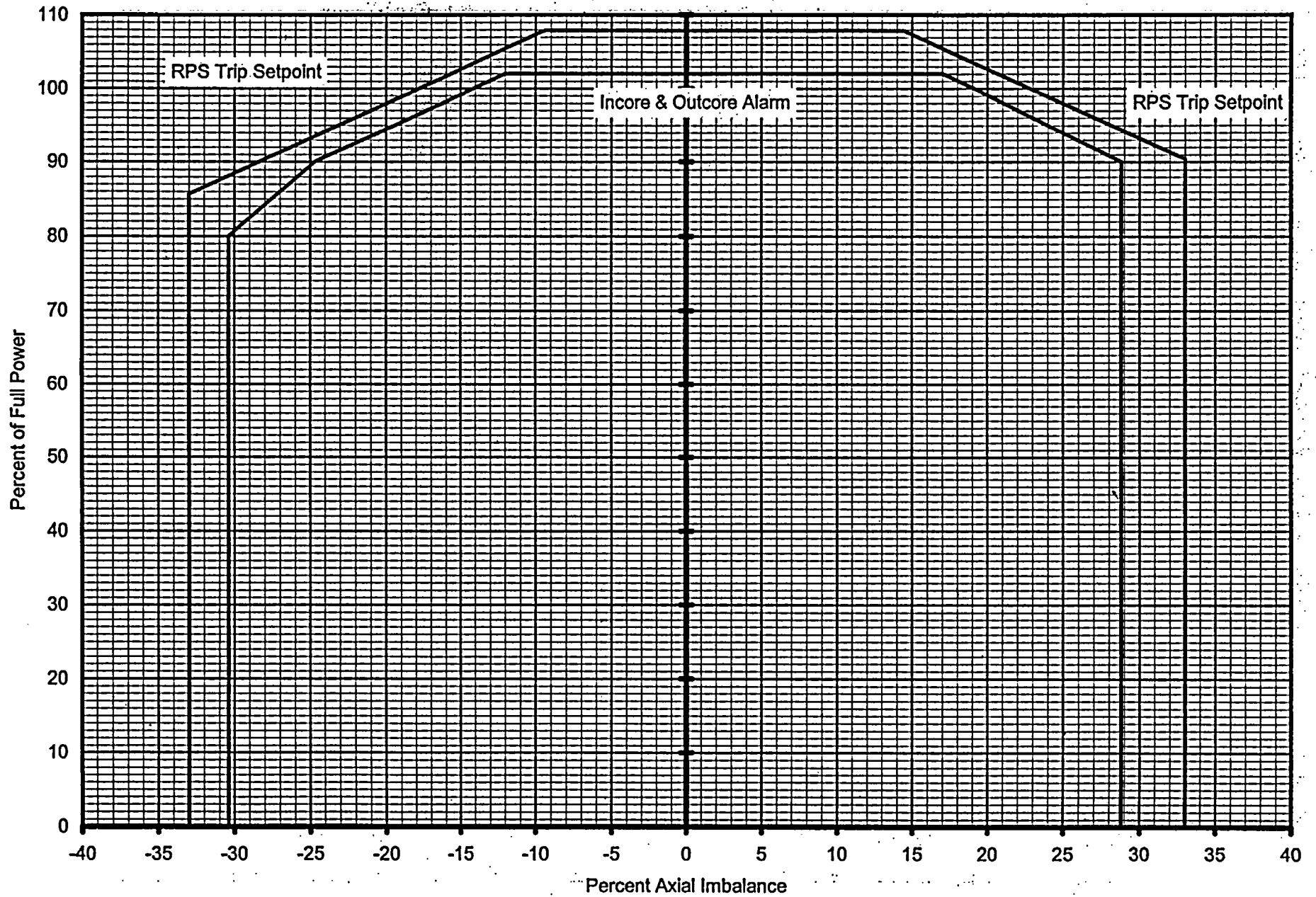
Thermal Power Level, %FP





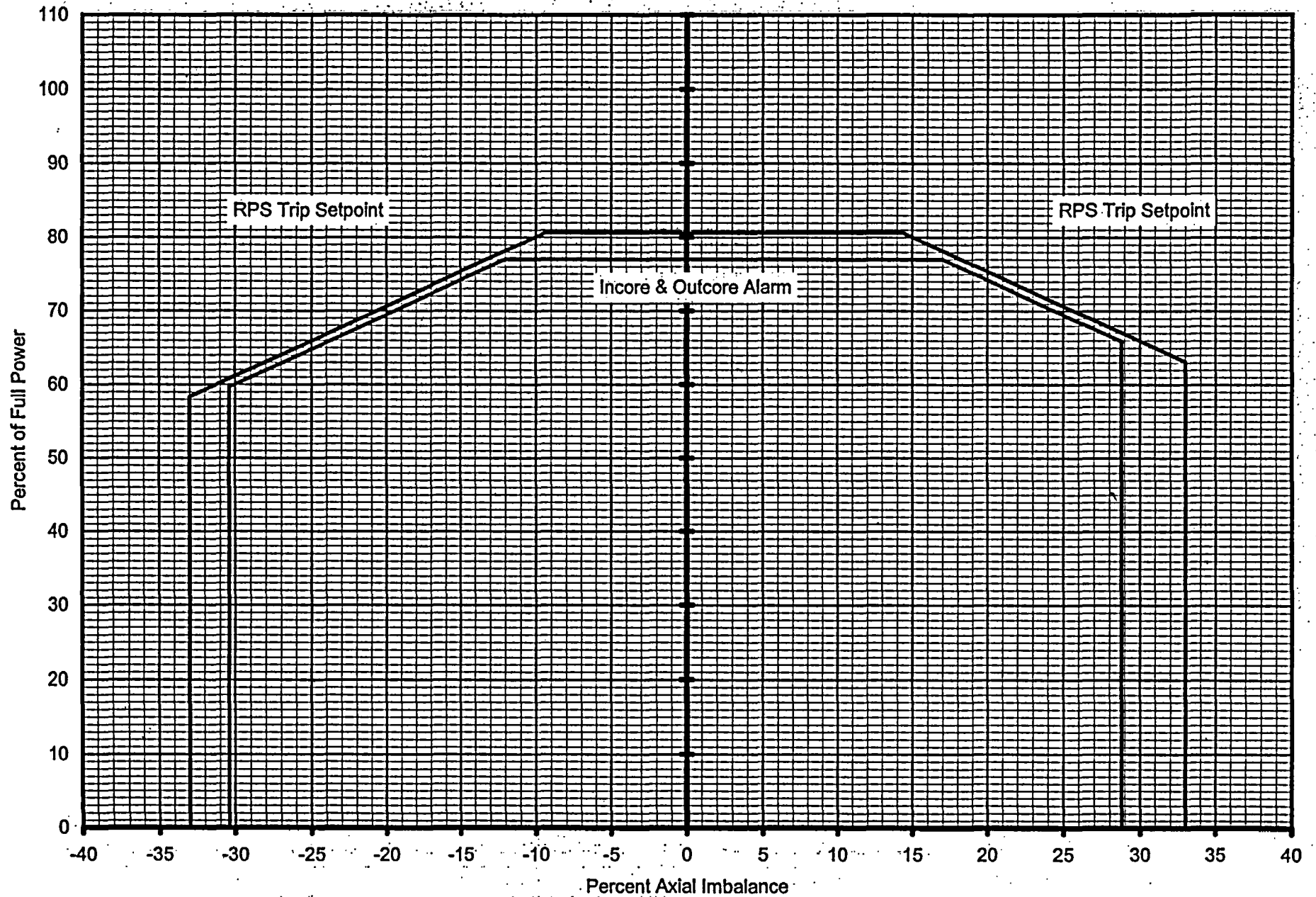
## Oconee 1 Cycle 22

### Imbalance Setpoints for 4 Pump Operation, BOC to EOC



## Oconee 1 Cycle 22

## Imbalance Setpoints for 3 Pump Operation, BOC to EOC



## Oconee 1 Cycle 22

### Operational Rod Index Setpoints

	%FP	RI Insertion Setpoint		RI Withdrawal Setpoint
		No Inop Rod	1 Inop Rod	
4 Pumps	102.0	261.5	287.6	300
	100.0	261.5	285.5	300
	90.0	261.5	275.1	300
	80.0	261.5	264.7	300
	50.0	201.5	233.6	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	255.5	285.2	300
	75.0	251.5	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 1 Cycle 22

## Shutdown Margin Rod Index Setpoints

	%FP	RI Insertion Setpoint		RI Withdrawal Setpoint
		No Inop Rod	1 Inop Rod	
4 Pumps	102.0	224.6	287.6	300
	100.0	221.5	285.5	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

Oconee 1 Cycle 22  
Rod Index Setpoints  
4 Pump Operation, No Inoperable Rods, BOC to EOC

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% 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	61.5
101	100	99.0	24.0	100	100	61.5
100	100	98.2	23.2	100	100	61.5
99	100	97.5	22.5	100	100	61.5
98	100	96.7	21.7	100	100	61.5
97	100	95.9	20.9	100	100	61.5
96	100	95.2	20.2	100	100	61.5
95	100	94.4	19.4	100	100	61.5
94	100	93.6	18.6	100	100	61.5
93	100	92.9	17.9	100	100	61.5
92	100	92.1	17.1	100	100	61.5
91	100	91.3	16.3	100	100	61.5
90	100	90.6	15.6	100	100	61.5
89	100	89.8	14.8	100	100	61.5
88	100	89.0	14.0	100	100	61.5
87	100	88.2	13.2	100	100	61.5
86	100	87.5	12.5	100	100	61.5
85	100	86.7	11.7	100	100	61.5
84	100	85.9	10.9	100	100	61.5
83	100	85.2	10.2	100	100	61.5
82	100	84.4	9.4	100	100	61.5
81	100	83.6	8.6	100	100	61.5
80	100	82.9	7.9	100	100	61.5
79	100	82.1	7.1	100	100	59.5
78	100	81.3	6.3	100	100	57.5
77	100	80.6	5.6	100	100	55.5
76	100	79.8	4.8	100	100	53.5
75	100	79.0	4.0	100	100	51.5
74	100	78.2	3.2	100	100	49.5
73	100	77.5	2.5	100	100	47.5
72	100	76.7	1.7	100	100	45.5
71	100	75.9	0.9	100	100	43.5
70	100	75.2	0.2	100	100	41.5
69.8	100	75.0	0	100	100	41.1
69	100	73.8	0	100	100	39.5
68	100	72.3	0	100	100	37.5
67	100	70.7	0	100	100	35.5
66	100	69.2	0	100	100.0	33.5
65	100	67.7	0	100	100.0	31.5
64	100	66.1	0	100	100.0	29.5
63	100	64.6	0	100	100.0	27.5
62	100	63.0	0	100	100.0	25.5
61.8	100	62.7	0	100	100.0	25.0
61	100	61.5	0	100	99.2	24.2
60	100	60.0	0	100	98.2	23.2
59	100	58.4	0	100	97.2	22.2
58	100	56.9	0	100	96.2	21.2
57	100	55.3	0	100	95.2	20.2
56	100	53.8	0	100	94.2	19.2
55	100	52.3	0	100	93.2	18.2
54	100	50.7	0	100	92.2	17.2
53	100	49.2	0	100	91.2	16.2
52	100	47.7	0	100	90.2	15.2
51	100	46.1	0	100	89.2	14.2
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 1 Cycle 22  
Rod Index Setpoints  
3 Pump Operation, No Inoperable Rods, BOC to EOC

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% 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	55.5
76.2	100	100	25.0	100	100	53.9
76	100	99.7	24.7	100	100	53.5
75	100	98.2	23.2	100	100	51.5
74	100	96.8	21.8	100	100	49.5
73	100	95.3	20.3	100	100	47.5
72	100	93.8	18.8	100	100	45.5
71	100	92.3	17.3	100	100	43.5
70	100	90.8	15.8	100	100	41.5
69	100	89.4	14.4	100	100	39.5
68	100	87.9	12.9	100	100	37.5
67	100	86.4	11.4	100	100	35.5
66	100	84.9	9.9	100	100.0	33.5
65	100	83.4	8.4	100	100.0	31.5
64	100	82.0	7.0	100	100.0	29.5
63	100	80.5	5.5	100	100.0	27.5
62	100	79.0	4.0	100	100.0	25.5
61.8	100	78.6	3.6	100	100.0	25.0
61	100	77.5	2.5	100	99.2	24.2
60	100	76.0	1.0	100	98.2	23.2
59.3	100	75.0	0	100	97.6	22.6
59	100	74.1	0	100	97.2	22.2
58	100	71.1	0	100	96.2	21.2
57	100	68.2	0	100	95.2	20.2
56	100	65.2	0	100	94.2	19.2
55	100	62.2	0	100	93.2	18.2
54	100	59.3	0	100	92.2	17.2
53	100	56.3	0	100	91.2	16.2
52	100	53.4	0	100	90.2	15.2
51	100	50.4	0	100	89.2	14.2
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.

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**RI = 300 is withdrawal limit at all power levels.**



Oconee 1 Cycle 22  
Rod Index Setpoints  
4 Pump Operation, 1 Inoperable Rod, BOC to EOC

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% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
102	100	100	87.6	100	100	87.6
101	100	100	86.5	100	100	86.5
100	100	100	85.5	100	100	85.5
99	100	100	84.5	100	100	84.5
98	100	100	83.4	100	100	83.4
97	100	100	82.4	100	100	82.4
96	100	100	81.3	100	100	81.3
95	100	100	80.3	100	100	80.3
94	100	100	79.3	100	100	79.3
93	100	100	78.2	100	100	78.2
92	100	100	77.2	100	100	77.2
91	100	100	76.2	100	100	76.2
90	100	100	75.1	100	100	75.1
89	100	100	74.1	100	100	74.1
88	100	100	73.0	100	100	73.0
87	100	100	72.0	100	100	72.0
86	100	100	71.0	100	100	71.0
85	100	100	69.9	100	100	69.9
84	100	100	68.9	100	100	68.9
83	100	100	67.8	100	100	67.8
82	100	100	66.8	100	100	66.8
81	100	100	65.8	100	100	65.8
80	100	100	64.7	100	100	64.7
79	100	100	63.7	100	100	63.7
78	100	100	62.7	100	100	62.7
77	100	100	61.6	100	100	61.6
76	100	100	60.6	100	100	60.6
75	100	100	59.5	100	100	59.5
74	100	100	58.5	100	100	58.5
73	100	100	57.5	100	100	57.5
72	100	100	56.4	100	100	56.4
71	100	100	55.4	100	100	55.4
70	100	100	54.3	100	100	54.3
69	100	100	53.3	100	100	53.3
68	100	100	52.3	100	100	52.3
67	100	100	51.2	100	100	51.2
66	100	100	50.2	100	100	50.2
65	100	100	49.2	100	100	49.2
64	100	100	48.1	100	100	48.1
63	100	100	47.1	100	100	47.1
62	100	100	46.0	100	100	46.0
61	100	100	45.0	100	100	45.0
60	100	100	44.0	100	100	44.0
59	100	100	42.9	100	100	42.9
58	100	100	41.9	100	100	41.9
57	100	100	40.8	100	100	40.9
56	100	100	39.8	100	100	39.8
55	100	100	38.8	100	100	38.8
54	100	100	37.7	100	100	37.7
53	100	100	36.7	100	100	36.7
52	100	100	35.7	100	100	35.7
51	100	100	34.6	100	100	34.6
50	100	100	33.6	100	100	33.6
49	100	100	32.5	100	100	32.6
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.

Oconee 1 Cycle 22  
Rod Index Setpoints  
4 Pump Operation, 1 Inoperable Rod, BOC to EOC

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% 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	0	75.0	0	0
2	68.0	0	0	68.0	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 1 Cycle 22  
Rod Index Setpoints  
3 Pump Operation, 1 Inoperable Rod, BOC to EOC

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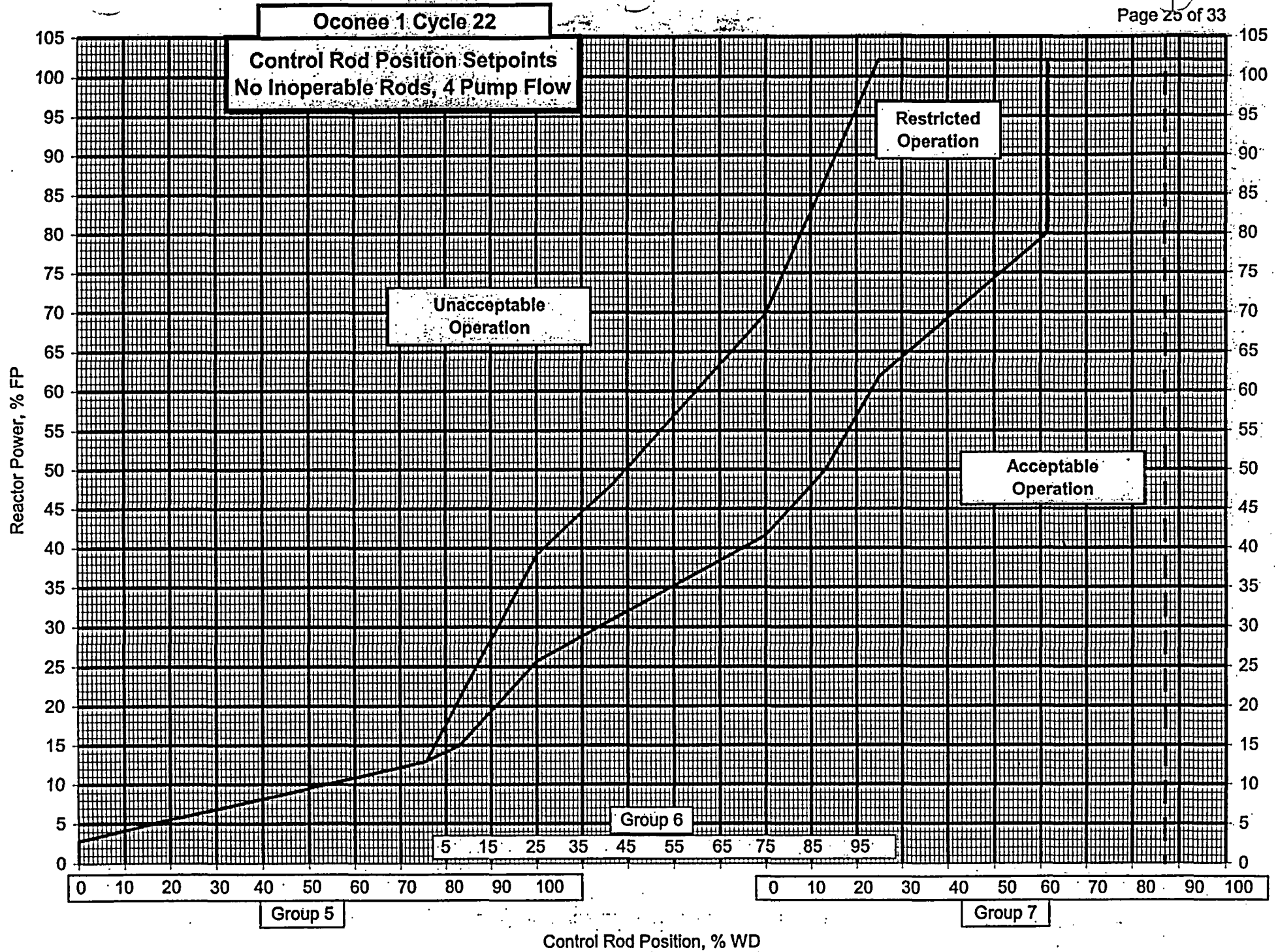
% FP	Shutdown Margin Setpoint			Operational Alarm Setpoint		
	CRGP 5	CRGP 6	CRGP 7	CRGP 5	CRGP 6	CRGP 7
77	100	100	85.2	100	100	85.2
76	100	100	83.4	100	100	83.4
75	100	100	81.5	100	100	81.5
74	100	100	79.6	100	100	79.6
73	100	100	77.8	100	100	77.8
72	100	100	75.9	100	100	75.9
71	100	100	74.1	100	100	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		

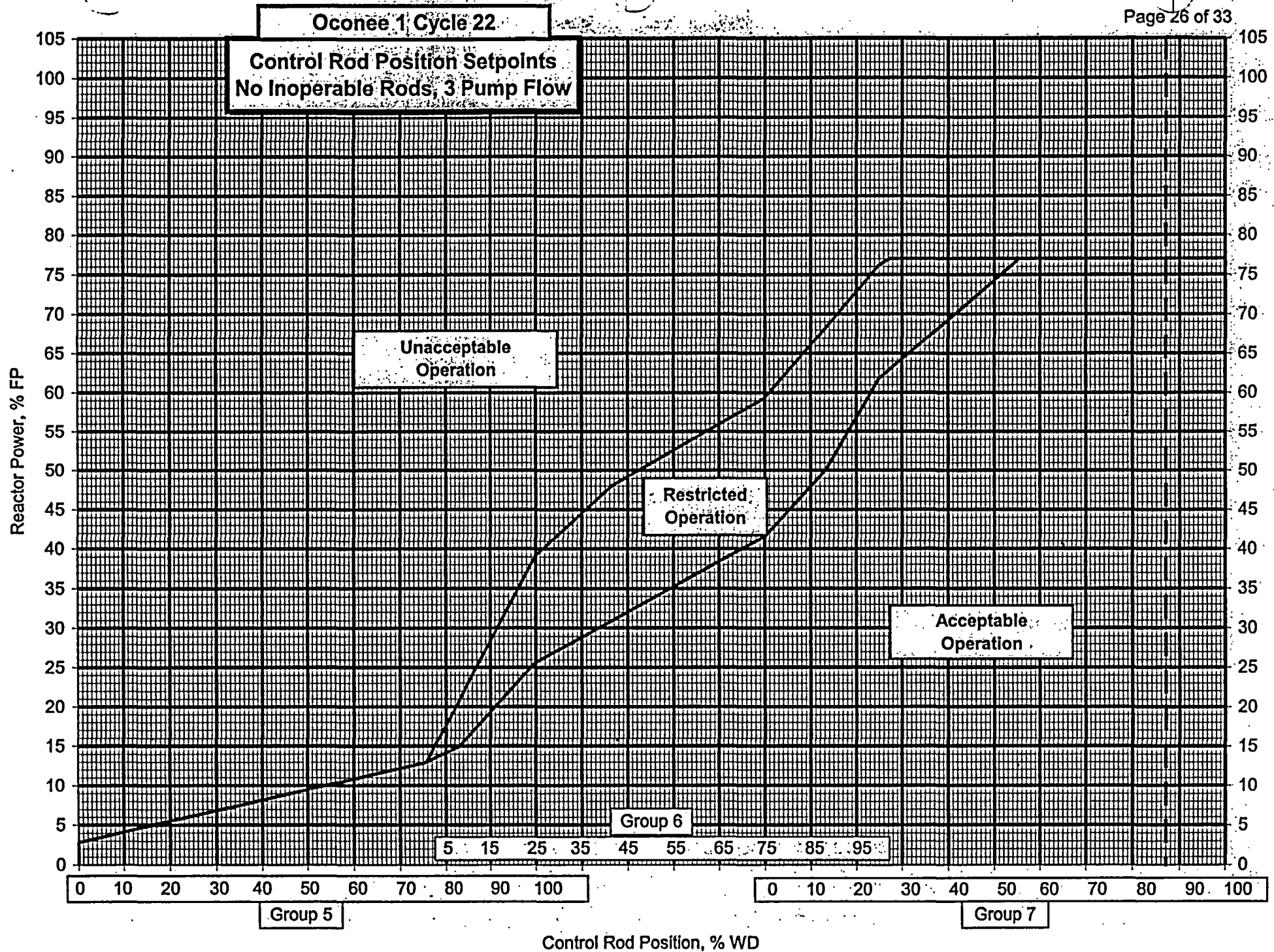
RI = 300 is withdrawal limit at all power levels.

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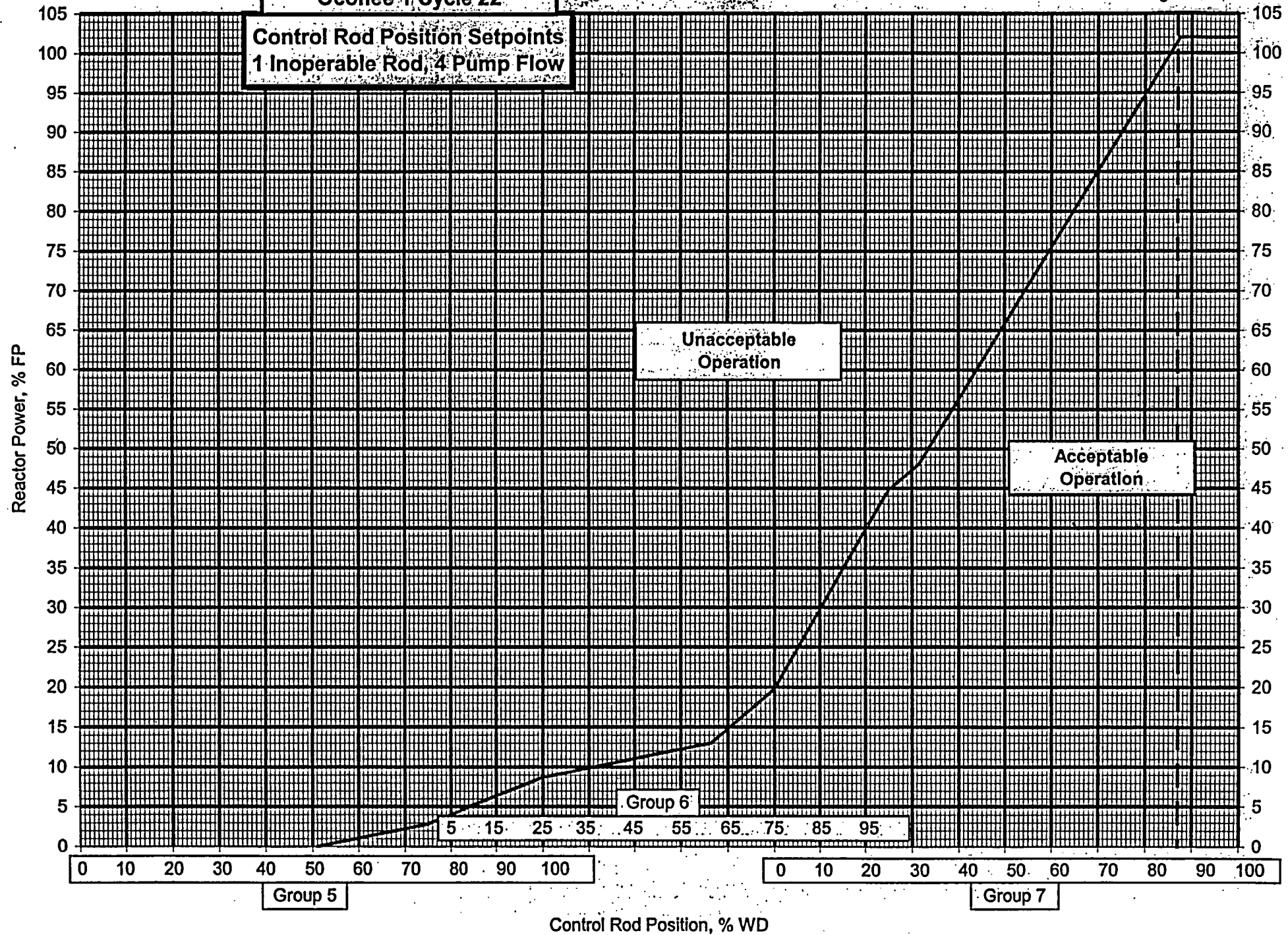
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**RI = 300 is withdrawal limit at all power levels.**





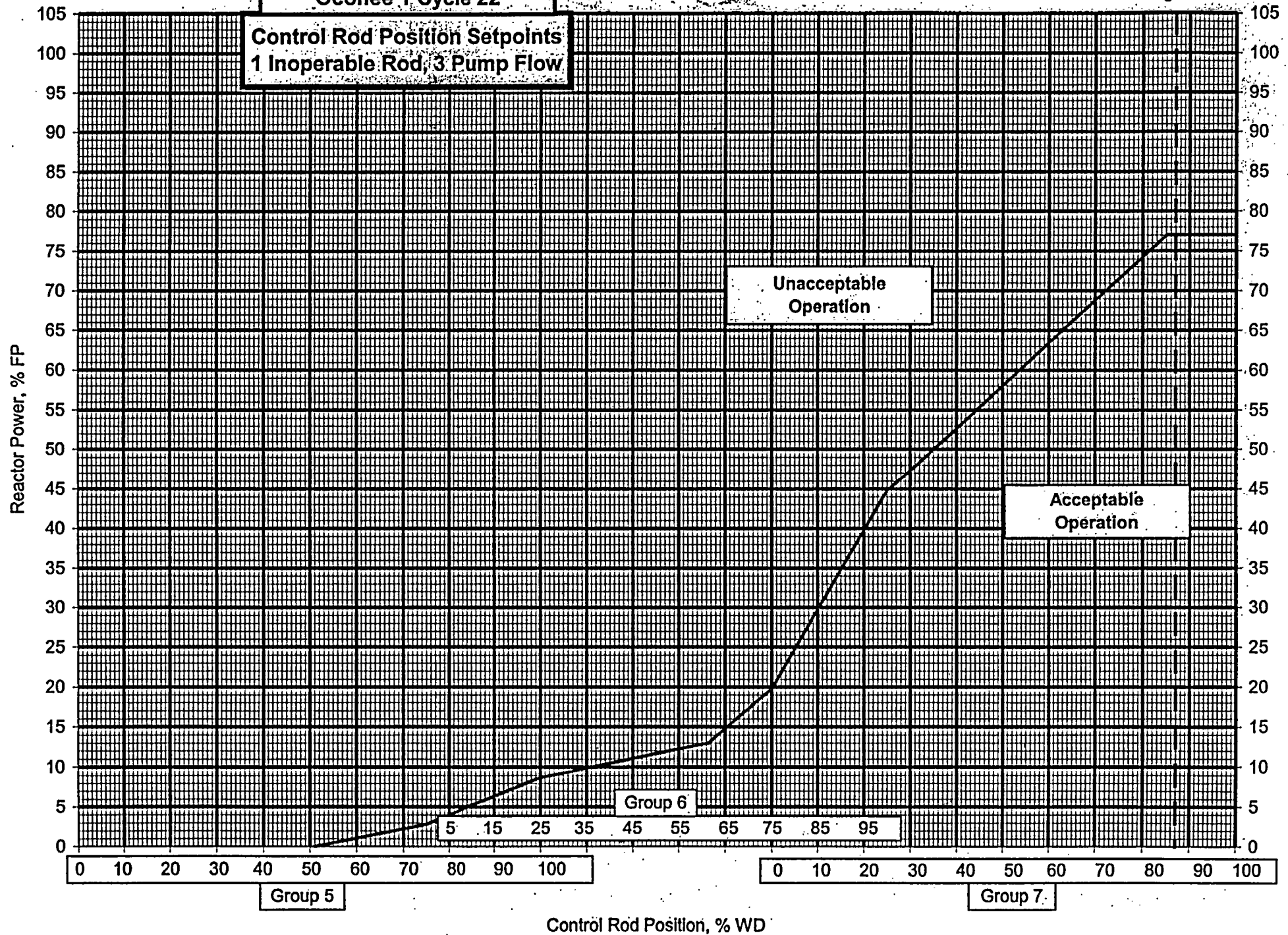
## Oconee 1 Cycle 22

**Control Rod Position Setpoints  
1 Inoperable Rod, 4 Pump Flow**



## Oconee 1 Cycle 22

Control Rod Position Setpoints  
1 Inoperable Rod, 3 Pump Flow





## Oconee 1 Cycle 22

## 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 ITS 3.2.3.

	Steady State		Transient		Maximum
Core Power Level, %FP	30 - 100	0 - 30	30 - 100	0 - 30	0 - 100
Quadrant Power Tilt, %	5.41	10.00	9.44	12.00	20.00

## Variable Low RCS Pressure Protective Limits

Referred to by ITS 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 1 Cycle 22

## Axial Power Imbalance Protective Limits

Referred to by ITS 2.1.1

Not for Plant Use

	%FP	RPS	Operational
4 Pumps	0	-48.0	-42.4
	80	-	-42.4
	90	-	-41.0
	100	-48.0	-30.0
	112	-31.1	-
	112	31.1	-
	100	48.0	30.0
	90	-	41.8
	80	-	40.5
	0	48.0	40.5
3 Pumps	0	-48.0	-42.4
	74.6	-48.0	-
	77.0	-	-42.4
	86.6	-31.1	-
	86.6	31.1	-
	77.0	-	40.5
	74.6	48.0	-
	0	48.0	40.5

# Oconee 1 Cycle 22

## Rod Index Limits

Referred to by ITS 3.2.1

Not for Plant Use

	%FP	Operational RI Insertion Limit	Shutdown Margin No Inop Rod	RI Insertion Limit 1 Inop Rod	RI Withdrawal Limit
4 Pumps	102	260	220	284	300
	100	260	-	-	300
	90	260	-	-	300
	80	260	-	-	300
	50	200	140	230	300
	15	90	75	160	300
	5	0	0	75	300
3 Pumps	77	254	220	280	300
	50	200	140	230	300
	15	90	75	160	300
	5	0	0	75	300

# Oconee 1 Cycle 22

## LOCA Limits

Not for Plant Use

Core Elevation  
Feet

LOCA LHR kw/ft Limit Versus Burnup

Mk-B10F and  
Mk-B10L Fuel

	0 GWd/mtU	30 GWd/mtU	62 GWd/mtU
0.000	15.6	15.6	11.6
2.506	16.5	16.5	11.6
4.264	16.8	16.8	11.6
6.021	17.0	17.0	11.6
7.779	17.0	17.0	11.6
9.536	16.7	16.7	11.6
12.00	15.8	15.8	11.6

Mk-B11 Fuel

	0 GWd/mtU	40 GWd/mtU	62 GWd/mtU
0.000	16.6	16.6	12.2
2.506	17.5	17.5	12.2
4.264	17.6	17.6	12.2
6.021	17.7	17.7	12.2
7.779	17.6	17.6	12.2
9.536	17.5	17.5	12.2
12.00	16.6	16.6	12.2

Oconee 1 Cycle 22

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

$\Delta T_{cold}$ , °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