DUKE ENERGY®

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May 16, 2013

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

Subject: Duke Energy Carolinas LLC (Duke Energy)
Oconee Nuclear Station, Units 1, 2, and 3
Docket Nos.: 50-269, 50-270, and 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 1, Cycle 28, ONEI-0400-50, Revision 34, Oconee Unit 2, Cycle 26, ONEI-0400-51, Revision 32 and Oconee Unit 3, Cycle 27, ONEI-0400-70, Revision 34. The COLRs have been revised to incorporate the effects of additional conservatisms included in the modified SBLOCA axial power shape verification.

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

Sincerely,

Scott L. Batson
Vice President
Oconee Nuclear Station

Attachments (3)

A001
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# Duke Energy
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**REFERENCE**

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UNIT: OCONEE NUCLEAR STATION
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Page 1 of 1

Date: 04/17/13

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| ONEI-0400-051 | 1 | 032 04/17/13 | | | | | | | | | | | | | | | | | |
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# Duke Energy

# Oconee 1 Cycle 28

# Core Operating Limits Report

## QA Condition 1

Prepared By: L. D. McClain Dewain McClain Date: 16 Apr 2013

Reviewed By: L. C. James II Date: 17 Apr 2013

CDR By: M. C. Handrick Mark C. Handrick Date: 4/16/13

Approved By: R.R. St.Clair Robert St. Clair Date: 4/17/2013

## INSPECTION OF ENGINEERING INSTRUCTIONS

Inspection Waived By: R.R St. Clair Robert St Clair Date: 4/17/2013
(Sponsor)

### 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: _____ |

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|---|---|---|
| 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 1 Cycle 28

## Core Operating Limits Report

### Insertion Sheet for Revision 34

This revision is not valid until the end of operation for Oconee 1 Cycle 27.

Remove these Revision 33 pages: 1 - 33

Insert these Revision 34 pages: 1 - 33

Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 1 Cycle 28 revisions below | | | | | |
| 34 | Apr 2013 | 1 - 33 | - | - | 33 |
| 33 | Oct 2012 | 1 - 33 | - | - | 33 |
| Oconee 1 Cycle 27 revisions below | | | | | |
| 32 | Mar 2011 | 1 - 33 | - | - | 33 |
| Oconee 1 Cycle 26 revisions below | | | | | |
| 31 | Nov 2009 | 1 - 33 | - | - | 33 |
| 30 | Nov 2009 | 1 - 33 | - | - | 33 |
| 29 | Nov 2009 | 1 - 33 | - | - | 33 |
| 28 | Sep 2009 | 1 - 33 | - | - | 33 |
| Oconee 1 Cycle 25 revisions below | | | | | |
| 27 | Apr 2008 | 1 - 33 | - | - | 33 |
| Oconee 1 Cycle 24 revisions below | | | | | |
| 26 | Oct 2006 | 1 - 33 | - | - | 33 |
| Oconee 1 Cycle 23 revisions below | | | | | |
| 25 | Apr 2005 | 1 - 33 | - | - | 33 |

# Oconee 1 Cycle 28

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O1C28 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 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 O1C28 by References 15 through 17. The O1C28 analyses assume a design flow of 108.5% of 88,000 gpm per RCS pump, 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 O1C28 reload core.

## 1.1 References

1. Oconee Nuclear Design Methodology Using CASMO-4 / SIMULATE-3, DPC-NE-1006-PA, NRC SE dated August 2, 2011.
2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002-A, NRC SE dated July 21, 2011.
3. Oconee Nuclear Station Reload Design Methodology, NFS-1001-A, NRC SE dated July 21, 2011.
4. ONS Core Thermal-Hydraulic Methodology Using VIPRE-01, DPC-NE-2003-PA, NRC SE dated July 21, 2011.
5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005-PA, Revision 4a, December 2008.
6. Fuel Mechanical Reload Analysis Methodology Using TACO3 and GDTACO, DPC-NE-2008-PA, NRC SE dated July 21, 2011.
7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, NRC SE dated July 21, 2011.
8. Thermal Hydraulic Transient Analysis Methodology, DPC-NE-3000-PA, NRC SE dated July 21, 2011.
9. BAW-10192-PA, BWNT LOCA - BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants, Revision 0, NRC SER dated February 18, 1997.
10. BAW-10164-PA, 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 (NRC SER to BAW-10186-PA dated June 18, 2003).
12. Digital RPS RCS Pressure & Temperature Trip Function Uncertainties and Variable Low RCS Pressure Safety Limit, OSC-8828, Revision 3, October 2010.
13. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 4, April 2011.
14. $\Delta$Tc and EOC Reduced Tavg Operation, OSC-7265, Revision 1, June 2002.
15. O1C28 Maneuvering Analysis, OSC-10606, Revision 2, April 2013.
16. O1C28 Specific DNB Analysis, OSC-10694, Revision 0, May 2012.
17. O1C28 Reload Safety Evaluation, OSC-10728, Revision 0, September 2012.

# Oconee 1 Cycle 28

## Miscellaneous Setpoints

BWST boron concentration shall be greater than **2500** ppm and less than **3000** ppm.
Referred to by TS 3.5.4.

Spent fuel pool boron concentration shall be greater than **2500** 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 **2300** ppm. The average boron concentration in the CFTs 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 and less than **3000** ppm.
Referred to by TS 3.9.1.

Shutdown Margin (SDM) shall be greater than **1%** $\Delta k/k$.
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 $\Delta\rho$ / °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 $\geq$ 2125 psig
3 RCP: measured hot leg pressure $\geq$ 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. $\Delta$Tc 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) | |
|---|---|---|
| $\Delta$Tc, °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 $\geq$ **109.5** %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 TS 3.2.1.

Regulating rod group overlap shall be 25% $\pm$ 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 1 Cycle 28

## Steady State Operating Band

| | Rod Index | | APSR %WD | |
|---|---|---|---|---|
| EFPD | Min | Max | Min | Max |
| 0 to 641 | 292 ± 5 | 300 | 30 | 40 |
| 641 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 | 7.61 | 7.11 | 9.40 | 16.55 |
| Out of Core | 2.35 | 6.09 | 5.63 | 7.72 | 14.22 |
| Backup Incore | 2.25 | 3.87 | 3.63 | 4.81 | 10.07 |

Referred to by TS 3.2.3

## Correlation Slope (CS)

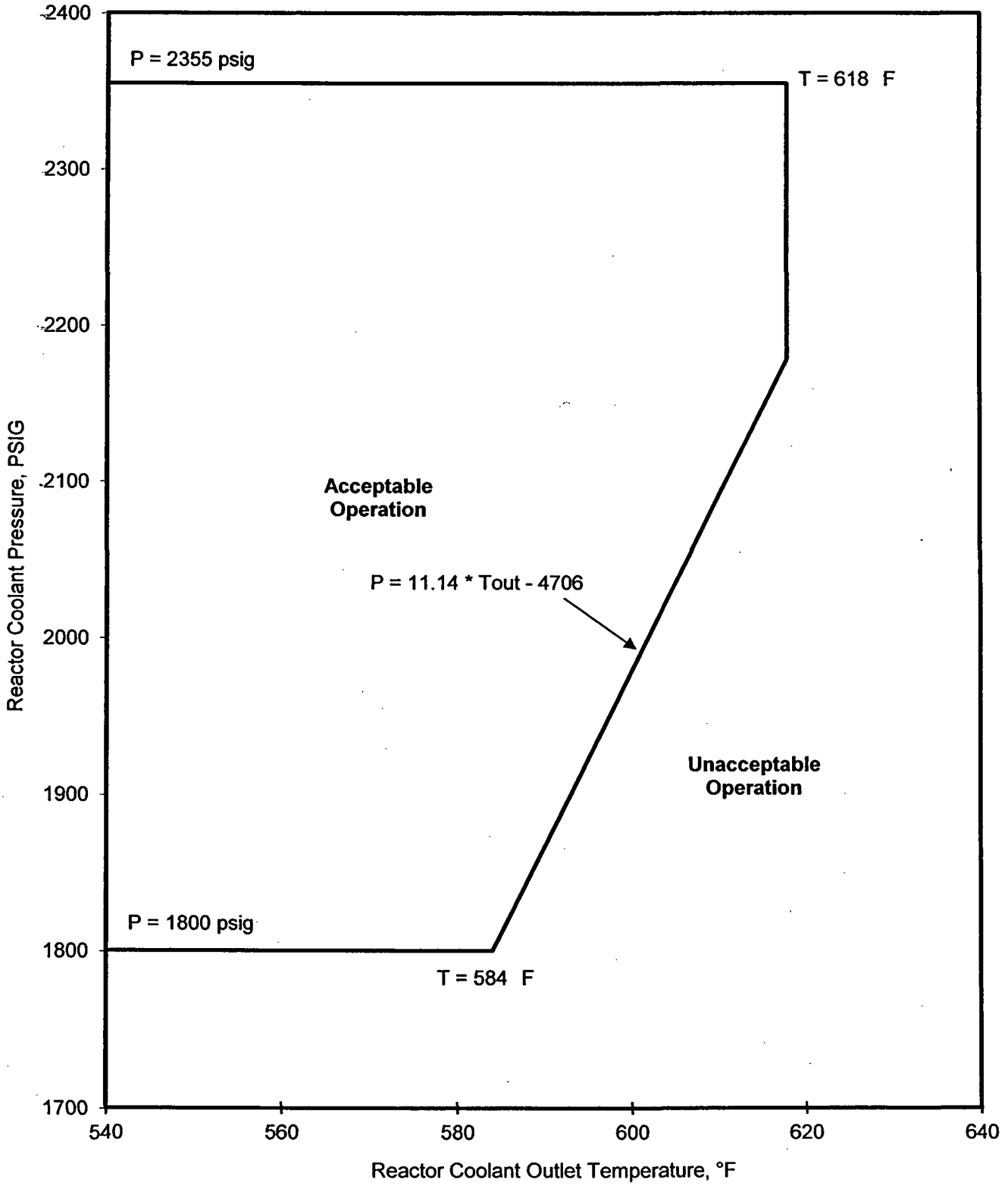
1.15

Referred to by TS 3.3.1 (SR 3.3.1.3).

# Oconee 1 Cycle 28

## Variable Low RCS Pressure RPS Setpoints

Referred to by TS 3.3.1



# Oconee 1 Cycle 28

## 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 |
| | *Pmax* => | 109.4 | -14.4 |
| | *Pmax* => | 109.4 | 14.4 |
| | | 90.0 | 35.0 |
| | | 0.0 | 35.0 |
| 3 Pumps | | 0.0 | -35.0 |
| | | 62.3 | -35.0 |
| | *Pmax* => | 81.7 | -14.4 |
| | *Pmax* => | 81.7 | 14.4 |
| | | 62.3 | 35.0 |
| | | 0.0 | 35.0 |

# Oconee 1 Cycle 28

## Operational Power Imbalance Setpoints

| | %FP | Full Incore | Backup Incore | Out of Core |
|---|---|---|---|---|
| 4 Pumps | 0.0 | -28.0 | -27.8 | -28.0 |
| | 80.0 | -28.0 | -27.8 | -28.0 |
| | 90.0 | -28.0 | -27.8 | -28.0 |
| | 100.0 | -17.8 | -17.8 | -17.8 |
| | 102.0 | -15.7 | -15.7 | -15.7 |
| | 102.0 | 15.7 | 9.9 | 10.6 |
| | 100.0 | 17.8 | 13.6 | 14.3 |
| | 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 | -27.8 | -28.0 |
| | 63.1 | -28.0 | - | -28.0 |
| | 63.2 | - | -27.8 | - |
| | 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 1 Cycle 28

## 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 | 10.6 |
| 101.0 | -21.7 | 21.7 | -16.7 | 16.7 | -16.7 | 12.4 |
| 100.0 | -22.8 | 22.8 | -17.8 | 17.8 | -17.8 | 14.3 |
| 99.0 | -23.9 | 23.9 | -18.8 | 18.8 | -18.8 | 15.6 |
| 98.0 | -24.9 | 24.9 | -19.8 | 19.8 | -19.8 | 17.0 |
| 97.0 | -26.0 | 26.0 | -20.9 | 20.9 | -20.9 | 18.4 |
| 96.0 | -27.0 | 27.0 | -21.9 | 21.9 | -21.9 | 19.8 |
| 95.0 | -28.1 | 28.1 | -22.9 | 22.9 | -22.9 | 21.1 |
| 94.0 | -29.2 | 29.2 | -23.9 | 23.9 | -23.9 | 22.5 |
| 93.0 | -30.2 | 30.2 | -24.9 | 24.9 | -24.9 | 23.9 |
| 92.0 | -31.3 | 31.3 | -26.0 | 26.0 | -26.0 | 25.3 |
| 91.0 | -32.3 | 32.3 | -27.0 | 27.0 | -27.0 | 26.6 |
| 90.4 | -33.0 | 33.0 | -27.6 | 27.6 | -27.6 | 27.5 |
| 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 1 Cycle 28

## Operational Power Imbalance Setpoints

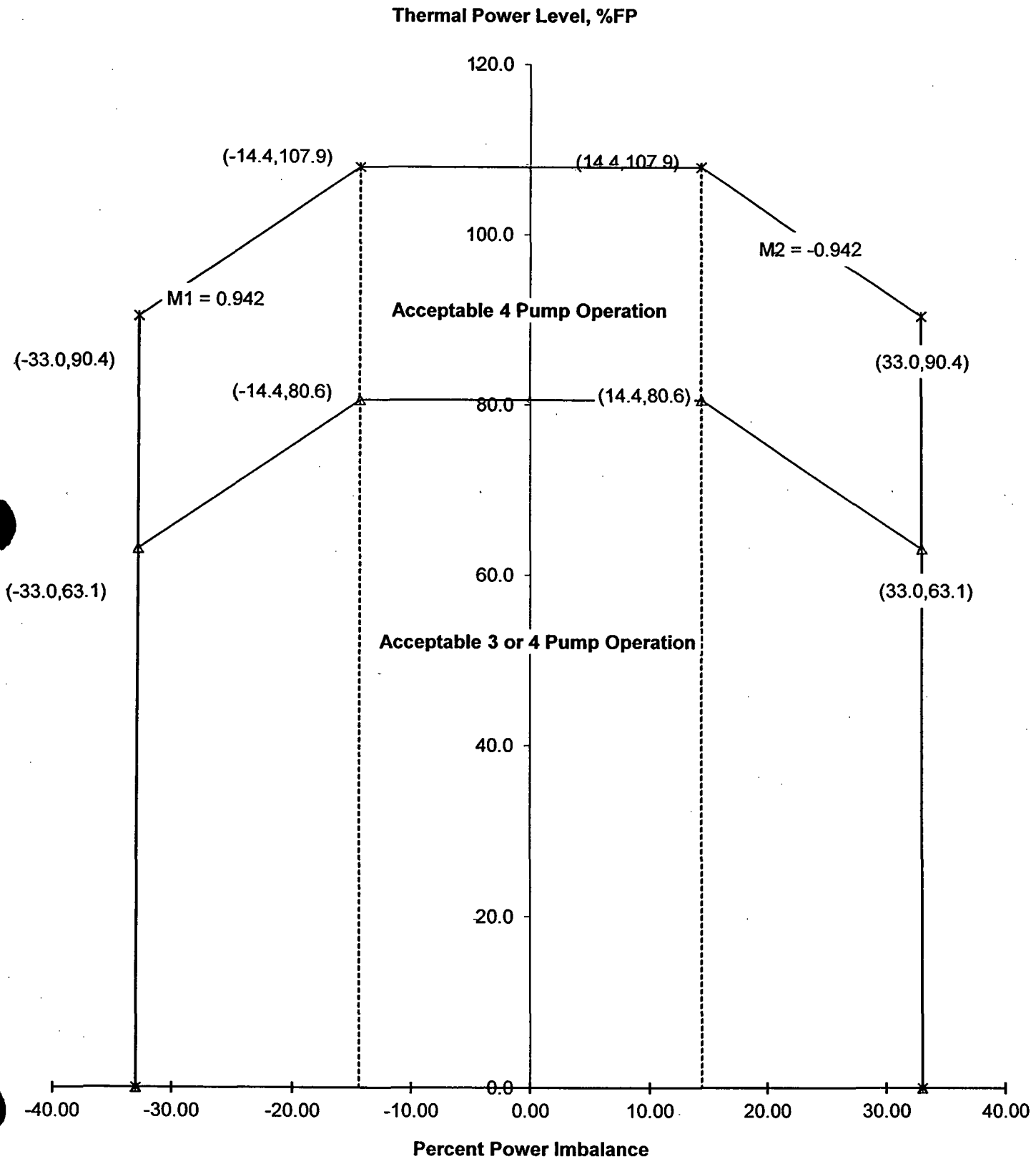
Operation with 3 RCS Pumps, BOC to EOC

| % 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 | |

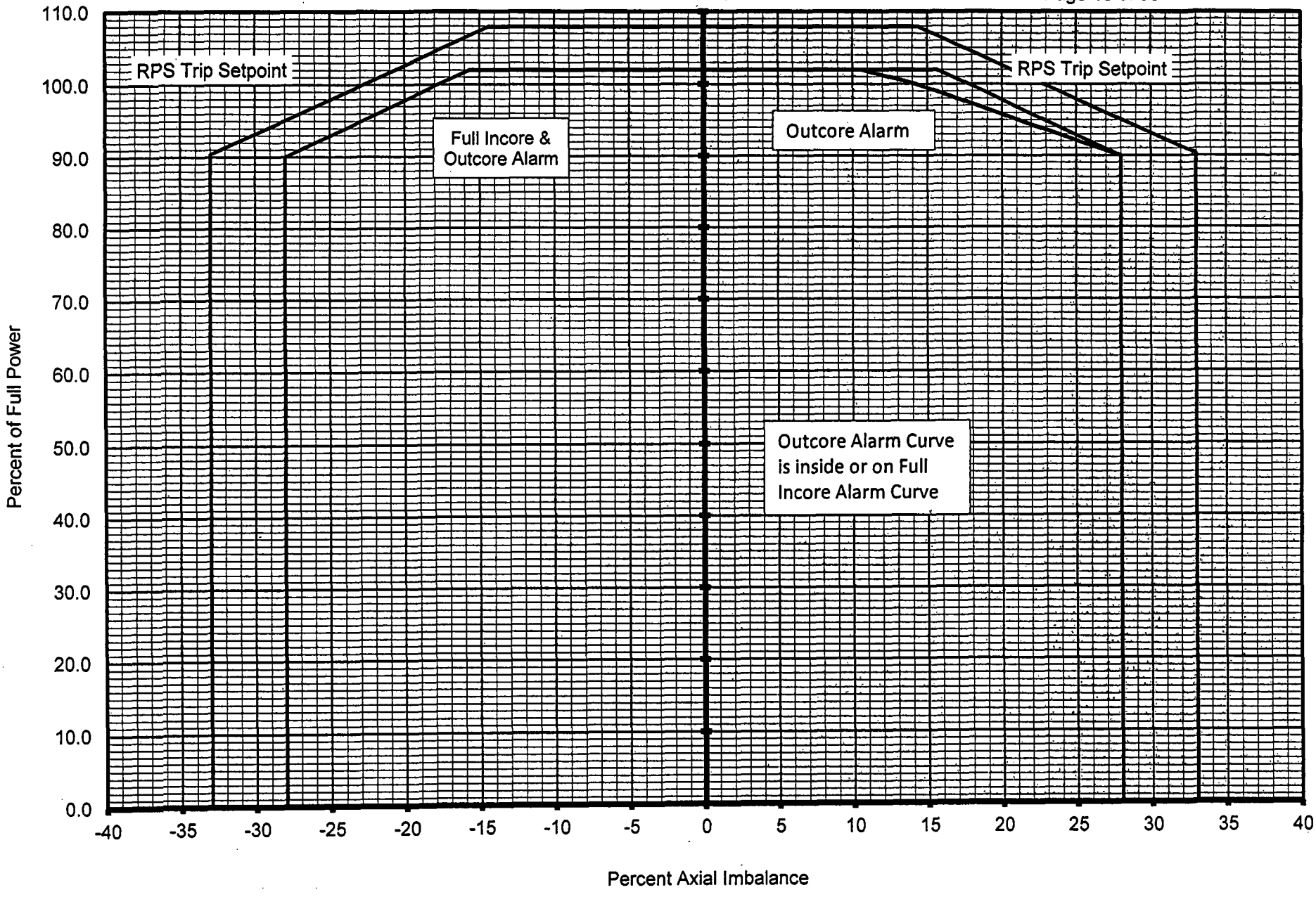
# Oconee 1 Cycle 28

## RPS Power Imbalance Setpoints

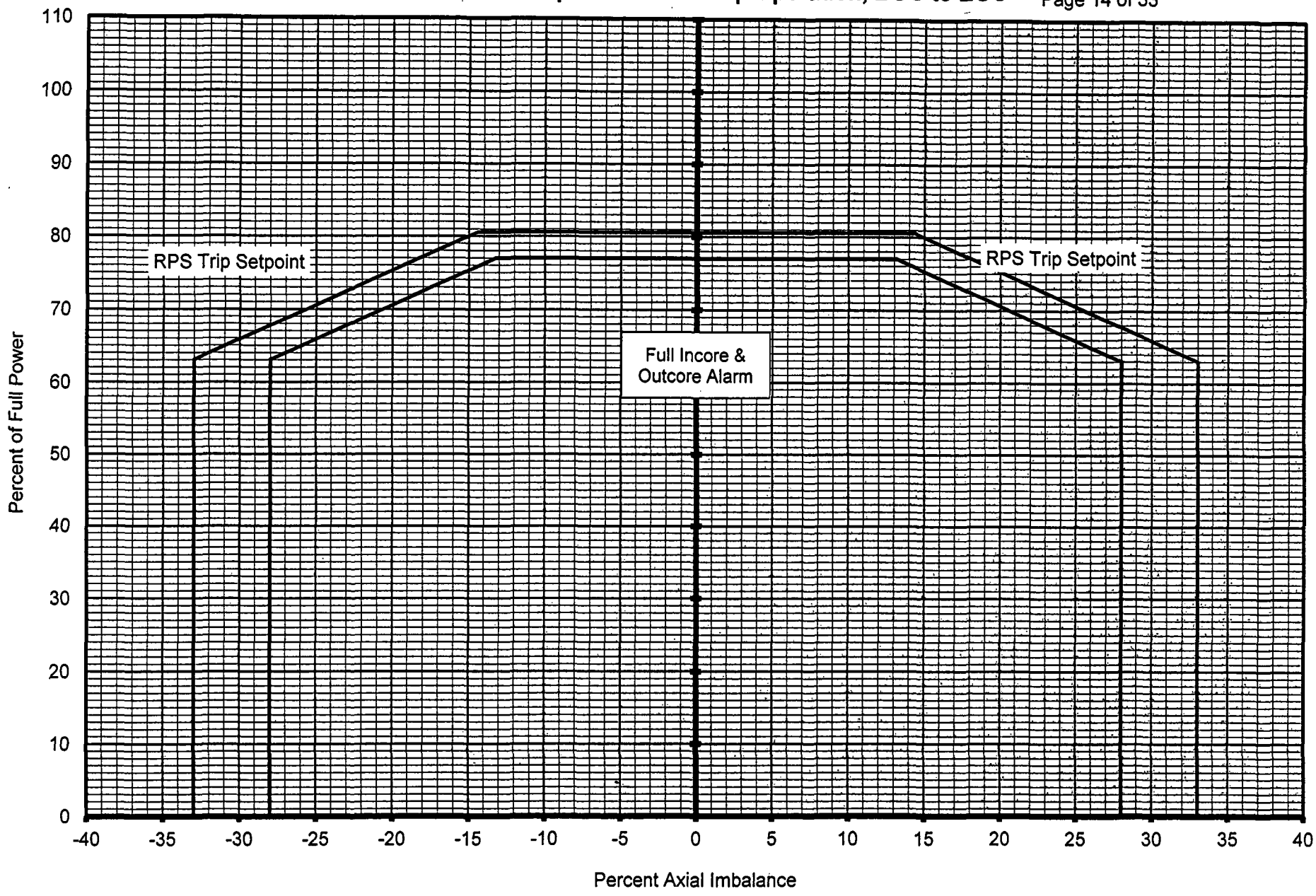
Referred to by TS 3.3.1



## Oconee 1 Cycle 28
## Imbalance Setpoints for 4 Pump Operation, BOC to EOC



## Oconee 1 Cycle 28
## Imbalance Setpoints for 3 Pump Operation, BOC to EOC



# Oconee 1 Cycle 28

## 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 1 Cycle 28

## 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.

| % 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 28
## 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.

| % 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.

# Oconee 1 Cycle 28
## 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.

# Oconee 1 Cycle 28
## 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.

# Oconee 1 Cycle 28
## 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 |
| | | | | | | |
| 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 | | |

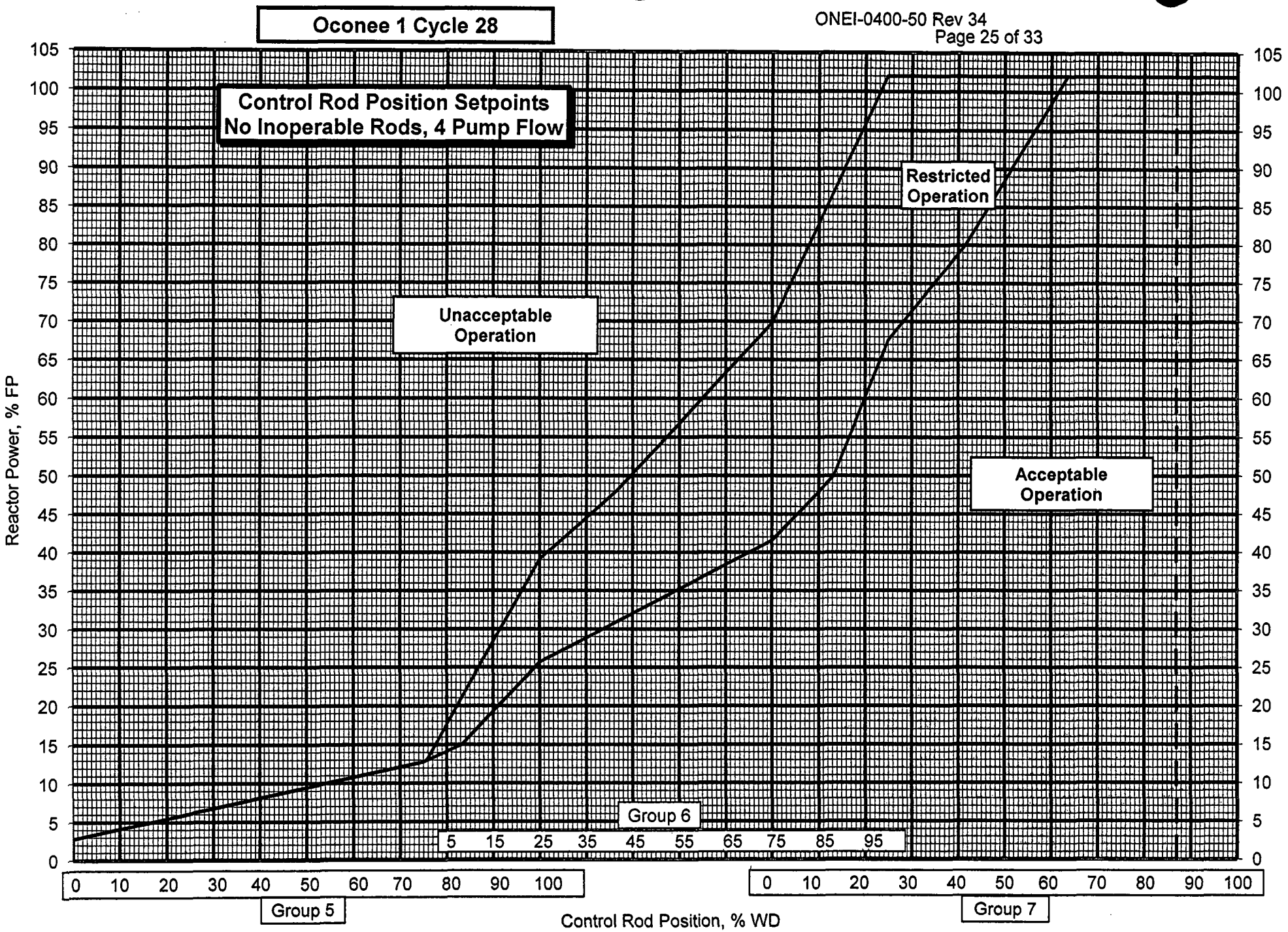
RI = 300 is withdrawal limit at all power levels.

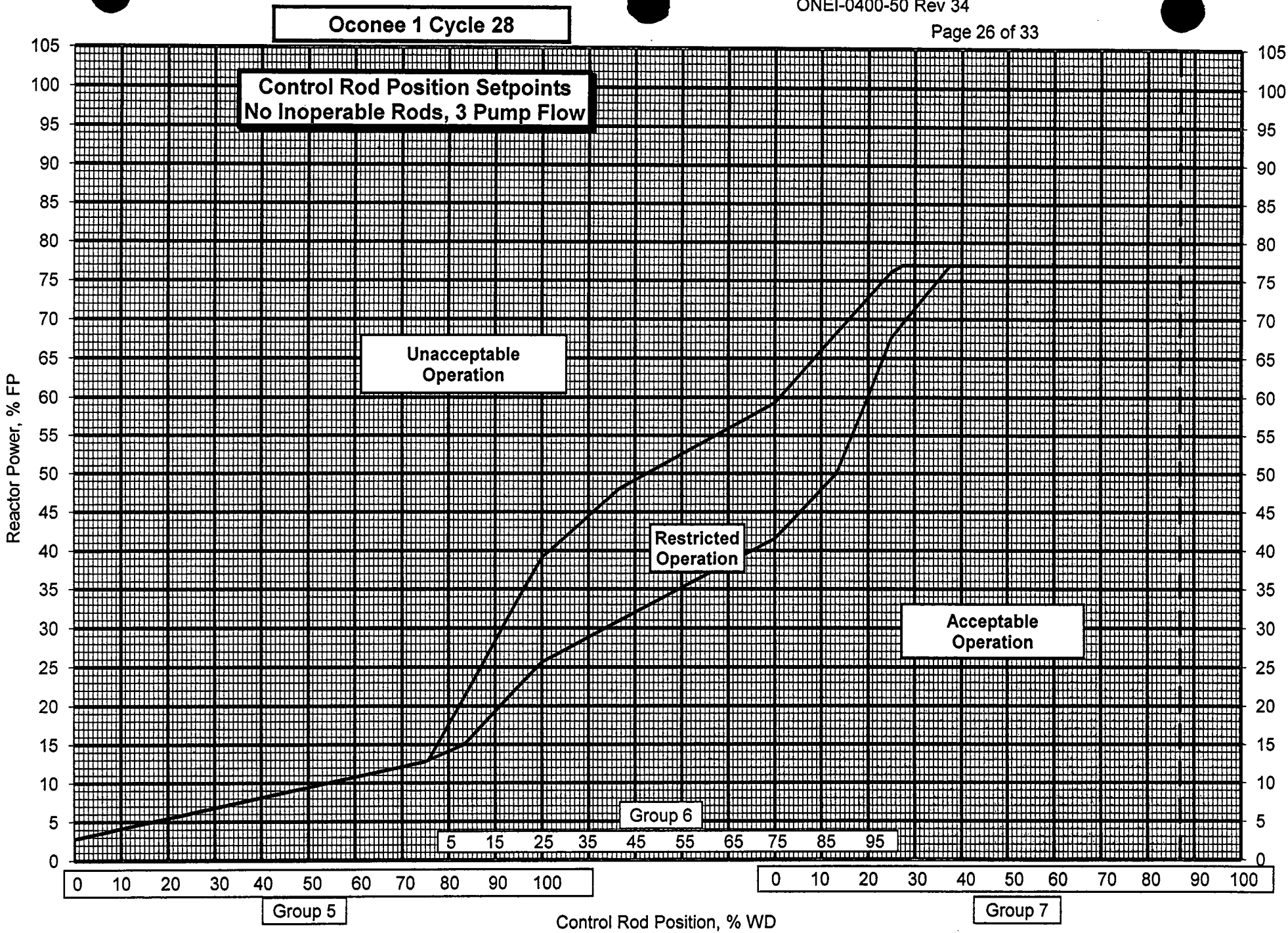
Continued on next page.

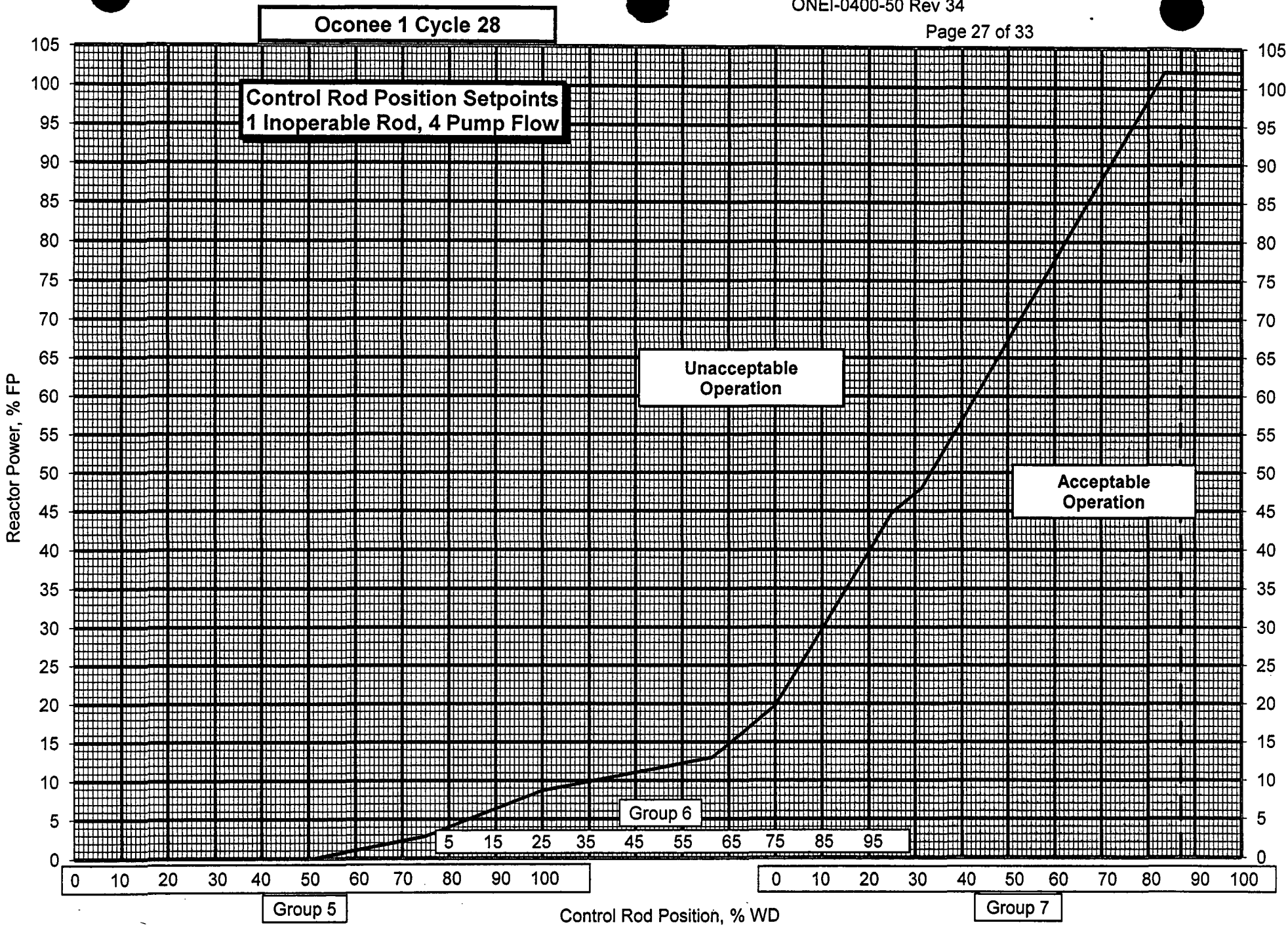
# Oconee 1 Cycle 28
## Rod Index Setpoints
### 3 Pump Operation, 1 Inoperable Rod, BOC to EOC

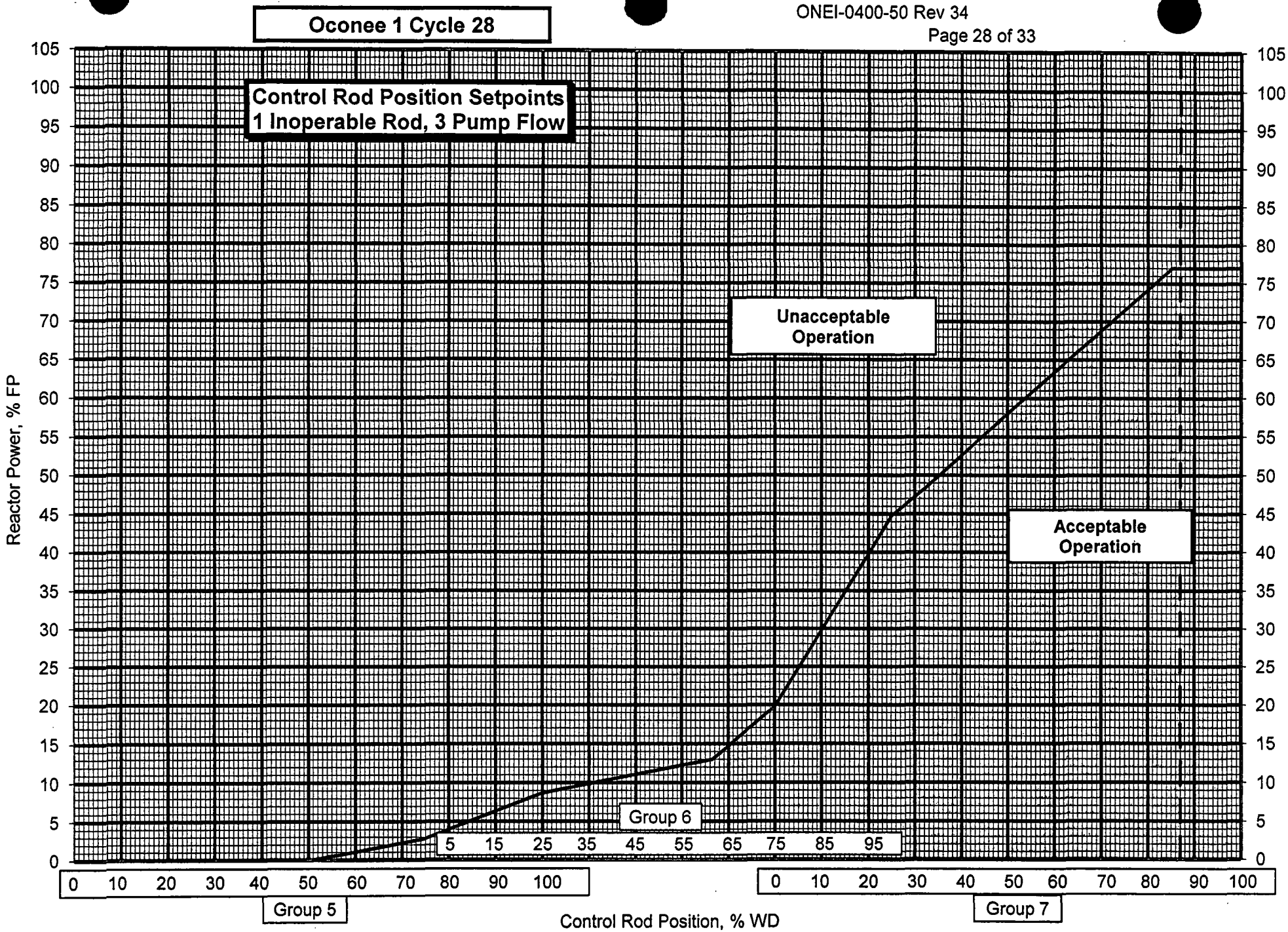
| % FP | Shutdown Margin Setpoint | | | Operational Alarm Setpoint | | |
|---|---|---|---|---|---|---|
| | CRGP 5 | CRGP 6 | CRGP 7 | CRGP 5 | CRGP 6 | CRGP 7 |
| 23 | 100 | 78.2 | 3.2 | 100 | 78.2 | 3.2 |
| 22 | 100 | 77.2 | 2.2 | 100 | 77.2 | 2.2 |
| 21 | 100 | 76.2 | 1.2 | 100 | 76.2 | 1.2 |
| 20 | 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 1 Cycle 28
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 1 Cycle 28
Control Rod Position Setpoints
No Inoperable Rods, 3 Pump Flow
Unacceptable Operation
Restricted 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
0 10 20 30 40 50 60 70 80 90 100
Group 5
5 15 25 35 45 55 65 75 85 95
Group 6
0 10 20 30 40 50 60 70 80 90 100
Group 7
Control Rod Position, % WD


Oconee 1 Cycle 28
Control Rod Position Setpoints
1 Inoperable Rod, 4 Pump Flow
Unacceptable Operation
Acceptable Operation
Group 6
Group 5
Group 7
Reactor Power, % FP
Control Rod Position, % WD
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
5 15 25 35 45 55 65 75 85 95


Oconee 1 Cycle 28
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 1 Cycle 28

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, % | 5.40 | 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 1 Cycle 28

## 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 | -39.5 |
| | 100.0 | - | -28.4 |
| | 109.4 | -14.4 | - |
| | 109.4 | 14.4 | - |
| | 100.0 | - | 24.1 |
| | 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 1 Cycle 28

## 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 1 Cycle 28

## LOCA Limits

**Not for Plant Use**

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/0% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.9 | 16.9 | 12.3 |
| 2.506 | 17.8 | 17.8 | 12.3 |
| 4.264 | 17.8 | 17.8 | 12.3 |
| 6.021 | 17.8 | 17.8 | 12.3 |
| 7.779 | 17.8 | 17.8 | 12.3 |
| 9.536 | 17.3 | 17.3 | 12.3 |
| 12 | 16.4 | 16.4 | 12.3 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/2% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.0 | 16.0 | 11.6 |
| 2.506 | 16.9 | 16.9 | 11.6 |
| 4.264 | 16.9 | 16.9 | 11.6 |
| 6.021 | 16.9 | 16.9 | 11.6 |
| 7.779 | 16.9 | 16.9 | 11.6 |
| 9.536 | 16.4 | 16.4 | 11.6 |
| 12 | 15.5 | 15.5 | 11.6 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/4% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 15.2 | 15.2 | 11.1 |
| 2.506 | 16.1 | 16.1 | 11.1 |
| 4.264 | 16.1 | 16.1 | 11.1 |
| 6.021 | 16.1 | 16.1 | 11.1 |
| 7.779 | 16.1 | 16.1 | 11.1 |
| 9.536 | 15.7 | 15.7 | 11.1 |
| 12 | 14.9 | 14.9 | 11.1 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/6% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.8 | 14.8 | 10.8 |
| 2.506 | 15.6 | 15.6 | 10.8 |
| 4.264 | 15.6 | 15.6 | 10.8 |
| 6.021 | 15.6 | 15.6 | 10.8 |
| 7.779 | 15.6 | 15.6 | 10.8 |
| 9.536 | 15.2 | 15.2 | 10.8 |
| 12 | 14.4 | 14.4 | 10.8 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/8% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.3 | 14.3 | 10.4 |
| 2.506 | 15.1 | 15.1 | 10.4 |
| 4.264 | 15.1 | 15.1 | 10.4 |
| 6.021 | 15.1 | 15.1 | 10.4 |
| 7.779 | 15.1 | 15.1 | 10.4 |
| 9.536 | 14.7 | 14.7 | 10.4 |
| 12 | 13.9 | 13.9 | 10.4 |

# Oconee 1 Cycle 28

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

| ΔTcold, °F | 4 RCP Operation - Loop Average Temp., °F<br>Tavg (Analytical) | 3 RCP Operation - Loop Average Temp., °F<br>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 |

# Duke Energy

# Oconee 2 Cycle 26

# Core Operating Limits Report

## QA Condition 1

Prepared By: L. D. McClain Dewain McClain Date: 15 Apr 2013

Reviewed By: J.D. Forster Jay D. Forster Date: 17 APR 2013

CDR By: A.R. Bingham Date: 4-16-13

Approved By: R.R. St.Clair Robert St Clair Date: 4/17/2013

## INSPECTION OF ENGINEERING INSTRUCTIONS

Inspection Waived By: R.R St. Clair Robert St. Clair Date: 4/17/2013
(Sponsor)

### 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 2 Cycle 26

# Core Operating Limits Report

Insertion Sheet for Revision 32

This revision is not valid until the end of operation for Oconee 2 Cycle 25.

Remove these Revision 31 pages

1 - 33

Insert these Revision 32 pages

1 - 33

Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 2 Cycle 26 revisions below | | | | | |
| 32 | Apr 2013 | 1 - 33 | | - | 33 |
| 31 | Oct 2011 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 25 revisions below | | | | | |
| 30 | Apr 2010 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 24 revisions below | | | | | |
| 29 | Feb 2010 | 1 - 33 | | | 33 |
| 28 | Nov 2008 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 23 revisions below | | | | | |
| 27 | May 2008 | 1 - 33 | | - | 33 |
| 26 | Mar 2007 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 22 revisions below | | | | | |
| 25 | Oct 2005 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 21 revisions below | | | | | |
| 24 | Aug 2005 | 1 - 4, 6 | | - | 33 |
| 23 | Mar 2005 | 1 - 5 | | - | 33 |
| 22 | Dec 2004 | 1 - 3, 30 | | - | 33 |
| 21 | Apr 2004 | 1 - 33 | | - | 33 |
| Oconee 2 Cycle 20 revisions below | | | | | |
| 20 | Feb 2004 | 1 - 3, 5 | - | - | 33 |
| 19 | Nov 2003 | 1-4,8-10,12-13,29 | 1a | - | 33 |
| 18 | Oct 2002 | 1-3,14,16,24,30 | - | - | 32 |
| 17 | Oct 2002 | 1 - 31 | 32 | - | 32 |

# Oconee 2 Cycle 26

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O2C26 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 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 O2C26 by References 15 through 17. The O2C26 analyses assume a design flow of 108.5% of 88,000 gpm per RCS pump, 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 O2C26 reload core.

### 1.1 References

1. Nuclear Design Methodology Using CASMO-4 / SIMULATE-3P, DPC-NE-1006-P, SER dated August 2, 2011.
2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002, SER dated July 21, 2011.
3. Oconee Nuclear Station Reload Design Methodology, NFS-1001, SER dated July 21, 2011.
4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003-P, SER dated July 21, 2011.
5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005-PA, Revision 4a, December 2008.
6. Fuel Mechanical Reload Analysis Methodology Using TACO3 and GDTACO, DPC-NE-2008-P, SER dated July 21, 2011.
7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-P, SER dated July 21, 2011.
8. Thermal Hydraulic Transient Analysis Methodology, DPC-NE-3000-P, SER dated July 21, 2011.
9. BAW-10192P-A, BWNT LOCA - BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants, Revision 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-10227P-A, 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 4, April 2011.
14. $\Delta$Tc and EOC Reduced Tavg Operation, OSC-7265, Revision 1, June 2002.
15. O2C26 Maneuvering Analysis, OSC-10098, Revision 3, April 2013.
16. O2C26 Specific DNB Analysis, OSC-10162, Revision 1, October 2011.
17. O2C26 Reload Safety Evaluation, OSC-10423, Revision 1, October 2011.

# Oconee 2 Cycle 26

## Miscellaneous Setpoints

BWST boron concentration shall be greater than **2500** ppm and less than **3000** ppm.
Referred to by TS 3.5.4.

Spent fuel pool boron concentration shall be greater than **2500** 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 **2300** 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 2 Cycle 26

## Steady State Operating Band

| | Rod Index | | APSR %WD | |
|---|---|---|---|---|
| EFPD | Min | Max | Min | Max |
| 0 to 622 | 292 ± 5 | 300 | 30 | 40 |
| 622 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 | 4.50 | 7.82 | 7.33 | 9.62 | 16.77 |
| Out of Core | 3.08 | 6.09 | 5.63 | 7.72 | 14.22 |
| Backup Incore | 2.51 | 3.87 | 3.63 | 4.81 | 10.07 |

Referred to by TS 3.2.3

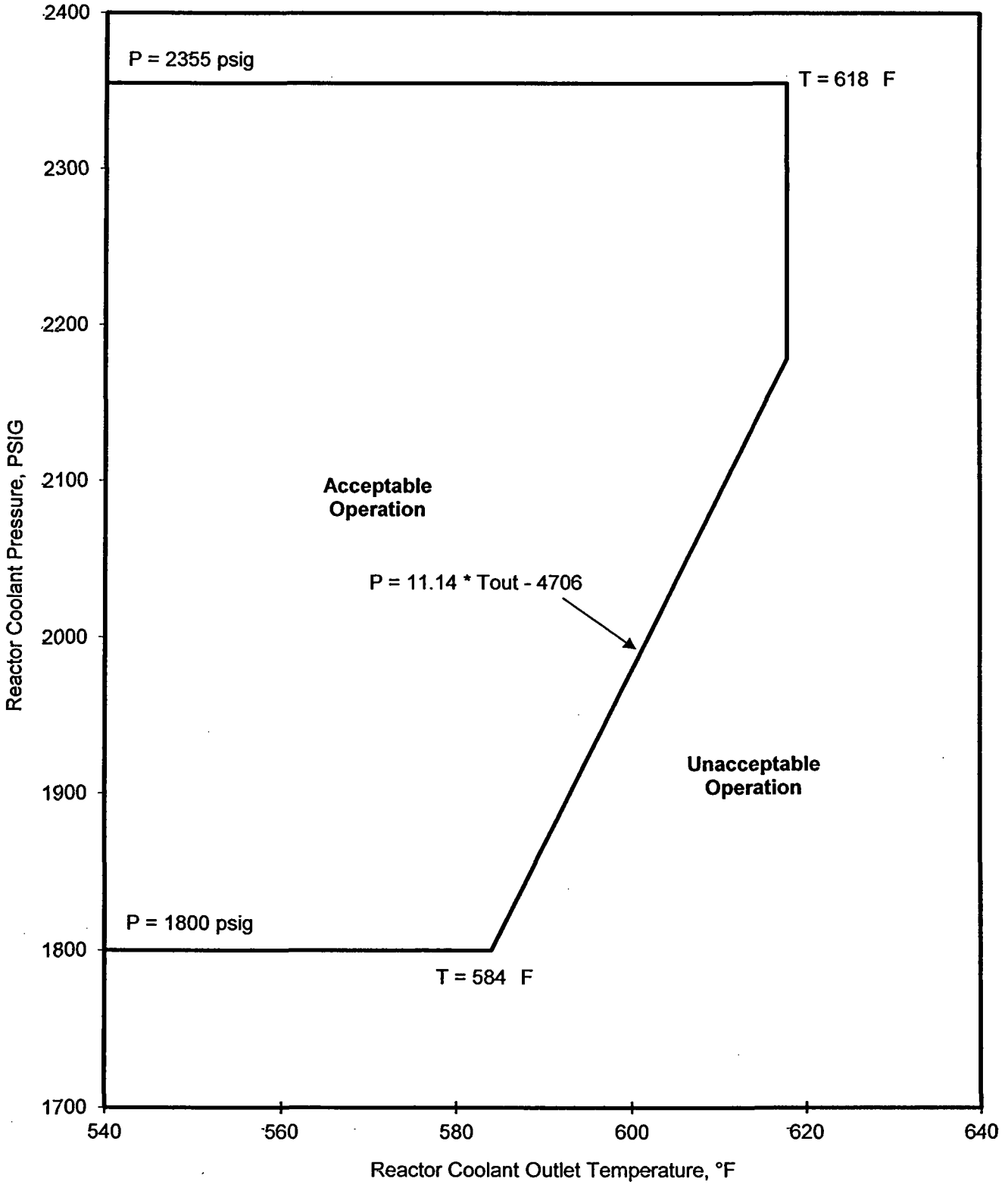
## Correlation Slope (CS)

1.15

Referred to by TS 3.3.1 (SR 3.3.1.3).

# Oconee 2 Cycle 26
## Variable Low RCS Pressure RPS Setpoints

Referred to by TS 3.3.1



# Oconee 2 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 |
| | *Pmax* => | 109.4 | -14.4 |
| | *Pmax* => | 109.4 | 14.4 |
| | | 90.0 | 35.0 |
| | | 0.0 | 35.0 |
| 3 Pumps | | 0.0 | -35.0 |
| | | 62.3 | -35.0 |
| | *Pmax* => | 81.7 | -14.4 |
| | *Pmax* => | 81.7 | 14.4 |
| | | 62.3 | 35.0 |
| | | 0.0 | 35.0 |

# Oconee 2 Cycle 26

## Operational Power Imbalance Setpoints

| | %FP | Full Incore | Backup Incore | Out of Core |
|---|---|---|---|---|
| 4 Pumps | 0.0 | -28.0 | -27.5 | -28.0 |
| | 80.0 | -28.0 | -27.5 | -28.0 |
| | 90.0 | -28.0 | -27.5 | -28.0 |
| | 100.0 | -17.8 | -17.8 | -17.8 |
| | 102.0 | -15.7 | -15.7 | -15.7 |
| | 102.0 | 15.7 | 11.3 | 11.9 |
| | 100.0 | 17.8 | 14.0 | 14.6 |
| | 90.0 | 28.0 | 27.7 | 28.0 |
| | 80.0 | 28.0 | 28.0 | 28.0 |
| | 0.0 | 28.0 | 28.0 | 28.0 |
| 3 Pumps | 0.0 | -28.0 | -27.5 | -28.0 |
| | 63.1 | -28.0 | - | -28.0 |
| | 63.5 | - | -27.5 | - |
| | 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 2 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 | 11.9 |
| 101.0 | -21.7 | 21.7 | -16.7 | 16.7 | -16.7 | 13.2 |
| 100.0 | -22.8 | 22.8 | -17.8 | 17.8 | -17.8 | 14.6 |
| 99.0 | -23.9 | 23.9 | -18.8 | 18.8 | -18.8 | 15.9 |
| 98.0 | -24.9 | 24.9 | -19.8 | 19.8 | -19.8 | 17.3 |
| 97.0 | -26.0 | 26.0 | -20.9 | 20.9 | -20.9 | 18.6 |
| 96.0 | -27.0 | 27.0 | -21.9 | 21.9 | -21.9 | 20.0 |
| 95.0 | -28.1 | 28.1 | -22.9 | 22.9 | -22.9 | 21.3 |
| 94.0 | -29.2 | 29.2 | -23.9 | 23.9 | -23.9 | 22.6 |
| 93.0 | -30.2 | 30.2 | -24.9 | 24.9 | -24.9 | 24.0 |
| 92.0 | -31.3 | 31.3 | -26.0 | 26.0 | -26.0 | 25.3 |
| 91.0 | -32.3 | 32.3 | -27.0 | 27.0 | -27.0 | 26.7 |
| 90.4 | -33.0 | 33.0 | -27.6 | 27.6 | -27.6 | 27.5 |
| 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 2 Cycle 26

## Operational Power Imbalance Setpoints

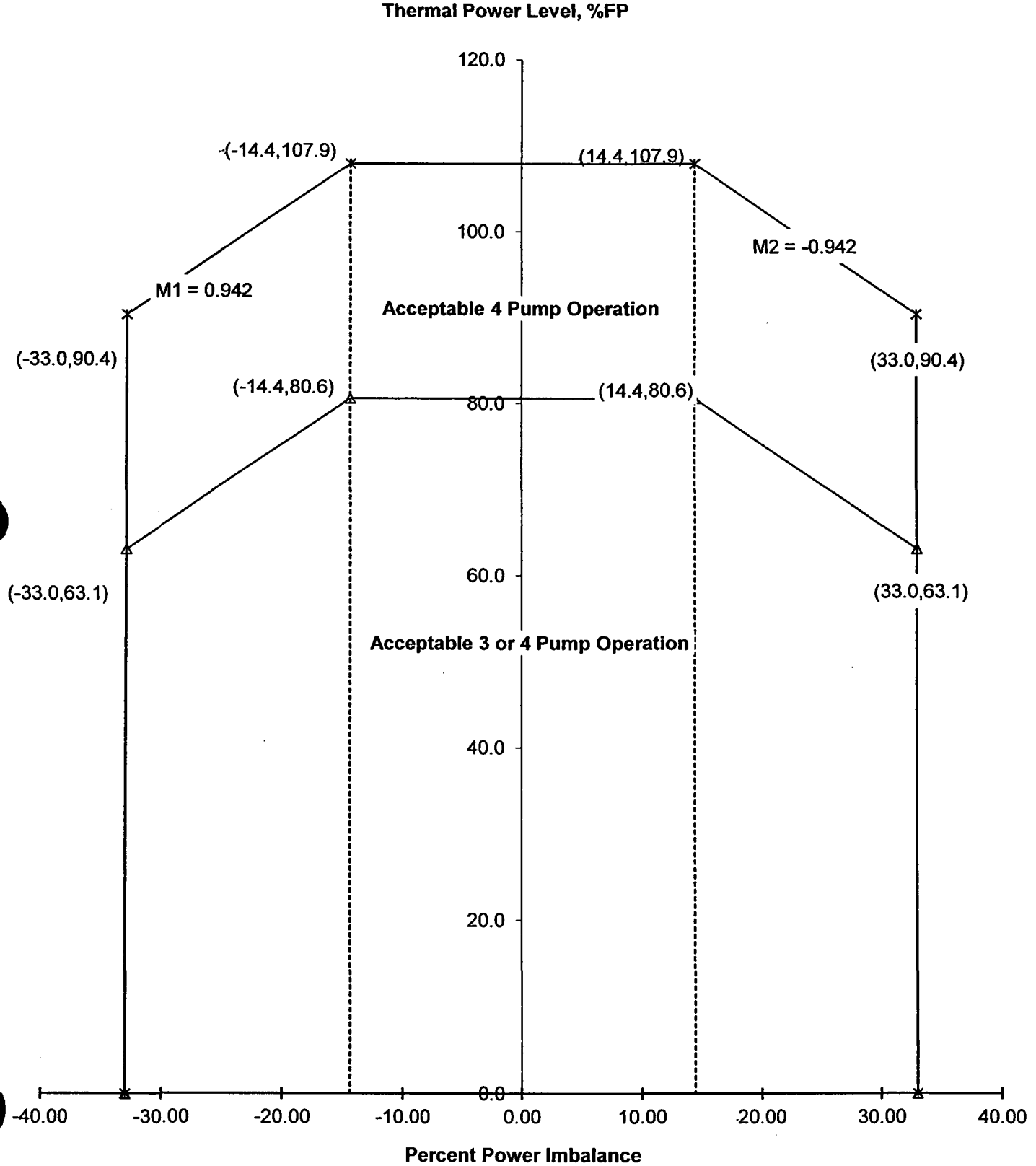
Operation with 3 RCS Pumps, BOC to EOC

| % 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 | |

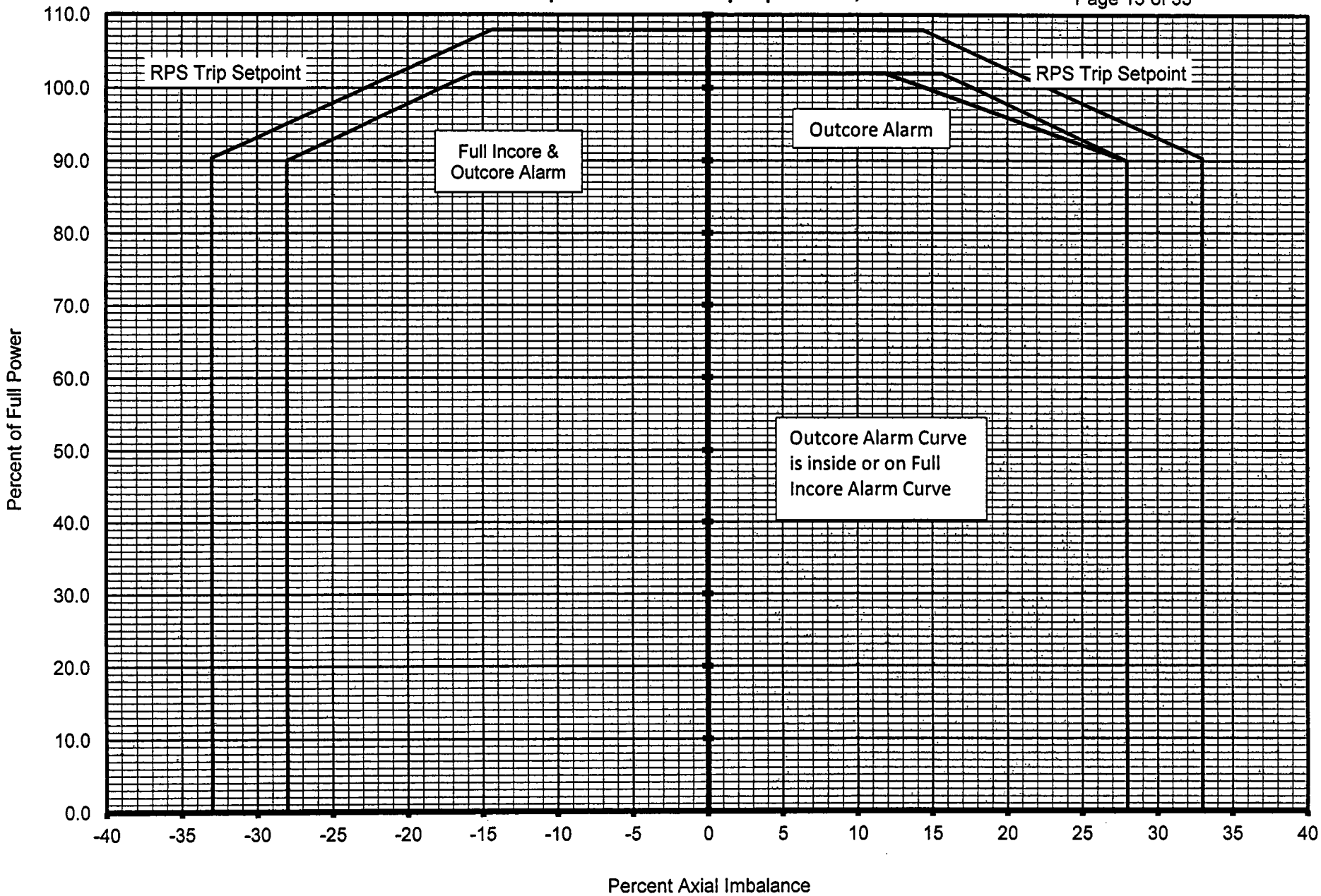
Oconee 2 Cycle 26

RPS Power Imbalance Setpoints

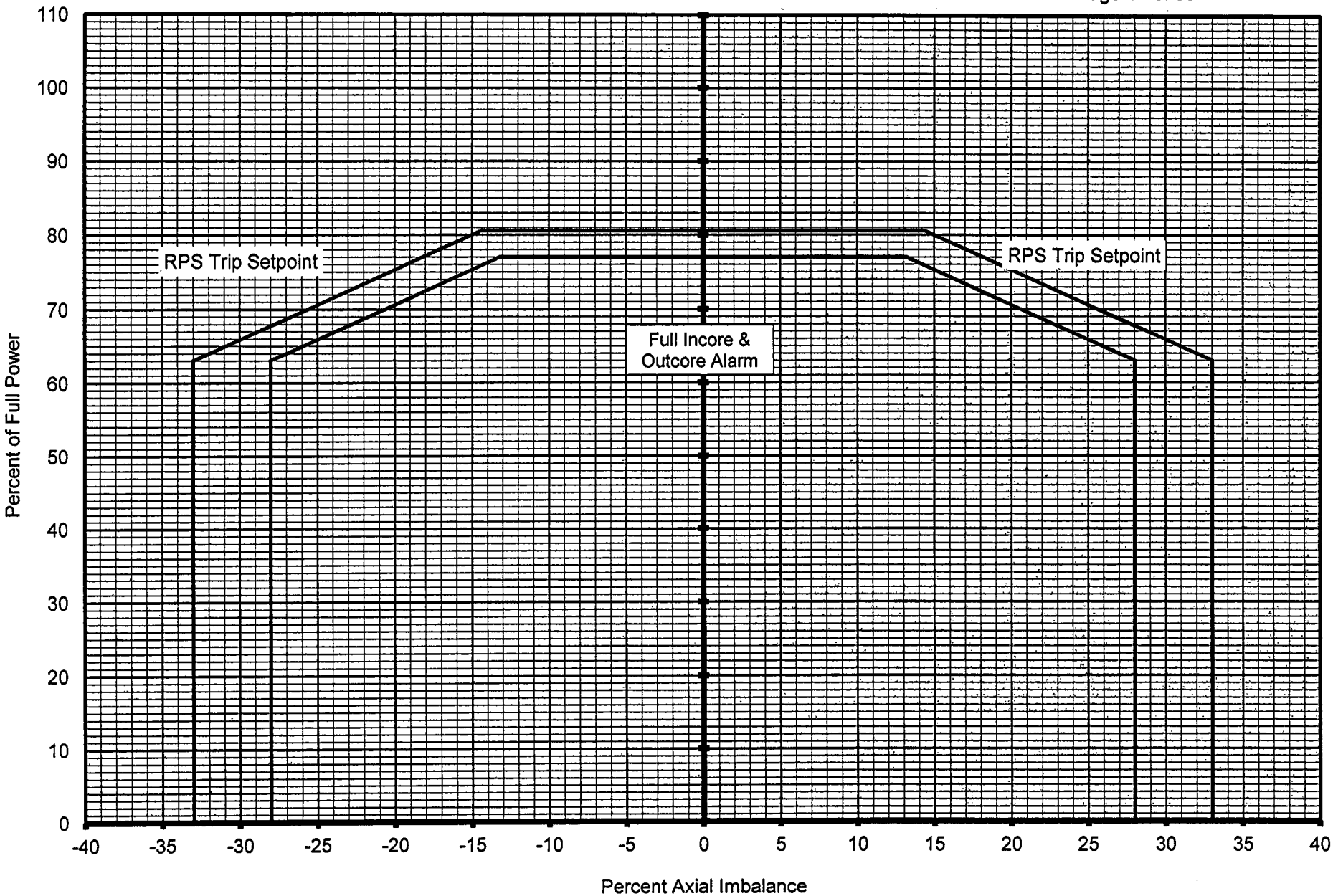
Referred to by TS 3.3.1



## Oconee 2 Cycle 26
## Imbalance Setpoints for 4 Pump Operation, BOC to EOC



## Oconee 2 Cycle 26
## Imbalance Setpoints for 3 Pump Operation, BOC to EOC



# Oconee 2 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 2 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.

| % 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.

| % 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.

| % 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.

| % 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.

# Oconee 2 Cycle 26
## 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.

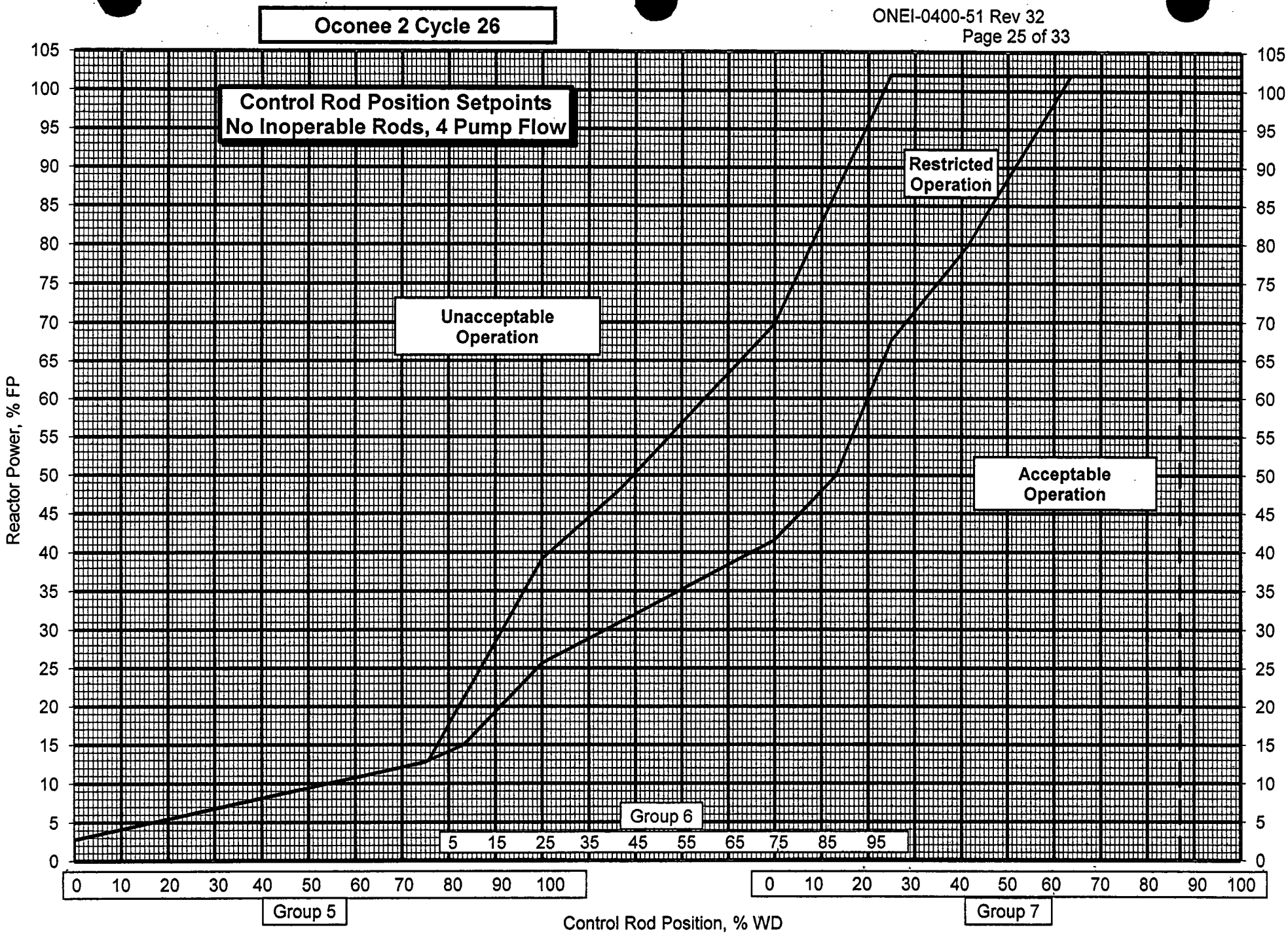
| % FP | Shutdown Margin Setpoint | | | Operational Alarm Setpoint | | |
|---|---|---|---|---|---|---|
| | CRGP 5 | CRGP 6 | CRGP 7 | CRGP 5 | CRGP 6 | CRGP 7 |
| | | | | | | |
| 77 | 100 | 100 | 85.2 | 100 | 100 | 85.2 |
| 76 | 100 | 100 | 83.4 | 100 | 100 | 83.4 |
| 75 | 100 | 100 | 81.5 | 100 | 100 | 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 | | |

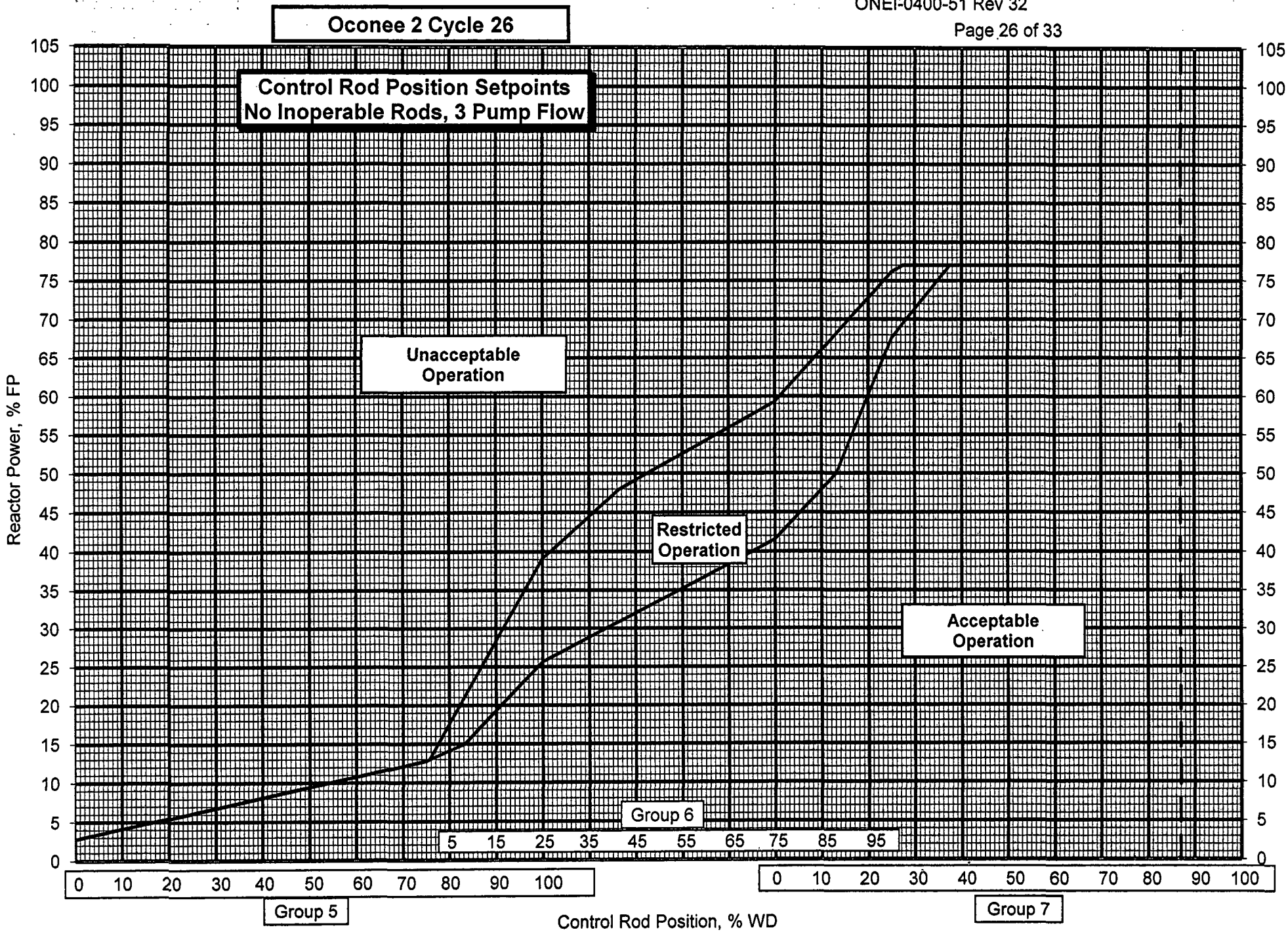
RI = 300 is withdrawal limit at all power levels.

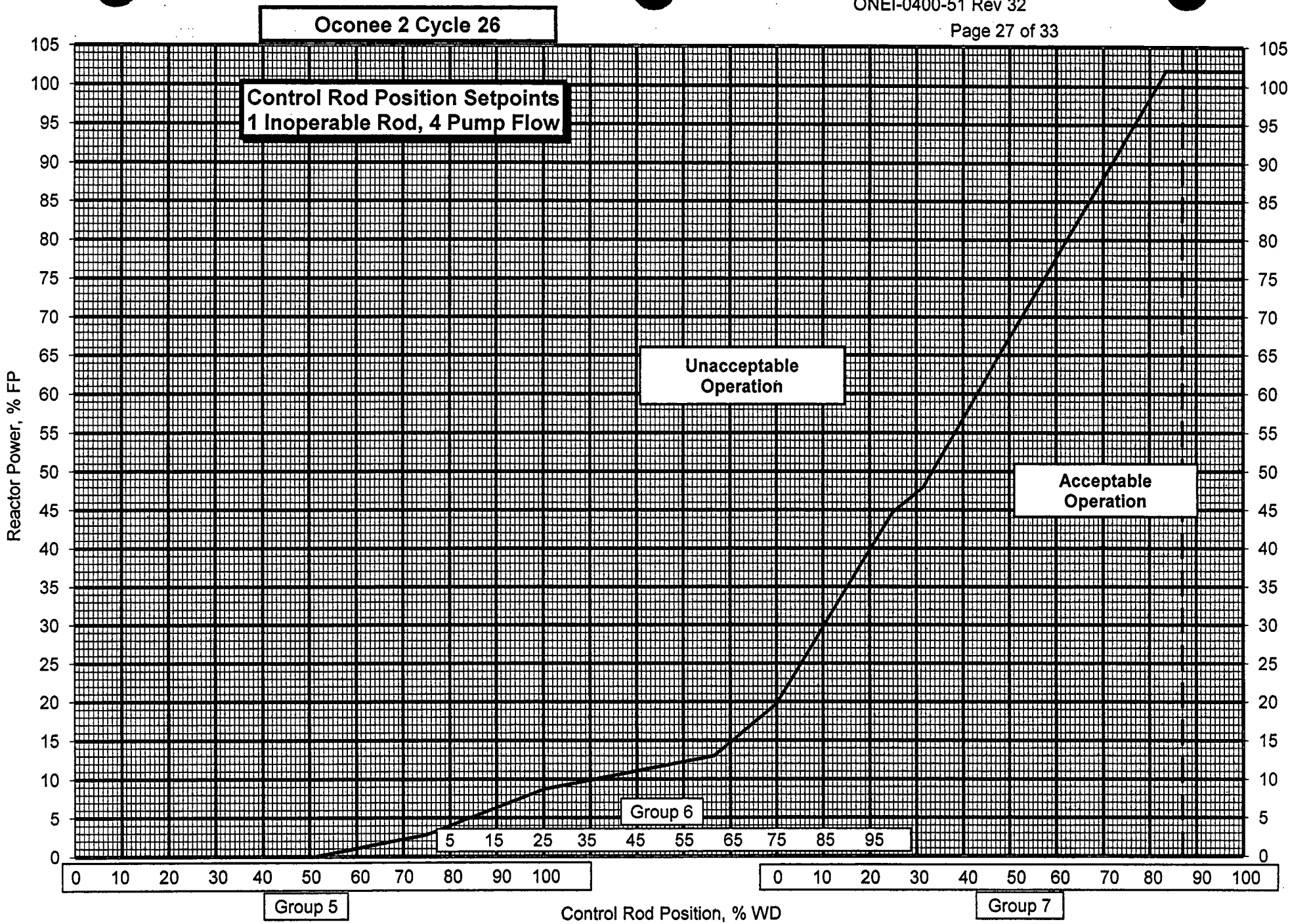
Continued on next page.

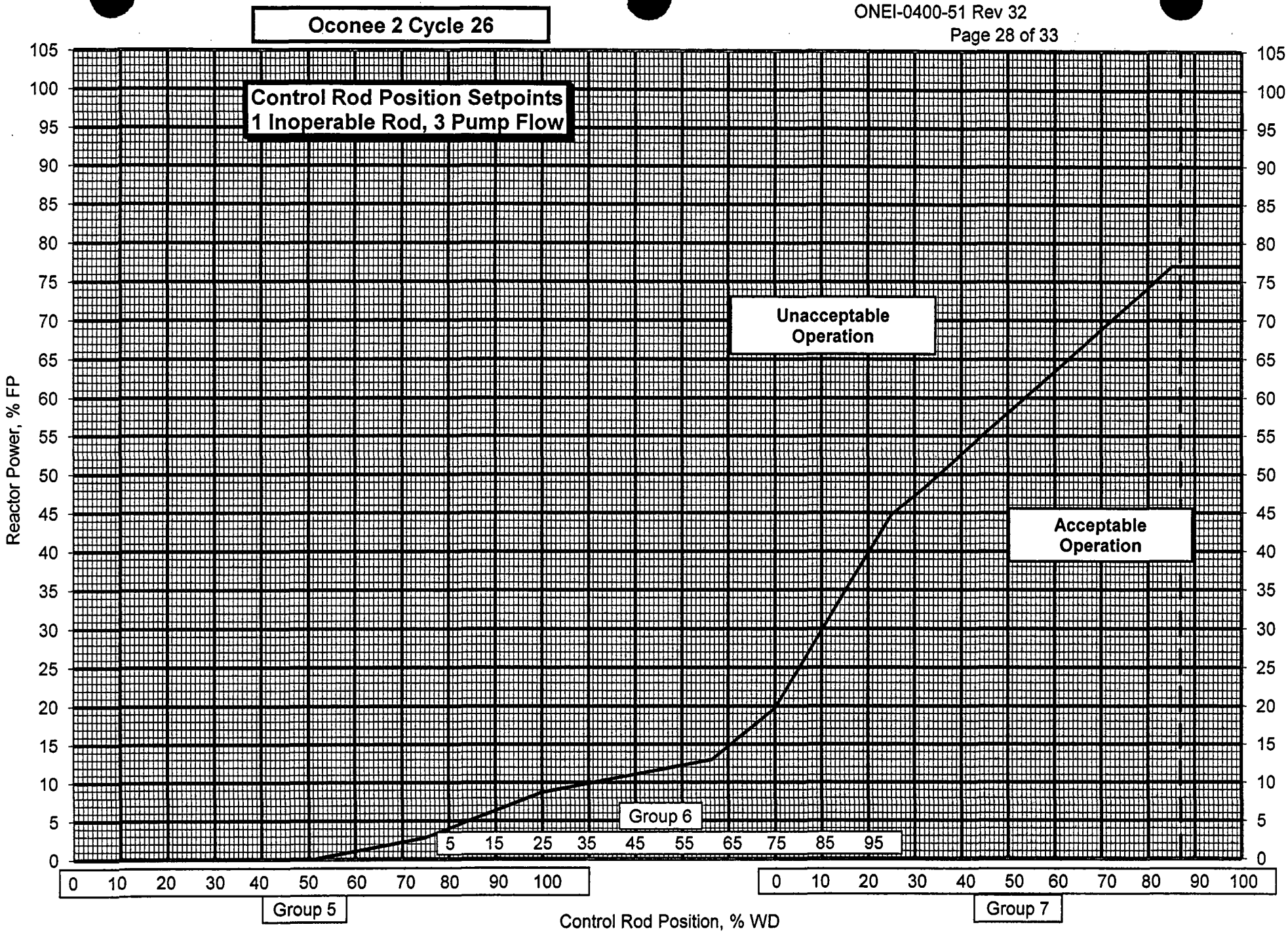
| % FP | Shutdown Margin Setpoint | | | Operational Alarm Setpoint | | |
|---|---|---|---|---|---|---|
| | CRGP 5 | CRGP 6 | CRGP 7 | CRGP 5 | CRGP 6 | CRGP 7 |
| 23 | 100 | 78.2 | 3.2 | 100 | 78.2 | 3.2 |
| 22 | 100 | 77.2 | 2.2 | 100 | 77.2 | 2.2 |
| 21 | 100 | 76.2 | 1.2 | 100 | 76.2 | 1.2 |
| 20 | 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 2 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 2 Cycle 26
Control Rod Position Setpoints
No Inoperable Rods, 3 Pump Flow
Unacceptable Operation
Restricted 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 2 Cycle 26
Control Rod Position Setpoints
1 Inoperable Rod, 4 Pump Flow
Unacceptable Operation
Acceptable Operation
Group 6
Group 5
Group 7
Reactor Power, % FP
Control Rod Position, % WD
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
5 15 25 35 45 55 65 75 85 95


Oconee 2 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 2 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, % | 6.30 | 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 2 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 | -39.5 |
| | 100.0 | - | -28.4 |
| | 109.4 | -14.4 | - |
| | 109.4 | 14.4 | - |
| | 100.0 | - | 24.5 |
| | 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 2 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 2 Cycle 26

## LOCA Limits

**Not for Plant Use**

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/0% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.9 | 16.9 | 12.3 |
| 2.506 | 17.8 | 17.8 | 12.3 |
| 4.264 | 17.8 | 17.8 | 12.3 |
| 6.021 | 17.8 | 17.8 | 12.3 |
| 7.779 | 17.8 | 17.8 | 12.3 |
| 9.536 | 17.3 | 17.3 | 12.3 |
| 12 | 16.4 | 16.4 | 12.3 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/2% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.0 | 16.0 | 11.6 |
| 2.506 | 16.9 | 16.9 | 11.6 |
| 4.264 | 16.9 | 16.9 | 11.6 |
| 6.021 | 16.9 | 16.9 | 11.6 |
| 7.779 | 16.9 | 16.9 | 11.6 |
| 9.536 | 16.4 | 16.4 | 11.6 |
| 12 | 15.5 | 15.5 | 11.6 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/4% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 15.2 | 15.2 | 11.1 |
| 2.506 | 16.1 | 16.1 | 11.1 |
| 4.264 | 16.1 | 16.1 | 11.1 |
| 6.021 | 16.1 | 16.1 | 11.1 |
| 7.779 | 16.1 | 16.1 | 11.1 |
| 9.536 | 15.7 | 15.7 | 11.1 |
| 12 | 14.9 | 14.9 | 11.1 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/6% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.8 | 14.8 | 10.8 |
| 2.506 | 15.6 | 15.6 | 10.8 |
| 4.264 | 15.6 | 15.6 | 10.8 |
| 6.021 | 15.6 | 15.6 | 10.8 |
| 7.779 | 15.6 | 15.6 | 10.8 |
| 9.536 | 15.2 | 15.2 | 10.8 |
| 12 | 14.4 | 14.4 | 10.8 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/8% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.3 | 14.3 | 10.4 |
| 2.506 | 15.1 | 15.1 | 10.4 |
| 4.264 | 15.1 | 15.1 | 10.4 |
| 6.021 | 15.1 | 15.1 | 10.4 |
| 7.779 | 15.1 | 15.1 | 10.4 |
| 9.536 | 14.7 | 14.7 | 10.4 |
| 12 | 13.9 | 13.9 | 10.4 |

# Oconee 2 Cycle 26

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

| ΔTcold, °F | 4 RCP Operation - Loop Average Temp., °F<br>Tavg (Analytical) | 3 RCP Operation - Loop Average Temp., °F<br>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 |

# Duke Energy

# Oconee 3 Cycle 27

# Core Operating Limits Report

## QA Condition 1

Prepared By: L. D. McClain Devrin McClain Date: 16Apr2013

Reviewed By: L. C. James II Date: 17Apr2013

CDR By: A.R. Bingham Date: 4-16-13

Approved By: R.R. St.Clair Robert St. Clair Date: 4/17/2013

## INSPECTION OF ENGINEERING INSTRUCTIONS

Inspection Waived By: R.R St.Clair Robert St. Clair (Sponsor) Date: 4/17/2013

### 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 27

# Core Operating Limits Report

## Insertion Sheet for Revision 34

This revision is not valid until the end of operation for Oconee 3 Cycle 26.

Remove these Revision 33 pages: 1 - 33

Insert these Revision 34 pages: 1 - 33

Revision Log

| Revision | Effective Date | Pages Revised | Pages Added | Pages Deleted | Total Effective Pages |
|---|---|---|---|---|---|
| Oconee 3 Cycle 27 revisions below | | | | | |
| 34 | Apr 2013 | 1 - 33 | | - | 33 |
| 33 | Oct 2012 | 1 - 33 | | - | 33 |
| 32 | May 2012 | 1 - 33 | | - | 33 |
| Oconee 3 Cycle 26 revisions 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 27

## 1.0 Error Adjusted Core Operating Limits

The Core Operating Limits Report for O3C27 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 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 O3C27 by References 15 through 17. The O3C27 analyses assume a design flow of 108.5% of 88,000 gpm per RCS pump, 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 O3C27 reload core.

### 1.1 References

1. Oconee Nuclear Design Methodology Using CASMO-4 / SIMULATE-3, DPC-NE-1006-PA, SE dated August 2, 2011.
2. Oconee Nuclear Station Reload Design Methodology II, DPC-NE-1002-A, SE dated July 21, 2011.
3. Oconee Nuclear Station Reload Design Methodology, NFS-1001-A, SE dated July 21, 2011.
4. ONS Core Thermal Hydraulic Methodology Using VIPRE-01, DPC-NE-2003-PA, SE dated July 21, 2011.
5. Thermal Hydraulic Statistical Core Design Methodology, DPC-NE-2005-PA, Revision 4a, December 2008.
6. Fuel Mechanical Reload Analysis Methodology Using TACO3 and GDTACO, DPC-NE-2008-PA, SE dated July 21, 2011.
7. UFSAR Chapter 15 Transient Analysis Methodology, DPC-NE-3005-PA, SE dated July 21, 2011.
8. Thermal Hydraulic Transient Analysis Methodology, DPC-NE-3000-PA, SE dated July 21, 2011.
9. BAW-10192P-A, BWNT LOCA - BWNT Loss of Coolant Accident Evaluation Model for Once-Through Steam Generator Plants, Revision 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-10227P-A, 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. Digital RPS RCS Pressure & Temperature Trip Function Uncertainties and Variable Low RCS Pressure Safety Limit, OSC-8828, Revision 3, October 2010.
13. Power Imbalance Safety Limits and Tech Spec Setpoints Using Error Adjusted Flux-Flow Ratio of 1.094, OSC-5604, Revision 4, April 2011.
14. $\Delta Tc$ and EOC Reduced Tavg Operation, OSC-7265, Revision 1, June 2002.
15. O3C27 Maneuvering Analysis, OSC-10517, Revision 3, April 2013.
16. O3C27 Specific DNB Analysis, OSC-10526, Revision 0, January 2012.
17. O3C27 Reload Safety Evaluation, OSC-10535, Revision 1, May 2012.

# Oconee 3 Cycle 27

## Miscellaneous Setpoints

BWST boron concentration shall be greater than **2500** ppm and less than **3000** ppm.
Referred to by TS 3.5.4.

Spent fuel pool boron concentration shall be greater than **2500** 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 **2300** ppm. The average boron concentration in the CFTs 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 27

## Steady State Operating Band

| | Rod Index | | APSR %WD | |
|---|---|---|---|---|
| EFPD | Min | Max | Min | Max |
| 0 to 595 | 292 ± 5 | 300 | 30 | 40 |
| 595 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 | 7.61 | 7.11 | 9.40 | 16.55 |
| Out of Core | 2.35 | 6.09 | 5.63 | 7.72 | 14.22 |
| Backup Incore | 2.25 | 3.87 | 3.63 | 4.81 | 10.07 |

Referred to by TS 3.2.3

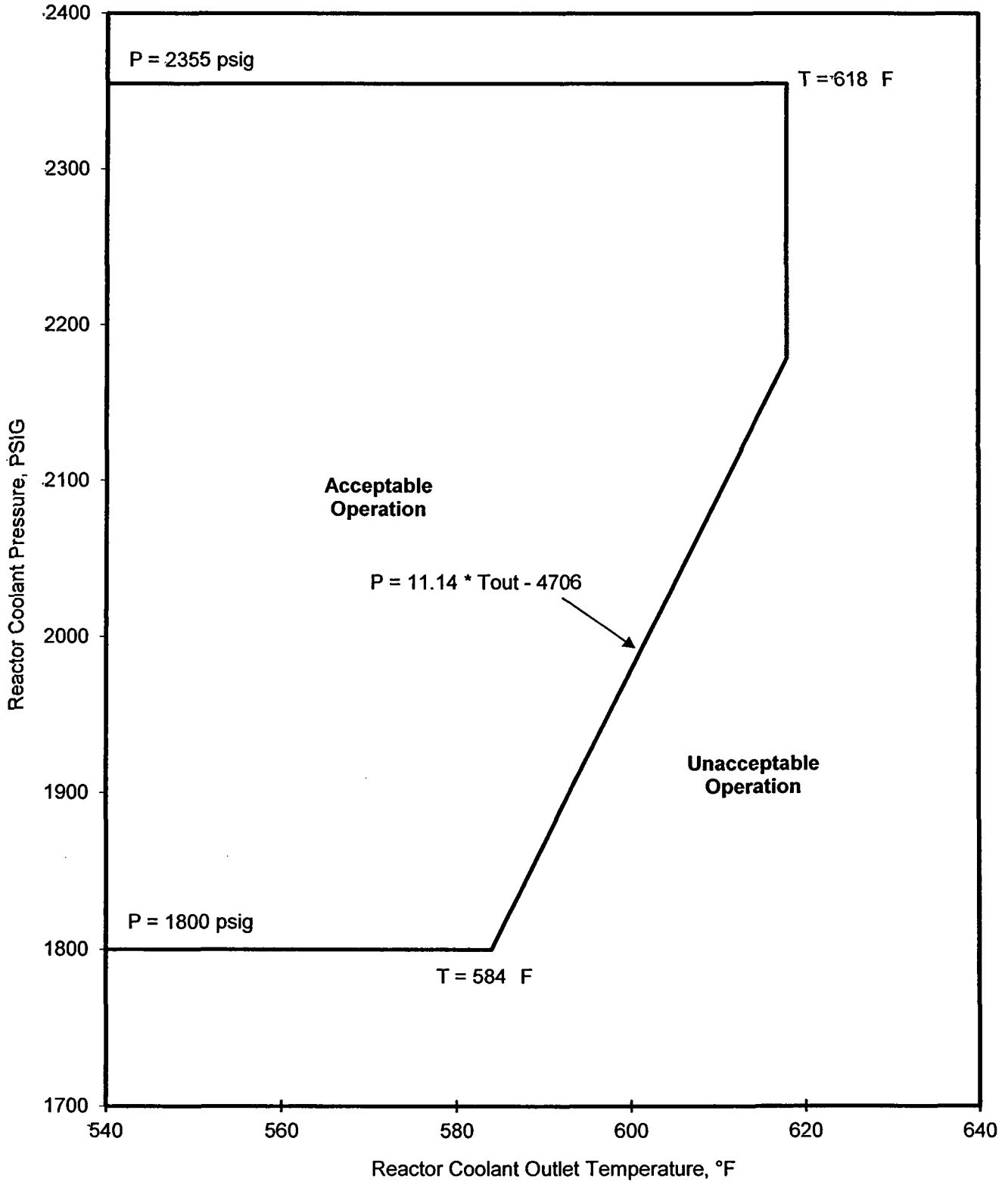
## Correlation Slope (CS)

1.15

Referred to by TS 3.3.1 (SR 3.3.1.3).

# Oconee 3 Cycle 27
## Variable Low RCS Pressure RPS Setpoints

Referred to by TS 3.3.1



# Oconee 3 Cycle 27

## 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 |
| | *Pmax* => | 109.4 | -14.4 |
| | *Pmax* => | 109.4 | 14.4 |
| | | 90.0 | 35.0 |
| | | 0.0 | 35.0 |
| 3 Pumps | | 0.0 | -35.0 |
| | | 62.3 | -35.0 |
| | *Pmax* => | 81.7 | -14.4 |
| | *Pmax* => | 81.7 | 14.4 |
| | | 62.3 | 35.0 |
| | | 0.0 | 35.0 |

# Oconee 3 Cycle 27

## Operational Power Imbalance Setpoints

| | %FP | Full Incore | Backup Incore | Out of Core |
|---|---|---|---|---|
| 4 Pumps | 0.0 | -28.0 | -27.3 | -28.0 |
| | 80.0 | -28.0 | -27.3 | -28.0 |
| | 90.0 | -28.0 | -27.3 | -28.0 |
| | 100.0 | -17.8 | -17.8 | -17.8 |
| | 102.0 | -15.7 | -15.7 | -15.7 |
| | 102.0 | 15.7 | 11.1 | 11.7 |
| | 100.0 | 17.8 | 14.3 | 14.9 |
| | 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 | -27.3 | -28.0 |
| | 63.1 | -28.0 | - | -28.0 |
| | 63.7 | - | -27.3 | - |
| | 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 27

## 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 | 11.7 |
| 101.0 | -21.7 | 21.7 | -16.7 | 16.7 | -16.7 | 13.3 |
| 100.0 | -22.8 | 22.8 | -17.8 | 17.8 | -17.8 | 14.9 |
| 99.0 | -23.9 | 23.9 | -18.8 | 18.8 | -18.8 | 16.2 |
| 98.0 | -24.9 | 24.9 | -19.8 | 19.8 | -19.8 | 17.5 |
| 97.0 | -26.0 | 26.0 | -20.9 | 20.9 | -20.9 | 18.8 |
| 96.0 | -27.0 | 27.0 | -21.9 | 21.9 | -21.9 | 20.2 |
| 95.0 | -28.1 | 28.1 | -22.9 | 22.9 | -22.9 | 21.5 |
| 94.0 | -29.2 | 29.2 | -23.9 | 23.9 | -23.9 | 22.8 |
| 93.0 | -30.2 | 30.2 | -24.9 | 24.9 | -24.9 | 24.1 |
| 92.0 | -31.3 | 31.3 | -26.0 | 26.0 | -26.0 | 25.4 |
| 91.0 | -32.3 | 32.3 | -27.0 | 27.0 | -27.0 | 26.7 |
| 90.4 | -33.0 | 33.0 | -27.6 | 27.6 | -27.6 | 27.5 |
| 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 27

## Operational Power Imbalance Setpoints

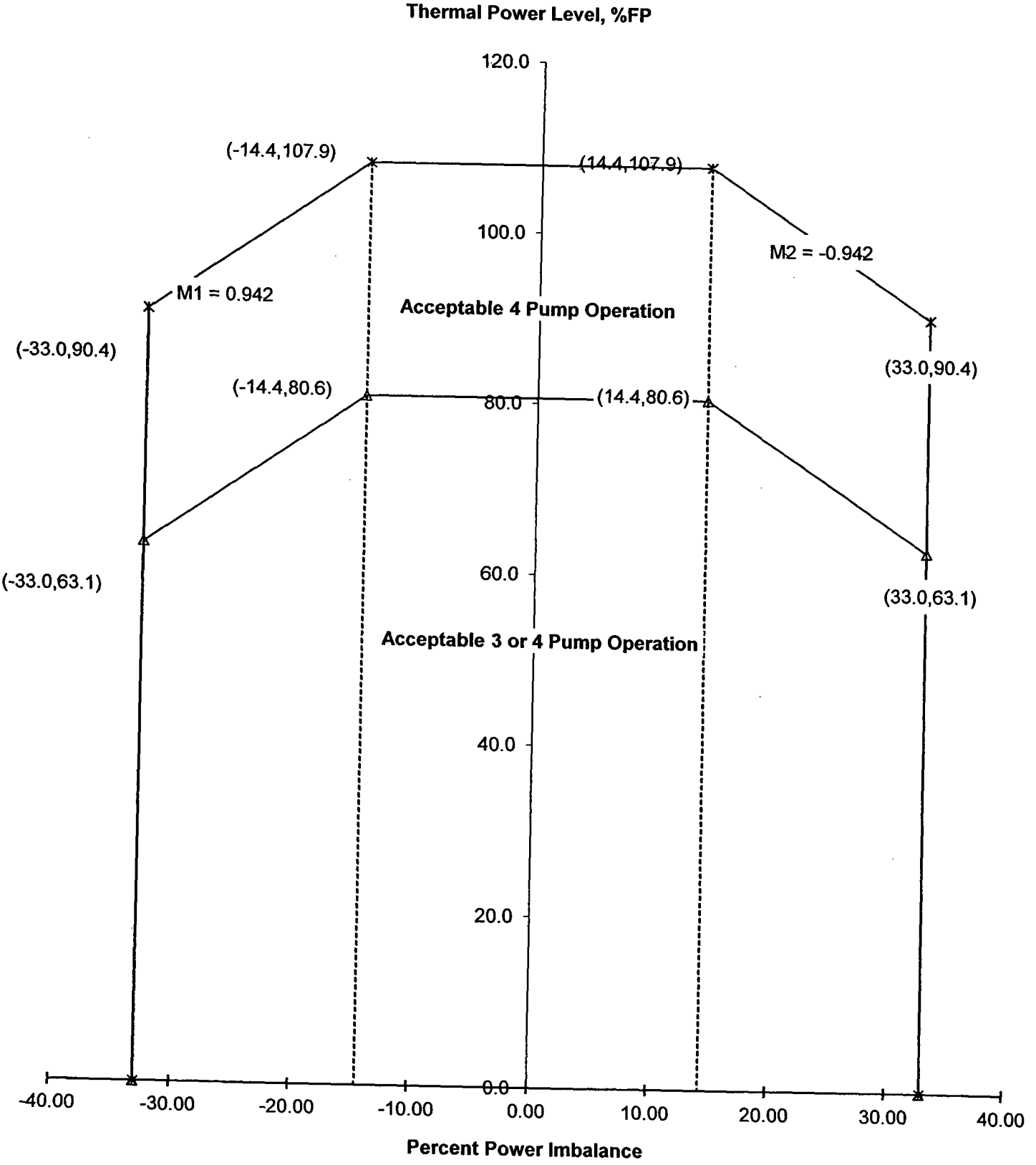
Operation with 3 RCS Pumps, BOC to EOC

| % 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 | |

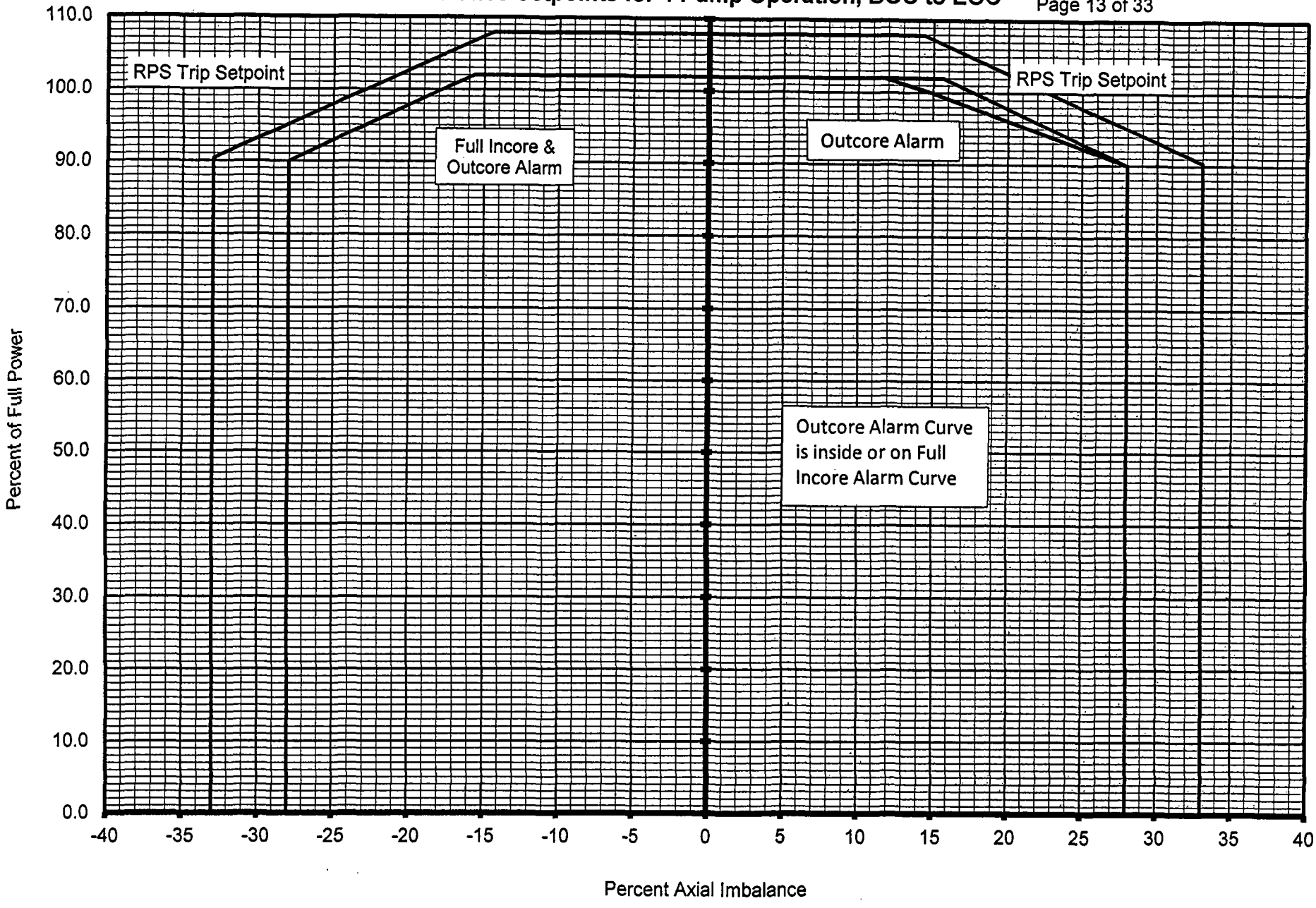
# Oconee 3 Cycle 27

## RPS Power Imbalance Setpoints

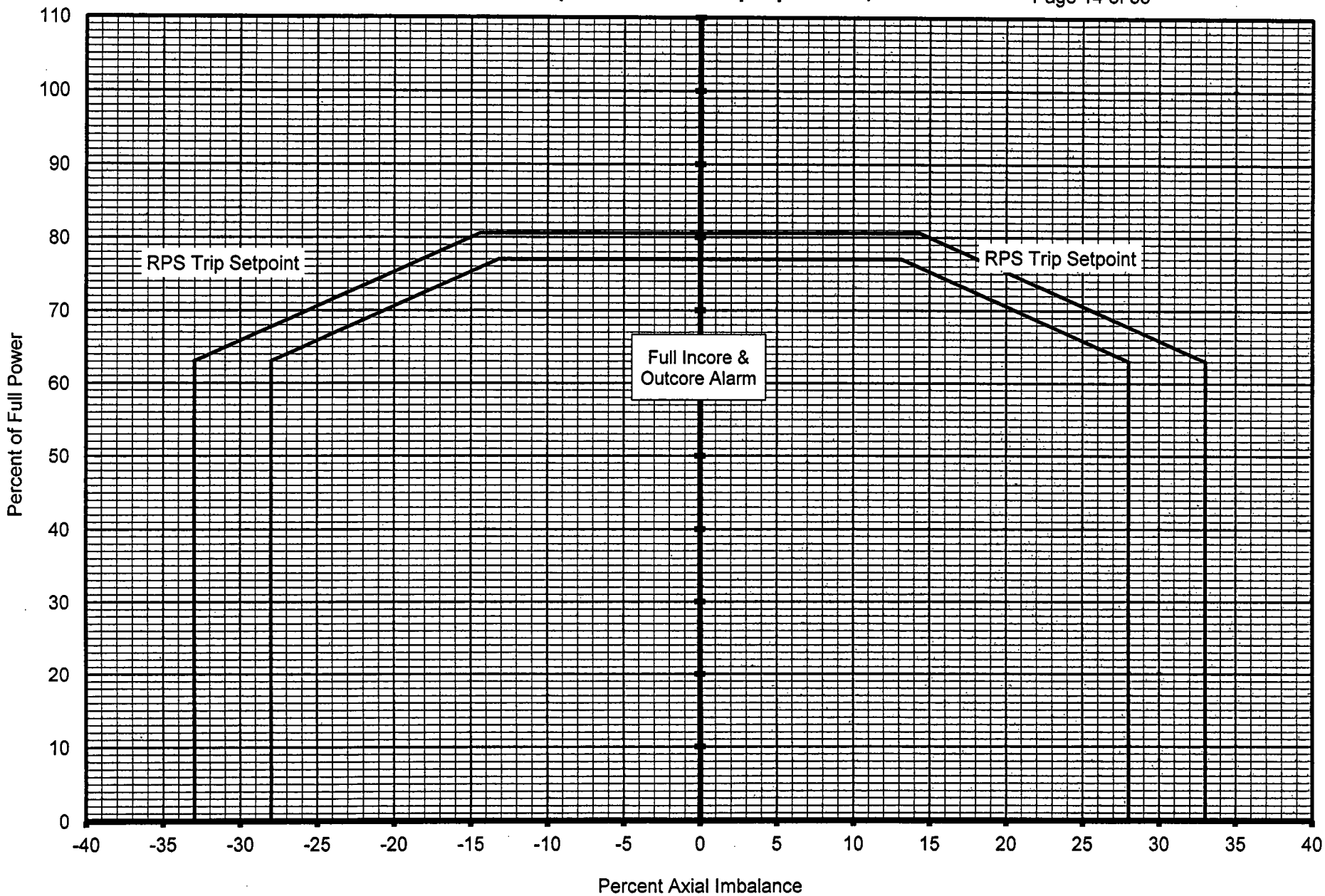
Referred to by TS 3.3.1



## Oconee 3 Cycle 27
## Imbalance Setpoints for 4 Pump Operation, BOC to EOC



## Oconee 3 Cycle 27
## Imbalance Setpoints for 3 Pump Operation, BOC to EOC



# Oconee 3 Cycle 27

## 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 27

## 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.

| % 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.

| % 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.

# Oconee 3 Cycle 27
## 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.

# Oconee 3 Cycle 27
## 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.

# Oconee 3 Cycle 27
## 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 | | |

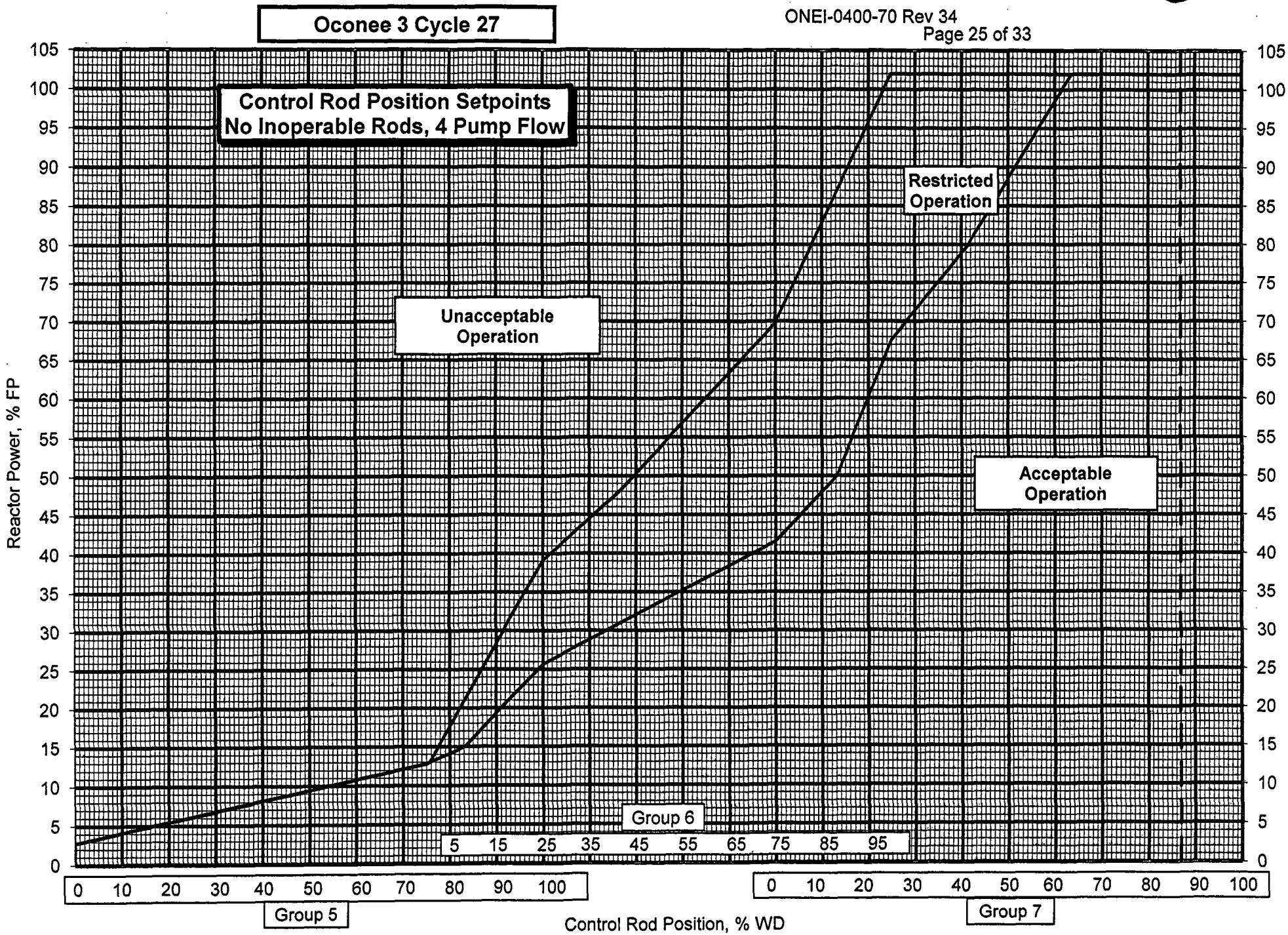
RI = 300 is withdrawal limit at all power levels.

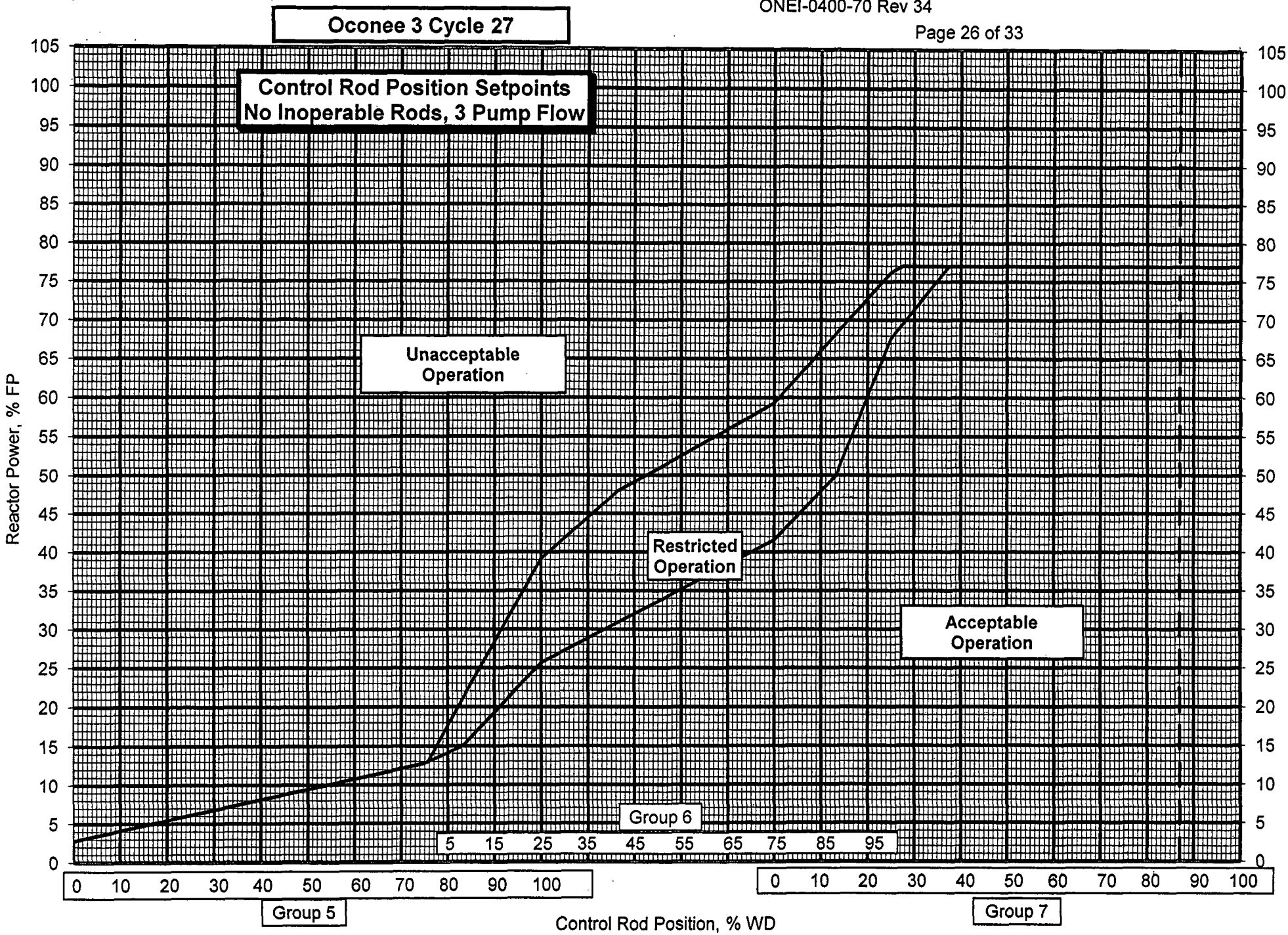
Continued on next page.

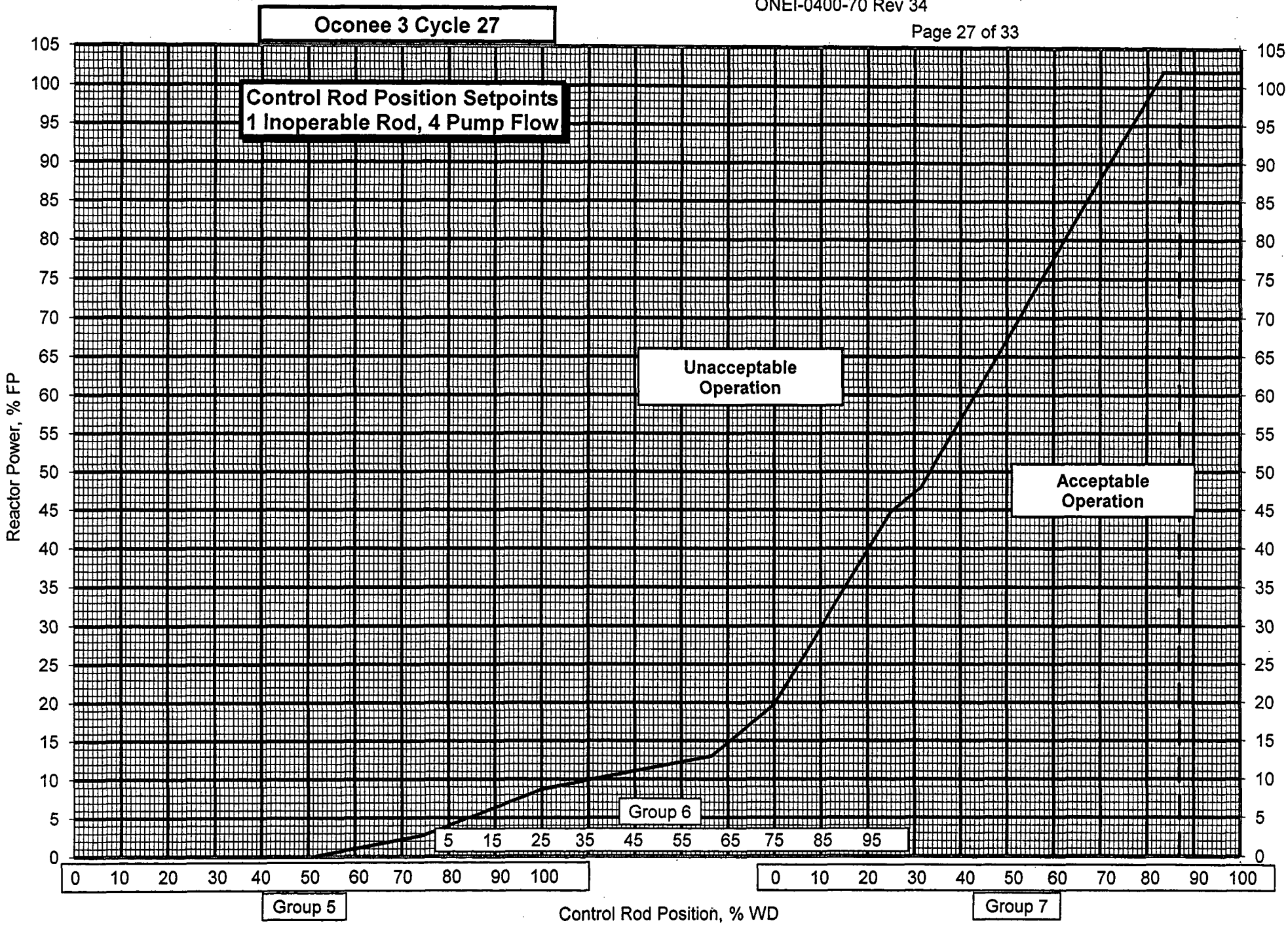
# Oconee 3 Cycle 27
## Rod Index Setpoints
### 3 Pump Operation, 1 Inoperable Rod, BOC to-EOC

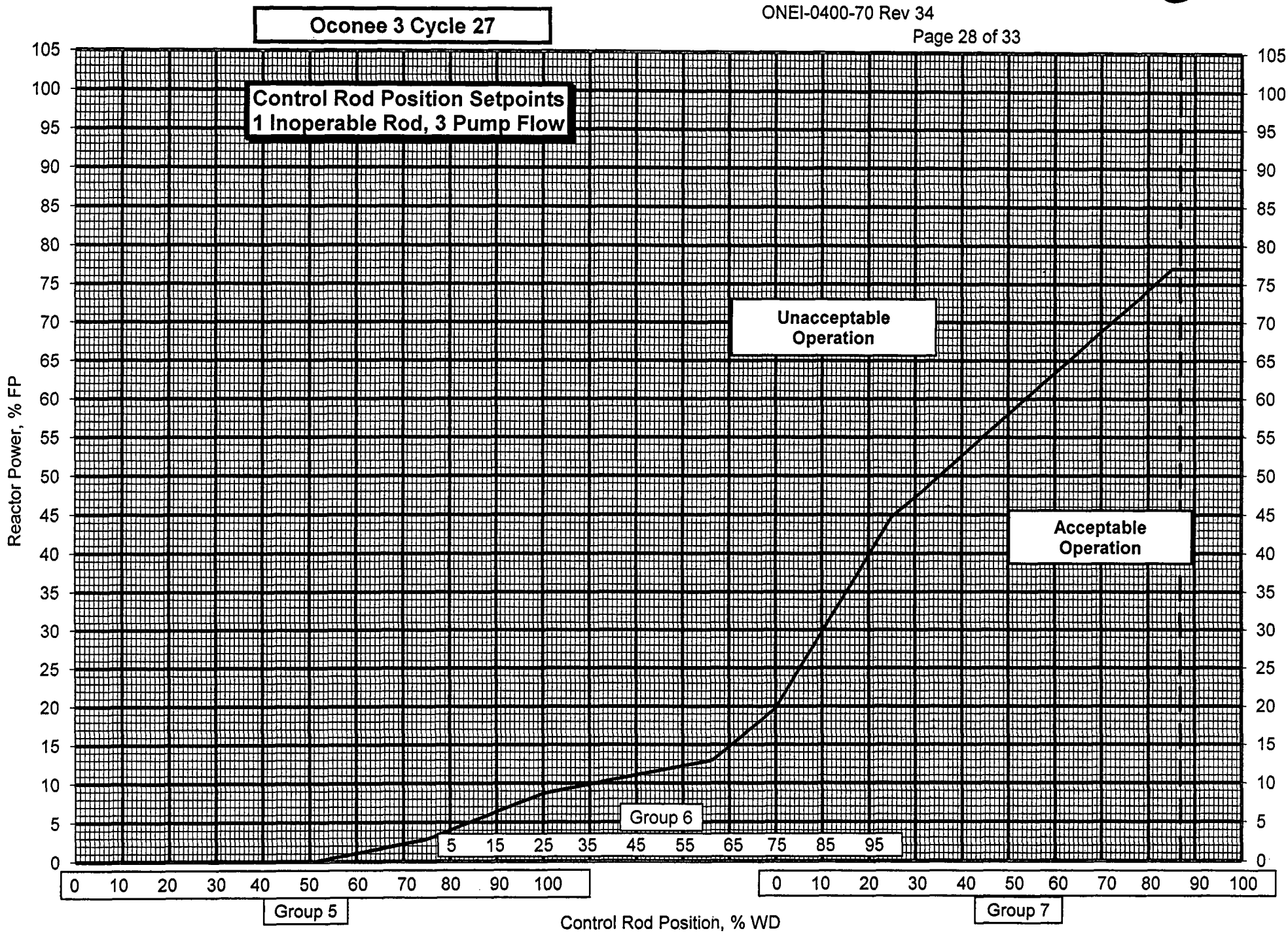
| % FP | Shutdown Margin Setpoint | | | Operational Alarm Setpoint | | |
|---|---|---|---|---|---|---|
| | CRGP 5 | CRGP 6 | CRGP 7 | CRGP 5 | CRGP 6 | CRGP 7 |
| 23 | 100 | 78.2 | 3.2 | 100 | 78.2 | 3.2 |
| 22 | 100 | 77.2 | 2.2 | 100 | 77.2 | 2.2 |
| 21 | 100 | 76.2 | 1.2 | 100 | 76.2 | 1.2 |
| 20 | 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 27
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 27
Control Rod Position Setpoints
No Inoperable Rods, 3 Pump Flow
Unacceptable Operation
Restricted 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
0 10 20 30 40 50 60 70 80 90 100
Group 5
5 15 25 35 45 55 65 75 85 95
Group 6
0 10 20 30 40 50 60 70 80 90 100
Group 7
Control Rod Position, % WD


Oconee 3 Cycle 27
Control Rod Position Setpoints
1 Inoperable Rod, 4 Pump Flow
Unacceptable Operation
Acceptable Operation
Reactor Power, % FP
Control Rod Position, % WD
Group 5
Group 6
Group 7
0 10 20 30 40 50 60 70 80 90 100
5 15 25 35 45 55 65 75 85 95
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105


Oconee 3 Cycle 27
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 27

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, % | 5.40 | 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 27

## 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 | -39.5 |
| | 100.0 | - | -28.4 |
| | 109.4 | -14.4 | - |
| | 109.4 | 14.4 | - |
| | 100.0 | - | 24.9 |
| | 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 27

## 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 27

## LOCA Limits

**Not for Plant Use**

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/0% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.9 | 16.9 | 12.3 |
| 2.506 | 17.8 | 17.8 | 12.3 |
| 4.264 | 17.8 | 17.8 | 12.3 |
| 6.021 | 17.8 | 17.8 | 12.3 |
| 7.779 | 17.8 | 17.8 | 12.3 |
| 9.536 | 17.3 | 17.3 | 12.3 |
| 12 | 16.4 | 16.4 | 12.3 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/2% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 16.0 | 16.0 | 11.6 |
| 2.506 | 16.9 | 16.9 | 11.6 |
| 4.264 | 16.9 | 16.9 | 11.6 |
| 6.021 | 16.9 | 16.9 | 11.6 |
| 7.779 | 16.9 | 16.9 | 11.6 |
| 9.536 | 16.4 | 16.4 | 11.6 |
| 12 | 15.5 | 15.5 | 11.6 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/4% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 15.2 | 15.2 | 11.1 |
| 2.506 | 16.1 | 16.1 | 11.1 |
| 4.264 | 16.1 | 16.1 | 11.1 |
| 6.021 | 16.1 | 16.1 | 11.1 |
| 7.779 | 16.1 | 16.1 | 11.1 |
| 9.536 | 15.7 | 15.7 | 11.1 |
| 12 | 14.9 | 14.9 | 11.1 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/6% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.8 | 14.8 | 10.8 |
| 2.506 | 15.6 | 15.6 | 10.8 |
| 4.264 | 15.6 | 15.6 | 10.8 |
| 6.021 | 15.6 | 15.6 | 10.8 |
| 7.779 | 15.6 | 15.6 | 10.8 |
| 9.536 | 15.2 | 15.2 | 10.8 |
| 12 | 14.4 | 14.4 | 10.8 |

| Core Elevation Feet | LOCA LHR kw/ft Limit Versus Burnup Mk-B-HTP w/8% Gad rods | | |
|---|---|---|---|
| | 0 GWd/mtU | 34 GWd/mtU | 62 GWd/mtU |
| 0 | 14.3 | 14.3 | 10.4 |
| 2.506 | 15.1 | 15.1 | 10.4 |
| 4.264 | 15.1 | 15.1 | 10.4 |
| 6.021 | 15.1 | 15.1 | 10.4 |
| 7.779 | 15.1 | 15.1 | 10.4 |
| 9.536 | 14.7 | 14.7 | 10.4 |
| 12 | 13.9 | 13.9 | 10.4 |

# Oconee 3 Cycle 27

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

| ΔTcold, °F | 4 RCP Operation - Loop Average Temp., °F<br>Tavg (Analytical) | 3 RCP Operation - Loop Average Temp., °F<br>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 |