

TOLEDO EDISON COMPANY

DAVIS-BESSE UNIT 1

CYCLE 8

CORE OPERATING LIMITS REPORT

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Rev. 0

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TOLEDO EDISON

DAVIS-BESSE UNIT 1

CYCLE 8

CORE OPERATING LIMITS REPORT

1.0 Core Operating Limits

This CORE OPERATING LIMITS REPORT for DB-1 Cycle 8 has been prepared in accordance with the requirements of Technical Specification 6.9.1.7. The core operating limits have been developed using the methodology provided in the references.

The following cycle-specific core operating limits are included in this report:

- 1) Regulating rod insertion limits
- 2) Rod program group positions
- 3) Axial power shaping rod insertion limits
- 4) AXIAL POWER IMBALANCE operating limits and
- 5) QUADRANT POWER TILT limits
- 6) Negative Moderator Temperature Coefficient limit

2.0 References

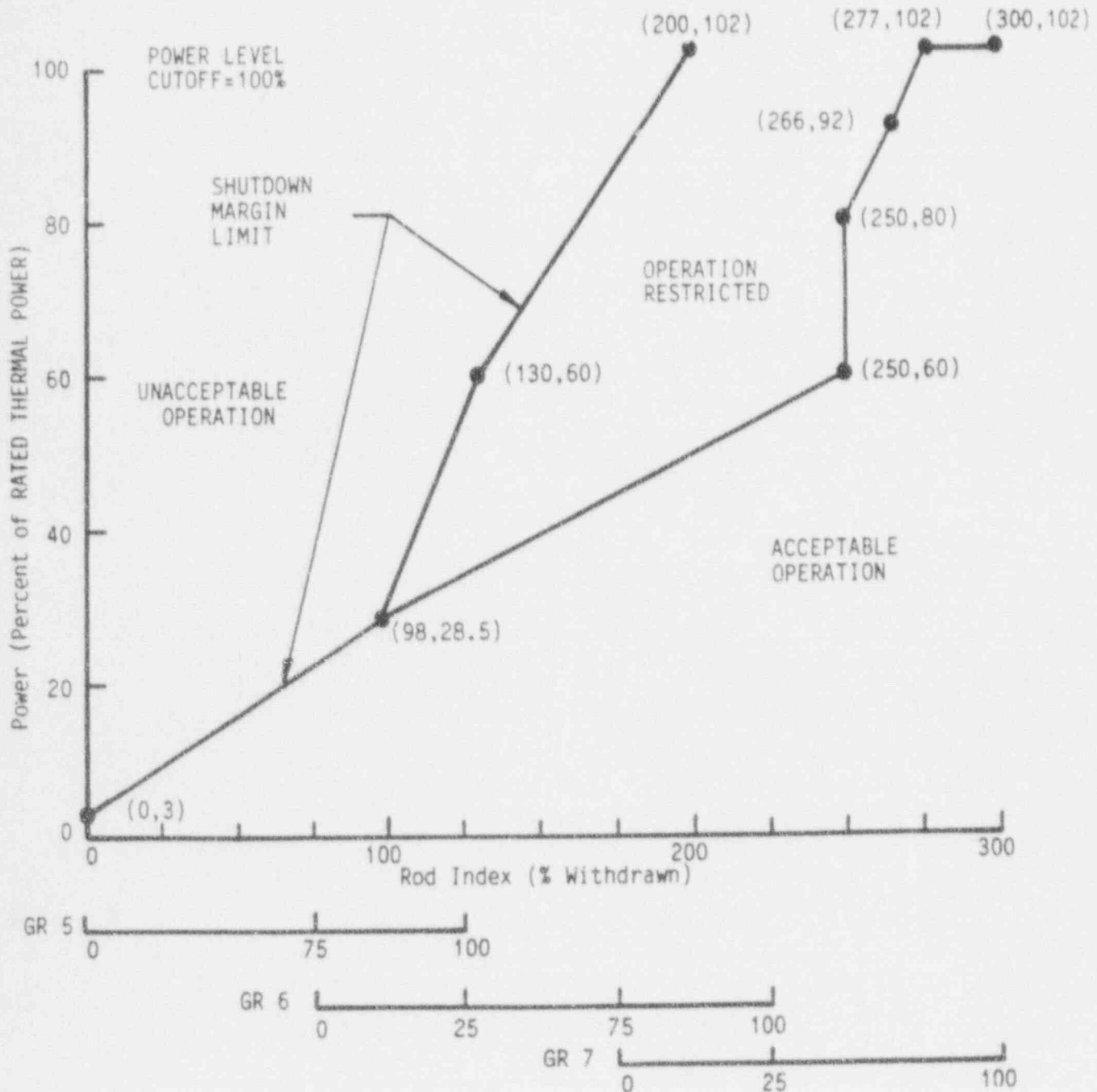
- 1) B&W Fuel Company, Topical Report BAW-10122A Rev. 1, "Normal Operating Controls", May 1984
- 2) B&W Fuel Company, Topical Report BAW-10116A, "Assembly Calculations and Fitted Nuclear Data", May 1977
- 3) B&W Fuel Company, Topical Report BAW-10117P-A, "Babcock & Wilcox Version of PDQ User's Manual", January 1977
- 4) B&W Fuel Company, Topical Report BAW-10118A, "Core Computational Techniques and Procedures", December 1979.
- 5) B&W Fuel Company, Topical Report BAW-10124A, "FLAME 3 - A Three-Dimensional Nodal Code for Calculating Core Reactivity and Power Distributions", August 1976

- 6) B&W Fuel Company, Topical Report BAW-10125A, "Verification of the Three-Dimensional FLAME Code", August 1976
- 7) B&W Fuel Company, Topical Report BAW-10152A, "NOODLE - A Multi-Dimensional Two-Group Reactor Simulator", June 1985
- 8) B&W Fuel Company, Topical Report BAW-10119 P-A, "Power Peaking Nuclear Reliability Factors", February 1979
- 9) Log Number 3139, dated January 11, 1990 (T. V. Wambach (NRC) to D. C. Shelton (TE)). (NRC SER for Rod Program)
- 10) Log Number 3441, dated April 10, 1991 (J. R. Hall, Sr. (NRC) to D. C. Shelton (TE)). (NRC's SER for Negative Moderator Temperature Coefficient Limit)
- 11) Log Number 3609, dated October 29, 1991, (J. B. Hopkins (NRC) to D. C. Shelton (TE)). (NRC's SER for change to Technical Specification 5.3.1)

- 6) B&W Fuel Company, Topical Report BAW-10125A, "Verification of the Three-Dimensional FLAME Code", August 1976
- 7) B&W Fuel Company, Topical Report BAW-10152A, "NOODLE - A Multi-Dimensional Two-Group Reactor Simulator", June 1985
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Figure 1a Regulating Group Position Limits,
0 to 200±10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

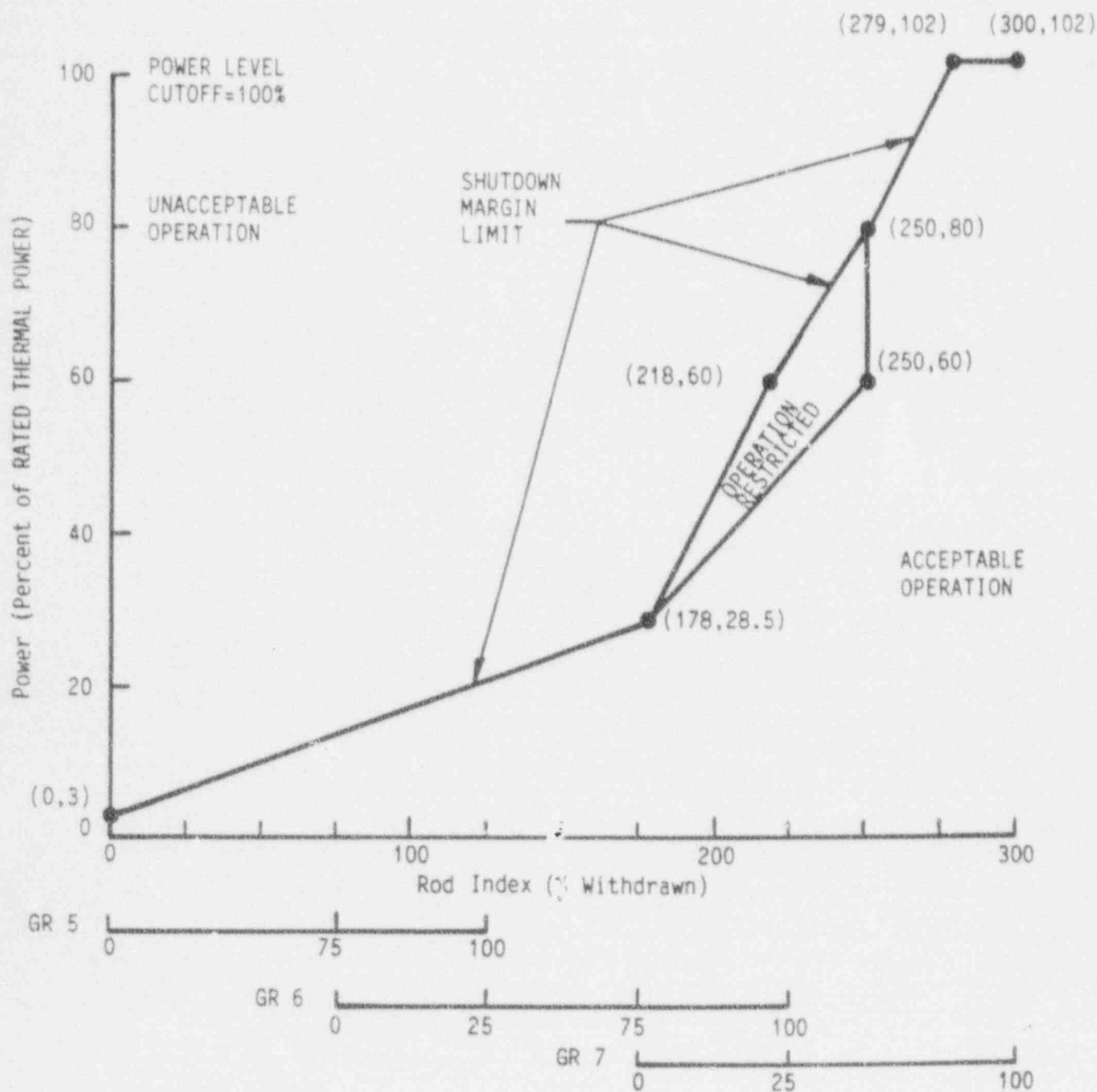
This Figure is referred
to by Technical Specification
1.3.6



Note 1: A Rod Group overlap of 25±5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 1b Regulating Group Position Limits,
200±10 to 400±10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

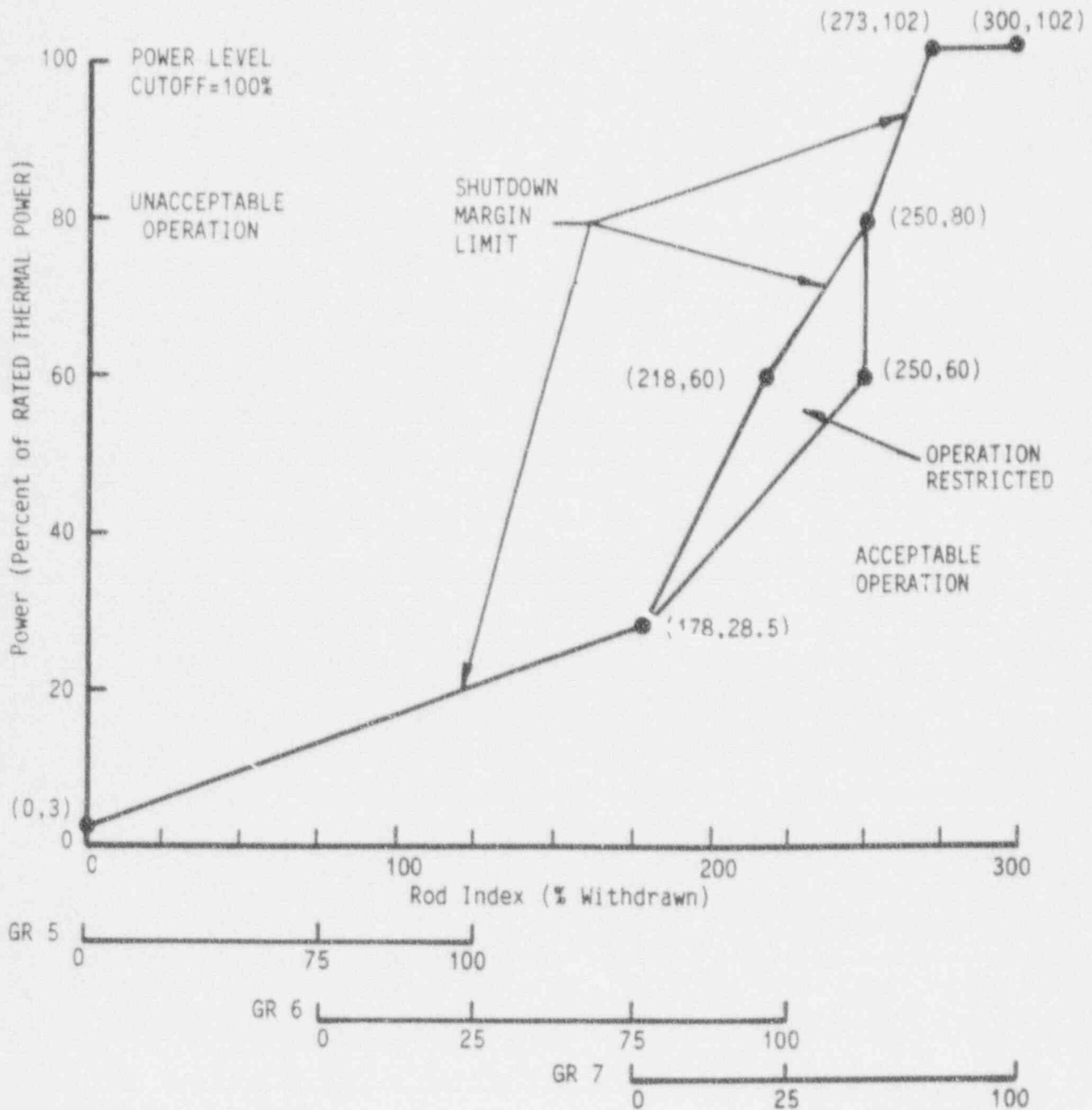
This Figure is referred
to by Technical Specification
3.1.3.6



Note 1: A Rod Group overlap of 25±5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 1c Regulating Group Position Limits,
After 400±10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

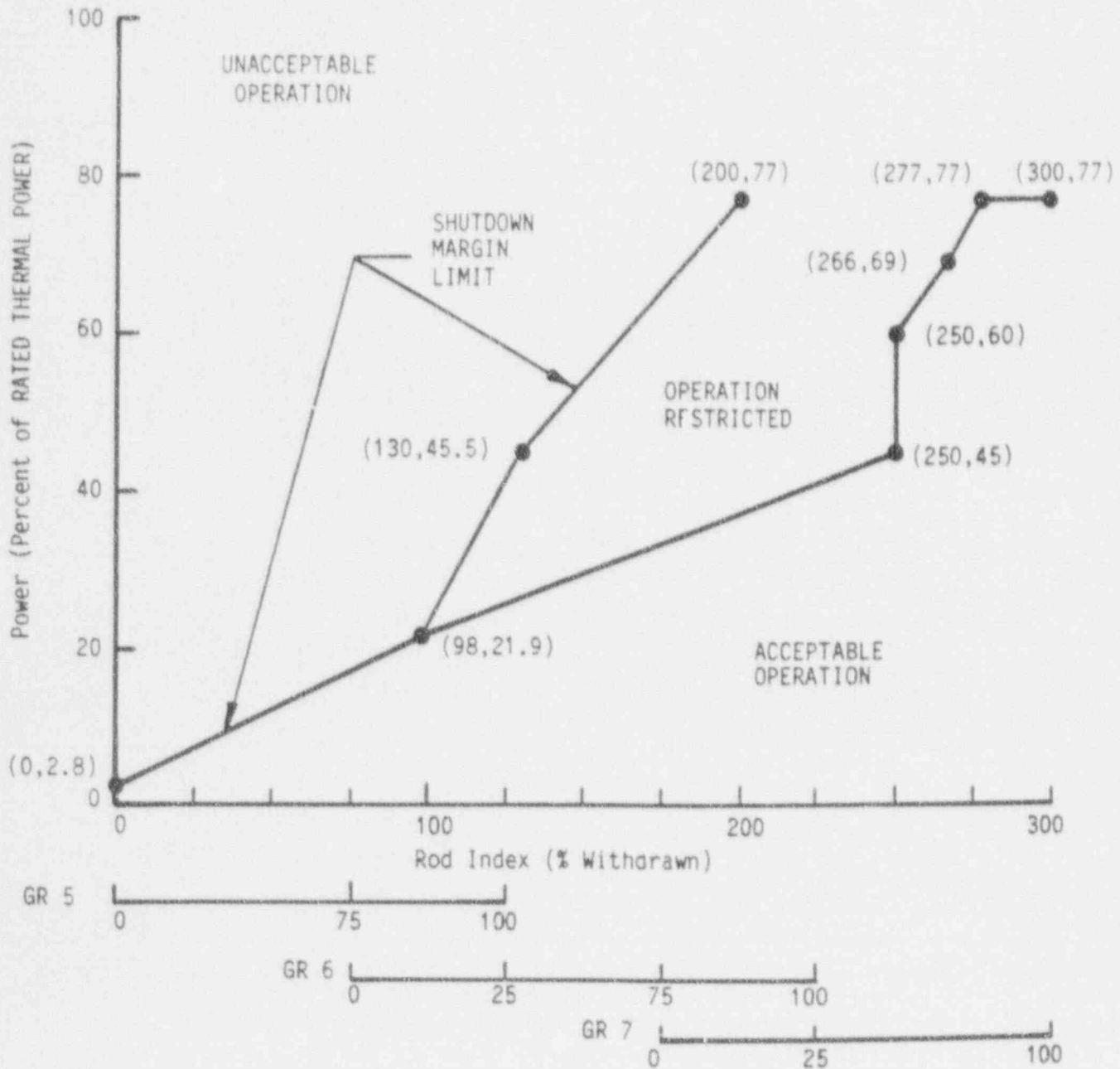
This Figure is referred
to by Technical Specification
3.1.3.6



Note 1: A Rod Group overlap of 25±5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 2a Regulating Group Position Limits,
0 to 200±10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

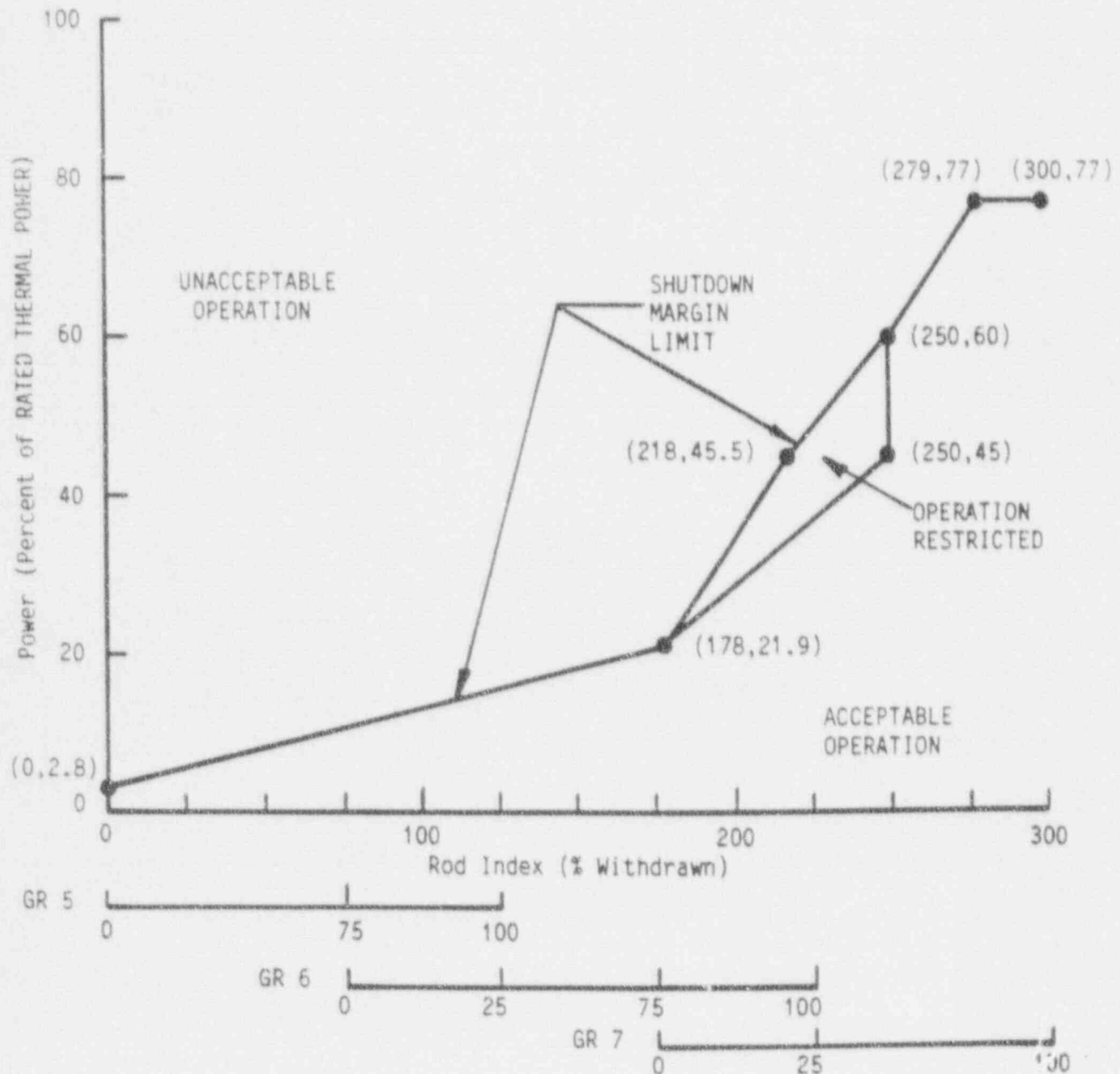
This Figure is referred
to by Technical Specification
3.1.3.6



Note 1: A Rod Group overlap of 25±5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 2b Regulating Group Position Limits,
200±10 to 400±10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

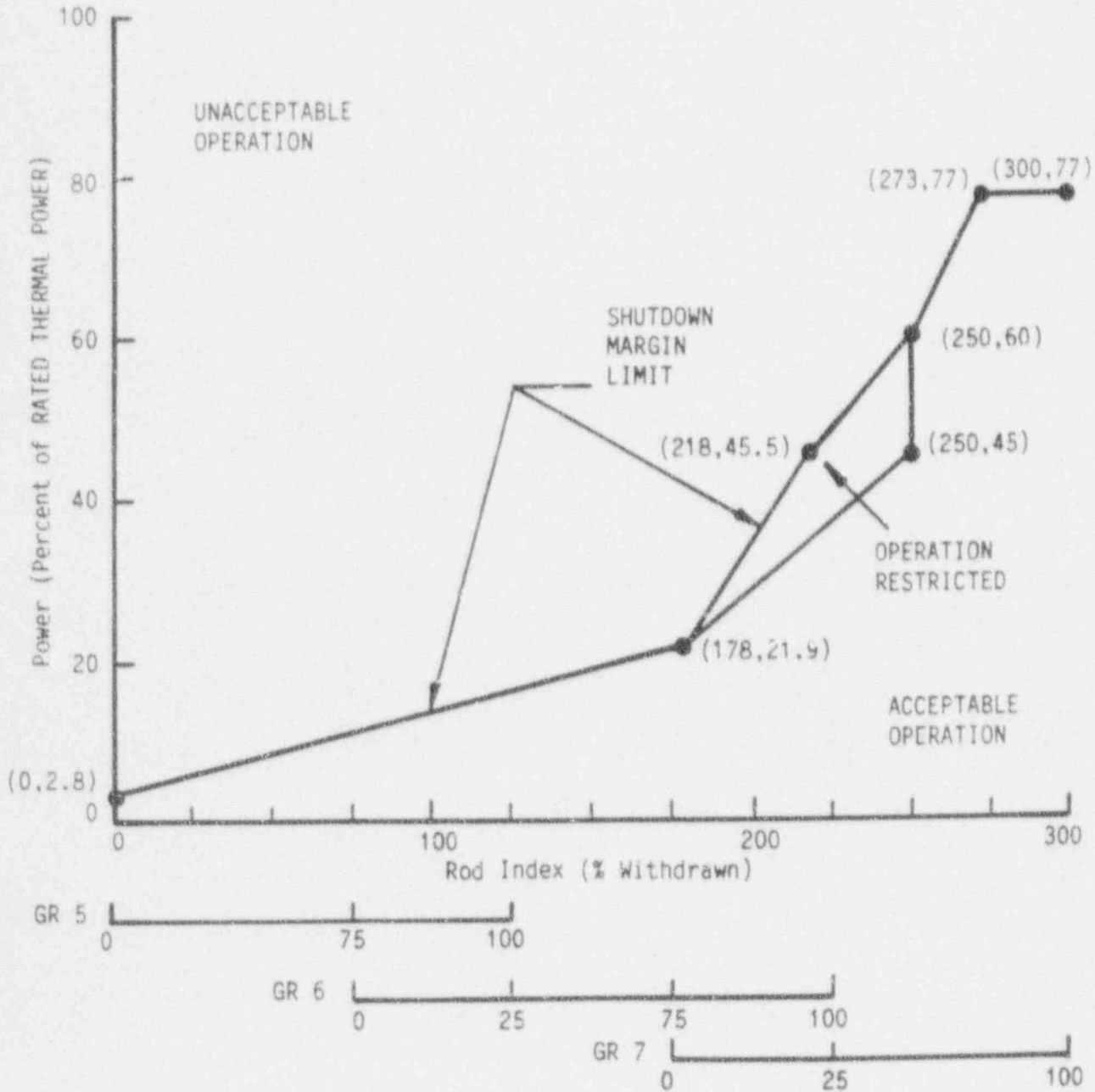
This Figure is referred
to by Technical Specification
3.1.3.6



Note 1: A Rod Group overlap of 25±5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 2c Regulating Group Position Limits,
After 400+10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

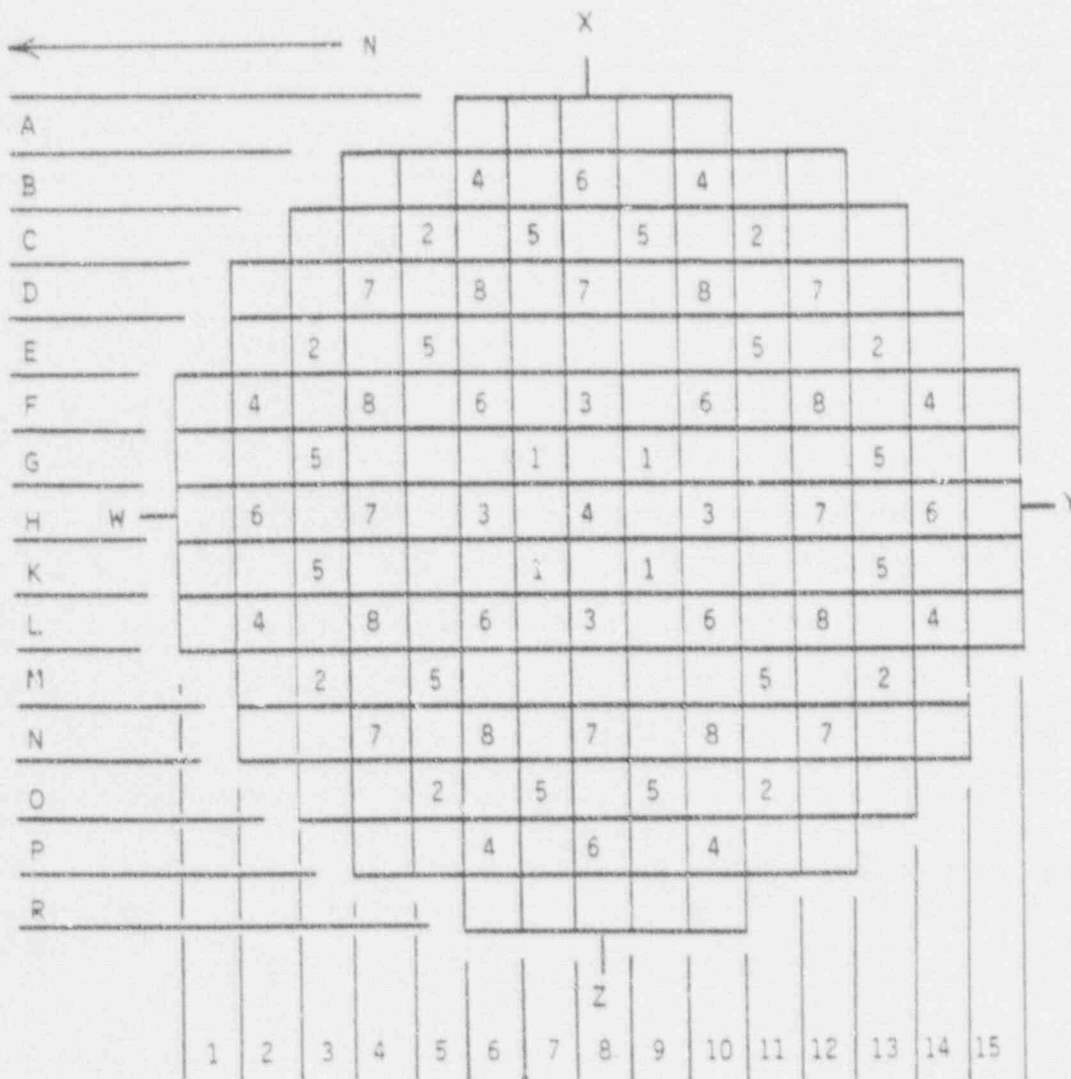
This Figure is referred
to by Technical Specification
3.1.3.6



Note 1: A Rod Group overlap of 25+5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

Figure 3 Control Rod Core Locations
and Group Assignments --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.1.3.7



X Group Number

Group	No. of Rods	Function
1	4	Safety
2	8	Safety
3	4	Safety
4	9	Safety
5	12	Control
6	8	Control
7	8	Control
8	8	APSRs
Total	61	

Figure 4a APSR Positions Limits,
0 to 400+10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.1.3.9

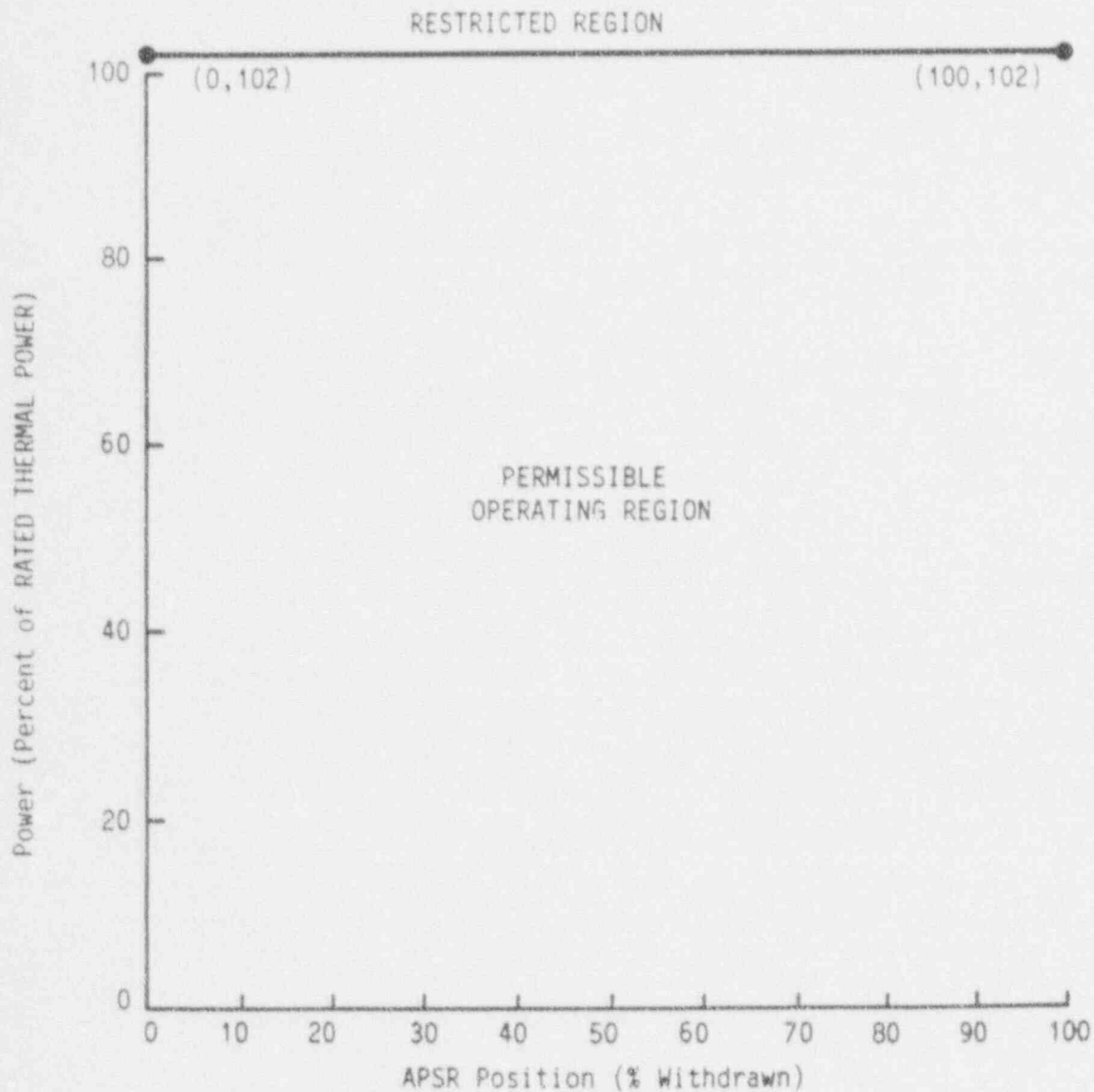


Figure 4b APSR Positions Limits, After
400+10 EFPD, Three or Four RC Pumps,
APSRs Withdrawn -- Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.1.3.9

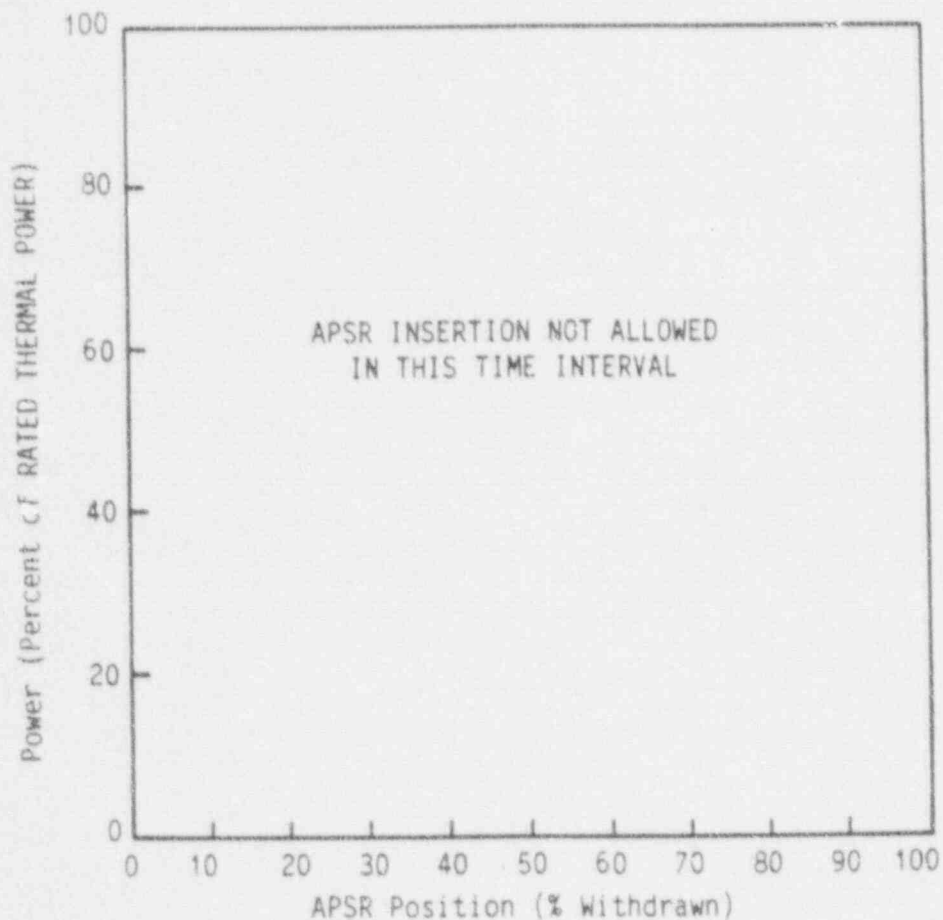


Figure 4c APSR Positions Limits,
0 to 400+10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.1.3.9

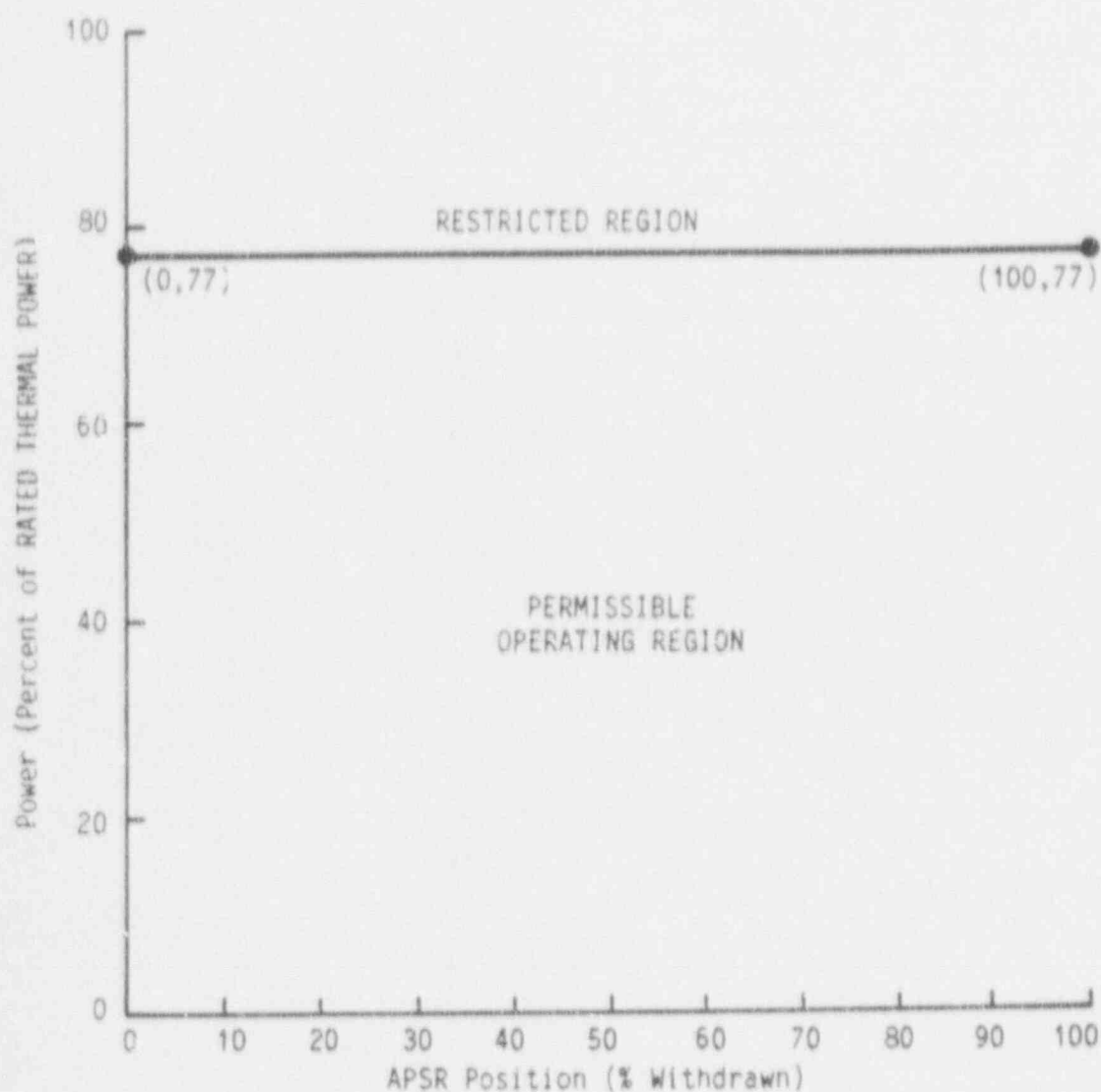


Figure 5a AXIAL POWER IMBALANCE Limits,
0 to 200±10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

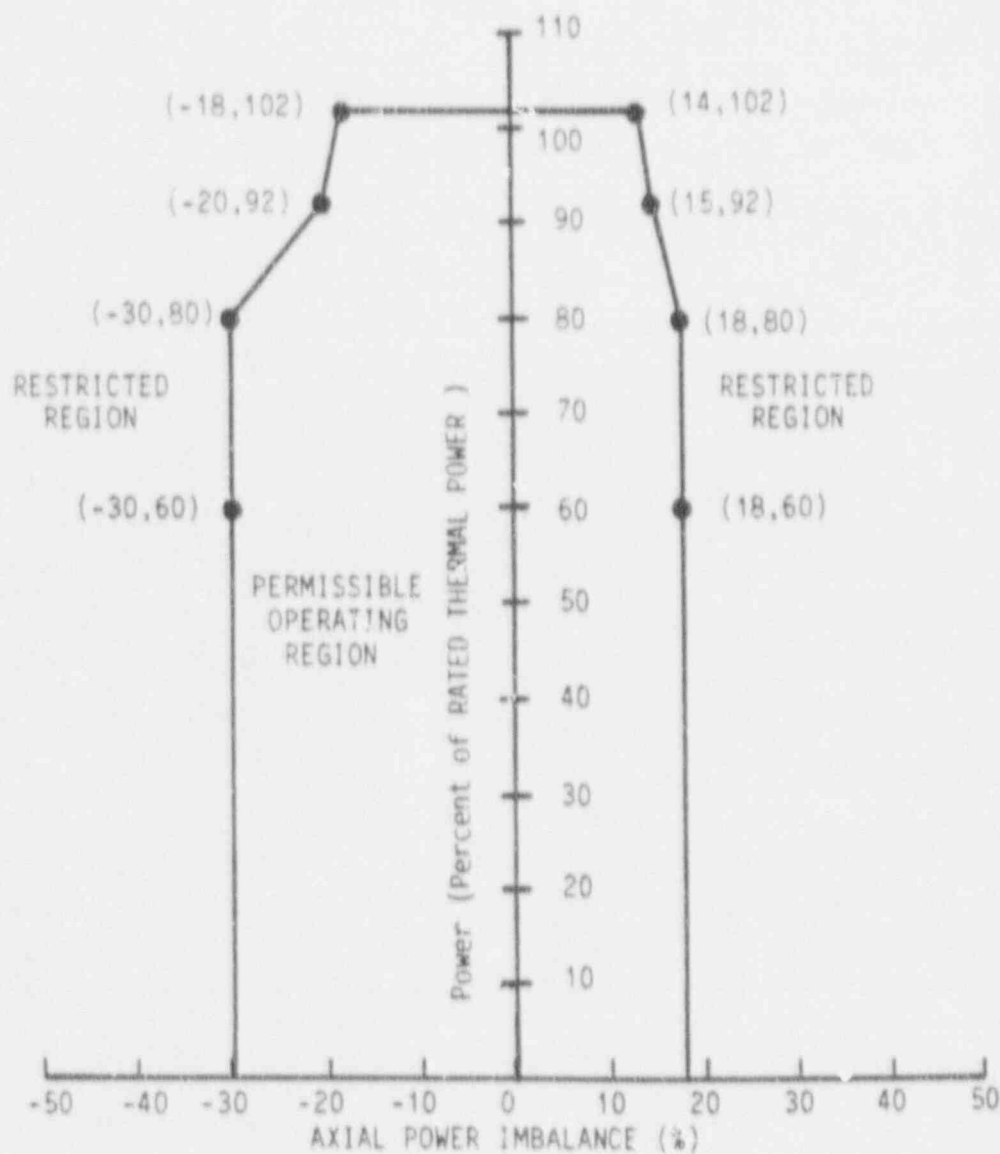


Figure 5b AXIAL POWER IMBALANCE Limits,
200 \pm 10 to 400 \pm 10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

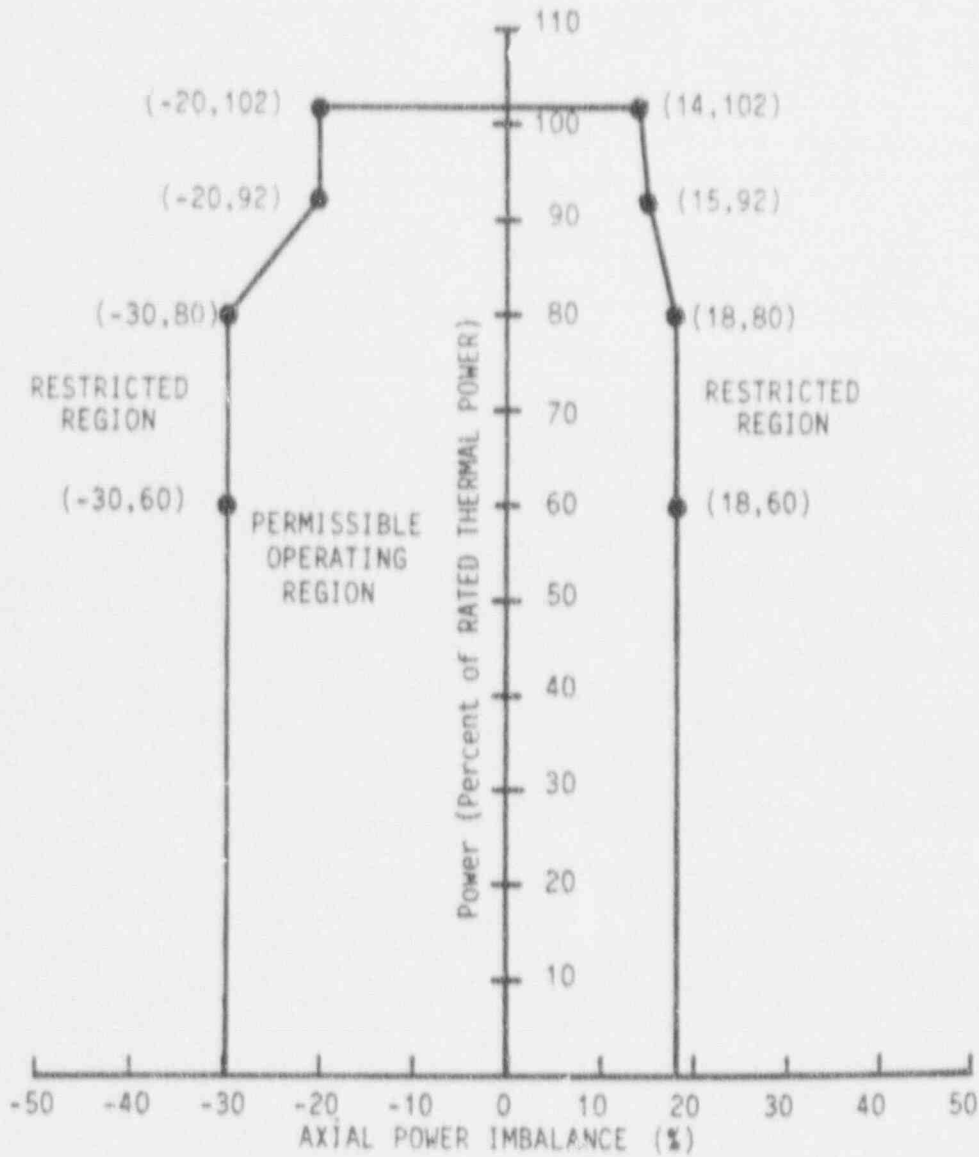


Figure 5c AXIAL POWER IMBALANCE Limits,
After 400+10 EFPD, Four RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

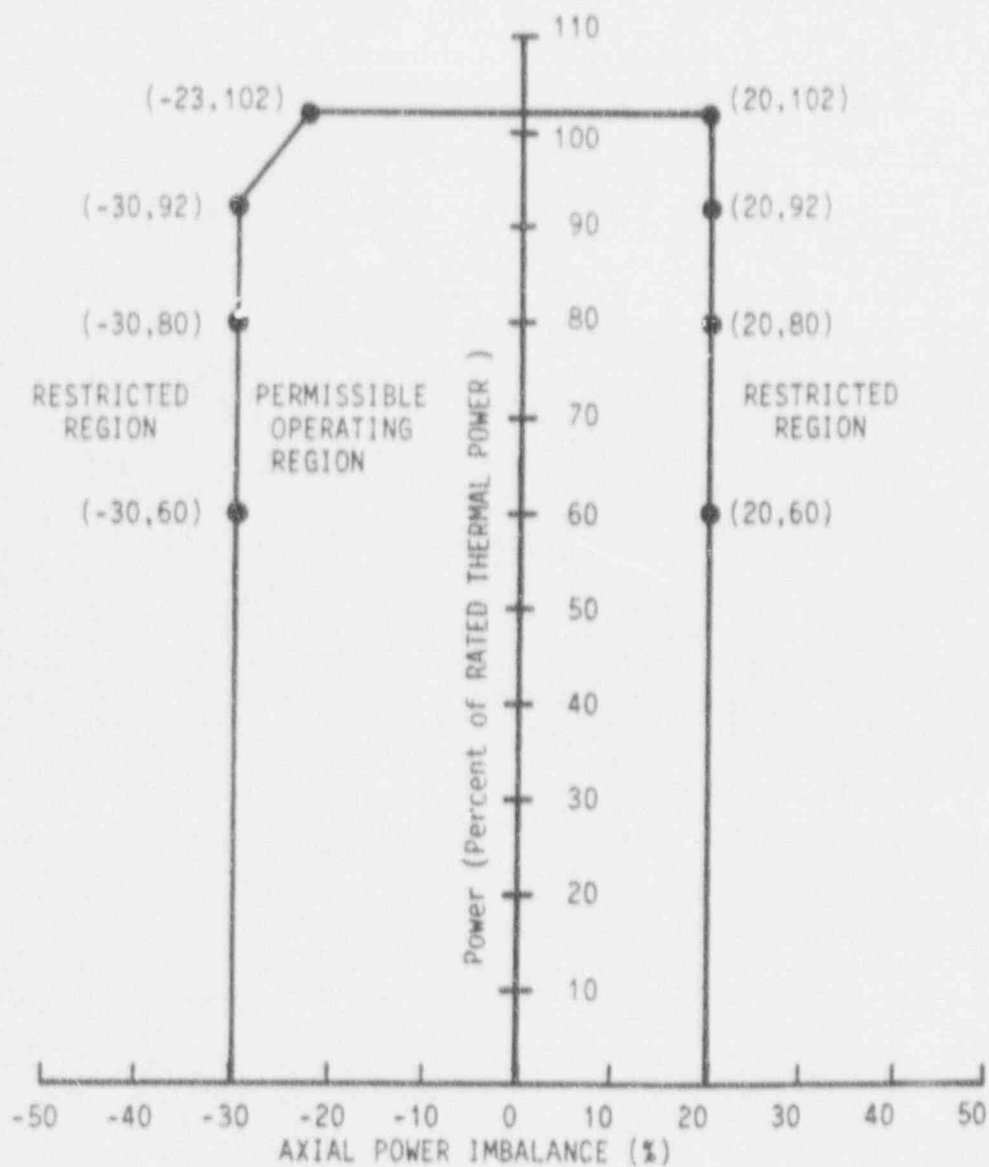


Figure 6a AXIAL POWER IMBALANCE Limits,
0 to 200±10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

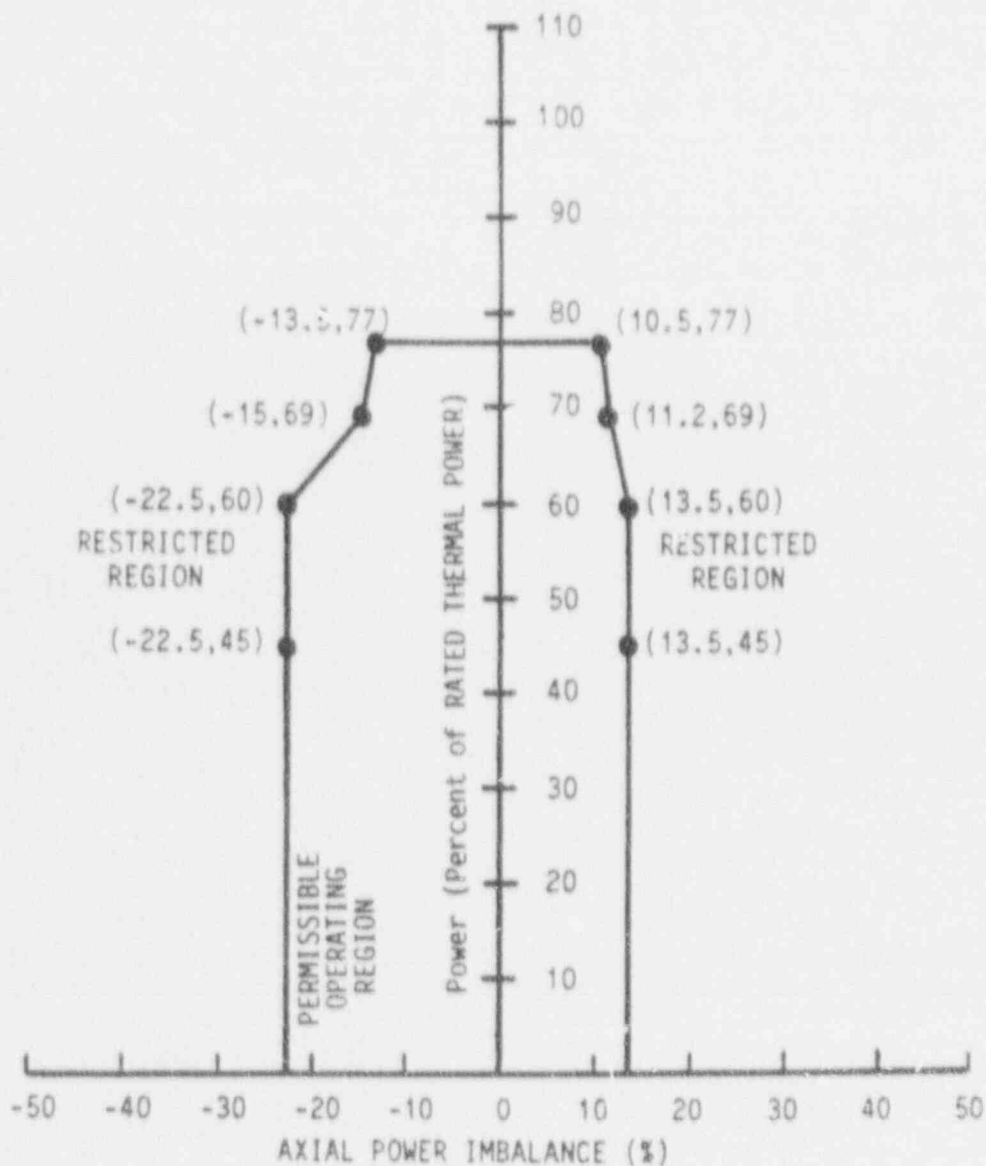


Figure 6b AXIAL POWER IMBALANCE Limits,
200 \pm 10 to 400 \pm 10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

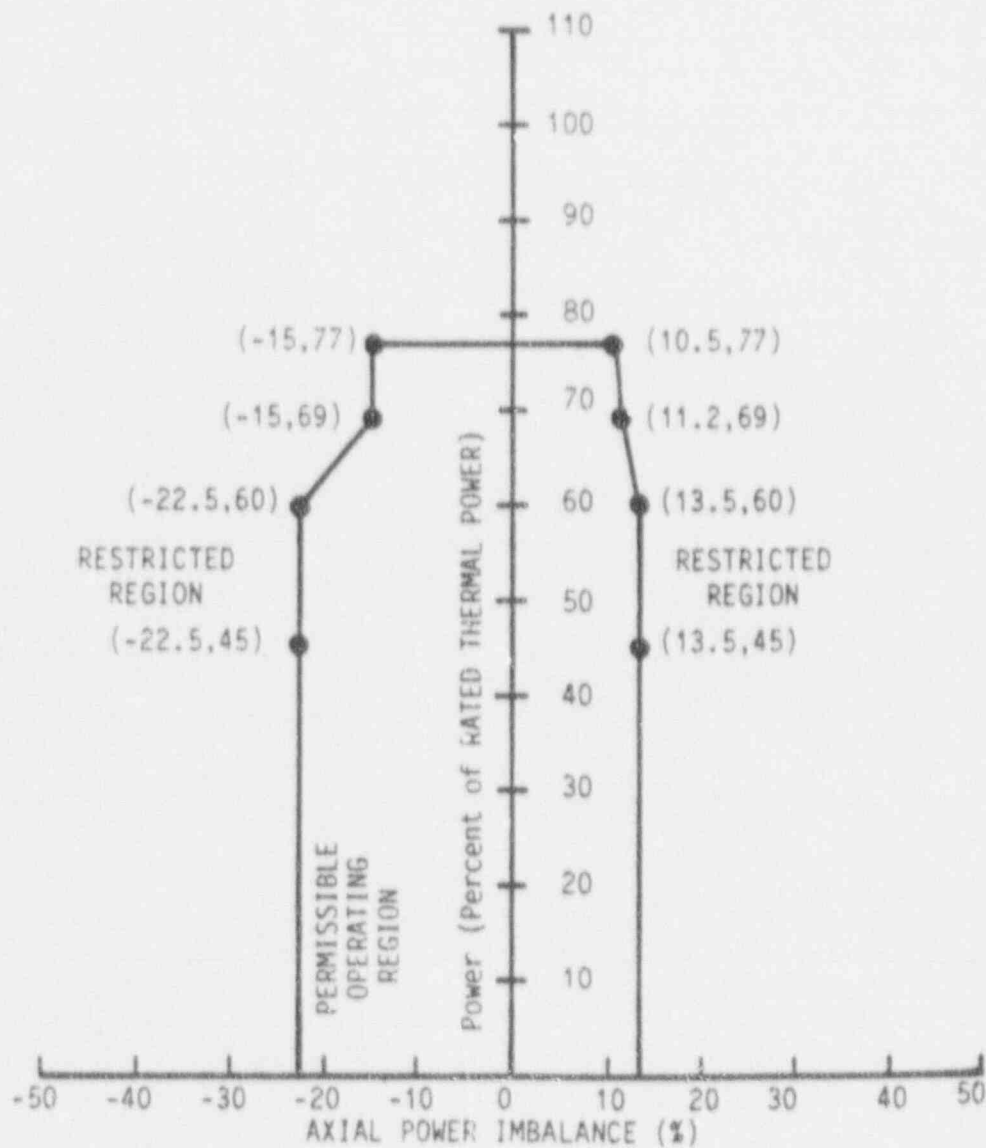


Figure 6c AXIAL POWER IMBALANCE Limits,
After 400±10 EFPD, Three RC Pumps --
Davis-Besse 1, Cycle 8

This Figure is referred
to by Technical Specification
3.2.1

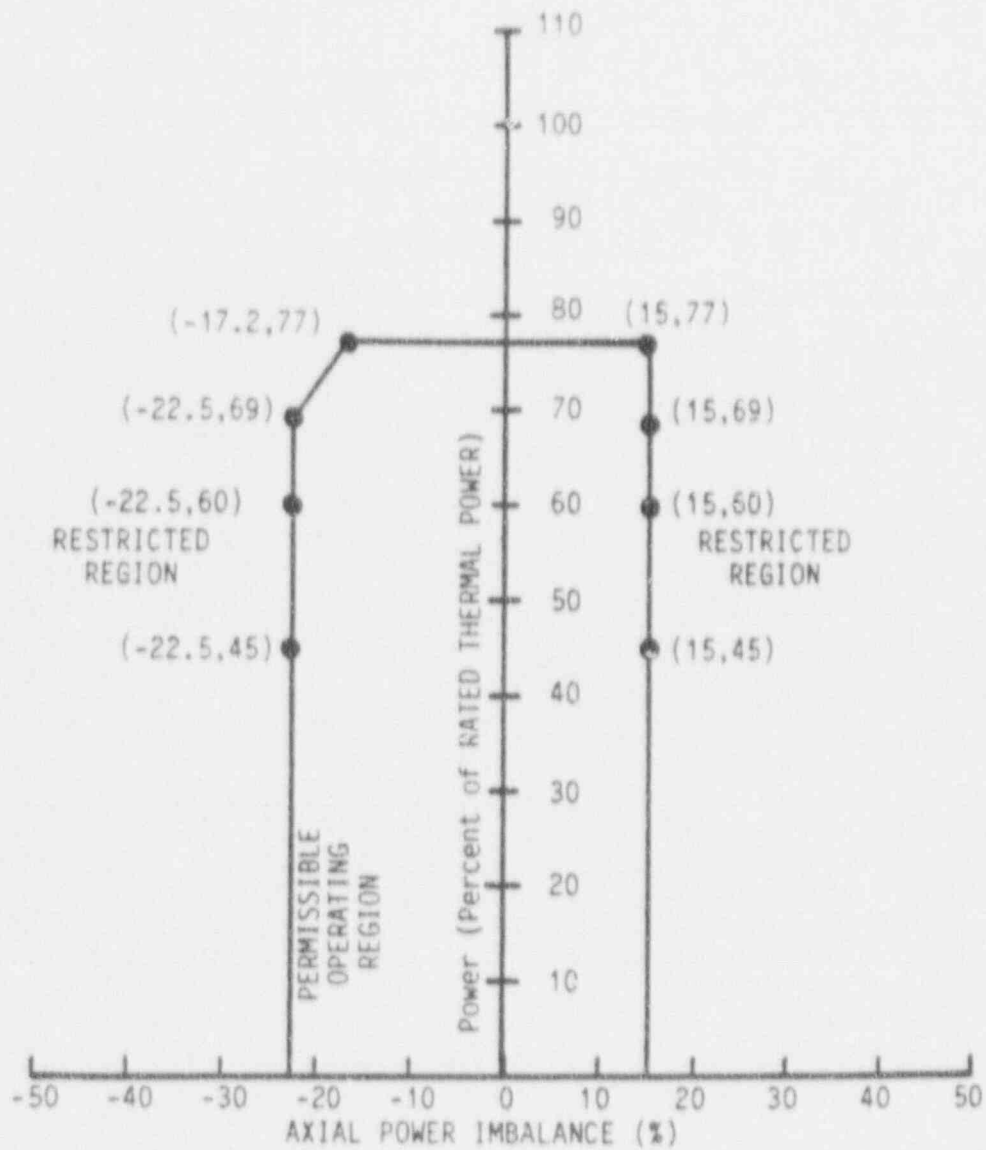


Table 1 QUADRANT POWER TILT Limits

This Table is referred
to by Technical Specification
3.2.4

Quadrant Power Tilt as measured by:	Steady-state Limit for Thermal Power \leq 60%	Steady-state Limit for Thermal Power \geq 60%	Transient Limit	Maximum Limit
Symmetrical incore detector system	6.83	4.11	10.03	20.0
Power Range channels	4.05	1.96	6.96	20.0
Minimum incore detector system	2.80*	1.90*	4.40*	20.0*

*Assumes detector strings with $>60\%$ depletion are excluded from the minimum incore system configuration.

Table 2 Negative Moderator Temperature Coefficient Limit

This Table is referred
to by Technical Specification
3.1.1.3c

Negative Moderator Temperature Coefficient Limit
(at RATED THERMAL POWER)

$$-3.73 \times 10^{-2} \Delta k/k/^{\circ}F$$