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DEFINITIONS

CORE OPERATING LIMITS REPORT

1.41 The CORE OPERATING LIMITS REPORT is the unit-specific document that provides core operating limits for the current reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.7. Plant operation within these core operating limits is addressed in incividual specifications.

ADDITIONAL CHANGES PREVIOUSLY
PROPUSED BY LETTER
Serial No. 1407 Date 11/2/87

REACTIVITY CONTROL SYSTEMS

ACTION: (Continued)

- A power distribution map is obtained from the incore detectors an Fo and Formula are verified to be within their limits within 72 hours.
- d) Either the THERMAL POWER level is reduced to < 60% of the THERMAL POWER allowable for the reactor coolant pump combination within one hour and within the next 4 hours the High Flux Trip Setpoint is reduced to < 70% of the THERMAL POWER allowable for the reactor coolant pump combination, or
- e) The remainder of the rods in the group with the inoperable rod are aligned to within + 6.5% of the inoperable rod within one hour while maintaining the rod sequence, insertion and overlap limits of Figures 3.1-2 and 3.1-3% the THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

sposition of the rods within the limits provided in the Core Operating limits Report

SURVEILLANCE REQUIREMENTS

- 4.1.3.1.1 The position of each control rod shall be determined to be within the group average height limit by verifying the individual rod positions at least once per 12 hours except during time intervals when the Asymmetric Rod Fault Circuitry is inoperable, then verify the individual rod position(s) of the rod(s), with inoperable Faul Circuitry at least once per 4 hours.
- 4.1.3.1.2 Each control rod not fully inserted shall be determined to be OPERABLE by movement of at least 2% in any one direction at least once every 31 days.

REACTIVITY CONTROL SYSTEMS

REGULATING ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.6 The regulating rod groups shall be limited in physical insertion as shown on Figures 3.1-22, and -2b, 3.1-3a, and -3b. A rod groups 5, 6 and 7, positioned within the acceptable operating limits for regulating rod position provided in the Core Operating Limits Report.

APPLICABILITY: MODES 1* and 2**.

ACTION

With the regulating rod groups inserted beyond the sove insertion limits (in a region other than acceptable operation), or with any group sequence or overlap outside the specified limits, except for surveillance testing pursuant to Specification (4.1.3.1.2. either:

- a. Restore the regulating groups to within the limits within 2 hours,
 or

 (provided in the Core Operations Limits Report)
- b. Reduce THERMAL POWER to less than or equal to that fraction of RATED
 THERMAL POWER which is allowed by the rod group position using the
 Shove figures within 2 hours, or
- c. Be in at least HOT STANDBY within 6 hours.

NOTE: If in unacceptable region, also see Section 3/4.1.1.1.

*See Special Test Exception 3.10.1 and 3.10.2. $\#With \ k_{eff} \ge 1.0.$

CORE COBRATING LIMITS

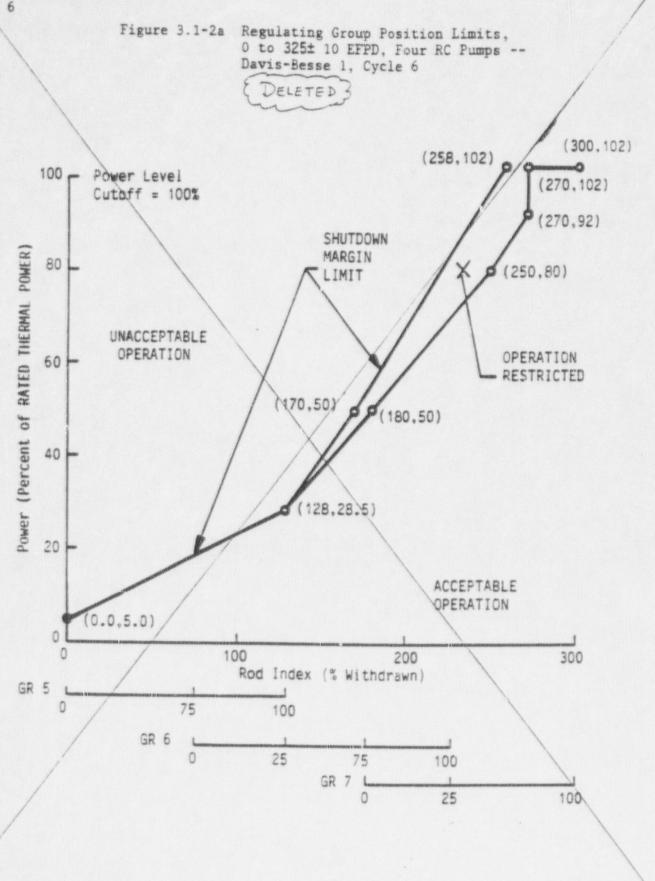
REACTIVITY CONTROL SYSTEMS

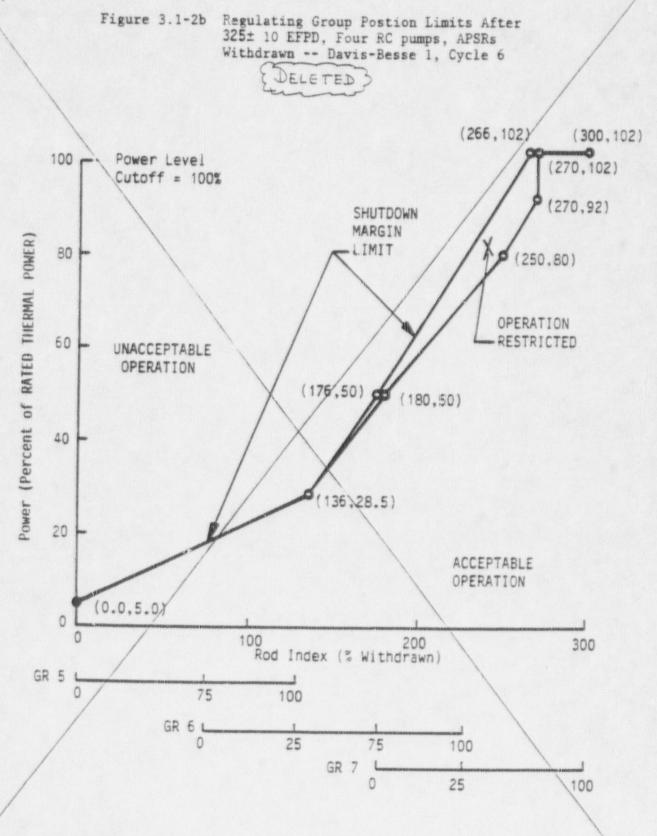
REGULATING ROD INSERTION LIMITS

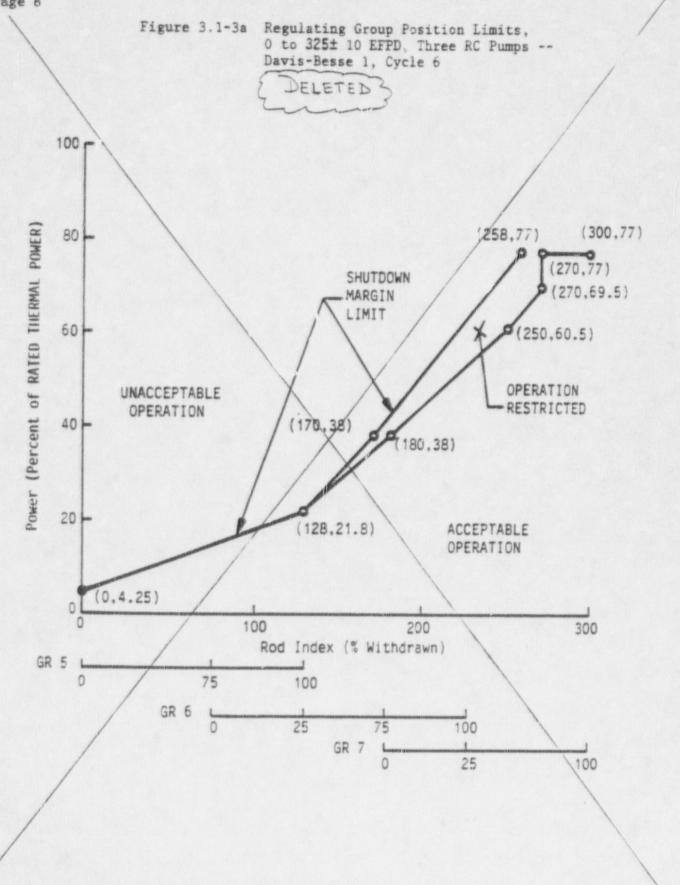
SURVEILLANCE REQUIREMENTS

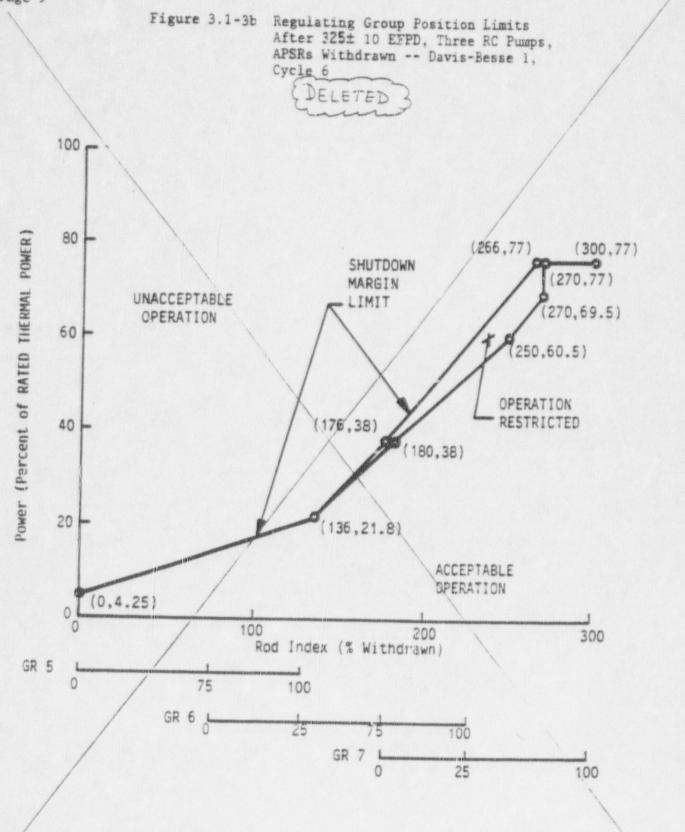
4.1.3.6 The position of each regulating group thall be determined to be within the insertion, sequence and overlap limits at least once every 12 hours except when:

- a. The regulating rod insertion limit alarm is inoperable, then verify the groups to be within the insertion limits at least once per 4 hours;
- b. The control rod drive sequence alarm is inoperable, then verify the groups to be within the sequence and overlap limits at least once per 4 hours.









REACTIVITY CONTROL SYSTEMS

ROD PROGRAM

LIMITING CONDITION FOR OPERATION

3.1.3.7 Each control roda (safety, regulating and APSR) shall be programmed to operate in the core position and rod group specified in Figure 3.1-4. The CORECPERATING LIMITS REPORT.

-location

(assembly)

6 assembly 3

APPLICABILITY: MODES 1* and 2*.

ACTION:

(assembly) With any control rodenot programmed to operate as specified above, be in HOT STANDBY within Thour.

SURVEILLANCE REQUIREMENTS

4.1.3.7

Each control rod shall be demonstrated to be programmed to a. operate in the specified core position and rod group by: location 1

Selection and actuation from the control room and verification of movement of the proper rod as indicated by both the absolute and relative position indicators:

(& ssemblies) For all control room, after the control rod drive patches are locked subsequent to test, reprogramming or maintenance within the panels. assemblies3

- b) For specifically affected individual rods following maintenance, test, reconnection or modification of power or instrumentation cables from the control rod drive control system to the control rod drive.
- Verifying that each cable that has been disconnected has been properly matched and reconnected to the specified control rod drive.
- At least once each 7 days, verify that the control rod drive patch panels are locked.

*See Special Test Exceptions 3.10.1 and 3.10.2.

Total

Control

APSRS

REACTIVITY CONTROL SYSTEMS

XENON REACTIVITY

LIMITING CONDITION FOR OPERATION

3.1.3.8 THERMAL POWER shall not be increased above the power level cutoff specified in Figure 3.1-2 unless one of the following conditions is satisfied: The acceptable operating limits for regulating rod position provided in the Core operating Limits Report.

- a. Xenon reactivity is within 10 percent of the equilibrium value for RATED THERMAL POWER and is approaching stability, or
- b. THERMAL POWER has been within a range of 87 to 92 percent of RATED THERMAL POWER for a period exceeding 2 hours in the soluble poison control mode, excluding xenon free start-ups.

APPLICABILITY: MODE 1.

ACTION:

With the requirements of the above specification not satisfied, reduce THERMAL POWER to less than or equal to the power level cutoff within 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.3.8 Xenon reactivity shal? be determined to be within 10% of the equilibrium value for RATED THERMAL POWER and to be approaching stability or it shall be determined that the THERMAL POWER has been in the range of 87 to 92% of RATED THERMAL POWER for > 2 hours, prior to increasing THERMAL POWER above the power level cutoff.

REACTIVITY CONTROL SYSTEMS

AXIAL POVER SHAPING ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.9 The axial power shaping rod group shall be limited in physical (Insertion as shown on Figures 3.1-5a, -5b, and 5c, within the acceptable operating limits for axial power shaping rod position specified in the Core Operating Limits Report APPLICABILITY: MODES 1 and 2*.

ACTION

With the axial power shaping rod group outside the above insertion limits, either:

- a. Restore the axial power shaping rod group to within the limits within 2 hours, or
- b. Reduce THERMAL POWER to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the rod group position using the above figures within 2 hours, or lacceptable operating limits provided in the CORE OPERATING LIMITS READER c. Be in at least HOT STANDBY within 6 hours.

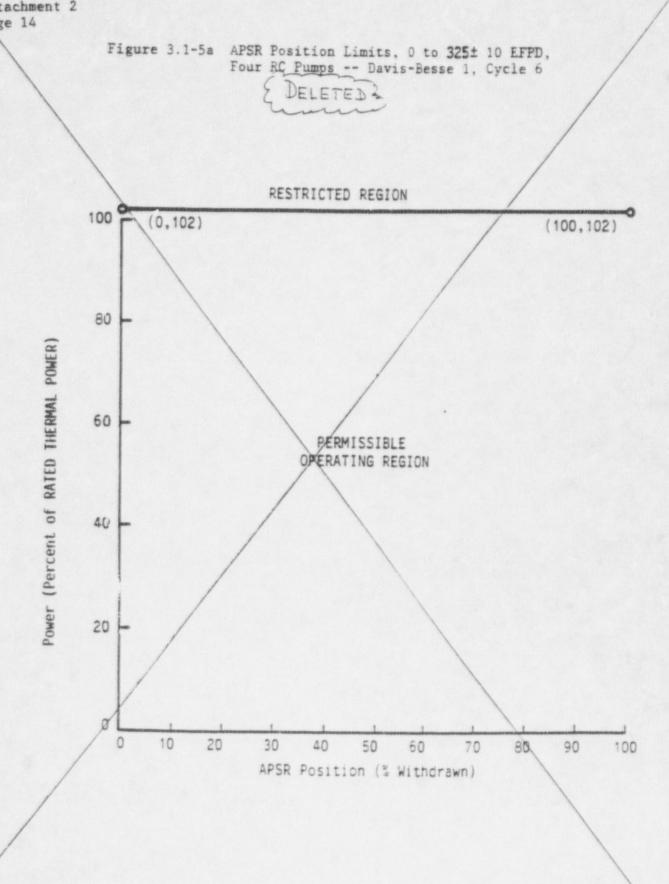
SURVEILLANCE REQUIREMENTS

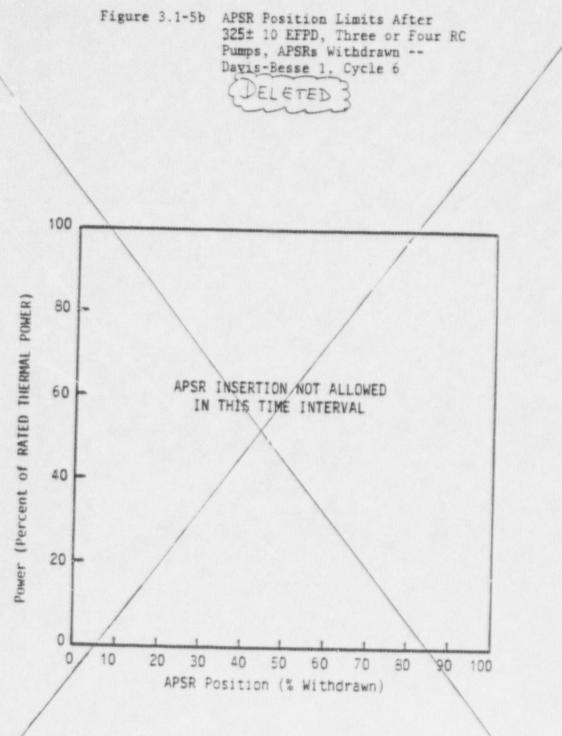
4.1.3.9 The position of the Axial power shaping rod group shall be determined to be within the insertion limits at least once every 12 hours except when the axial power shaping rod insertion limit alarm is inoperable, then verify the group to be within the insertion limits?

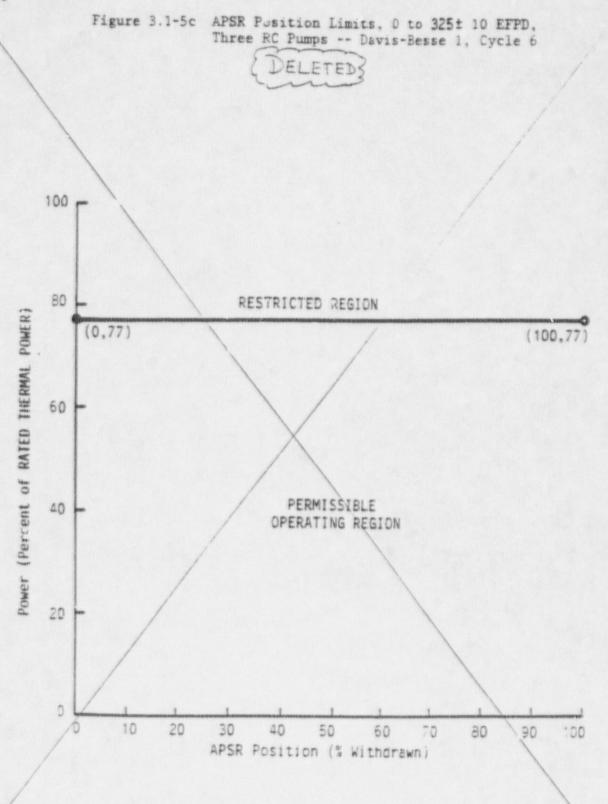
At least once every 4 hours.

Provided in the Core Operating?

*With $K_{eff} \ge 1.0$.







3/4.2 POWER DISTRIBUTION LIMITS

AXIAL POVER IMBALANCE

LIMITING CONDITION FOR OPERATION

3.2.1 AKIAL POVER IMBALANCE shall be maintained within the limits shown on Figures 3.2-1 and 3.2-2 acceptable Akial Power Imbalance operating limits Peront.

APPLICABILITY: MOVE 1 above 40% of RATED THERMAL POVER.*

ACTION

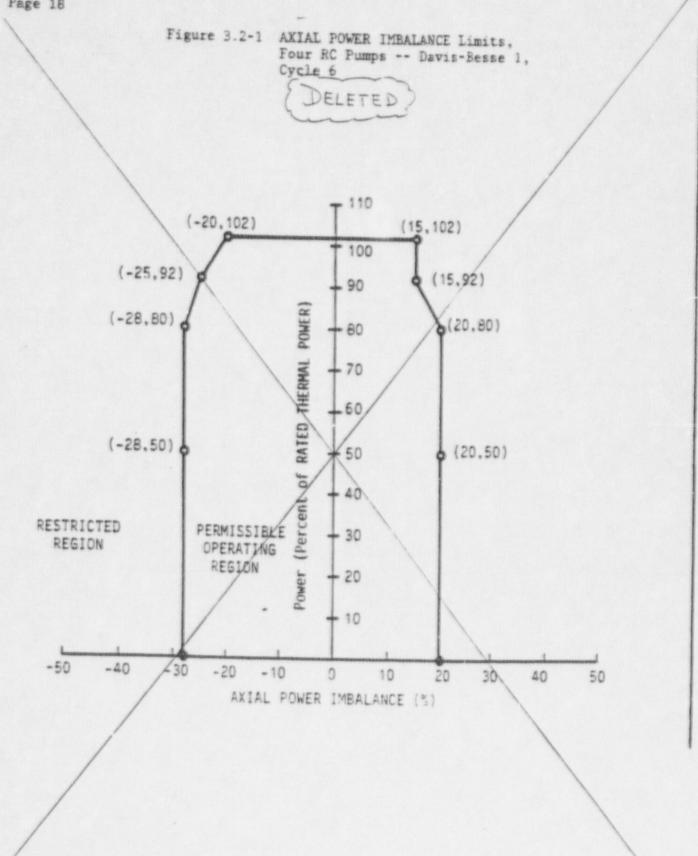
With AXIAL POWER IMBALANCE exceeding the limits specified above, either:

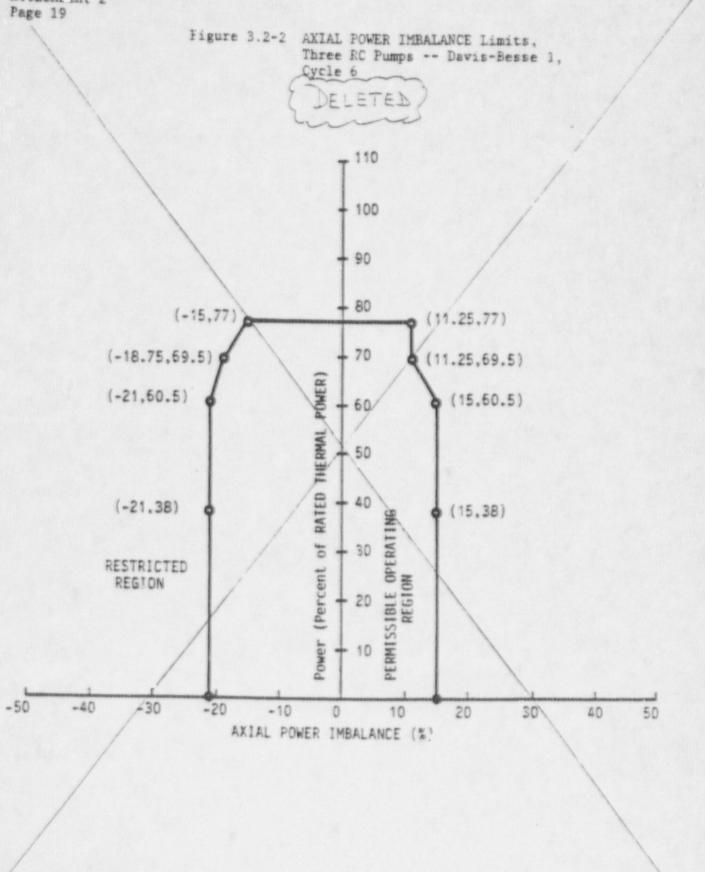
- a. Restore the AXIAL POVER IMBALANCE to within (the limits Quithin 15 pinutes, or provided in the Core OPERATING LIMITS REPORT)
- b. Within one hour reduce power until imbalance limitscare met or to
 40% of RATED THERMAL POWER or less. [provided in the Correspondenting Limits REPORT]

SURVEILLANCE REQUIREMENTS

4.2.1. The AKIAL POWER IMBALANCE shall be determined to be within the limits at least once every 12 hours when above 40% of RATED THERMAL FOWER Except when the AKIAL POWER IMBALANCE alarm is inoperable, then calculate the AKIAL POWER IMBALANCE at least once per hour.

^{*}See Special Test Exception 3.10.1.





POWER DISTRIBUTION LIMITS

QUADRANT POWER TILT

LIMITING CONDITION FOR OPERATION

3.2.4 THE QUADRANT POVER TILT shall not exceed the Steady State Limit of Table 3.2-1. For QUADRANT POWER TILT provided in the CORE OFERHTING

APPLICABILITY: MODE 1 above 15% of RATED THERMAL POWER. *

ACTION:

- State Limit but less than or equal to the Transient Limit of Table 3.2-1. provided in the CORE OPERATING LIMITS REPORT:
 - 1. Within 2 hours:
 - a) Either reduce the QUADRANT POWER TILT to within its Steady State Limit, or
 - b) Reduce THERMAL POWER so as not to exceed THERMAL POWER, including power level cutoff, allowable for the reactor coolant pump combination less at least 2% for each 1% of QUADRANT POWER TILT in excess of the Steady State Limit and within 4 hours, reduce the High Flux Trip Setpoint and the Flux-A Flux-Flow Trip Setpoint at least 2% for each 1% of QUADRANT POWER TILT in excess of the Steady State Limit.
 - 2. Verify that the QUADRANT POWER TILT is within its Steady State Limit within 24 hours after exceeding the Steady State Limit or reduce THERMAL POWER to less than 60% of THERMAL POWER allowable for the reactor coolant pump combination within the next 2 hours and reduce the High Flux Trip Setpoint to < 65.5% of THERMAL POWER allowable for the reactor coolant pump combination within the next 4 hours.
 - 3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 60% of THERMAL POWER allowable for the reactor coolant pump combination may proceed provided that the QUADRANT POWER TILT is verified within its Steady State Limit at least once her hour for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.

^{*}See Special Test Exception 3.10.1

PROPOSED BY LETTER
Serial No. 1407 Date 11/2/87

POVER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

- b. With the QUADRANT POWER TILT determined to exceed the Transient Limit but less than the Maximum Limit of Table 302-1, due to misalignment of either a safety, regulating or axial power shaping rod:

 OPERATING LIMITS REPORT
 - Reduce THERMAL POWER at least 2% for each 1% of indicated QUADRANT POWER TILT in excess of the Steady State Limit within 30 minutes.
 - Verify that the QUADRANT POWER TILT is within its Transient Limit within 2 hours after exceeding the Transient Limit or reduce THERMAL POWER to less than 60% of THERMAL POWER allowable for the reactor coolant pump combination within the next 2 hours and reduce the High Flux Trip Setpoint to < 65.5% of THERMAL POWER allowable for the reactor coolant pump combination within the next 4 hours.
 - 3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 60% of THERMAL POWER allowable for the reactor coolant pump combination may proceed provided that the QUADRANT POWER TILT is verified within its Steady State Limit at least once per hour for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.
- Limit but less than the Maximum Limit of Table 3.2-17 due to causes other than the misalignment of either a safety, regulating or axial power shaping rod:

 Provided in the CORE OPERATING LIMITS REPORT
 - Reduce THERMAL POWER to less than 60% of THERMAL POWER allowable for the reactor coolant pump combination within 2 hours and reduce the High Flux Trip Setpont to < 65.5% of THERMAL POWER allowable for the reactor coolant pump combination within the next 4 hours.
 - 2. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 60% of THERMAL POWER allowable for the reactor coolant pump combination may proceed provided that the QUADRANT POWER TILT is verified within its Steady State Limit at least once per hour for 12 hours or until verified at 95% or greater RATED THERMAL POWER.

POVER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

d. With the OUADRANT POWER TILT determined to exceed the Maximum Limit of Table 3:2-1; reduce THERMAL POWER to < 15% of RATED THERMAL POWER vithin 2 hours.

Provided in the CORE OPERATING LIMITS REPORT

SUPERIOR REQUIREMENTS

The QUADRANT POWER TILT shall be determined to be within the THERMAT POWER except when the QUADRANT POWER TILT alarm is inoperable, then the QUADRANT POWER TILT shall be calculated at least once per 12

Provided in the CORE OPERATING LIMITS REPORT

A A STATE OF THE PARTY OF THE P	PRODUCTION AND PRODUCTION AND ADDRESS OF THE PRODUCTION ADDRESS	NOTE PERSONNELLA RECORDINATION DE L'ARCHE	
Docket Number 50-346 License Number NPF-3 Serial Number 1691 Attachment 2 Page 23	20.0	20.0	
Transient	10.03	6.96	
Steady state limit for THERNAL POWER > 50%	4.12	1.96	
Steady state Steady state Sieady state Si	6.83	2.80	
QUADRANT POWER	Symmetrical incore detector system Power range	Minimum incore detector system	
DAVIS-BESSE, UNIT 1	3	/4 2-12	Amendment No. 14/, 33, A5, A5, B0, B0, 123

Page 24 3/4.2. POWER DISTRIBUTION LIMITS

BASES

The specifications of this section provide assurance of fuel integrity during Condition I (normal operation) and II (incidents of moderate frequency) events by: (a) maintaining the minimum DNBR in the core ≥ 1.30 during normal operation and during short term transients. (b) maintaining the peak linear power density ≤ 18.4 kW/ft during normal operation, and (c) maintaining the peak power density less than the limits given in the bases to specification 2.1 during short term transients. In addition, the above criteria must be met in order to meet the assumptions used for the loss-of-coolant accidents.

The power imbalance envelope defined in Figures 3.2-1 and 3.2-2 and the insertion limit curves Figures 3.1-2 and 3.1-3 are based on LOCA analyses which have defined the maximum linear heat rate such that the maximum clad temperature will not exceed the Final Acceptance Criteria of 2200°F following a LOCA. Operation outside of the power imbalance envelope alone does not conceeded should a LOCA occur. The power imbalance envelope represents the boundary of operation limited by the Final Acceptance Criteria only if the control rods are at the insertion limits, as defined by Figures 3.1-2 and 3.1-3 and if the steady-state limit QUADRANT POWER TILL exists. Additional conservatism is introduced by application of:

- Nuclear uncertainty factors.
- b. Thermal calibration uncertainty.
- c. Fuel densification effects.
- d. Hot rod manufacturing tolerance factors.
- e. Potential fuel rod bow effects.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensures that the original criteria are met.

The definitions of the design limit nuclear power peaking factors as used in these specifications are as follows:

For Nuclear heat flux hot channel factor, is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density, assuming nominal fuel pellet and rod dimensions.

ADDITIONAL CHANCES PREVIOUSLY
PROPOSED BY LITTER
Serial No. 1529 Date 1/5/89

ADMINISTRATIVE CONTROLS

microcuries per gram as a function of time for the duration of the specific activity above the steady-state level; and (5) The time duration when the specific activity of the primary coolant exceeded the radioiodine limit.

MONTHLY OPERATING REPORT

6.9.1.6 Routine reports of operating statistics, shutdown experience and challenges to the Pressurizer Power Operated Relief Valve (PORV) and the Pressurizer Code Safety Valves shall be submitted on a monthly basis to the Director, Office of Management and Program Analysis, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with a copy to the Regional Office, to arrive no later than the 15th of each month following the calendar month covered by the report.

CORE OPERATING LIMITS REPORT

6.9.1.7 (Insert A)

Insert A

CORE OPERATING LIMITS REPORT

6.9.1.7 Core operating limits shall be established and documented in the CORE OPERATING LIMITS REPORT before each reload cycle and any remaining part of a reload cycle for the following:

3.1.3.6 Regulating Rod Insertion Limits

3.1.3.7 Rod Program

3.1.3.8 Xenon Reactivity

3.1.3.9 Axial Power Shaping Rod Insertion Limits

3.2.1 AXIAL POWER IMBALANCE

3.2.4 QUADRANT POWER TILT

The analytical methods used to determine the core operating limits addressed by the individual Technical Specifications shall be those previously reviewed and approved by the NRC, specifically:

- 1) BAW-10122A Rev. 1, "Normal Operating Controls", May 1984
- 2) BAW-10116A, "Assembly Calculations and Fitted Nuclear Data", May 1977
- 3) BAW-10117P-A, "Babcock & Wilcox Version of PDQ User's Manual", January 1977
- 4) BAW-10118A, "Core Calculational Techniques and Procedures", December 1979.
- 5) BAW-10124A, "FLAME 3 A Three-Dimensional Nodal Code for Calculating Core Reactivity and Power Distributions", August 1976
- 6) BAW-10125A, "Verification of Three-Dimensional FLAME Code", August 1976
- 7) BAW-10152A, "NOODLE A Multi-Dimensional Two-Group Reactor Simulator", June 1985
- 8) BAW-10119, "Power Peaking Nuclear Reliability Factors", June 1977

The methodology for Rod Program received NRC approval in the Safety Evaluation Report dated ______.

The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

The CORE OPERATING LIMITS REPORT, including any mid-cycle revision or supplements thereto, shall be provided upon issuance for each reload cycle to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

SAMPLE

TOLEDO EDISON COMPANY

DAVIS-BESSE UNIT 1

CYCLE 6

CORE OPERATING LIMITS REPORT

REVISION O

TOLEDO EDISON

DAVIS-BESSE UNIT 1

CYCLE 6

CORE OPERATING LIMITS REPORT

REVISION O

1.0 Core Operating Limits

This Core Operating Limits Report for DB-1 Cycle 6 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.

2.0 References

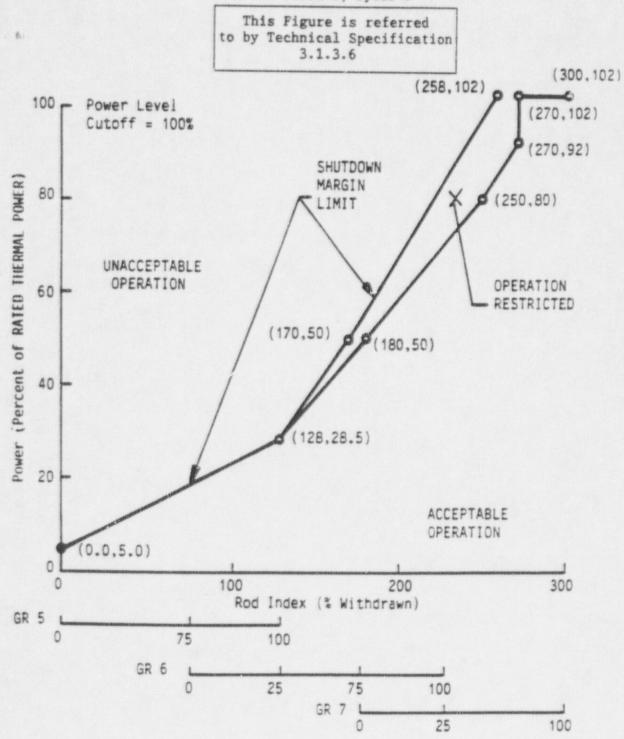
- 1) B&W Fuel Company, Topical Report BAW-10122A Rev. 1, "Normal Operating Controls", May 1984
- B&W Fuel Company, Topical Report BAW-10116A, "Assembly Calculations and Fitted Nuclear Data", May 1977
- 3) B&W Fuel Company, Topical Report BAW-10117P-A, "Babcock & Wilcox Version of PDQ User's Manual", January 1977
- 4) B&W Fuel Company, Topical Report BAW-10118A, "Core Calculational 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 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, "Power Peaking Nuclear Reliability Factors", June 1977

9) Letter from to dated , 1989. (NRC SER for Rod Program)

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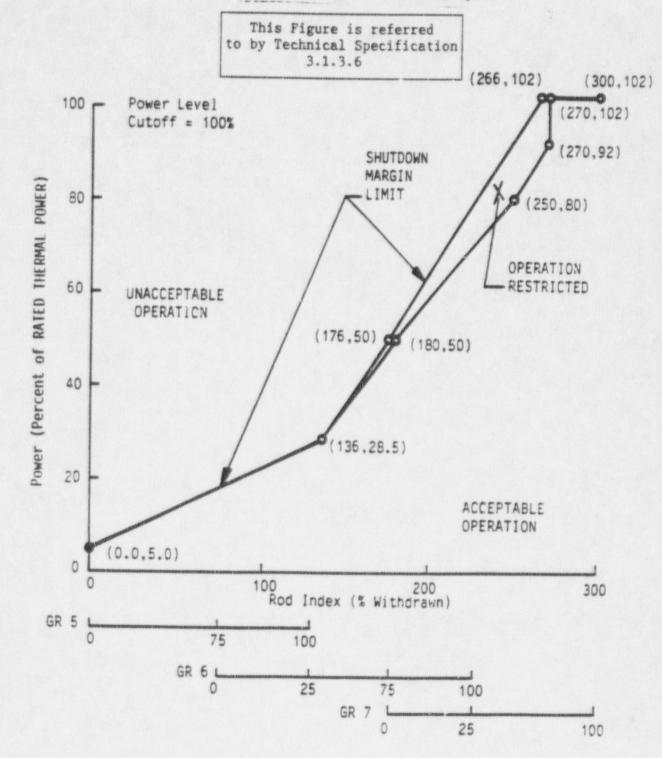
Figure 1 Regulating Group Position Limits, 0 to 325± 10 EFPD, Four RC Pumps --Davis-Besse 1, Cycle 6



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

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Figure 2 Regulating Group Position Limits After 325+ 10 EFPD, Four RC pumps, APSRs Withdrawn -- Davis-Besse 1, Cycle 6

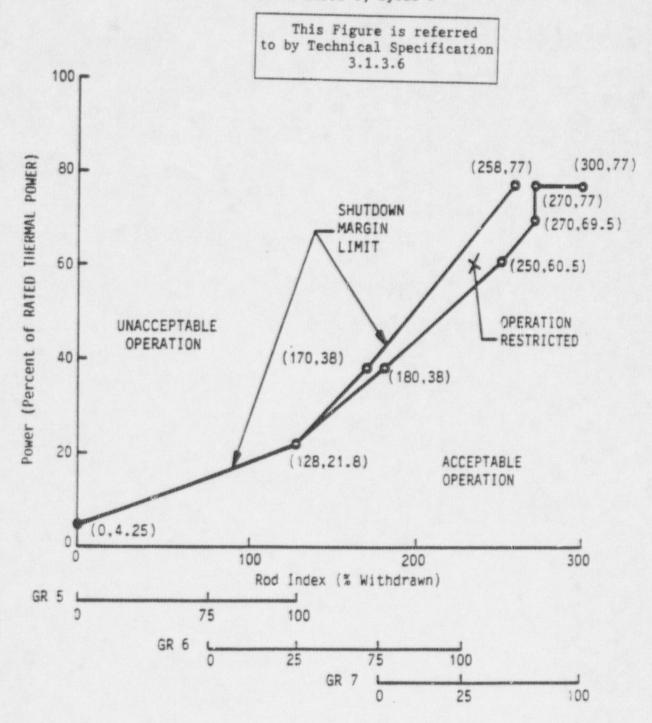


Note 1: A Rod Group overlap of 25+5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

SAMPLE

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Figure 3 Regulating Group Position Limits, 0 to 325± 10 EFPD, Three RC Pumps --Davis-Besse 1, Cycle 6

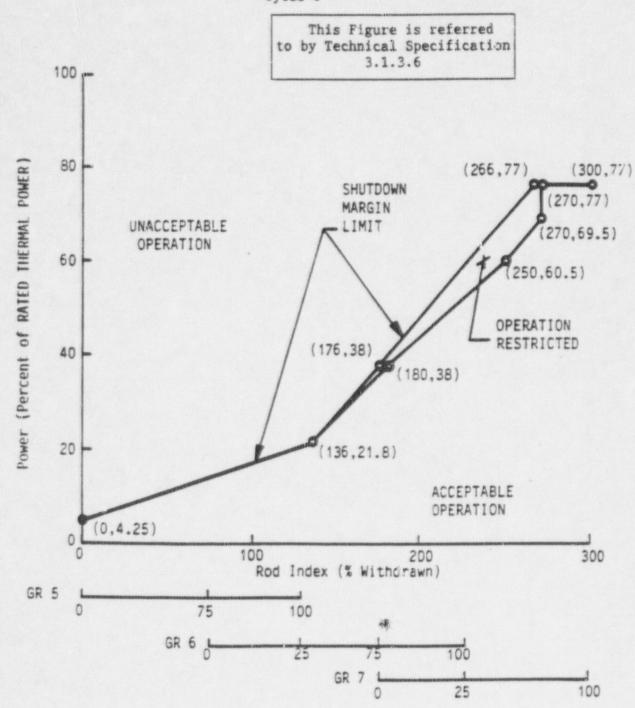


Note 1: A Rod Group overlap of 25+5% between sequential withdrawn groups 5 and 6, and 6 and 7 shall be maintained.

SAMPLE

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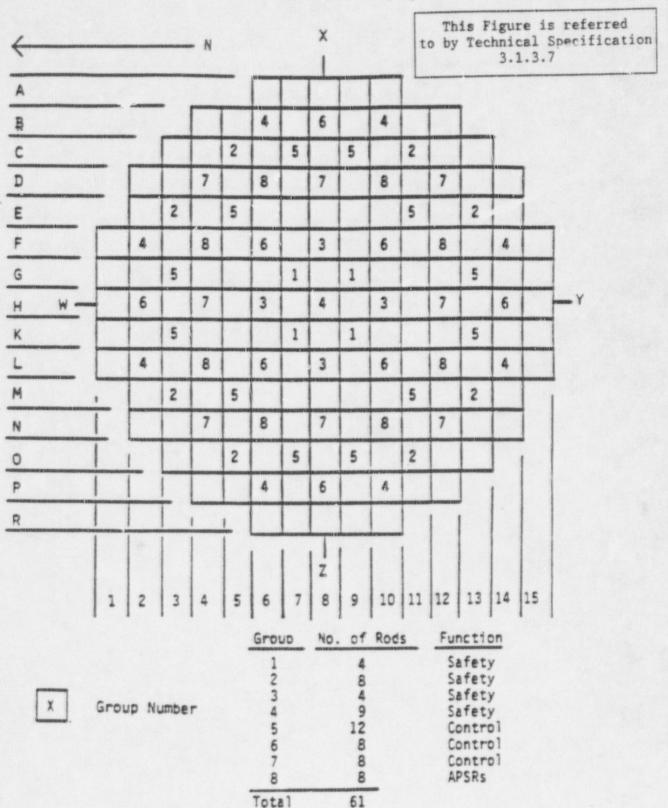
Figure 4 Regulating Group Position Limits
After 325± 10 EFPD, Three RC Pumps,
APSRs Withdrawn -- Davis-Besse 1,
Cycle 6



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

SAMPLE DRAFT

Figure 5 Control Rod Core Locations and Group Assignments --Davis-Besse 1, Cycle 6

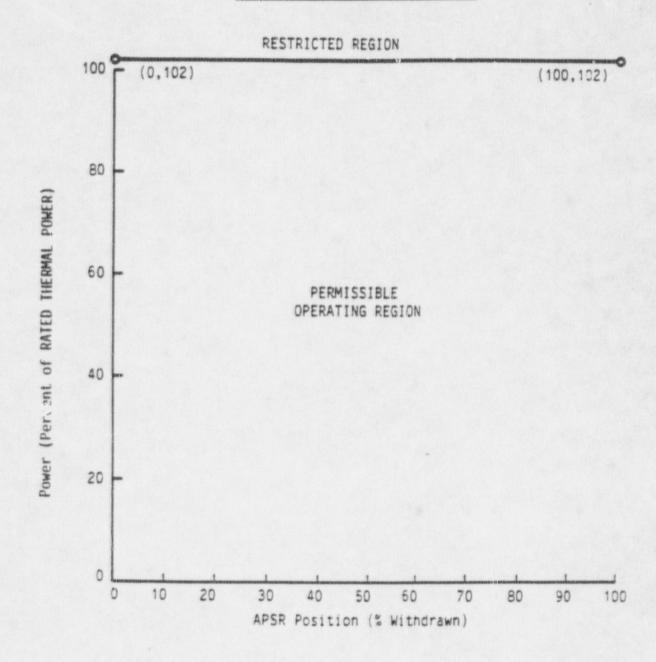


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Figure 6 APSR Position Limits, 0 to 325± 10 EFPD, Four RC Pumps -- Davis-Besse 1, Cycle 6

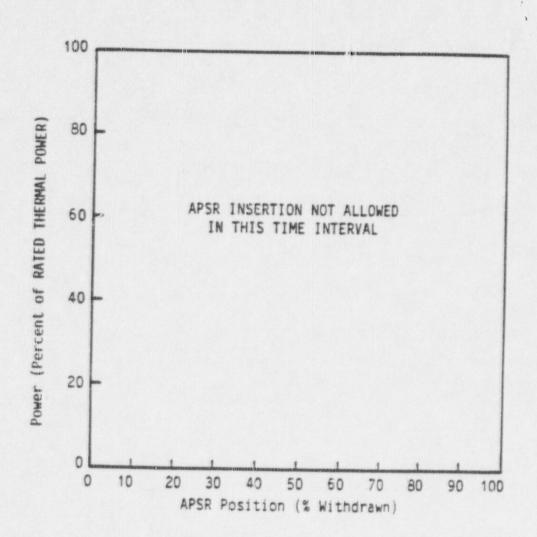
This Figure is referred to by Technical Specification 3.1.3.9



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Figure 7 APSR Position Limits After 325± 10 EFPD, Three or Four RC Pumps, APSRs Withdrawn -- Davis-Besse 1, Cycle 6

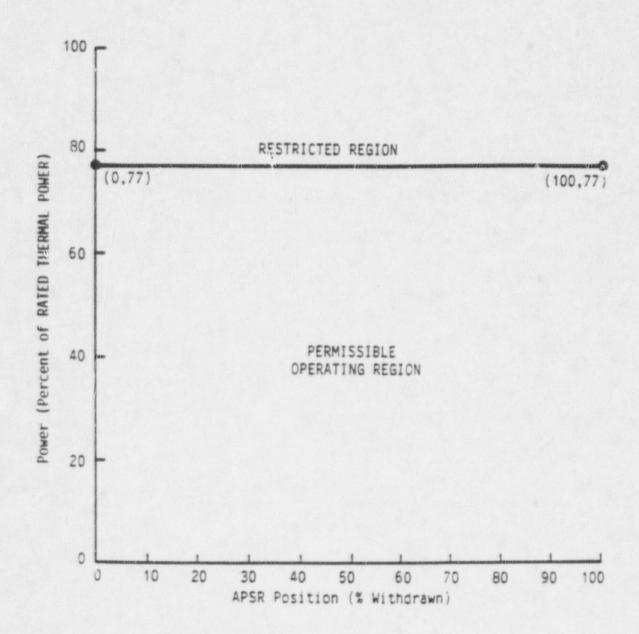
This Figure is referred to by Technical Specification 3.1.3.9



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Figure 8 APSR Position Limits, 0 to 325± 10 EFPD, Three RC Pumps -- Davis-Besse 1, Cycle 6

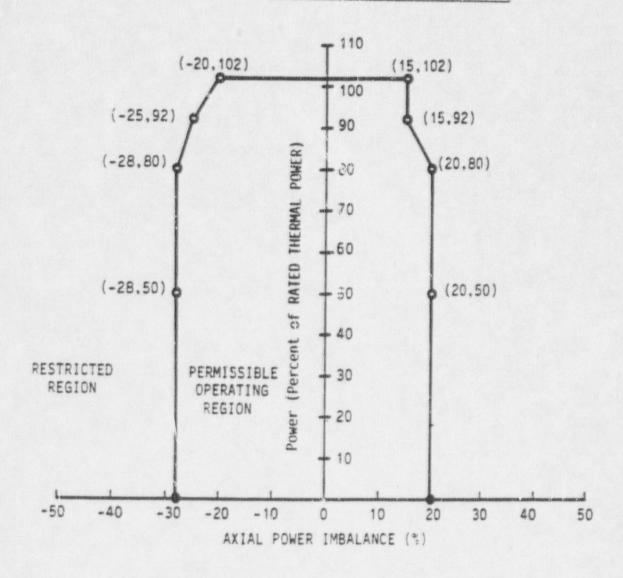
This Figure is referred to by Technical Specification 3.1.3.9



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Figure 9 AXIAL POWER IMBALANCE Limits, Four RC Pumps -- Davis-Besse 1, Cycle 6

This Figure is referred to by Technical Specification 3.2.1

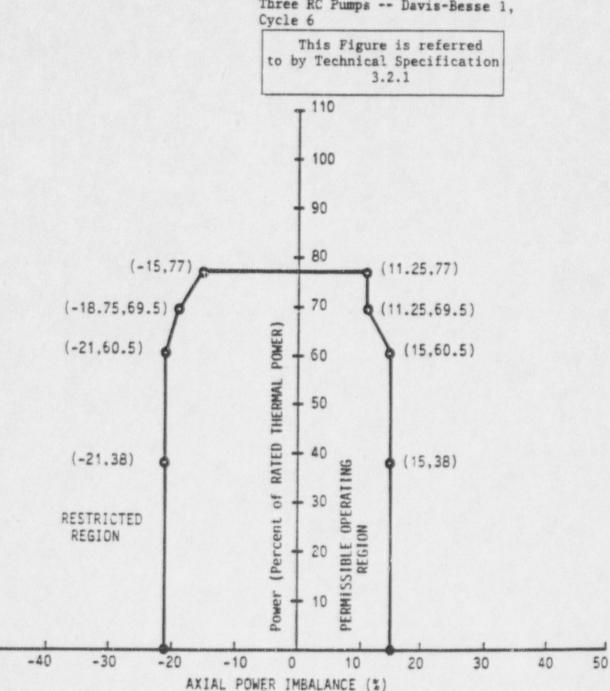


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Figure 10 AXIAL POWER IMBALANCE Limits, Three RC Pumps -- Davis-Besse 1, Cycle 6



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	Table 1	Table 1 QUADRANT POVER TILT Limits	to by Technical Specification 3.2.4	referred
	Steady state limit for THERMAL POWER < 50%	Steady state limit for THERMAL POWER > 502	Transient	Maximum
QUADRANT POWER TILT as measured by:				
Symmetrical incore detector system	6.83	4.12	10.03	20.0
Power range channels	4.05	1.96	96.99	20.0
Minimum incore detector system	2.80	1.90	07 7	0