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DESCRIPTION:
Ltr notarized 3-8-74, re their 11-30-73, 12-31-73, & 1-25-74 ltr.....furnishing addl info to Tech Spec 3.5.2, regarding rev rod withdrawal limits.....w/atchmts.....

ENCLOSURES:

DO NOT REMOVE

ACKNOWLEDGED

PLANT NAME: Oconee Units 1 & 2

FOR ACTION/INFORMATION 3-12-74

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DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28201

A. C. THIES
SENIOR VICE PRESIDENT
PRODUCTION AND TRANSMISSION

P.O. BOX 2178

40 C.S

March 8, 1974

Mr. Angelo Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
Office of Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545

Re: Oconee Nuclear Station
Units 1 and 2
Docket Nos. 50-269 and -270

Dear Mr. Giambusso:

Please refer to my letters of November 30, 1973, December 31, 1973, and January 25, 1974 to you and Mr. J. F. Mallay's letter of February 21, 1974 to Mr. Al Schwencer. In my letters of November 30 and December 31, we requested certain changes to the Oconee Units 1 and 2 Technical Specifications. These changes involved Technical Specification 3.5.2 and principally revised rod withdrawal limits for both Units 1 and 2.

Subsequently, upon discovery by B&W of a change in the calculation of the specific heat curve for uranium dioxide fuel, we requested in my letter of January 25, 1974 that you hold in abeyance your review of the requested technical specification changes. B&W has since advised us that they have issued a new specific heat curve and incorporated this curve into the affected transient codes for plant safety analyses. A new specific heat curve is attached.

The safety implications of higher values of specific heat were investigated by re-analysis of the various transients using the new specific heat curve. The slower transients were unaffected. The rapid transients investigated yielded the following results:

1. For the rod ejection transient, DNBR was not noticeably affected. The maximum cladding temperature decreased by 70°F to 100°F and the maximum fuel temperature decreased by 200°F to 300°F.

2. For locked rotor transient, the DNBR was not noticeably affected. The maximum cladding temperature increased by 5°F to 15°F and the fuel

temperatures fell off at a slower rate. The overall effect of this change is insignificant.

3. For the four-pump coastdown transient, the increased specific heat value had no significant effect.

4. For emergency core cooling analysis, the impact of the specific heat revision on safety limits was to lower some portions of the allowable linear heat rate by up to 0.65 kw/ft. The attached curve identified as "LOCA Limited Maximum Allowable Linear Heat Rate" determines the allowable linear heat rate as a function of elevation in the core. The revised linear heat rate is in compliance with the interim acceptance criteria. The revised LOCA limits were determined by repeating the Oconee 2 calculations. The allowable heat rate curve for Oconee 2 is lower by .65 kw/ft at the six foot elevation but is unchanged at the 10 foot elevation.

5. For the reactor building pressure analysis, the initial stored energy in the core is increased by less than one million BTU's and the calculation of maximum reactor building pressure shows no change.

A reanalysis of the Oconee 1 and 2 operating margins with respect to the revised LOCA limit curve was performed by B&W using the procedures developed in BAW-10078. This analysis shows that the revised LOCA limit could have been exceeded assuming licensed design conditions early in plant life. However, based on Oconee 1 and 2 operation, these design conditions are known to be conservative and to exceed their limits and would have required the simultaneous existence of several "worst case" uncertainties. A review of operating data shows that the actual experienced quadrant power tilt for Unit 1 and the achieved power level for Unit 2 preclude the Interim Acceptance Criteria being exceeded. In order for Oconee 2 to operate within the revised LOCA limit and to more accurately reflect the operating characteristics of Oconee 1 and 2 experience to date, revised technical specifications are attached. As identified in my letter of November 30, 1973, increased flexibility in power maneuvering over the existing approved technical specification is provided by a reduction in quadrant power tilt. The attached technical specifications for Unit 2 supersede those attached to my letter of December 31, 1973.

With regard to Oconee 1, the technical specifications submitted for your approval by my letter of November 30, 1973 were requalified with the revised LOCA limit. This requalification used the procedures of BAW-10078; the method identified as Attachment 1 in my November 30, 1973 letter; and also the effects of 92 effective full power day burnup on the Oconee 1, Cycle 1 core. The results of the requalification verify the acceptability of the proposed technical specification; therefore, approval and implementation is requested for the continued operation of Unit 1 through the completion of the first fuel cycle. For your convenience, additional copies of the Unit 1 technical specification are attached.

For your information, Oconee 3 technical specifications have been revised using the new LOCA limit curve and the procedures developed in BAW-10078. These technical specifications will be submitted for your review by a Final Safety Analysis Report amendment in late March, 1974.

We would appreciate receiving approval to revise the Units 1 and 2 technical specifications as soon as possible. In order to allow sufficient time to make appropriate procedure changes and inform all operators of the technical specification revision, please make the effective date of technical specification change one week from your date of notification to us.

Very truly yours,

A. C. Thies

ACT:vr
Attachments

A. C. THIES, being duly sworn, states that he is Senior Vice President of Duke Power Company; that he is authorized on the part of said company to sign and file with the Atomic Energy Commission this request for amendment of the Oconee Nuclear Station Technical Specifications, Appendix A to Facility Operating Licenses DPR-38 and DPR-47; and that all statements and matters set forth therein are true and correct to the best of his knowledge.

A. C. Thies, Senior Vice President

ATTEST:

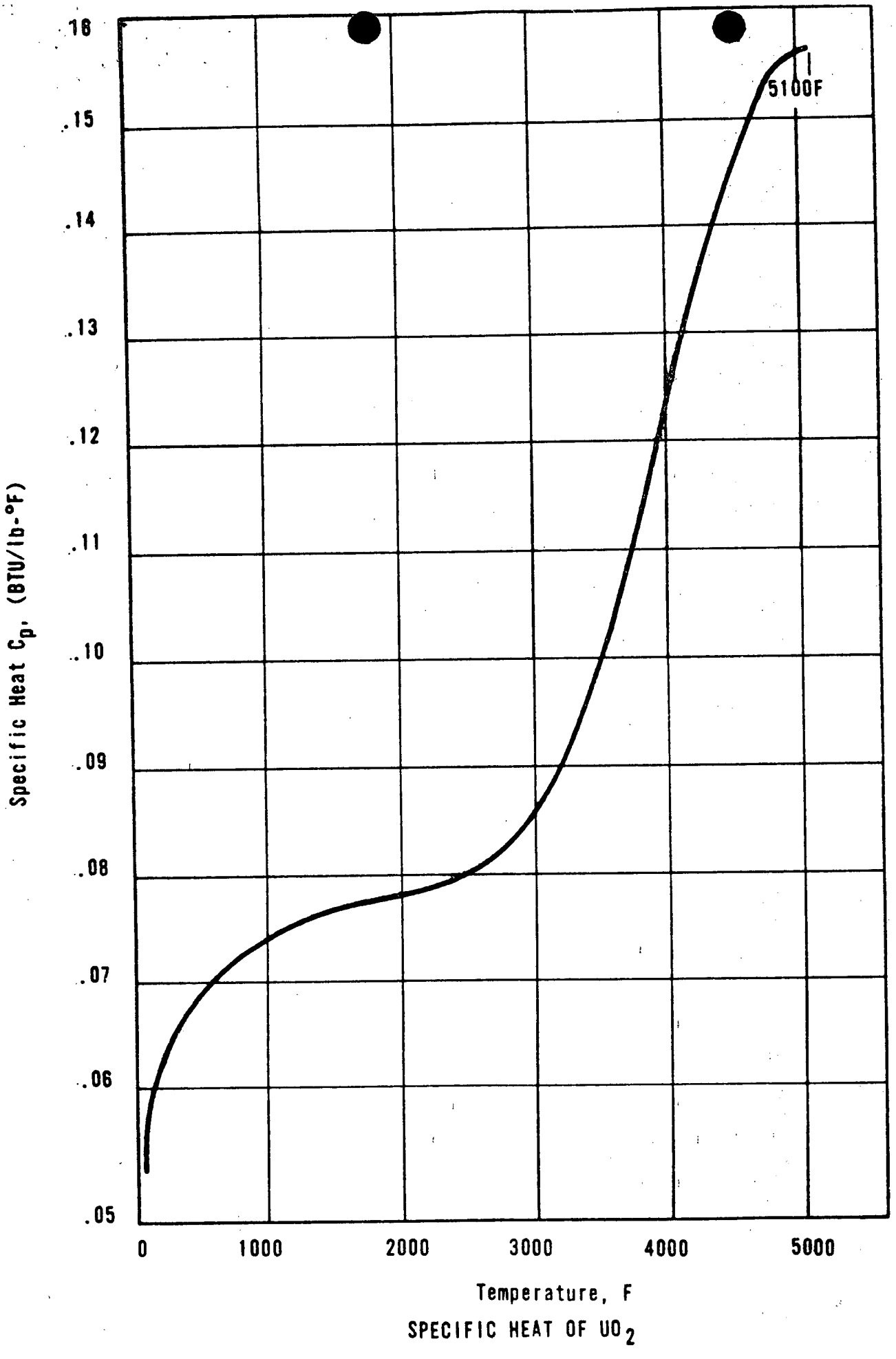
John C. Goodman, Jr.
Assistant Secretary

Subscribed and sworn to before me this 8th day of March, 1974.

Notary Public

My Commission Expires:

Jan. 13, 1979



SPECIFIC HEAT OF UO_2

3.5.2 Control Rod Group and Power Distribution Limits

Applicability

This specification applies to power distribution and operation of control rods during power operation.

Objective

To assure an acceptable core power distribution during power operation, to set a limit on potential reactivity insertion from a hypothetical control rod ejection, and to assure core subcriticality after a reactor trip.

Specification

3.5.2.1 The available shutdown margin shall be not less than 1% $\Delta k/k$ with the highest worth control rod fully withdrawn.

3.5.2.2 Operation with inoperable rods:

a. Operation with more than one inoperable rod, as defined in Specification 4.7.1 and 4.7.2.3, in the safety or regulating rod groups shall not be permitted.

b. If a control rod in the regulating or safety rod groups is declared inoperable in the withdrawn position as defined in Specification 4.7.1.1 and 4.7.1.3, an evaluation shall be initiated immediately to verify the existance of 1% $\Delta k/k$ hot shutdown margin. Boration may be initiated either to the worth of the inoperable rod or until the regulating and transient rod groups are fully withdrawn, whichever occurs first. Simultaneously a program of exercising the remaining regulating and safety rods shall be initiated to verify operability.

c. If within one (1) hour of determination of an inoperable rod as defined in Specification 4.7.1, it is not determined that a 1% $\Delta k/k$ hot shutdown margin exists combining the worth of the inoperable rod with each of the other rods, the reactor shall be brought to the hot standby condition until this margin is established.

d. Following the determination of an inoperable rod as defined in Specification 4.7.1, all rods shall be exercised within 24 hours and exercised weekly until the rod problem is solved.

e. If a control rod in the regulating or safety rod groups is declared inoperable per 4.7.1.2, power shall be reduced to 60% of the thermal power allowable for the reactor coolant pump combination.

f. If a control rod in the regulating or axial power shaping groups is declared inoperable per Specification 4.7.1.2, operation above 60% of rated power may continue provided the rods in the group are positioned such that the rod that was declared inoperable is maintained within allowable group average position limits of Specification 4.7.1.2 and the withdrawal limits of Specification 3.5.2.5.c.

3.5.2.3 The worth of a single inserted control rod shall not exceed 0.5% $\Delta k/k$ at rated power or 1.0% $\Delta k/k$ at hot zero power except for physics testing when the requirements of Specification 3.1.9 shall apply.

3.5.2.4 Quadrant tilt:

a. Below the power level cutoff (See Figures 3.5.2-1), except for physics tests, thermal power shall be reduced 2% for each 1% tilt in excess of 4% tilt. For less than 4 pump operation, thermal power shall be reduced 2% of the thermal power allowable for the reactor coolant pump combination for each 1% tilt in excess of 4%.

b. Within a period of 4 hours, the quadrant power tilt shall be reduced to less than 4%, except for physics tests, or the following adjustments in setpoints and limits shall be made:

1. The protection system maximum allowable setpoints (Figure 2.3-2A-Unit 1; 2.3-2B-Unit 2) shall be reduced 2% in power for each 1% tilt.

2. The control rod group withdrawal limits (Figures 3.5.2-1A1, 3.5.2-1A2, 3.5.2-2A Unit 1; 3.5.2-1B1, 3.5.2-1B2, 3.5.2-2B Unit 2) shall be reduced 2% in power for each 1% tilt in excess of 4%.

3. The operational imbalance limits (Figure 3.5.2-3A-Unit 1; 3.5.2-3B-Unit 2) shall be reduced 2% in power for each 1% tilt in excess of 4%.

c. If quadrant tilt is in excess of 25%, except for physics tests or diagnostic testing, the reactor will be placed in the hot shutdown condition. Diagnostic testing during power operation with a quadrant power tilt is permitted provided the thermal power allowable for the reactor coolant pump combination is restricted as stated in 3.5.2.4.a above.

d. Quadrant tilt shall be monitored on a minimum frequency of once every two hours during power operation above 15% of rated power.

3.5.2.5 Control rod positions:

a. Technical Specification 3.1.3.5 (safety rod withdrawal) does not prohibit the exercising of individual safety rods as required by Table 4.1-2 or apply to inoperable safety rod limits in Technical Specification 3.5.2.2.

b. Operating rod group overlap shall be 25% $\pm$ 5% between two sequential groups, except for physics tests.

c. Except for physics tests or exercising control rods, the control rod withdrawal limits are specified on Figures 3.5.2-1A1, 3.5.2-1B1, 3.5.2-1A2, and 3.5.2-1B2 for four pump operation and on Figure 3.5.2-2A and 3.5.2-2B for three or two pump operation. If the control rod position limits are exceeded, corrective measures shall be taken immediately to achieve an acceptable control rod position. Acceptable control rod positions shall be attained within four hours.

d. Except for physics tests, power shall not be increased above the power level cutoff (see Figures 3.5.2-1) unless the xenon reactivity is within 10% of the equilibrium value for operation at rated power and asymptotically approaching stability.

3.5.2.6 Reactor Power Imbalance shall be monitored on a frequency not to exceed two hours during power operation above 40 percent rated power. Except for physics tests, imbalance shall be maintained within the envelope defined by Figure 3.5.2-3A and 3.5.2-3B. If the imbalance is not within the envelope defined by Figure 3.5.2-3A and 3.5.2-3B, corrective measures shall be taken to achieve an acceptable imbalance. If an acceptable imbalance is not achieved within four hours, reactor power shall be reduced until imbalance limits are met.

3.5.2.7 The control rod drive patch panels shall be locked at all times with limited access to be authorized by the superintendent.

Bases

The power-imbalance envelope defined in Figure 3.5.2-3A and 3.5.2-3B is based on LOCA analyses which have defined the maximum linear heat rate (see Figure 3.5.2-4) such that the maximum clad temperature will not exceed the Interim Acceptance Criteria. Corrective measures will be taken immediately should the indicated quadrant tilt, rod position, or imbalance be outside their specified boundary. Operation in a situation that would cause the interim acceptance criteria to be approached should a LOCA occur is highly improbable because all of the power distribution parameters (quadrant tilt, rod position, and imbalance) must be at their limits while simultaneously all other engineering and uncertainty factors are also at their limits.* Conservatism is introduced by application of:

a. Nuclear uncertainty factors
b. Thermal calibration
c. Fuel densification effects
d. Hot rod manufacturing tolerance factors

The 30 percent overlap between successive control rod groups is allowed since the worth of a rod is lower at the upper and lower part of the stroke. Control rods are arranged in groups or banks defined as follows:

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*Actual operating limits depend on whether or not incore or excore detectors are used and their respective instrument and calibration errors. The method used to define the operating limits is defined in plant operating procedures.

Group	Function
1	Safety
2	Safety
3	Safety
4	Safety
5	Regulating
6	Regulating
7	Xenon transient override
8	APSR (axial power shaping bank)

The minimum available rod worth provides for achieving hot shutdown by reactor trip at any time assuming the highest worth control rod remains in the full out position.(1)

Inserted rod groups during power operation will not contain single rod worths greater than 0.5% Δk/k. This value has been shown to be safe by the safety analysis of the hypothetical rod ejection accident.(2) A single inserted control rod worth of 1.0% Δk/k at beginning of life, hot, zero power would result in the same transient peak thermal power and therefore the same environmental consequences as a 0.5% Δk/k ejected rod worth at rated power.

Control rod groups are withdrawn in sequence beginning with Group 1. Groups 5, 6, and 7 are overlapped 25 percent. The normal position at power is for Groups 6 and 7 to be partially inserted.

The quadrant power tilt limits set forth in Specification 3.5.2.4 have been established within the thermal analysis design base using the definition of quadrant power tilt given in Technical Specifications, Section 1.6. These limits in conjunction with the control rod position limits in Specification 3.5.2.5c ensure that design peak heat rate criteria are not exceeded during normal operation when including the effects of potential fuel densification.

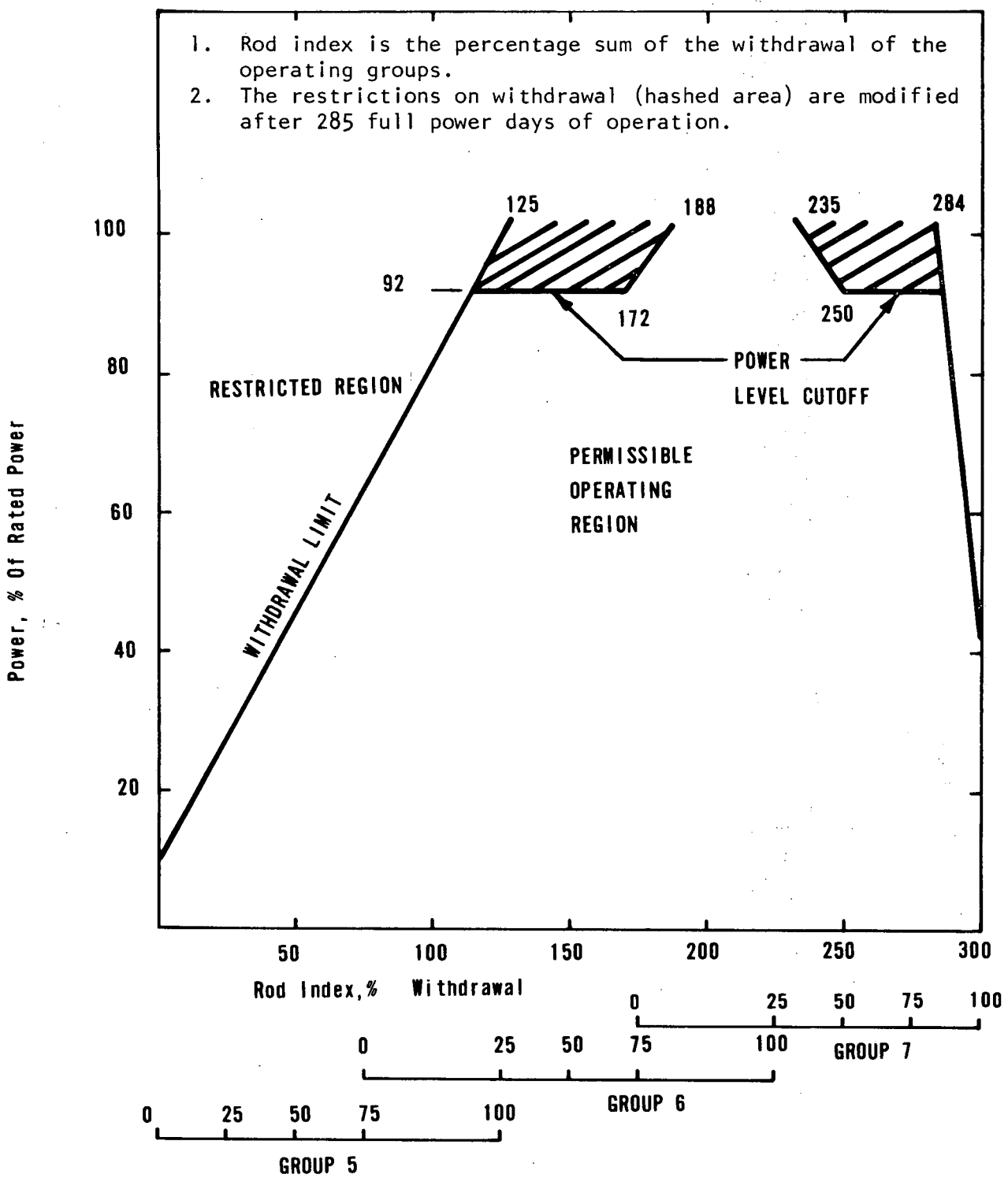
The quadrant tilt and axial imbalance monitoring in Specifications 3.5.2.4 and 3.5.2.6 respectively normally will be performed in the process computer. The two-hour frequency for monitoring these quantities will provide adequate surveillance when the computer is out of service.

Allowance is provided for rod withdrawal limits and reactor power imbalance limits to be exceeded for a period of four hours without specification violation. Acceptance rod positions and imbalance must be achieved within the four hour time period or appropriate action such as a reduction of power taken.

REFERENCES

[1]Section 3.2.2.1.2

[2]Section 14.2.2.2

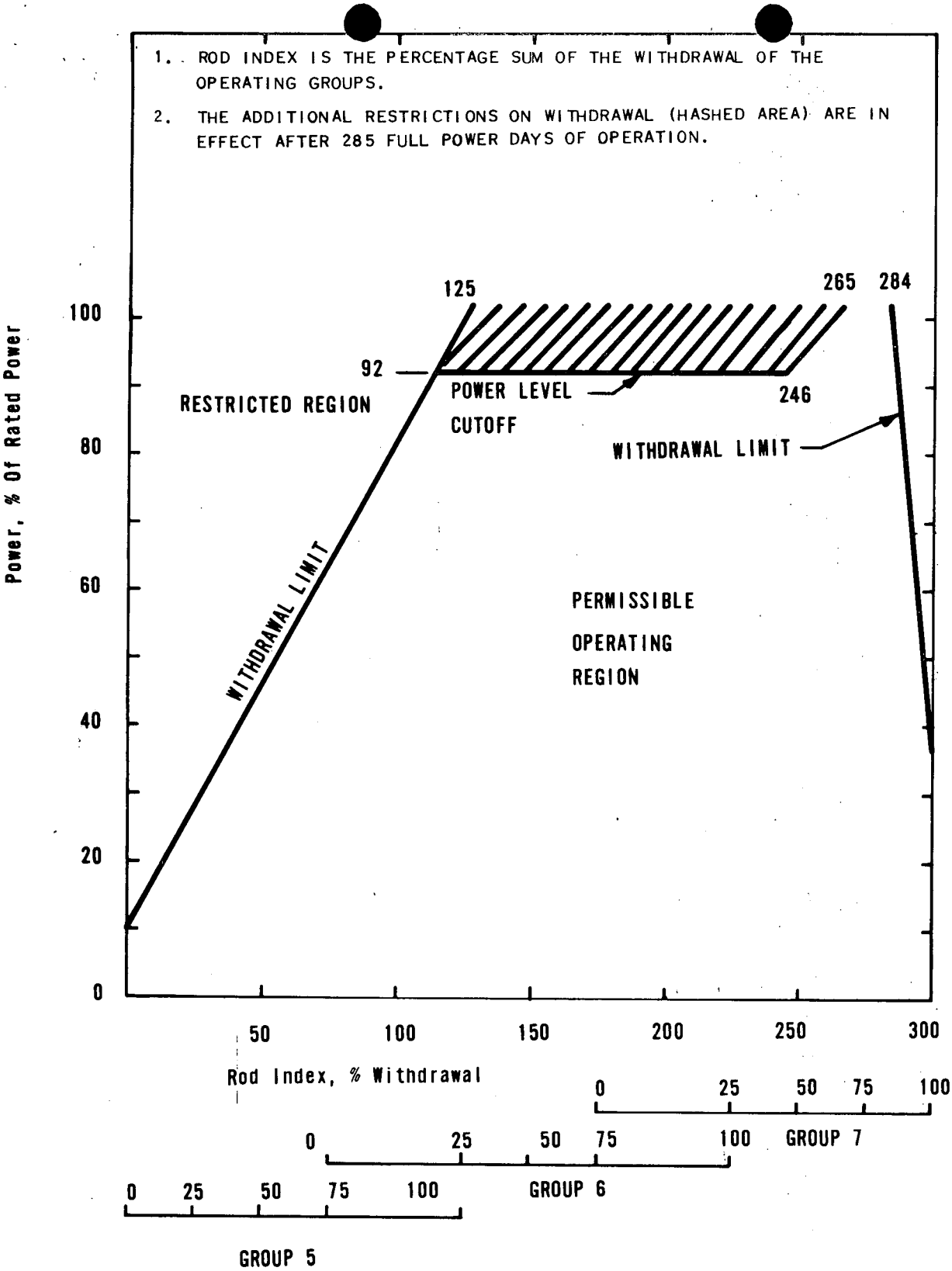


CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION

UNIT 1

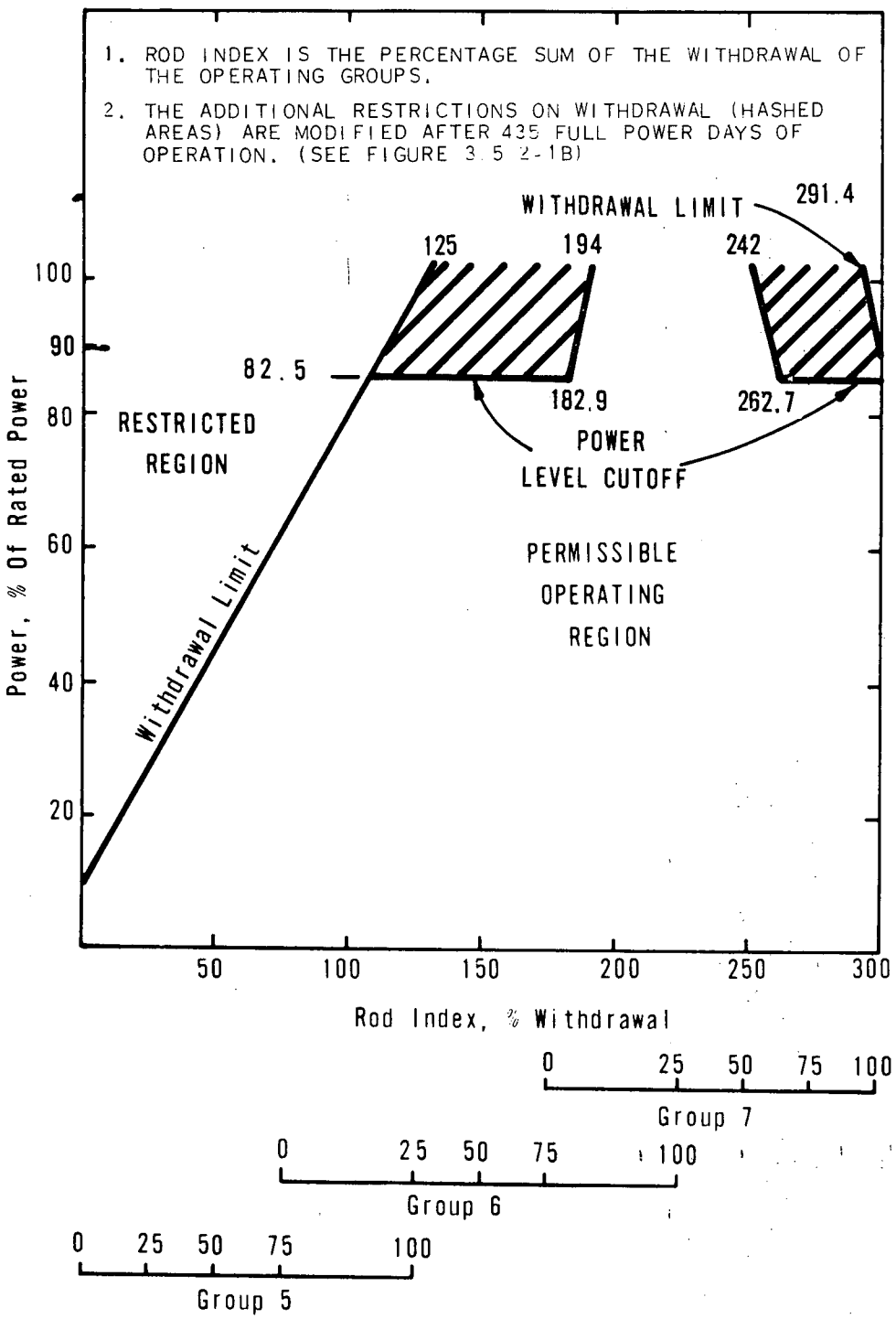
OCONEE NUCLEAR STATION

Figure 3.5.2-1A1



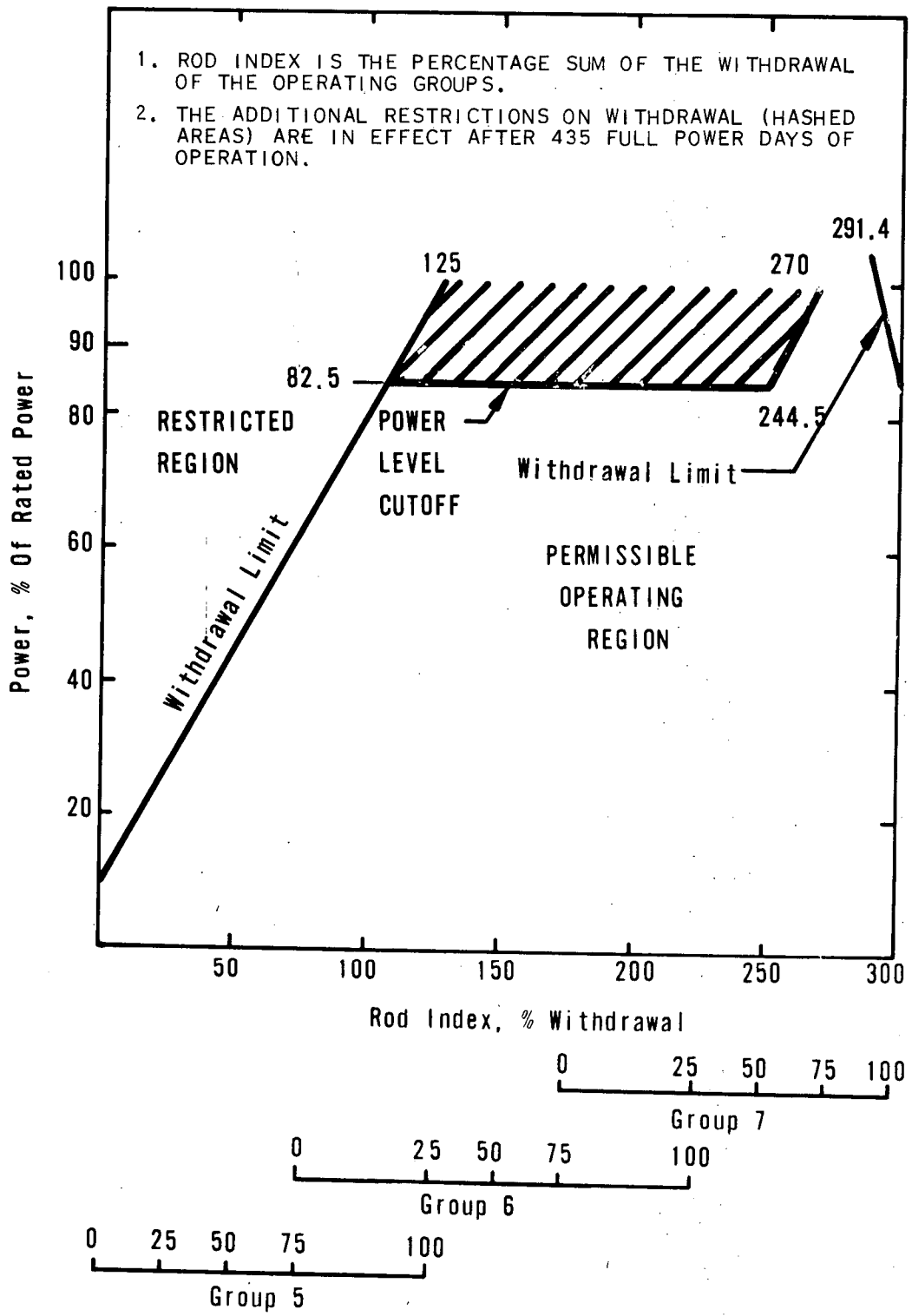
CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION

UNIT 1
OCONEE NUCLEAR STATION
Figure 3.5.2-1A2



CONTROL ROD GROUP WITHDRAWAL LIMITS
FOR 4 PUMP OPERATION UNIT 2

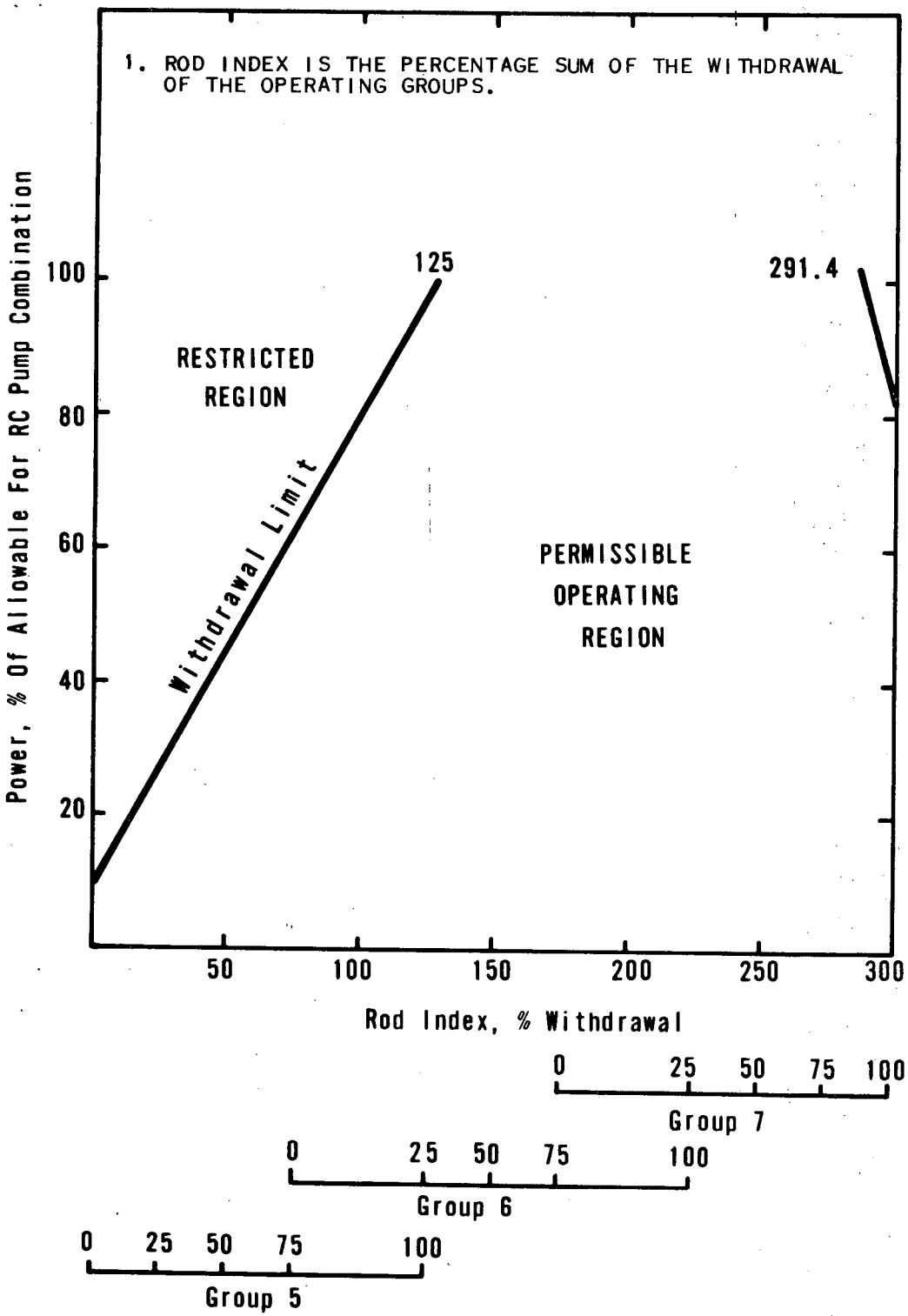
Figure 3.5.2-1B



CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION

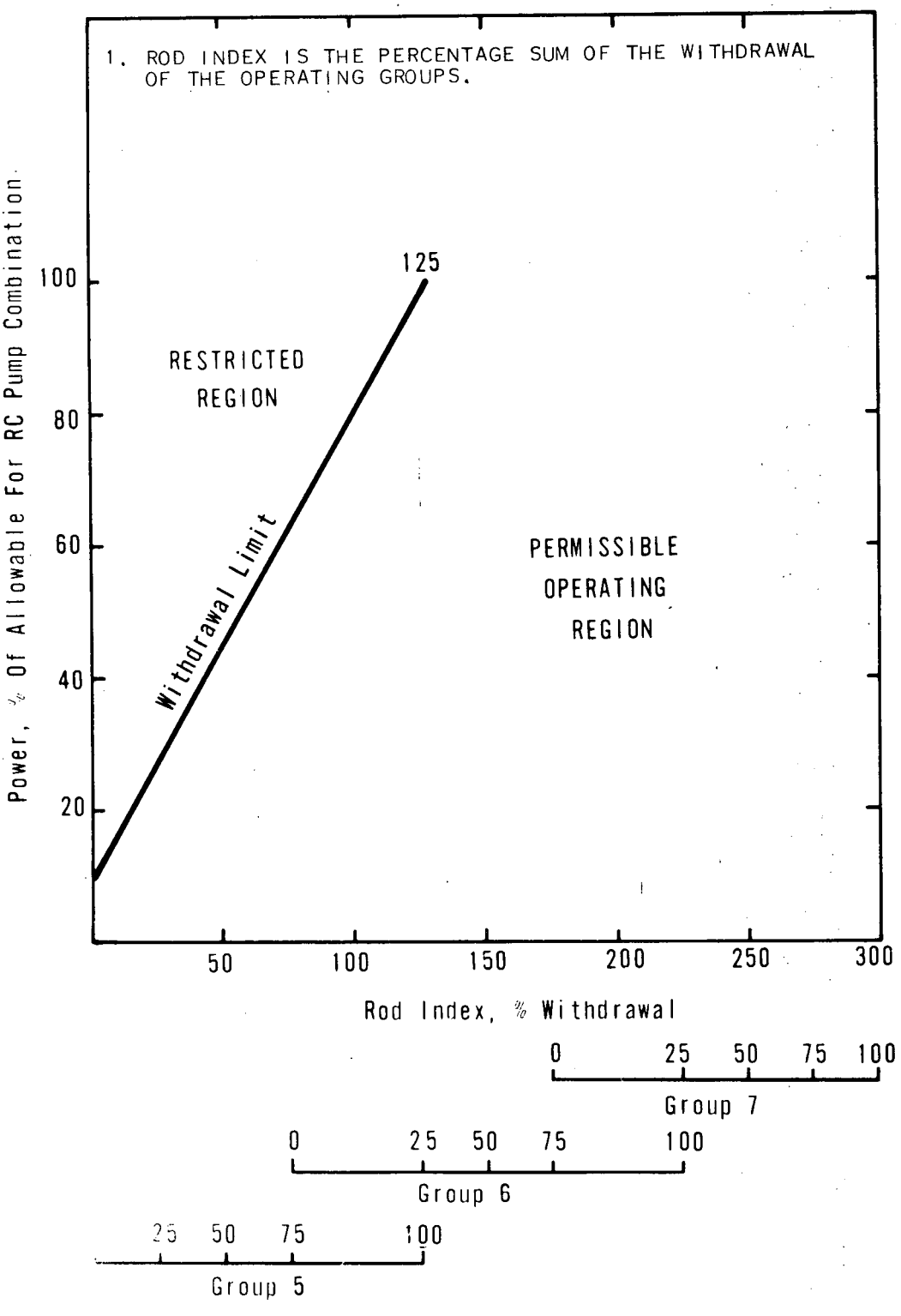
UNIT 2

Figure 3.5.2-1B2



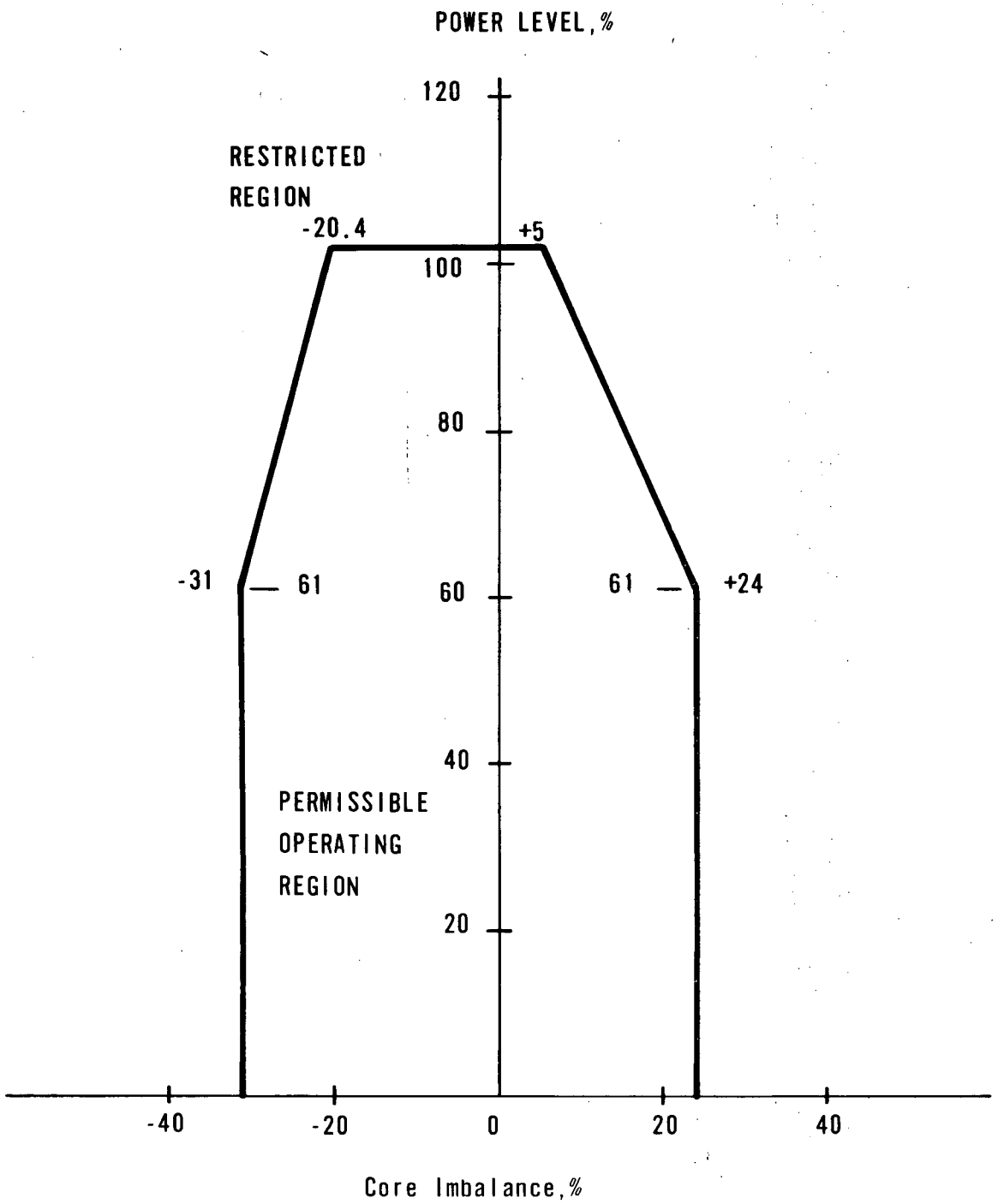
CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 3 AND 2 PUMP OPERATION

UNIT 1
OCONEE NUCLEAR STATION
Figure 3.5.2-2A



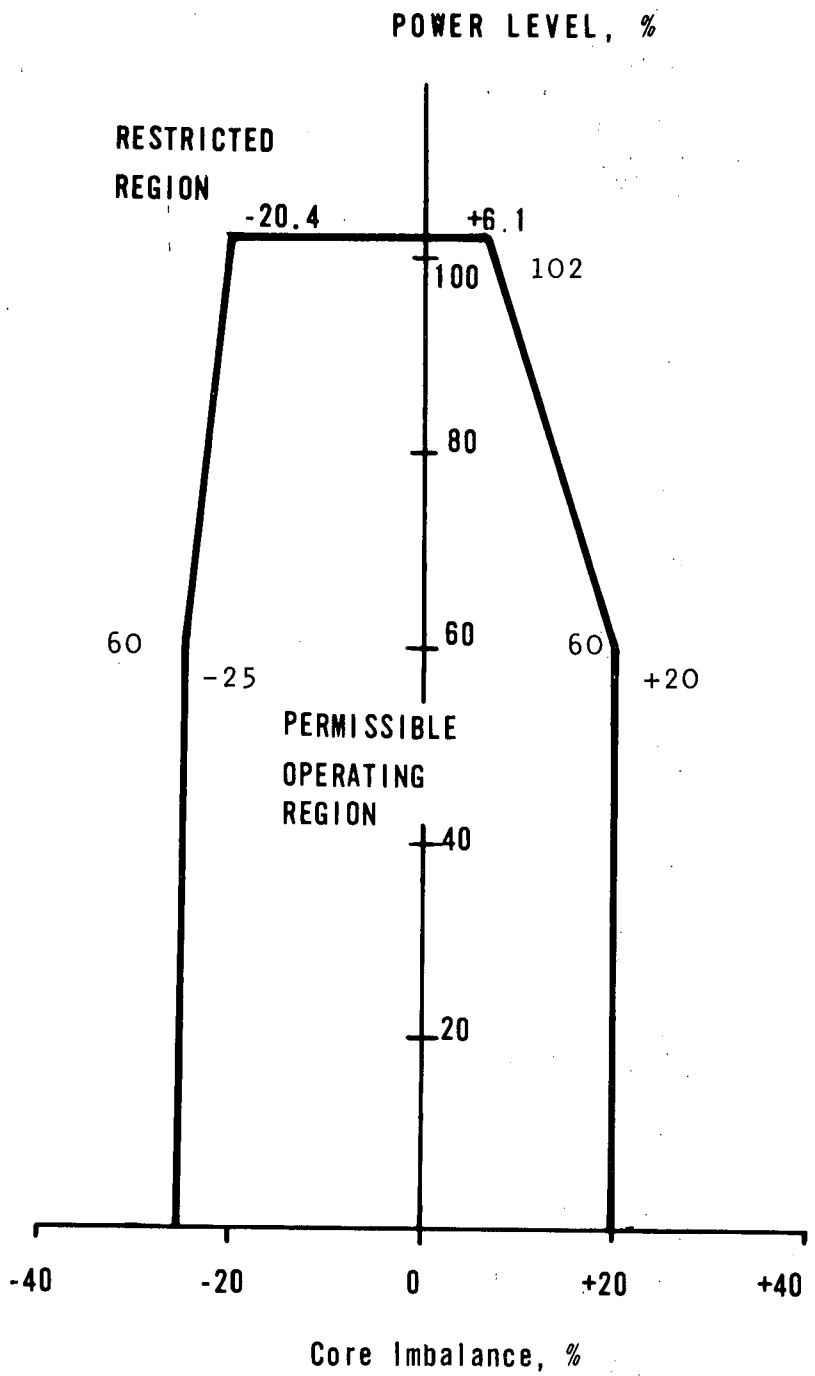
CONTROL ROD GROUP WITHDRAWAL LIMITS
FOR 3 AND 2 PUMP OPERATION

UNIT 2
OCONEE NUCLEAR STATION
Figure 3.5.2-2B



OPERATIONAL POWER-IMBALANCE ENVELOPE

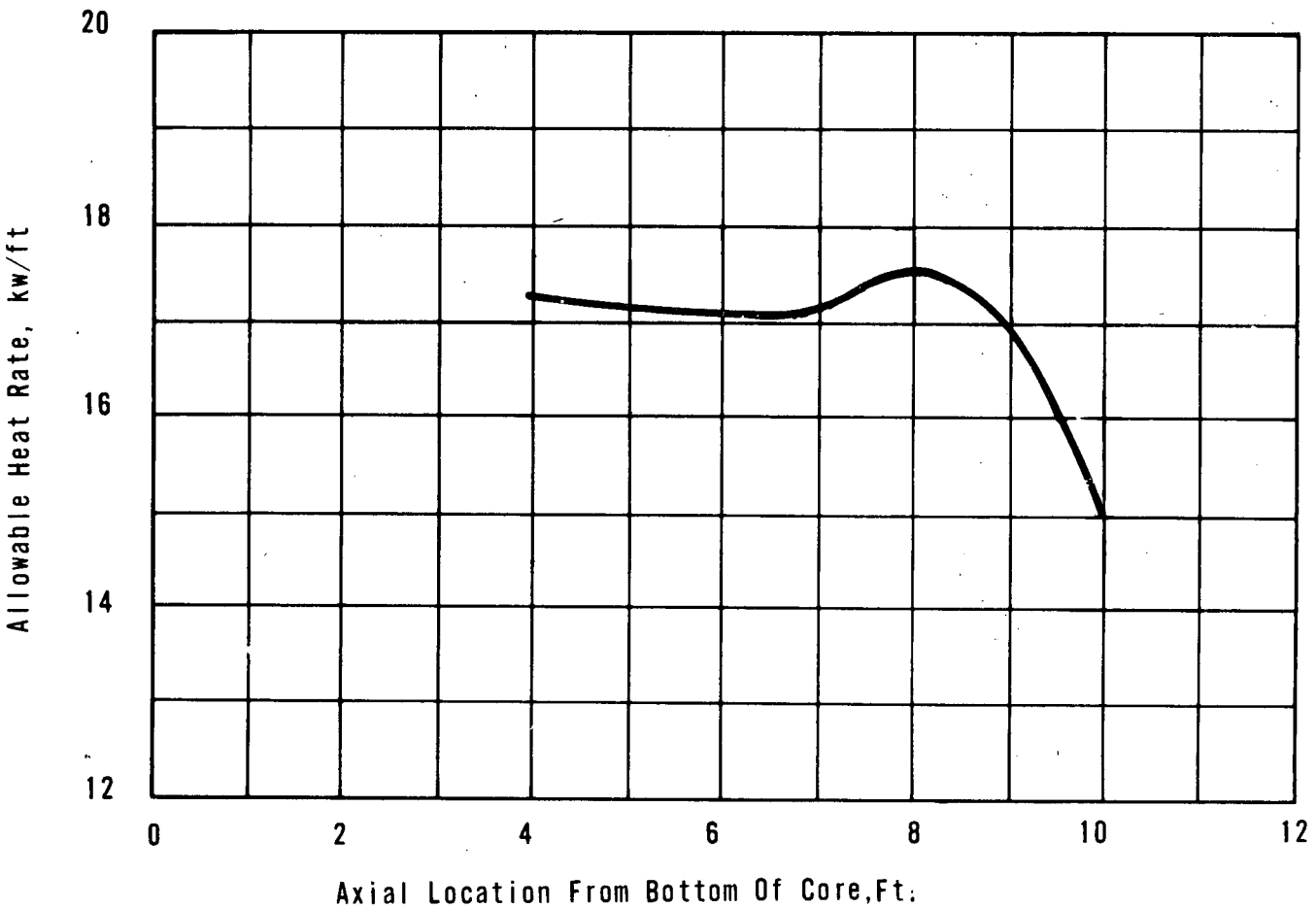
UNIT 1
OCONEE NUCLEAR STATION
Figure 3.5.2-3A



OPERATIONAL POWER IMBALANCE ENVELOPE

Figure 3.5.2-3B

UNIT 2



LOCA LIMITED MAXIMUM ALLOWABLE
LINEAR HEAT RATE

Figure 3.5.2-4