Docket Nos. 50-269
and 50-270

MAY 29 1974

Duke Power Company
ATTN: Mr. Austin C. Thies
Senior Vice President,
Production & Transmission
422 South Church Street
P. O. Box 2178
Charlotte, North Carolina 28201

Gentlemen:

The Atomic Energy Commission has issued Amendment Nos. 1 to Facility Operating License Nos. DPR-38 and DPR-47 issued to Duke Power Company for the operation of the Oconee Nuclear Station, Units 1 and 2. The Amendments revise Appendix A, Technical Specification 3.5.2, "Control Rod Group and Power Distribution Limits".

These Amendments are identified as Change No. 11 to Facility Operating License No. DPR-38 and Change No. 6 to Facility Operating License No. DPR-47.

We have concluded that the issuance of these Amendments will not be inimical to the common defense and security or to the health and safety of the public, and that the Amendments do not involve a significant hazards consideration.

Copies of the Amendments, and a related notice, which has been forwarded to the Office of the Federal Register for publication, are enclosed.

Sincerely,

Original Signed by
Albert Schwencer
A. Schwencer, Chief
Light Water Reactors Branch 2-3
Directorate of Licensing

Enclosures:
1. Amendments Nos. 1 to DPR-38 and DPR-47
2. Federal Register Notice
3. Safety Evaluation

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cc:	See next page					
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DATE ▷						

Form AEC-318 (Rev. 9-53) AECM 0240

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County Supervisor of Oconee County
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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DUKE POWER COMPANY

DOCKET NOS. 50-269 & 50-270

OCONEE NUCLEAR STATION, UNITS 1 & 2

AMENDMENTS TO FACILITY OPERATING LICENSES

Amendment No. 1
License Nos. DPR-38 and
DPR-47

1. The Atomic Energy Commission (the Commission) having found that:

   A. The application for amendments by Duke Power Company (the licensee) dated March 8, 1974, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended, and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the license, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. Prior public notice of this amendment is not required since the amendment does not involve a significant hazards consideration.

2. Accordingly, Paragraph 3.B. of Facility Licenses Nos. DPR-38 and DPR-47 are hereby amended to read as follows:

   "B. Technical Specifications

   The Technical Specifications contained in Appendices A and B attached to Facility Operating Licenses Nos. DPR-38 and DPR-47 are revised as indicated in the attachment to this license

amendment. The Technical Specifications, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised."

3. This license amendment is effective one day from the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Albert Schwencer
Voss A. Moore, Assistant Director
for Light Water Reactors, Group 2
Directorate of Licensing

Attachments:
Change No. 11 to Appendix A
Technical Specifications
License No. DPR-38
Change No. 6 to Appendix A
Technical Specifications
License No. DPR-47

Date of Issuance: MAY 2 9 1974

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NOS. 50-269 & 50-270

DUKE POWER COMPANY

NOTICE OF ISSUANCE OF FACILITY LICENSES AMENDMENTS

Notice is hereby given that the U. S. Atomic Energy Commission (the Commission) has issued Amendment No. 1 to Facility Operating License Nos. DPR-38 and DPR-47 (respectively) issued to the Duke Power Company which revised Technical Specifications for operation of the Oconee Nuclear Station, Units 1 and 2, located in Oconee County, South Carolina. The amendments are effective one day from date of issuance.

The amendments permit changes in control rod group and power distribution limits and require tighter control over reactor power quadrant tilt.

The application for the amendments complies with the standards and requirements of the Act and the Commission's rules and regulations and the Commission has made appropriate findings as required by the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations in 10 CFR Chapter 1, which are set forth in the license amendments.

For further details with respect to these actions, see (1) the application for amendments dated March 8, 1974, (2) Amendment Nos. 1 to License No. DPR-38 and License No. DPR-47, with any attachments, and (3) the Commission's related Safety Evaluation dated April 19, 1974.

All of these are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Oconee County Library, 201 S. Spring Street, Walhalla, South Carolina 29691.

A copy of items (2) and (3) may be obtained upon request addressed to the United States Atomic Energy Commission, Washington, D. C. 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

Dated at Bethesda, Maryland, this 29 day of MAY 1974.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Albert Schwencer
A. Schwencer, Chief
Light Water Reactors Branch 2-3
Directorate of Licensing

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING

SUPPORTING AMENDMENT NOS. 1 TO LICENSE NOS. DPR-38 AND DPR-47

(CHANGE NOS. 11 AND 6 TO APPENDIX A OF TECHNICAL SPECIFICATIONS)

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-269 AND 50-270

Introduction

By letter dated March 8, 1974, Duke Power Company requested changes to the Technical Specifications appended to Facility Operating Licenses Nos. DPR-38 and DPR-47 for the Oconee Nuclear Station, Units 1 and 2.

The Oconee Nuclear Station Technical Specifications, Appendix A to Facility Operating License DPR-38 and DPR-47, require that the reactors be operated such that the quadrant tilt is maintained within certain prescribed limits (Technical Specification 3.5.2.4), and specify certain limitations on control bank positions (Technical Specification 3.5.2.5). Technical Specification 3.5.2.5 also imposes, for transient xenon, operating restrictions involving hold times below 80 percent of rated power and permissives on boration/deboration of the coolant. Above 80 percent of rated power, the permissible control bank positions lie in a relatively narrow band. The result of the current Technical Specifications is that the allowable operating procedures for a return to full power, following load reductions below 80 percent of rated power, are unduly restrictive. Discussions with Duke Power Company and B&W personnel concerning this information and data, and an evaluation by the Regulatory staff has resulted

in the modifications to the current Technical Specifications discussed herein.

The proposed changes involve:

(1) More restrictive limits on reactor quadrant power tilt.

(2) Changed control rod withdrawal limits and operating restrictions.

(3) Slightly less restrictive limits on reactor power imbalance limits, with more stringent requirements on maintaining the power imbalance within limits.

(4) Inclusion of a new figure showing the LOCA limit maximum allowable linear heat rate as a function of axial location from the core inlet.

(5) Minor wording changes having no major technical significance.

The revised Technical Specification 3.5.2 is to be effective only through the first fuel cycle of Oconee Unit 1.

Bases for Changes in the Technical Specifications

The technical bases for the changes in the Technical Specification 3.5.2 are founded on the following considerations:

(1) The quadrant tilt limit at full rated power is reduced from 5 to 4 percent for Oconee Units 1 and 2.

(2) The previous limits from the B&W report BAW-10078 were established for Oconee Unit 2 fuel densification peaking penalties. The revised limits for Unit 1 are developed using Oconee Unit 1 fuel densification peaking penalties. Oconee Unit 1 fuel initial density is 93.5% of theoretical density compared to 92.5% for Oconee Unit 2. The greater density provides additional safety margin previously unaccounted for in Unit 1 operation.

(3) Oconee Unit 1 operating power peaks are 3.5% lower than Oconee Unit 2 peaks during time of maximum peaking condition (BOL power maneuver).

Discussion of Technical Specification 3.5.2 Changes

General

The substantive changes to be incorporated in the Technical Specification 3.5.2 are changes in the allowable limits of core operating parameters, as perceived by operating personnel from reactor plant instrumentation during plant operation. The parameters of interest directly affect the overall core power peaking factor. This factor has been established and approved through prior safety analyses of the Oconee 1 and 2 reactors, and is the only safety-related issue relevant to the changes discussed herein.

Quadrant Power Tilt

The quadrant tilt Technical Specification (3.5.2.4) has been made more restrictive for both Units 1 and 2. The changes incorporated reduce the allowable power variation (in a given plane through the core) relative to an average core power level, providing increased assurance that the reactor fuel is operating within acceptable power limits. The reduction in power peaking factor gained by the quadrant tilt limit changes provides some of the margin for reducing restrictions on control rod movement discussed in a following section of this evaluation. The following modifications have been made (except for physics tests):

(1) The quadrant power tilt limit is reduced from 5 to 4 percent.

(2) The maximum permitted quadrant power tilt is 9 percent. If the tilt exceeds 9 percent, the reactor must be brought to the hot shutdown condition. Previously, the reactor could operate with quadrant tilts up to 25 percent.

(3) If the quadrant power tilt exceeds 4 percent, the tilt must be reduced to 4 percent or less within two hours or a reduction in power is made. The tilt must also be reduced to less than 4 percent within 24 hours, otherwise, the reactor must be placed in the hot shutdown condition. Previously, the quadrant power tilt had to be reduced to less than 5 percent within four hours, otherwise, the reactor power/imbalance setpoints had to be reduced 2 percent in power for each 1 percent tilt.

(4) If the quadrant tilt exceeds 4 percent, but not more than 9 percent, and if there is a simultaneous indication of a dropped control rod, then reactor power is restricted to 60% of the power allowable for the reactor coolant pump combinations.

(5) If the reactor has been brought to the hot shutdown condition because of Technical Specification limits on the quadrant power tilt, subsequent reactor operation is permitted for the purpose of measurement, testing, and corrective action provided that the power and power range high flux set point are restricted by a reduction of 2 percent of full power for each 1 percent tilt.

Control Rod Positions

The control rod withdrawal limits given in Technical Specification 3.5.2.5c are specified in separate figures for Oconee Unit 1 and Oconee Unit 2. The control rod withdrawal limits for Oconee Unit 2 are only slightly changed from those in the current Technical Specifications; the changes primarily reflect the reduction in the quadrant power tilt limit from 5 to 4 percent. Oconee Unit 1 control rod withdrawal limits are changed considerably. The changes in the limits are made possible by items (1) through (3) listed above as "Bases for Changes in the Technical Specifications", and primarily by item (2), the higher fuel density in the Oconee Unit 1 core. Evaluation of the new rod withdrawal limits, in combination with other changes discussed in the safety evaluation, against previously approved core power peaking factors shows that the factors are not increased. Previously approved design margins of safety are maintained.

An addition has been made to the control rod withdrawal limit Technical Specification which requires that, if control rod withdrawal limits are reached, corrective action to achieve acceptable control rod positions must be taken immediately. Acceptable control rod positions must be attained within two hours. The intent of this addition to the Technical Specification is not to provide a broader operational control rod band, but to provide a small margin in time to achieve the proper boration/deboration of the coolant.

Operating restrictions are included in Technical Specification 3.5.2.5d to prevent excessive power peaking by transient xenon when the reactor is brought to full power after being at low power (less than 80% of full power) for a period of time. These restrictions are as follows:

(1) The xenon reactivity must be within 10 percent of the value for operation at steady state rated power.

(2) The xenon reactivity must be asymptotically approaching the value for operation at steady state power.

The restrictions listed are an explicit statement of allowable operating limits and replace previously specified procedural controls that were designed to achieve operation within these same limits. The Technical Specification change is thus not a change in the limiting condition. The change is the deletion of specific operating instructions in favor of the specification of required objectives with which the operator must comply. No change in any potential hazard is involved.

Reactor Power Imbalance

A modification has been made in the reactor power imbalance Technical Specification (3.5.2.6). If the imbalance is not within the envelope of the figures provided, then an acceptable imbalance must be achieved within two hours or else a decrease in power must be made until imbalance limits are met. Previously, a four hour period was allowed to achieve imbalance limits.

New figures for Oconee Units 1 and 2 are provided for the imbalance limits. These figures indicate an increase in the negative imbalance

limits due to margins in the power peaking factors available in the analysis provided in BAW-10078 and in the quadrant tilt limit. Evaluation of the increased imbalance limits relative to the other Technical Specification changes discussed in this safety evaluation has shown that previously approved core power peaking factors are not increased, and that the previously approved design margins of safety are maintained.

Other Changes

In addition to the changes in the preceding Technical Specifications, a number of other changes have also been made in Technical Specification 3.5.2. These changes are wording changes of no major significance. The bases for Technical Specification 3.5.2 have also been changed where needed to reflect changes throughout the Technical Specification.

A new figure giving the LOCA limit maximum allowable linear heat rate as a function of axial location from the core inlet has also been provided. This new figure is based on the use of corrected specific heat (Cp) values for UO_2 by B&W in its analyses. The new LOCA limit curve indicates a reduction of about 0.6 kW/ft in the LOCA limit over the 4 to 7 feet elevation of the core.

Conclusion

The staff concludes that the modifications proposed do not:

(1) involve a safety consideration of a type or magnitude not considered by any previous staff safety review of this facility,

(2) potentially involve a substantial increase in the probability or consequences of an accident considered in any previous staff safety review, or

(3) potentially decrease the margin of safety during normal plant operation, anticipated operational occurrences or postulated accidents considered in any previous staff safety review.

Therefore, changes in the Technical Specification 3.5.2, as proposed by the applicant, do not involve a significant hazards consideration and would not cause undue risk to the health and safety of the public.

for I. A. Peltier, Project Manager
Light Water Reactors Branch 2-3
Directorate of Licensing

A. Schwencer, Chief
Light Water Reactors Branch 2-3
Directorate of Licensing

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% Δk/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% Δk/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% Δk/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% Δk/k at rated power or 1.0% Δk/k at hot zero power except for physics testing when the requirements of Specification 3.1.9 shall apply.

3.5.2.4 Quadrant Power Tilt

a. Whenever the quadrant power tilt exceeds 4 percent, except for physics tests, the quadrant tilt shall be reduced to less than 4 percent within two hours or the following actions shall be taken:

(1) If four reactor coolant pumps are in operation, the allowable thermal power shall be reduced by 2 percent of full power for each 1 percent tilt in excess of 4 percent below the power level cutoff (see Figures 3.5.2-1A1, 3.5.2-1A2, 2.5.2-1B1 and 3.5.2-1B2).

(2) If less than four reactor coolant pumps are in operation, the allowable thermal power shall be reduced by 2 percent of full power for each 1 percent tilt below the power allowable for the reactor coolant pump combination (see Figures 3.5.2-2A, 3.5.2-2B).

(3) Except as provided in 3.5.2.4.b, the reactor shall be brought to the hot shutdown condition within four hours if the quadrant tilt is not reduced to less than 4 percent after 24 hours.

b. If the quadrant tilt exceeds 4 percent and there is simultaneous indication of a misaligned control rod per Specification 3.5.2.2, reactor operation may continue provided power is reduced to 60% of the thermal power allowable for the reactor coolant pump combination.

c. Except for physics tests, if quadrant tilt exceeds 9 percent, a controlled shutdown shall be initiated immediately and the reactor shall be brought to the hot shutdown condition within four hours.

d. Whenever the reactor is brought to hot shutdown pursuant to 3.5.2.4.a(3) or 3.5.2.4.c above, subsequent reactor operation is permitted for the purpose of measurement, testing, and corrective action provided the thermal power and the power range high flux setpoint allowable for the reactor coolant pump combination are restricted by a reduction of 2 percent of full power for each 1 percent tilt for the maximum tilt observed prior to shutdown.

e. Quadrant power tilt shall be monitored on a minimum frequency of once every 2 hours during power operation above 15 percent of rated power.

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 25% $\pm$ 5% 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:

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% $\Delta k/k$. 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% $\Delta k/k$ 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% $\Delta k/k$ 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.

**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.

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

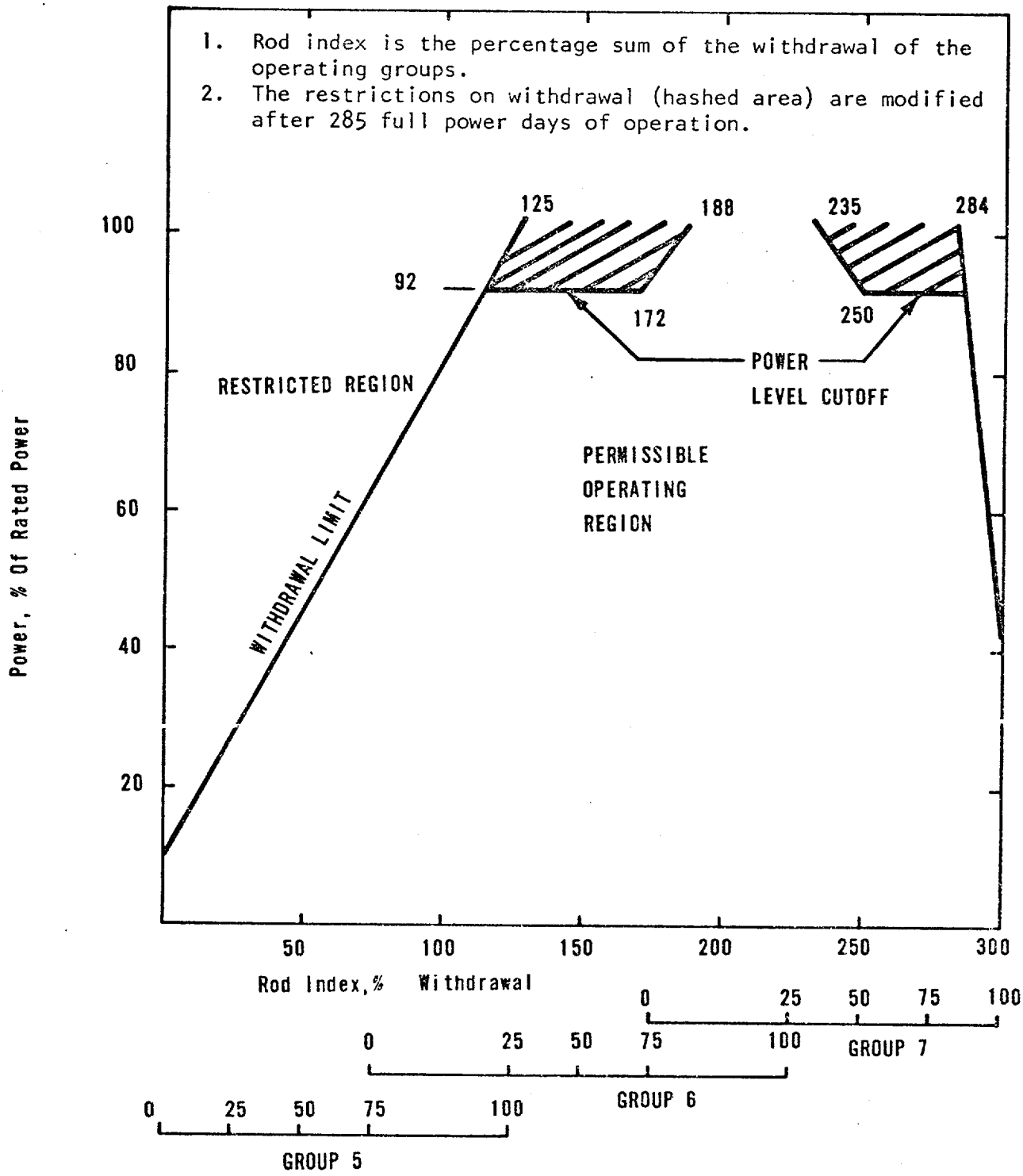
Unit 1 rod withdrawal and imbalance limits are restricted to the first fuel cycle since they were derived using the core burnup status at the time they were derived. New limits will be derived for the second fuel cycle.

Operating restrictions are included in Technical Specification 3.5.2.5d to prevent excessive power peaking by transient xenon. The xenon reactivity must be beyond the "undershoot" region and asymptotically approaching its equilibrium value at rated power.

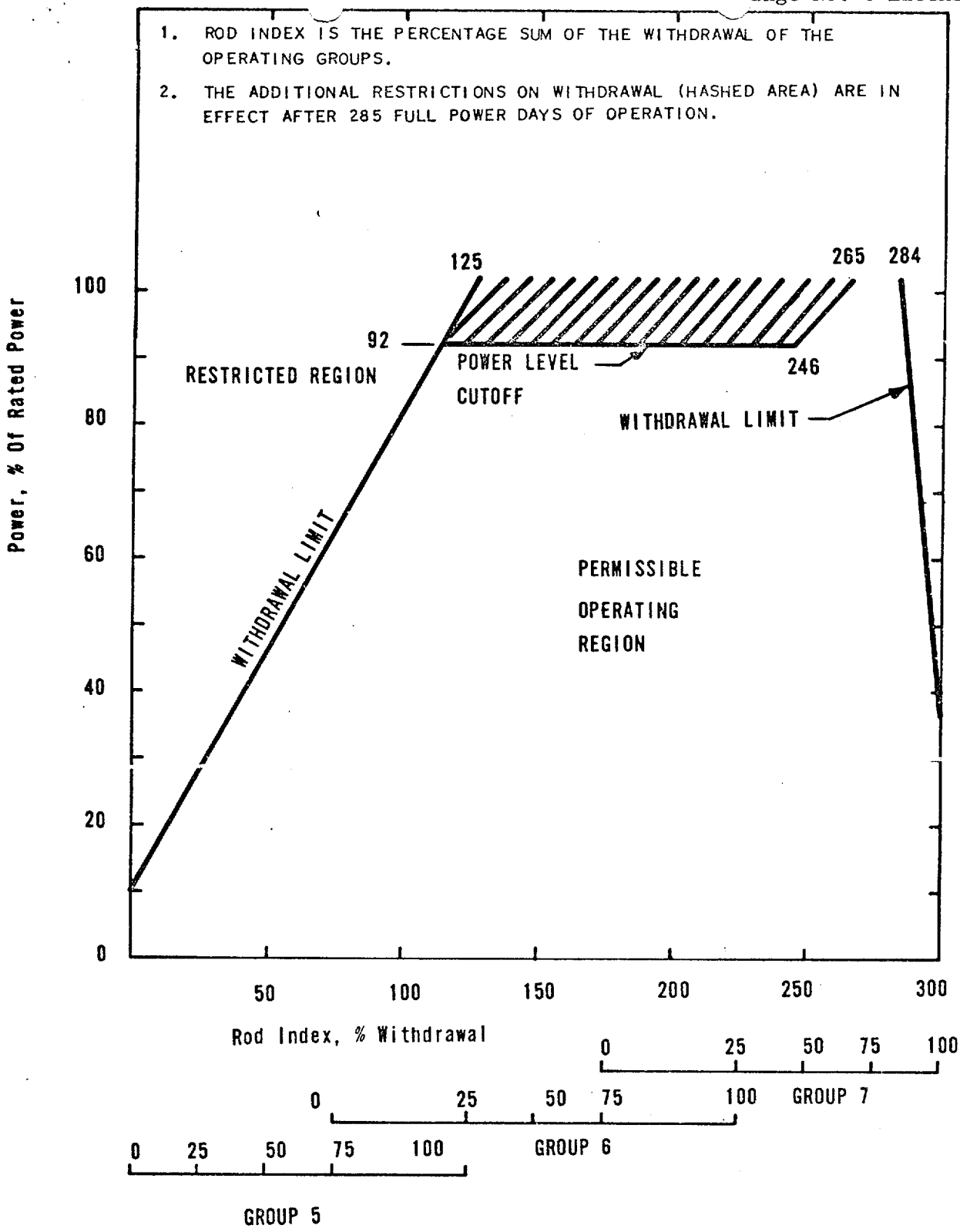
REFERENCES

[1]Section 3.2.2.1.2

[2]Section 14.2.2.2

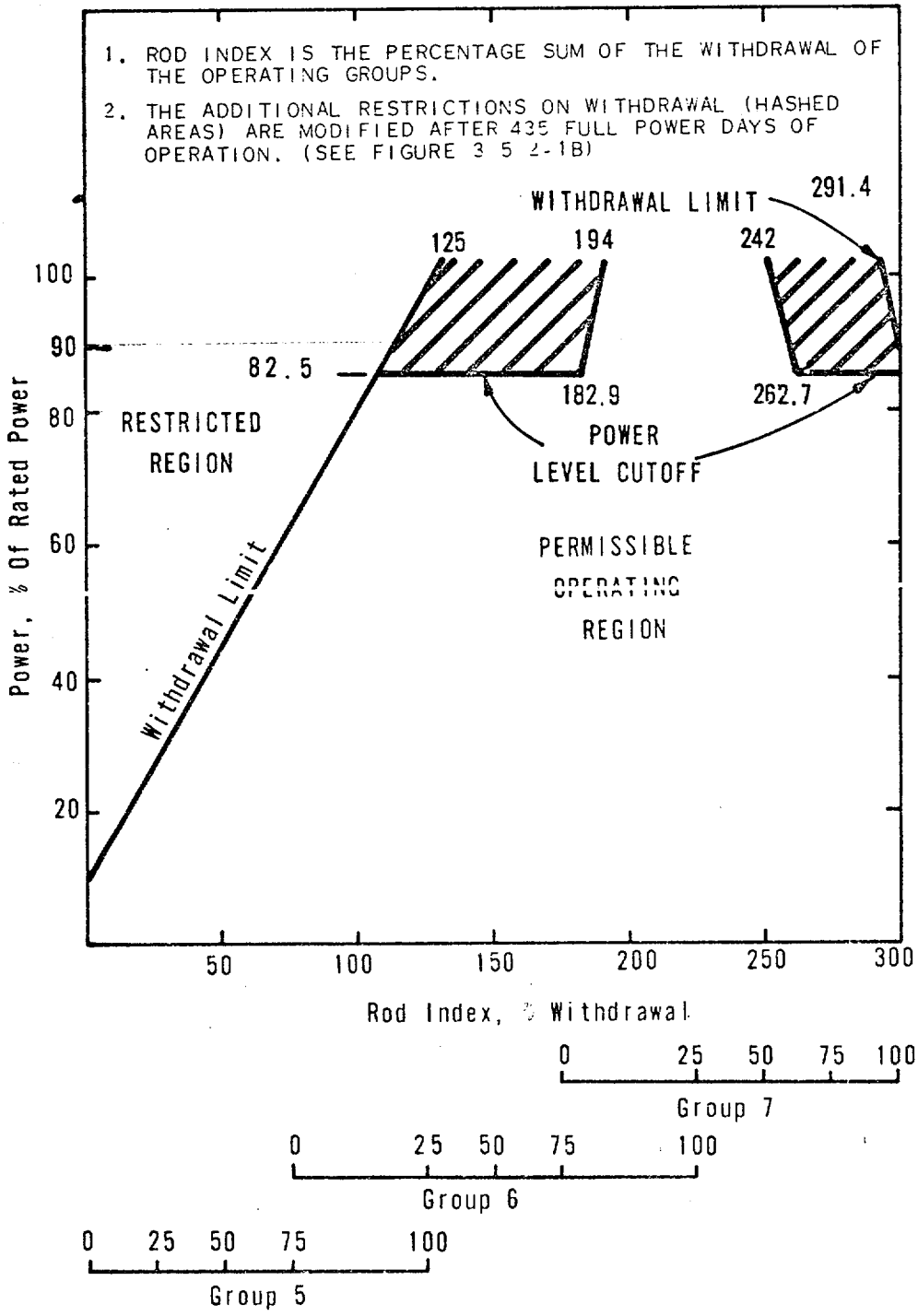


CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION



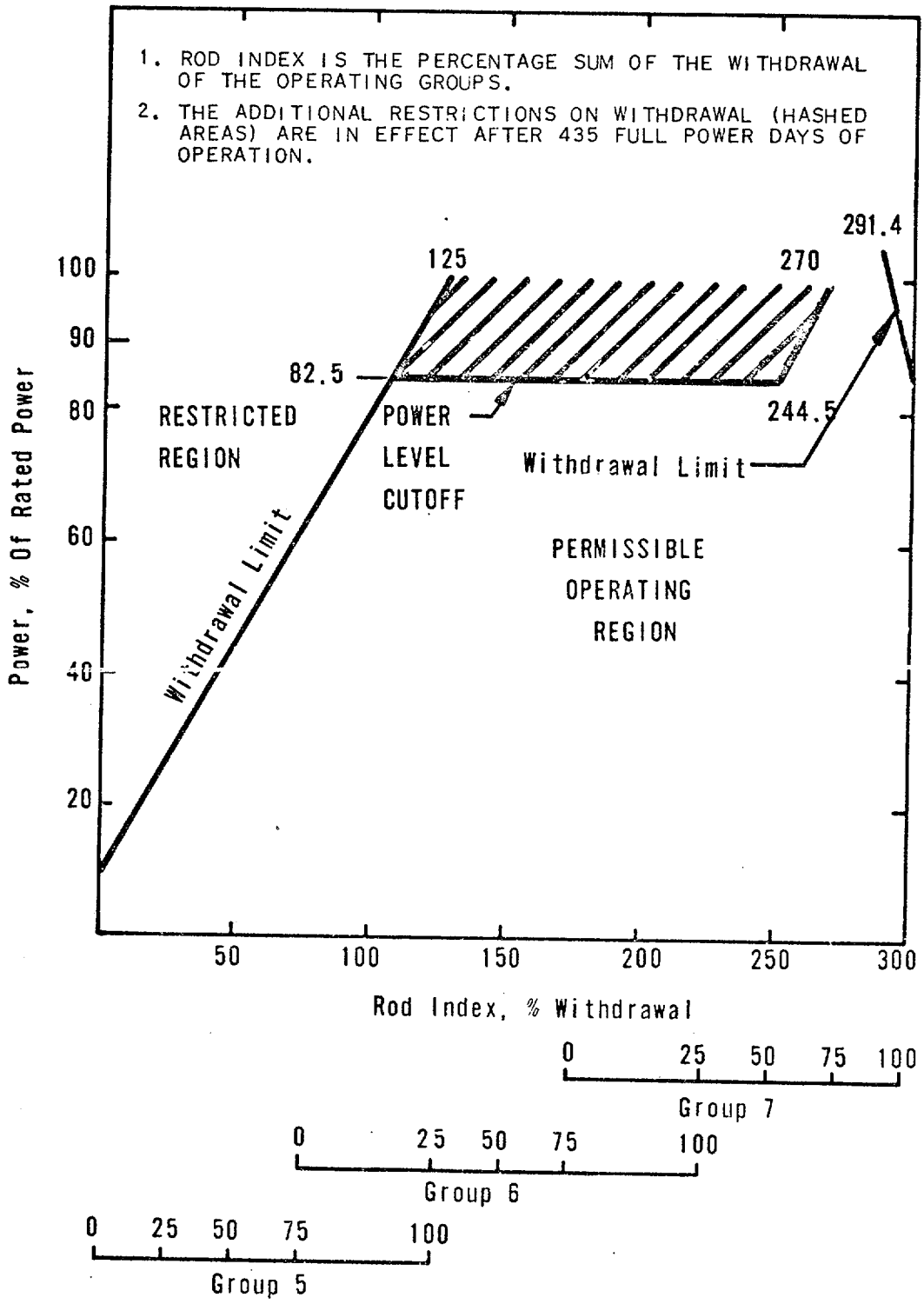
CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION

UNIT 1 (First Fuel Cycle)
OCONEE NUCLEAR STATION
Figure 3.5.2-1A2



CONTROL ROD GROUP WITHDRAWAL LIMITS
FOR 4 PUMP OPERATION UNIT 2

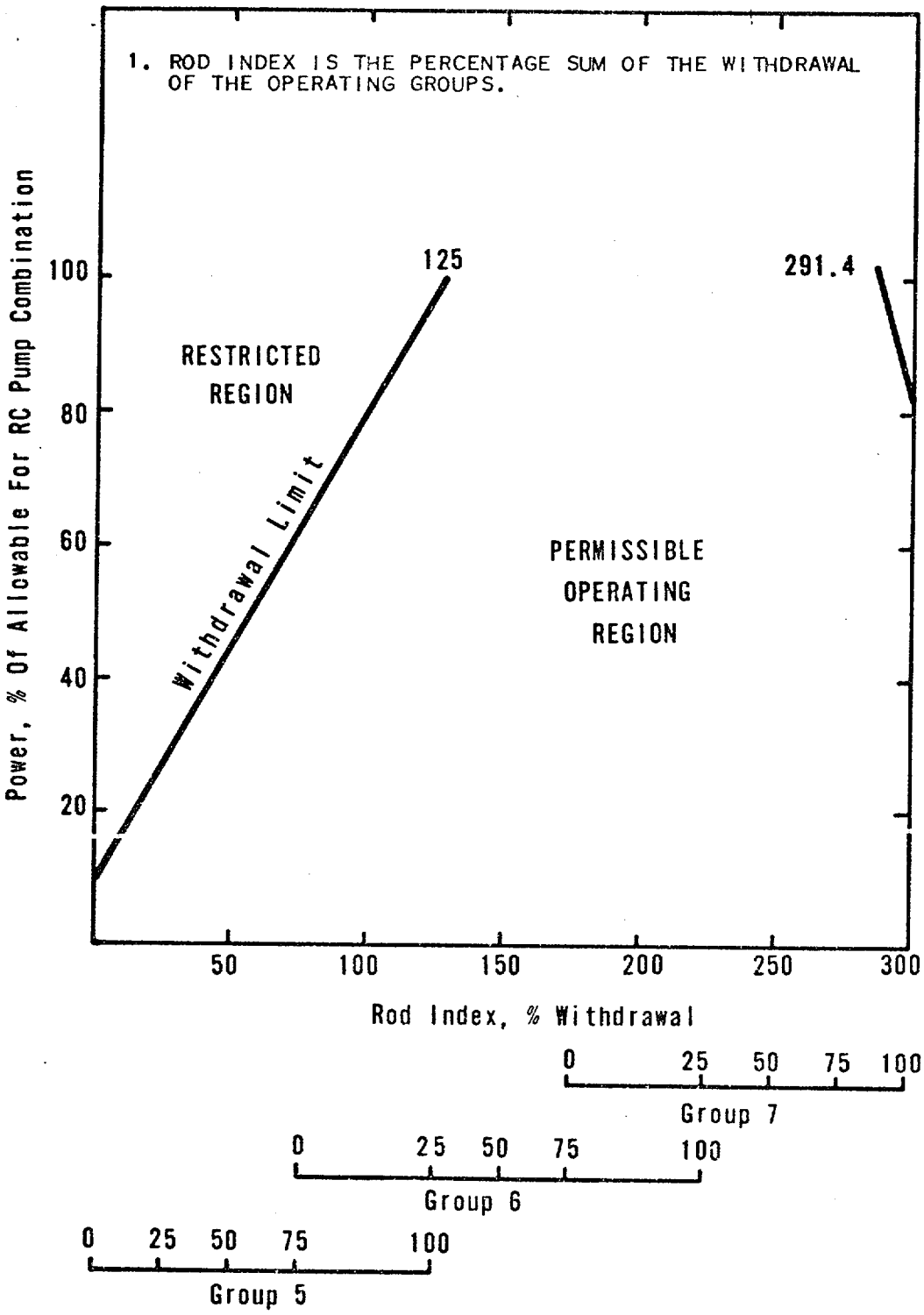
Figure 3.5.2-1B



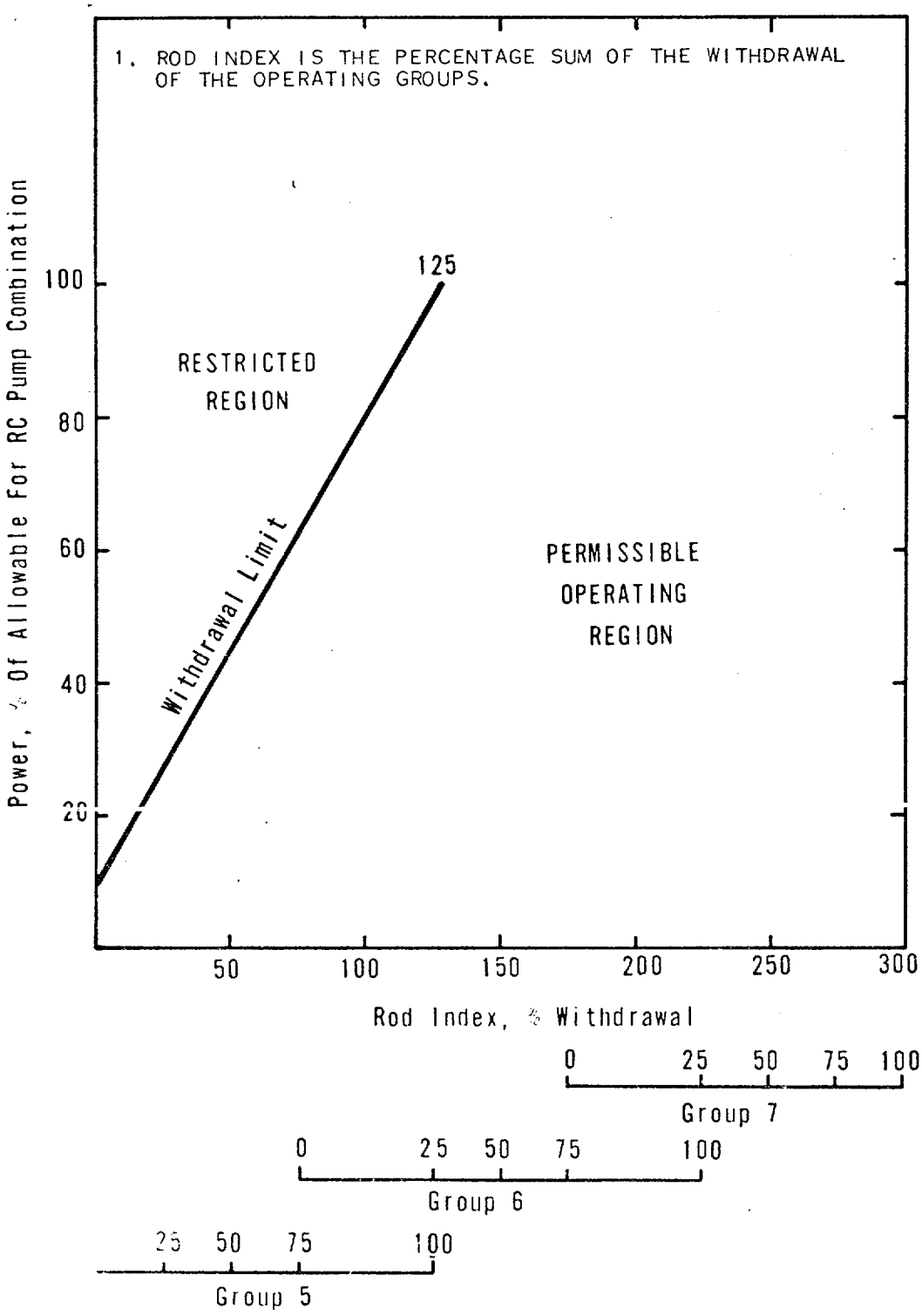
CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 4 PUMP OPERATION

UNIT 2

Figure 3.5.2-1B2

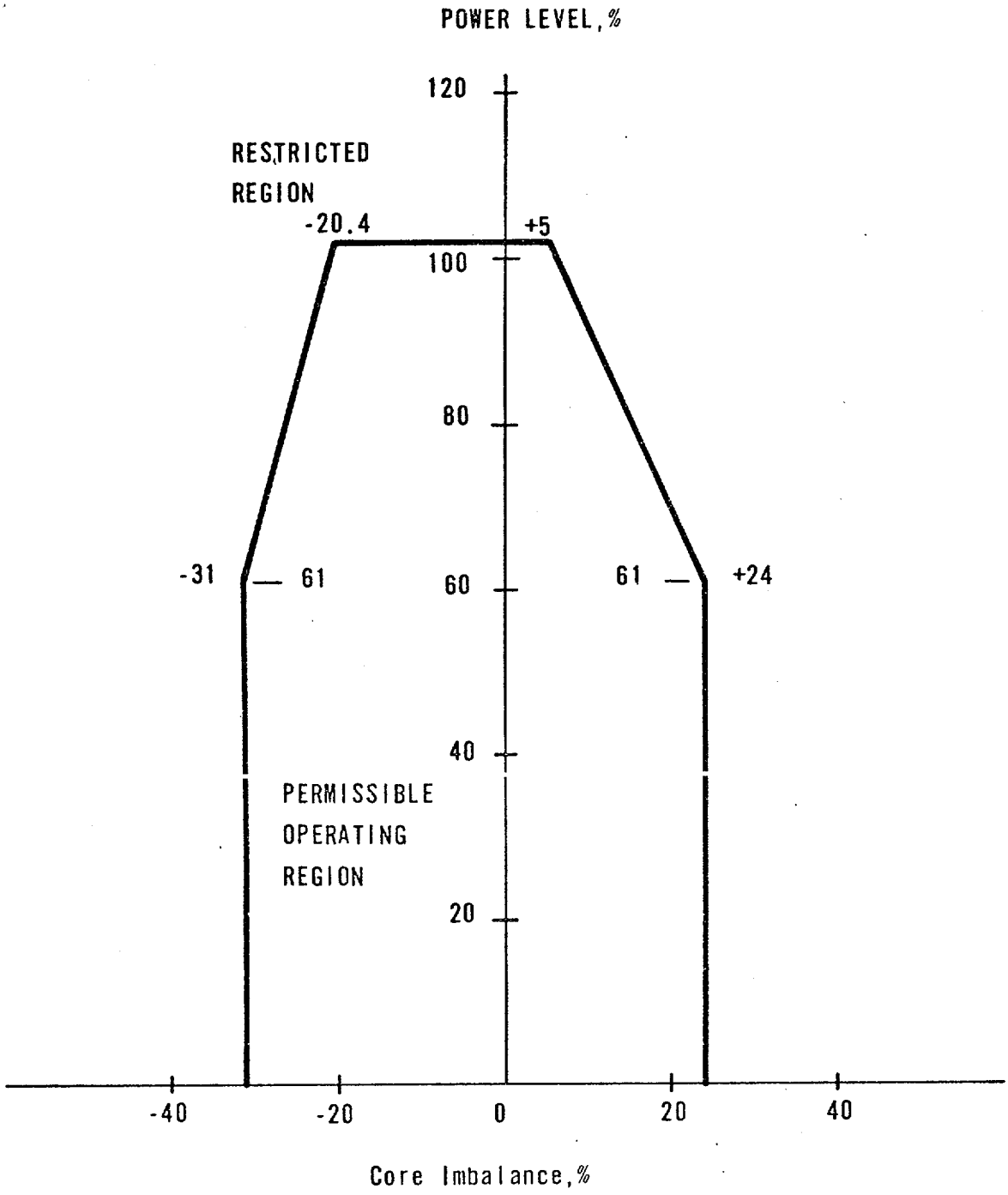


CONTROL ROD GROUP WITHDRAWAL LIMITS FOR 3 AND 2 PUMP OPERATION

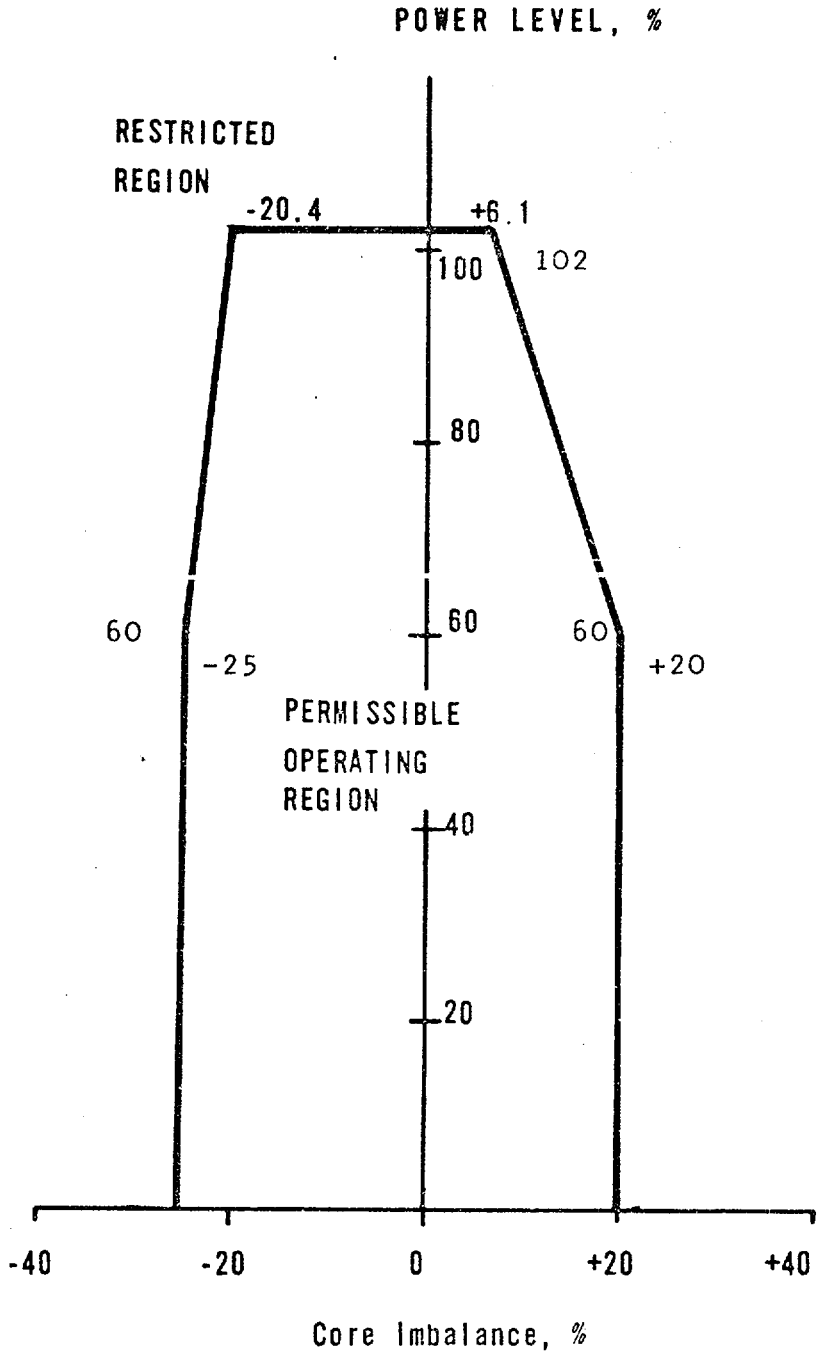


CONTROL ROD GROUP WITHDRAWAL LIMITS
FOR 3 AND 2 PUMP OPERATION

UNIT 2
OCONEE NUCLEAR STATION
Figure 3.5.2-2B

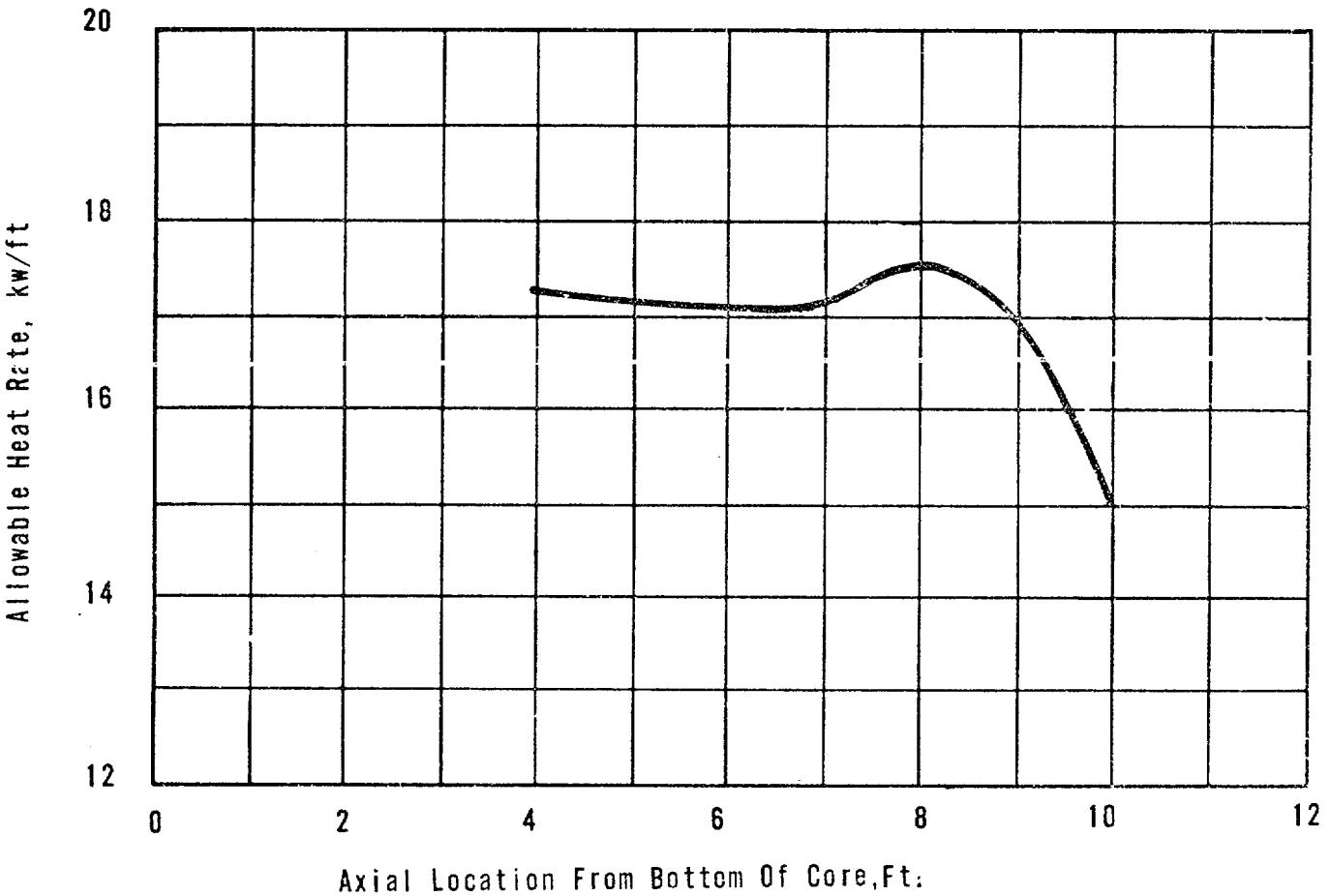


OPERATIONAL POWER-IMBALANCE ENVELOPE



OPERATIONAL POWER IMBALANCE ENVELOPE
Figure 3.5.2-3B

UNIT 2



LOCA LIMITED MAXIMUM ALLOWABLE
LINEAR HEAT RATE

Figure 3.5.2-4