



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 53 TO LICENSE NO. DPR-38

AMENDMENT NO. 53 TO LICENSE NO. DPR-47, AND

AMENDMENT NO. 50 TO LICENSE NO. DPR-55

DUKE POWER COMPANY

DOCKET NOS. 50-269, 50-270 AND 50-287

Introduction

By letter dated November 9, 1977, Duke Power Company (the licensee) requested Technical Specification changes on quadrant flux tilt and control rod position limits to the Facility Operating License for the Oconee Nuclear Station, Unit 1, Cycle 4. The request was initiated by the licensee's desire for full power operation with quadrant neutron flux tilt (potential power peaking) which has been observed. On October 31, 1977, the staff issued amendments which allowed continued operation and testing with an increased flux tilt at 75% power with conservative restrictions on core thermal power, nuclear power trip setpoint, and rod position limits. With this continued operation and testing, the tilt has decreased to a value near the current Technical Specification limit for 100% power. The licensee has stated in the November 9, 1977 letter, that the requested change would provide a restriction on power peaking, and that the proposed operation is more desirable and prudent than the current Technical Specification limits on the basis of the power peaking restriction.

Evaluation

The licensee's analysis in support of the proposed Technical Specifications is for the first 100 effective full power days (EFPD) of operation. Analysis for operation beyond 100 EFPD will be supplied at a later date. The licensee has stated that the proposed Technical Specifications have been established with the same calculation models and methods as previously reviewed and found acceptable for Oconee 1 Cycle 4. The proposed Technical Specifications would allow operation in an unrodded mode (change in rod position limits) with a maximum quadrant tilt of 6.03%.

The rod position limits are based on the most limiting of the following three criteria: ECCS power peaking, shutdown margin, and potential ejected rod worth. The quadrant tilt limits are established to prevent the linear heat generation rate peaking beyond analyzed conditions. A discussion of these considerations follow.

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The licensee performed the power peaking analysis for Oconee 1 Cycle 4 operation from 0 to 100 EFPD in the unrodded mode with an assumed 6.03% quadrant tilt throughout the range of power levels. This analysis was based on calculation using the PDQ computer code and showed a 9% increase in local peaking based on the relationship between peaking and tilt. The licensee has supplied a comparison of calculated and measured power distributions at 40% and 75% of full power. The licensee has stated that these power distributions in conjunction with the standard total and radial nuclear uncertainty factors show that the 9% increase in local peaking is conservative.

The licensee calculated the total peaks during various times of the fuel cycle through 100 EFPD for the proposed Technical Specification limits. This calculation showed that the total peaks would be reduced from the values for the current Technical Specification limits at all times from 4 EFPD to 100 EFPD. Oconee Unit 1 Cycle 4 is beyond the 4 EFPD value, so that the power peaking will be reduced for the Oconee Unit 1 proposed operation.

The licensee has pointed out that operation in the unrodded mode provides a means to restrict power peaking to nominal values. This protection is gained at the expense of operational flexibility. With this mode of operation the plant has a greatly reduced maneuvering capability. However, the usual peaking factors due to xenon changes induced by normal maneuvering were included in the analysis, providing additional conservatism.

The ejected rod worth insertion limits were determined based on using the hot, zero power measured values of rod worth to correct for the quadrant tilt effects. The resulting maximum effected rod worth correction factor was over 50%. This factor was used to adjust calculated ejected rod worths for the existence of the quadrant tilt. The net result of this procedure is the decrease in the amount that the operating banks may be inserted to satisfy the criteria during a postulated ejected rod accident. The resulting rod insertion limits were less limiting than shutdown margin criteria at all power levels above zero power. Thus, only at the zero power limit are the rod position limits based on ejected rod criteria.

The shutdown rod insertion limits were determined using standard techniques based on symmetric conditions and adjusting these calculations to account for the tilt. The calculated stuck rod worths are increased over 50%. The measured values of banks 5, 6 and 7 at Hot Zero Power were also used to determine the shutdown margin rod insertion limits. As an added conservatism the beginning of life calculated total rod worth was used at 100 EFPD to determine the limits at this time. The licensee stated that this procedure results in conservative shutdown rod insertion limits.

The licensee has concluded that the net effect of all these conservatisms is that the core is restricted in operating flexibility but allowed to operate at full power in a safe manner. The current Axial Power Shaping Rods position limits and imbalance limits for 0 to 100 EFPD are more restrictive than necessary for the proposed mode of rod-out-operations. The rod position limits were determined based on the super-position of the most conservative calculated and measured data.

The proposed unrodded operation is not a new operational mode. It has been previously submitted<sup>1</sup> and found acceptable.<sup>2</sup> The regulatory position in reference 2 suggests that Technical Specifications include a two-hour hold at 90% of rated power to ensure that transient xenon does not increase the linear heat rate by more than 5%, and quadrant tilt verifications at two-hour intervals. Rancho Seco Unit 1 Technical Specifications allow operation in an unrodded mode. The staff compared these to the Oconee 1 Technical Specifications. We have found that the Rancho Seco Unit 1 Technical Specifications are compatible with the Oconee 1 Technical Specifications and that the intent of the regulatory positions are satisfied by the current Oconee 1 Technical Specifications which are not changed for this amendment.

We have reviewed the licensee's current surveillance program. We consider that additional surveillance is necessary to assure that operational anomalies are observed on a timely basis. Thus, the licensee has agreed to increase surveillance of reactor power distribution to daily.

We have also agreed to remove the requirement for a report in 24 EFPD since the licensee must justify continued operation past 100 EFPD and this justification will address the flux tilt experienced during Oconee 1 Cycle 4.

Based on the licensee's\*submittal which shows that the rod position limits conservatively compensate for the increased potential tilt, the previous staff review of unrodded operation for Rancho Seco Unit 1, the compliance of Oconee Unit 1 to the regulatory position for unrodded cores, and the increased power distribution surveillance, we find the requested change in rod position and tilt limits to be acceptable.

We consider operation at 100% power or below acceptable with a flux tilt of 6.03%. However, we have evaluated operation for only 100 EFPDs. Operation past 100 EFPD must be supported by an amendment request by the licensee with suitable justification. We are requesting that a request to amend the license for operation past 100 EFPD be submitted no later than 80 EFPD.

Based on our evaluation, operation in the proposed manner does not reduce the safety margins of the current Technical Specification limits. We conclude that the probability or consequences of any transients and accidents considered in the FSAR are not increased and that the safety margins are not reduced. Thus, we conclude that these changes do not involve a significant hazards consideration.

### Environmental Consideration

We have determined that these amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that these amendments involve an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement, negative declaration, or environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

### Conclusion

We have concluded, based on the considerations discussed above, that:

- (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration,
- (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: November 23, 1977

References

- 1 "Operational Parameters for Rancho Seco, Unit 1," TRG-73-47, October 1973.
- 2 Memorandum from V. Stello to R. C. DeYoung, "Review of Babcock and Wilcox letter Report Entitled, 'Operational Parameters for Rancho Seco Unit 1,' October 1973, TRG-73-47," October 16, 1973.



UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NOS. 50-269, 50-270 AND 50-287

DUKE POWER COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY  
OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment Nos. 53, 53 and 50 to Facility Operating License Nos. DPR-38, DPR-47 and DPR-55, respectively, issued to Duke Power Company which revised the Technical Specifications for operation of the Oconee Nuclear Station, Unit Nos. 1, 2 and 3, located in Oconee County, South Carolina. The amendments are effective within 30 days after the date of issuance.

These amendments revise the Technical Specifications to allow operation of Oconee Unit 1 Cycle 4 at 100% full power with a flux tilt of 6.03% in an unrodded mode.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of these amendments was not required since the amendments do not involve a significant hazards consideration.

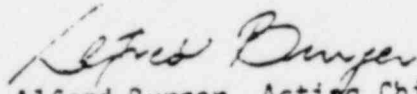
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The Commission has determined that the issuance of these amendments will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

For further details with respect to this action, see (1) the application for amendments dated November 9, 1977, (2) Amendment Nos. 53, 53 and 50 to License Nos. DPR-38, DPR-47 and DPR-55, respectively, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C. and at the Oconee County Library, 201 South Spring Street, Walhalla, South Carolina 29691. A copy of items (2) and (3) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 23rd day of November 1977.

FOR THE NUCLEAR REGULATORY COMMISSION

  
Alfred Burger, Acting Chief  
Operating Reactors Branch #1  
Division of Operating Reactors