

May 10, 1990

Dockets Nos. 50-269, 50-270  
and 50-287

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Mr. H. B. Tucker, Vice President  
Nuclear Production Department  
Duke Power Company  
422 South Church Street  
Charlotte, North Carolina 28242

Dear Mr. Tucker:

SUBJECT: ISSUANCE OF AMENDMENTS NOS. 184, 184, AND 181 TO FACILITY OPERATING  
LICENSES DPR-38, DPR-47, and DPR-55 - OCONEE NUCLEAR STATION,  
UNITS 1, 2, AND 3 (TACS 68064/68065/68066)

The Nuclear Regulatory Commission has issued the enclosed Amendments Nos. 184, 184, and 181 to Facility Operating Licenses Nos. DPR-38, DPR-47 and DPR-55 for the Oconee Nuclear Station, Units 1, 2, and 3. These amendments consist of changes to the Technical Specifications (TSs) in response to your request dated January 22, 1988, as supplemented October 9, 1989.

The TSs revised by these amendments allow an increase in the maximum linear heat rate at the 2-foot core level for specified periods of fuel burnup.

Copies of our Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

[Original signed by]

Leonard A. Wiens, Project Manager  
Project Directorate II-3  
Office of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 184 to DPR-38
2. Amendment No. 184 to DPR-47
3. Amendment No. 181 to DPR-55
4. Safety Evaluation
5. Notice of Issuance

cc w/enclosures:  
See next page

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Mr. H. B. Tucker  
Duke Power Company

Oconee Nuclear Station  
Units Nos. 1, 2 and 3

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DATED: May 10, 1990

AMENDMENT NO. 184 TO FACILITY OPERATING LICENSE DPR-38 - Oconee Nuclear Station, Unit 1  
AMENDMENT NO. 184 TO FACILITY OPERATING LICENSE DPR-47 - Oconee Nuclear Station, Unit 2  
AMENDMENT NO. 181 TO FACILITY OPERATING LICENSE DPR-55 - Oconee Nuclear Station, Unit 3

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

DUKE POWER COMPANY

DOCKET NO. 50-269

OCONEE NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 184  
License No. DPR-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Oconee Nuclear Station, Unit 1 (the facility) Facility Operating License No. DPR-38 filed by the Duke Power Company (the licensee) dated January 22, 1988, as supplemented October 9, 1989, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, 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 set forth in 10 CFR Chapter I;
  - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations, and all applicable requirements have been satisfied.
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B. of Facility Operating License No. DPR-38 is hereby amended to read as follows:

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Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 184, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



David B. Matthews, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Technical Specification  
Changes

Date of Issuance: May 10, 1990



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

DUKE POWER COMPANY

DOCKET NO. 50-270

OCONEE NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 184  
License No. DPR-47

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Oconee Nuclear Station, Unit 2 (the facility) Facility Operating License No. DPR-47 filed by the Duke Power Company (the licensee) dated January 22, 1988, as supplemented October 9, 1989, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, 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 set forth in 10 CFR Chapter I;
  - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations, and all applicable requirements have been satisfied.
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B. of Facility Operating License No. DPR-47 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 184, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

  
David B. Matthews, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Technical Specification  
Changes

Date of Issuance: May 10, 1990



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

DUKE POWER COMPANY

DOCKET NO. 50-287

OCONEE NUCLEAR STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 181  
License No. DPR-55

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Oconee Nuclear Station, Unit 3 (the facility) Facility Operating License No. DPR-55 filed by the Duke Power Company (the licensee) dated January 22, 1988, as supplemented October 9, 1989, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, 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 set forth in 10 CFR Chapter I;
  - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations, and all applicable requirements have been satisfied.
2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B. of Facility Operating License No. DPR-55 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 181, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



David B. Matthews, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Technical Specification  
Changes

Date of Issuance: May 10, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 184

FACILITY OPERATING LICENSE NO. DPR-38

DOCKET NO. 50-269

AND

TO LICENSE AMENDMENT NO. 184

FACILITY OPERATING LICENSE NO. DPR-47

DOCKET NO. 50-270

AND

TO LICENSE AMENDMENT NO. 181

FACILITY OPERATING LICENSE NO. DPR-55

DOCKET NO. 50-287

Replace the following page of the Appendix "A" Technical Specifications with the enclosed page. The revised page is identified by Amendment number and contains a vertical line indicating the area of change.

Remove Page

3.5-30

Insert Page

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ATTACHMENT TO LICENSE AMENDMENT NO. 184

FACILITY OPERATING LICENSE NO. DPR-38

DOCKET NO. 50-269

AND

TO LICENSE AMENDMENT NO. 184

FACILITY OPERATING LICENSE NO. DPR-47

DOCKET NO. 50-270

AND

TO LICENSE AMENDMENT NO. 181

FACILITY OPERATING LICENSE NO. DPR-55

DOCKET NO. 50-287

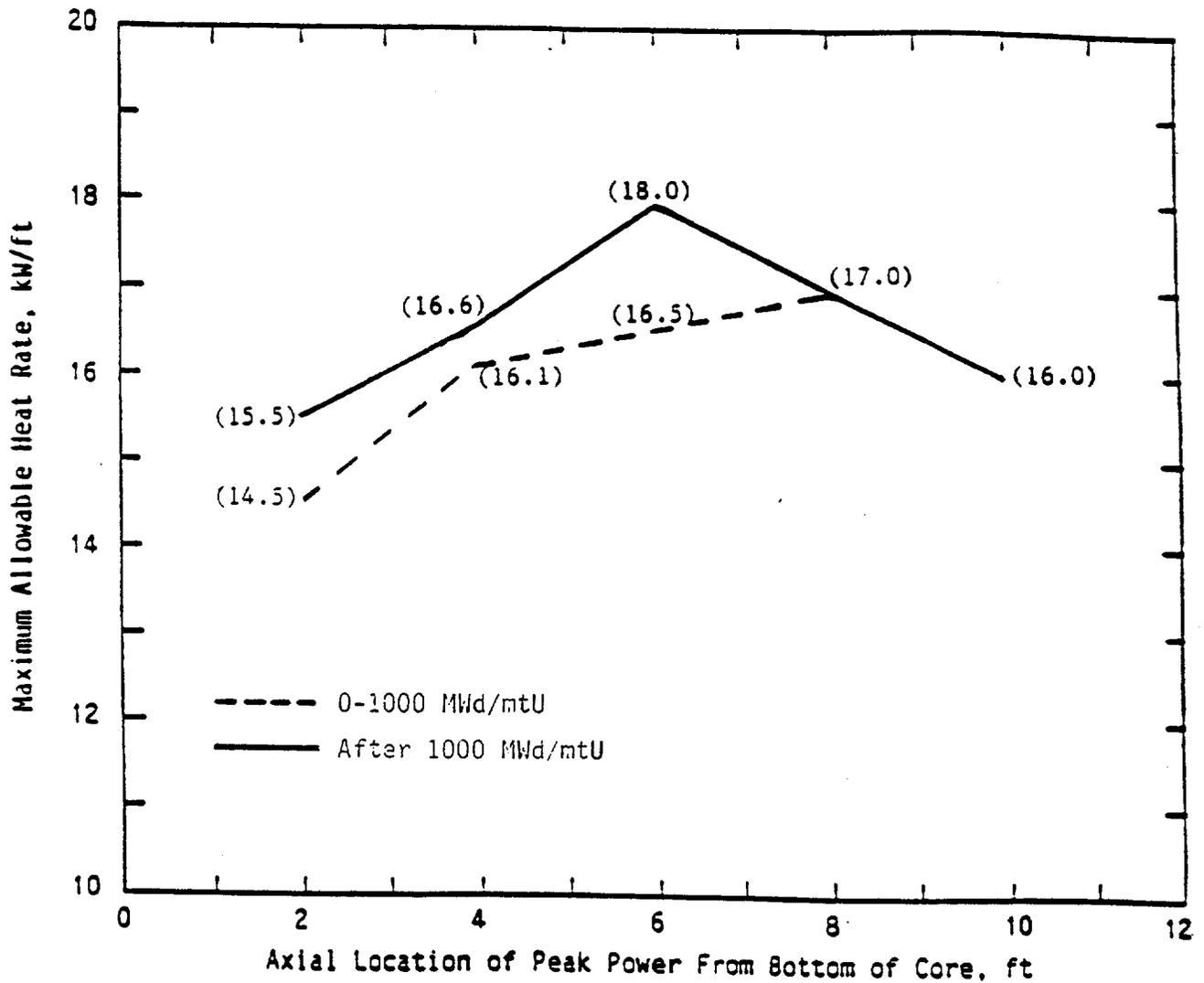
Replace the following page of the Appendix "A" Technical Specifications with the enclosed page. The revised page is identified by Amendment number and contains a vertical line indicating the area of change.

Remove Page

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LOCA-Limited Maximum Allowable  
Linear Heat

Oconee Nuclear Station  
Figure 3.5.2-16



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 184 TO FACILITY OPERATING LICENSE DPR-38

AMENDMENT NO. 184 TO FACILITY OPERATING LICENSE DPR-47

AMENDMENT NO. 181 TO FACILITY OPERATING LICENSE DPR-55

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS 1, 2 AND 3

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

1.0 INTRODUCTION

By letter dated January 22, 1988 (Ref. 1), Duke Power Company, licensee for the Oconee Nuclear Station (ONS), Units 1, 2, and 3, proposed a revision to Technical Specification (TS) Figure 3.5.2-16 for the loss of coolant accident (LOCA)-Limited Maximum Allowable Linear Heat Rate (LHR). The results of the analysis in BAW-2001P (Ref. 2) were provided in support of a peak power limit increase from 14.0 to 14.5 kW/ft for the 0-1000 megawatt days per metric ton uranium (MWd/mtU) burnup parameter. A modification was submitted in a letter dated October 9, 1989 (Ref. 3) for the elimination of the 1000-2600 MWd/mtU burnup parameter. The NRC staff review of the BAW-2001P report was limited to its applicability to the Oconee plant for the increase in LOCA-Limited Maximum Allowable LHR.

The BAW-2001P report presents the results of a series of analyses concerning low pre-pressure fuel rods. These fuel rods are the standard Mark-B designs in which the pre-pressure (fill gas pressure) has been reduced by 50 psi. The purpose of this reduction is to provide for extended burnup capabilities and for improved LOCA margins. The overall burnup limit was extended by 4,000 MWd/mtU. The increased burnup limits were obtained by trading off margin between the creep collapse and the pin pressure burnup limits. Reducing the pre-pressure caused the pin pressure burnup limit to increase and the creep collapse limit to decrease. The amount of pre-pressure reduction was chosen so that both resulting burnup limits were nearly equivalent. This resulted in an increase in the overall fuel and rod burnup limit. The analysis effort is described in this report.

2.0 EVALUATION

The licensee used the most restrictive LOCA for the analysis, which was a 8.55 ft<sup>2</sup> double ended rupture at the reactor coolant pump discharge, with the peak power at the 2-foot core elevation (core inlet) during BOL conditions. This analysis had resulted in an allowable LHR of 14.0 kW/ft, with a peak cladding temperature of 1865°F, which is in conformance with the acceptance criteria of

10 CFR 50.46. The method of analysis is described in B&W Topical Report BAW-10104, Revision 5 (Ref. 4), and the recent report (Ref. 5), "Bounding Analytical Assessment of NUREG-0630 Models on LOCA kW/ft Limits With Use of FLECSET."

For the reanalysis, the licensee used current LOCA analysis codes which include: CRAFT2 (Ref. 6) for loss of primary coolant, REFLOD3 (Ref. 7) for refill and reflood of the reactor vessel, FLECSET (Ref. 5) to determine fuel pin heat transfer coefficients during reflood, and the THETA1-B (Ref. 9) for calculation of the fuel pin cladding temperature response. All of these codes have been approved by the NRC. The analysis included the TACO2 (Ref. 10) fuel model, the NUREG-0630 cladding swell and rupture models and the B&W modified FLECHT-SEASET heat transfer correlation. The LOCA limits analysis to determine operating limits for the TSs was done at the 2-foot core elevation. For B&W operating plants, the 2-foot peak power core elevation is of most interest because it generally has the most restrictive LHR.

The design change made by the licensee was a reduction by 50 psi in the fuel rod pre-pressure, resulting in a reduction of the internal pin pressure during plant operation. The reduced internal pin pressure (1) allows for longer burnup periods (fuel cycles), and (2) delays the time to clad rupture during a LOCA. An evaluation by the licensee indicated that the pin pre-pressure reduction would delay rupture by a time increment equal to a rise in the LHR of .5 kW/ft. The LOCA analysis, therefore, utilized an increased LHR of 14.5 kW/ft, as compared to the current 14.0 kW/ft limit at the 2-foot core elevation for the 0-1000 MWd/mtU burnup parameter.

The licensee presented the results of the reduced pin pre-pressure LOCA analysis in Table 2 of Reference 3 which also included the previous 2-foot core elevation results for comparison purposes. The 50 psi pin pre-pressure reduction resulted in a 150 psi reduction in the operational internal pin pressure. This pressure reduction corresponds to an allowable LHR of 14.5 kW/ft at the 2-foot core elevation which was used in the analysis. In the analysis, the peak cladding temperature was 2028°F. This is in conformance with the acceptance criteria of 10 CFR 50.46 which requires that the calculated peak cladding temperature not exceed 2200°F.

In a letter dated October 9, 1989 (Ref. 3), the licensee modified their original proposal to eliminate the 1000-2600 MWd/mtU burnup parameter and to have the "after 2600 MWd/mtU" burnup parameter relabeled "after 1000 MWd/mtU." This change is in agreement with the tabulated results in Table 3-2 of the BAW-10104 report (Ref. 5), which was approved by NRC in a letter dated October 12, 1987 (Ref. 10), and is therefore acceptable.

### 3.0 FINDINGS

On the basis of the LOCA analysis, which used acceptable codes and in which the results were in conformance with approved limits and criteria, the NRC staff concludes that:

- (1) The reduced pin pressure results in delayed rupture and, consequently, lower peak cladding temperatures for the same LHR.
- (2) The reduced pin pressure maintains lower internal pin pressures for the entire fuel cycle.
- (3) Based on the reanalysis of the 2-foot core elevation LHR, as reported herein, the 2-foot peak power location LOCA LHR limit as shown in TS Figure 3.5.2-16, can be raised from 14.0 kW/ft to 14.5 kW/ft for the 0-1000 MWd/mtU burnup parameter for the Oconee Nuclear Station, Units 1, 2 and 3. Also, the 1000-2600 burnup parameter can be removed because of the results provided in the approved report BAW-1915.

#### 4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of these amendments will have no significant impact on the environment (55 FR 18991).

#### 5.0 CONCLUSION

The Commission issued Notices of Consideration of Issuance of Amendments to Facility Operating Licenses and Opportunity for Hearing, which were published in the Federal Register (53 FR 20196) on June 2, 1988, and (55 FR 2720) on January 26, 1990. No requests for hearing were received.

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

#### 6.0 REFERENCES

1. Letter from Hal B. Tucker, Duke Power Company, to USNRC, dated January 22, 1988.
2. BAW-2001P, "Low Pre-Pressure Fuel Rod Program Burnup Extension LOCA Analysis," the B&W Owners Group Core Performance Committee, June 1987.
3. Letter from Hal B. Tucker, Duke Power Company, to USNRC, dated October 9, 1989.
4. BAW-10104, Revision 5, "B&W's ECCS Evaluation Model," April 1986.
5. BAW-1915, "Bounding Analytical Assessment of NUREG-0630 Models on LOCA kW/ft Limits With Use of FLECSET," April 1986.

6. BAW-10092P, Rev. 3, "CRAFT2, A Fortran Program for Digital Simulation of a Multinode Reactor Plant During Loss of Coolant," October 1982 (Proprietary).
7. BAW-10148, "REFLOD3 - Model for Multinode Code Reflooding Analysis," May 1981.
8. BAW-10094, Rev. 3, "THETA1-B, A Computer Code for Nuclear Reactor Core Thermal Analysis (IN-1445)," February 1981.
9. BAW-10141P, Y. H. Hsii, et al., "TAC02 - Fuel Pin Performance Analysis," January 1979.
10. Letter from A. C. Thadani, USNRC, to C. N. Turk, B&W Owners Group Analysis Committee, dated October 12, 1987.

Principal Contributor: H. Balukjian, SRXB  
L. Wiens

Dated: May 10, 1990

UNITED STATES NUCLEAR REGULATORY COMMISSIONDUKE POWER COMPANYDOCKETS NOS. 50-269, 50-270, 50-287NOTICE OF ISSUANCE OF AMENDMENTS TOFACILITY OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendments Nos. 184, 184 , and 181 to Facility Operating Licenses Nos. DPR-38, DPR-47, and DPR-55 issued to Duke Power Company (the licensee), which revised the Technical Specifications for operation of the Oconee Nuclear Station, Units 1, 2, and 3 (the facility) located in Oconee County, South Carolina. The amendments were effective as of the date of issuance.

The amendments revise the Technical Specifications to allow an increase in the linear heat rate at the 2-foot core elevation level for Oconee Units 1, 2 and 3.

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.

Notices of Consideration of Issuance of Amendments and Opportunity for Hearing in connection with this action were published in the FEDERAL REGISTER June 2, 1988 (53 FR 20196) and January 26, 1990 (55 FR 2720). No request for a hearing or petition for leave to intervene was filed following the notices.

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The Commission has prepared an Environmental Assessment related to the action and has determined not to prepare an environmental impact statement. Based upon the environmental assessment, the Commission has concluded that the issuance of these amendments will not have a significant effect on the quality of the human environment (55 FR 18991).

For further details with respect to the action see (1) the application for amendments dated January 22, 1988, as supplemented October 9, 1989, (2) Amendments Nos. 184, 184, and 181 to Licenses Nos. DPR-38, DPR-47, DPR-55 and (3) the Commission's related Safety Evaluation and Environmental Assessment. All of these items are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and at the Oconee County Library, 501 West South Broad 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, DC 20555, Attention: Director, Division of Reactor Projects I/II.

Dated at Rockville, Maryland this 10th day of May 1990.

FOR THE NUCLEAR REGULATORY COMMISSION



Leonard A. Wiens, Project Manager  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation