

February 20, 1991

Docket Nos. 50-413  
and 50-414

Mr. M.S. Tuckman  
Vice President -  
Nuclear Operations  
Duke Power Company  
P.O. Box 1007  
Charlotte, North Carolina 28201-1007

Dear Mr. Tuckman:

SUBJECT: ISSUANCE OF AMENDMENT NO. 83 TO FACILITY OPERATING LICENSE NPF-35  
AND AMENDMENT NO. 77 TO FACILITY OPERATING LICENSE NPF-52 - CATAWBA  
NUCLEAR STATION, UNITS 1 AND 2 (TACS 79202 AND 79203)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 83 to Facility Operating License NPF-35 and Amendment No. 77 to Facility Operating License NPF-52 for the Catawba Nuclear Station, Units 1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 21, 1990.

The amendments modify the Technical Specifications to increase the surveillance interval for weighing ice condenser ice from 9 months to 18 months and to increase the required ice bed weight.

A copy of the related Safety Evaluation supporting the amendments is also enclosed. Notice of issuance of the amendments will be included in the Commission's biweekly Federal Register notice.

Sincerely,

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Robert E. Martin, Senior Project Manager  
Project Directorate II-3  
Division of Reactor Projects I/II  
Office of Nuclear Reactor Regulation

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Enclosures:

1. Amendment No. 83 to NPF-35
2. Amendment No. 77 to NPF-52
3. Safety Evaluation

cc w/enclosures:  
See next page

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Mr. M.S. Tuckman  
Duke Power Company

cc:

Mr. A.V. Carr, Esq.  
Duke Power Company  
422 South Church Street  
Charlotte, North Carolina 28242-0001

J. Michael McGarry, III, Esq.  
Winston and Strawn  
1400 L Street, N.W.  
Washington, D. C. 20005

North Carolina MPA-1  
Suite 600  
P.O. Box 29513  
Raleigh, North Carolina 27626-0513

Mr. Frank Modrak  
Project Manager, Mid-South Area  
ESSD Projects  
Westinghouse Electric Corp.  
MNC West Tower - Bay 241  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230

County Manager of York County  
York County Courthouse  
York, South Carolina 29745

Richard P. Wilson, Esq.  
Assistant Attorney General  
S.C. Attorney General's Office  
P.O. Box 11549  
Columbia, South Carolina 29211

Piedmont Municipal Power Agency  
121 Village Drive  
Greer, South Carolina 29651

Mr. Alan R. Herdt, Chief  
Project Branch #3  
U.S. Nuclear Regulatory Commission  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

Catawba Nuclear Station

North Carolina Electric Membership  
Corp.  
P.O. Box 27306  
Raleigh, North Carolina 27611

Saluda River Electric Cooperative,  
Inc.  
P.O. Box 929  
Laurens, South Carolina 29360

Senior Resident Inspector  
Route 2, Box 179N  
York, South Carolina 29745

Regional Administrator, Region II  
U.S. Nuclear Regulatory Commission  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

Mr. Heyward G. Shealy, Chief  
Bureau of Radiological Health  
South Carolina Department of Health  
and Environmental Control  
2600 Bull Street  
Columbia, South Carolina 29201

Ms. Karen E. Long  
Assistant Attorney General  
N.C. Department of Justice  
P.O. Box 629  
Raleigh, North Carolina 27602

Mr. Robert G. Morgan  
Nuclear Production Department  
Duke Power Company  
P.O. Box 1007  
Charlotte, North Carolina 28201-1007

Mr. R.L. Gill, Jr.  
Nuclear Production Department  
Duke Power Company  
P.O. Box 1007  
Charlotte, North Carolina 28201-1007



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

DUKE POWER COMPANY  
NORTH CAROLINA ELECTRIC MEMBERSHIP CORPORATION  
SALUDA RIVER ELECTRIC COOPERATIVE, INC.  
DOCKET NO. 50-413  
CATAWBA NUCLEAR STATION, UNIT 1  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 83  
License No. NPF-35

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Catawba Nuclear Station, Unit 1 (the facility) Facility Operating License No. NPF-35 filed by the Duke Power Company, acting for itself, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative, Inc. (licensees) dated December 21, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 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.

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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 2.C.(2) of Facility Operating License No. NPF-52 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 83, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Duke Power Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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: February 20, 1991



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

DUKE POWER COMPANY

NORTH CAROLINA MUNICIPAL POWER AGENCY NO. 1

PIEDMONT MUNICIPAL POWER AGENCY

DOCKET NO. 50-414

CATAWBA NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 77  
License No. NPF-52

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Catawba Nuclear Station, Unit 2 (the facility) Facility Operating License No. NPF-52 filed by the Duke Power Company, acting for itself, North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency (licensees) dated December 21, 1990, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 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 2.C.(2) of Facility Operating License No. NPF-52 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 77 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Duke Power Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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: February 20, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 83

FACILITY OPERATING LICENSE NO. NPF-35

DOCKET NO. 50-413

AND

TO LICENSE AMENDMENT NO. 77

FACILITY OPERATING LICENSE NO. NPF-52

DOCKET NO. 50-414

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf page is also provided to maintain document completeness.

Remove Pages

3/4 6-41  
3/4 6-42  
B 3/4 6-5  
B 3/4 6-6

Insert Pages

3/4 6-41  
3/4 6-42  
B 3/4 6-5  
B 3/4 6-6\*

\* Overleaf page

## CONTAINMENT SYSTEMS

### 3/4.6.5 ICE CONDENSER

#### ICE BED

#### LIMITING CONDITION FOR OPERATION

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3.6.5.1 The ice bed shall be OPERABLE with:

- a. The stored ice having a boron concentration of at least 1800 ppm boron as sodium tetraborate and a pH of 9.0 to 9.5,
- b. Flow channels through the ice condenser,
- c. A maximum ice bed temperature of less than or equal to 27°F,
- d. A total ice weight of at least 2,475,252 pounds at a 95% level of confidence, and
- e. 1944 ice baskets.

APPLICABILITY: MODES 1, 2, 3, and 4.

#### ACTION:

With the ice bed inoperable, restore the ice bed to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUT-DOWN within the following 30 hours.

#### SURVEILLANCE REQUIREMENTS

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4.6.5.1 The ice condenser shall be determined OPERABLE:

- a. At least once per 12 hours by using the Ice Bed Temperature Monitoring System to verify that the maximum ice bed temperature is less than or equal to 27°F,
- b. At least once per 9 months by:
  - 1) Chemical analyses which verify that at least nine representative samples of stored ice have a boron concentration of at least 1800 ppm as sodium tetraborate and a pH of 9.0 to 9.5 at 25°C; and
  - 2) Verifying, by a visual inspection of at least two flow passages per ice condenser bay, that the accumulation of frost or ice on flow passages between ice baskets, past lattice frames, through the top deck floor grating, or past the lower inlet plenum support



## CONTAINMENT SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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structures and turning vanes is restricted to a thickness of less than or equal to 0.38 inch. If one flow passage per bay is found to have an accumulation of frost or ice with a thickness of greater than or equal to 0.38 inch, a representative sample of 20 additional flow passages from the same bay shall be visually inspected. If these additional flow passages are found acceptable, the surveillance program may proceed considering the single deficiency as unique and acceptable. More than one restricted flow passage per bay is evidence of abnormal degradation of the ice condenser.

- c. At least once per 18 months by:

Weighing a representative sample of at least 144 ice baskets and verifying that each basket contains at least 1273 lbs of ice. The representative sample shall include six baskets from each of the 24 ice condenser bays and shall be constituted of one basket each from Radial Rows 1, 2, 4, 6, 8, and 9 (or from the same row of an adjacent bay if a basket from a designated row cannot be obtained for weighing) within each bay. If any basket is found to contain less than 1273 pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The minimum average weight of ice from the 20 additional baskets and the discrepant basket shall not be less than 1273 pounds/basket at a 95% level of confidence.

The ice condenser shall also be subdivided into 3 groups of baskets, as follows: Group 1 - Bays 1 through 8, Group 2 - Bays 9 through 16, and Group 3 - Bays 17 through 24. The minimum average ice weight of the sample baskets from Radial Rows 1, 2, 4, 6, 8, and 9 in each group shall not be less than 1273 pounds/basket at a 95% level of confidence.

The minimum total ice condenser ice weight at a 95% level of confidence shall be calculated using all ice basket weights determined during this weighing program and shall not be less than 2,475,252 pounds.

- d. At least once per 40 months by lifting and visually inspecting the accessible portions of at least two ice baskets from each one-third of the ice condenser and verifying that the ice baskets are free of detrimental structural wear, cracks, corrosion or other damage. The ice baskets shall be raised at least 12 feet for this inspection.

## CONTAINMENT SYSTEMS

### BASES

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#### 3/4.6.5 ICE CONDENSER

The requirements associated with each of the components of the ice condenser ensure that the overall system will be available to provide sufficient pressure suppression capability to limit the containment peak pressure transient to less than 14.7 psig during LOCA conditions.

##### 3/4.6.5.1 ICE BED

The OPERABILITY of the ice bed ensures that the required ice inventory will: (1) be distributed evenly through the containment bays, (2) contain sufficient boron to preclude dilution of the containment sump following the LOCA, and (3) contain sufficient heat removal capability to condense the Reactor Coolant System volume released during a LOCA. These conditions are consistent with the assumptions used in the safety analyses.

The minimum weight figure of 1273 pounds of ice per basket contains a 15% conservative allowance for ice loss through sublimation. The minimum total weight of 2,475,252 pounds of ice also contains an additional 1.1% conservative allowance to account for systematic error in the weighing instruments. In the event that observed sublimation rates are equal to or lower than design predictions after 3 years of operation, the minimum ice baskets weight may be adjusted downward.

##### 3/4.6.5.2 ICE BED TEMPERATURE MONITORING SYSTEM

The OPERABILITY of the Ice Bed Temperature Monitoring System ensures that the capability is available for monitoring the ice temperature. In the event the system is inoperable, the ACTION requirements provide assurance that the ice bed heat removal capacity will be retained within the specified time limits.

##### 3/4.6.5.3 ICE CONDENSER DOORS

The OPERABILITY of the ice condenser doors and the requirement that they be maintained closed ensures that the Reactor Coolant System fluid released during a LOCA will be diverted through the ice condenser bays for heat removal and that excessive sublimation of the ice bed will not occur because of warm air intrusion.

If an Ice Condenser Door is not capable of opening automatically, then system function is seriously degraded and immediate action must be taken to restore the opening capability of the door. Not capable of opening automatically is defined as those conditions in which a door is physically blocked from opening by installation of a blocking device or by obstruction from temporarily or permanently installed equipment. Impairment by ice, frost or debris is considered to render the doors inoperable but capable of opening automatically since these types of conditions will result in a slightly greater torque necessary to open the doors or a slight delay in door opening.

## CONTAINMENT SYSTEMS

### BASES

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#### 3/4.6.5.4 INLET DOOR POSITION MONITORING SYSTEM

The OPERABILITY of the Inlet Door Position Monitoring System ensures that the capability is available for monitoring the individual inlet door position. In the event the system is inoperable, the ACTION requirements provide assurance that the ice bed heat removal capacity will be retained within the specified time limits.

#### 3/4.6.5.5 DIVIDER BARRIER PERSONNEL ACCESS DOORS AND EQUIPMENT HATCHES

The requirements for the divider barrier personnel access doors and equipment hatches being closed and OPERABLE ensure that a minimum bypass steam flow will occur from the lower to the upper containment compartments during a LOCA. This condition ensures a diversion of the steam through the ice condenser bays that is consistent with the LOCA analyses.

#### 3/4.6.5.6 CONTAINMENT AIR RETURN AND HYDROGEN SKIMMER SYSTEMS

The OPERABILITY of the Containment Air Return and Hydrogen Skimmer Systems ensures that following a LOCA: (1) the containment atmosphere is circulated for cooling by the spray system, and (2) the accumulation of hydrogen in localized portions of the containment structure is minimized. Since these systems are required to function during post-accident situations, the air density that the fans experience during surveillance testing will be different than the air density following a LOCA. An air density adjustment will be made to the test data before it is compared to the Technical Specification Surveillance Requirements.

#### 3/4.6.5.7 and 3/4.6.5.8 FLOOR AND REFUELING CANAL DRAINS

The OPERABILITY of the ice condenser floor and refueling canal drains ensures that following a LOCA, the water from the melted ice and Containment Spray System has access for drainage back to the containment lower compartment and subsequently to the sump. This condition ensures the availability of the water for long-term cooling of the reactor during the post-accident phase.

#### 3/4.6.5.9 DIVIDER BARRIER SEAL

The requirement for the divider barrier seal to be OPERABLE ensures that a minimum bypass steam flow will occur from the lower to the upper containment compartments during a LOCA. This condition ensures a diversion of steam through the ice condenser bays that is consistent with the LOCA analyses.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 83 TO FACILITY OPERATING LICENSE NPF-35  
AND AMENDMENT NO. 77 TO FACILITY OPERATING LICENSE NPF-52

DUKE POWER COMPANY, ET AL.

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated December 21, 1990, the licensee, Duke Power Company, submitted a request to change the Technical Specifications for Catawba Nuclear Station, Units 1 and 2, to increase the surveillance interval for weighing ice condenser ice from 9 months to 18 months and to increase the required ice bed ice weight. The requested Technical Specification amendments would allow the licensee to perform ice weighings coincident with refueling outages and eliminate the present need for on-line ice weighings. During on-line ice weighings, the ice condenser baskets are twisted to ensure that they are free from ice buildup and are not binding in the lattice steel support structure, which could affect weighing accuracy. The licensee has determined that this twisting of the ice baskets results in unexpected loads on the ice basket U-bolts, which secure the ice baskets to their mounting bracket assemblies. These unexpected loads on the U-bolts could result in bolt failure rendering the ice condenser inoperable. For this reason, the licensee will no longer perform on-line ice weighings at Catawba using the current on-line ice weighing techniques.

2.0 EVALUATION

The licensee's submittal provided the following information.

The ice condenser is designed to limit the containment pressure below the design pressure for all reactor coolant pipe break sizes up to and including a double-ended severance. The ice condenser also serves as a containment air purification and cleanup system by absorbing molecular iodine from the containment atmosphere following a loss of coolant accident (LOCA). The required boron concentration and pH of the stored ice are not affected by this Technical Specification change request and, therefore, the air purification aspects of the ice condenser remain unchanged by this submittal.

The ice condenser is divided into 24 bays and contains 1,944 ice baskets that are 12 inches in diameter and 48 feet long. Each bay consists of nine columns and nine rows of ice baskets. The ice baskets function to promote heat transfer from the steam to the ice during and following a LOCA or steam line break in the containment by ensuring that the ice inventory is evenly distributed,

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contains sufficient heat removal capability, and is maintained in the appropriate geometry. The ice condenser is also administratively divided into three groups of baskets for the purpose of weighing.

Technical Specification 3.6.5.1 specifies that the ice bed shall be operable with a total ice weight of at least 2,368,652 pounds, at a 95% level of confidence, with 1,944 ice baskets. This is the minimum amount of ice to be maintained in the ice condenser to control the anticipated heat load during a large scale LOCA. The Catawba Nuclear Station, Units 1 and 2, Final Safety Analysis Report (FSAR) analysis assumes 2,132,000 pounds of ice initially in the ice condenser. A 10% conservative allowance for ice bed loss through sublimation is added to the above value as well as a 1.1% conservative allowance to account for errors in the weighing instruments. These conservative allowances are intended to ensure that the actual total ice weight remains above the value assumed in the FSAR analysis for the duration of the fuel cycle. The minimum average Technical Specification ice weight per basket is 2,368,652 pounds/1,944 ice baskets, or 1,218 pounds/basket.

Technical Specification Surveillance Requirement 4.6.5.1 currently requires that at least once per nine months a representative sample of at least 144 ice baskets be weighed to verify that each basket contains at least 1,218 pounds of ice. If any basket is found to contain less than 1,218 pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed and the minimum average weight of ice from the 20 baskets shall not be less than 1,218 pounds/basket, at a 95% level of confidence. The minimum total ice condenser ice weight, at a 95% level of confidence, shall be calculated using all ice basket weights determined during the weighing program and shall not be less than 2,368,652 pounds. The Technical Specification surveillance requirements ensure that the actual minimum average ice weight for any statistical sub-group always remains above 1,097 pounds/basket (2,132,000 pounds/1,944 baskets). The 1,097 pounds/basket plus a 1.1% weighing uncertainty factor equals 1,109 pounds/basket and is referred to as the design basis weight for each basket. As long as the measured minimum average ice weight per basket remains above 1,109 pounds from one refueling outage to the next, an adequate safety margin is maintained.

To provide justification for a Technical Specification change to decrease the frequency of the ice basket weighing program from 9 months to 18 months, past operating experience at Catawba Nuclear Station was analyzed to evaluate ice basket sublimation rates. The current Technical Specification total ice weight and minimum ice basket ice weights are based on a 10% per 9-month sublimation rate, as discussed above. Operating experience at Catawba has shown that the ice condenser sublimation rates are much less than this value. The average ice basket sublimation rates from previous years (1985-1990 for Unit 1 and 1987-1990 for Unit 2) were calculated based on actual Technical Specification surveillance weighing data for all 1,944 ice baskets. In the worst year, the average sublimation rate was less than 5% per year. In addition to analyzing the total average ice basket sublimation rates, the average sublimation rate and the average ice basket weight were determined

from the worst case baskets (Row 9) for all 24 bays. Row 9 experiences the highest sublimation rates because it is the row closest to the reactor. The average sublimation rate for both the Unit 1 and Unit 2, Row 9 baskets is also less than 5% per year.

To account for the increased sublimation that would occur over the proposed 18-month surveillance testing interval as compared to a 9-month testing interval, the total required ice bed ice weight as well as the minimum average ice basket ice weight should be increased. To calculate the revised Technical Specification total ice weight, a sublimation rate of 15% is assumed for the 18-month testing interval. The 15% sublimation rate for the 18-month testing interval is considered to be very conservative based on the measured sublimation rates at Catawba being consistently lower than 5% per year as discussed above.

Accounting for the increased sublimation rate, the proposed revised Technical Specification total ice bed ice weight for an 18-month surveillance interval is 2,475,252 pounds. This is derived by adjusting the safety analysis ice weight (2,132,000 pounds) for an estimated sublimation rate of 15% (319,800 pounds) and adding 1.1% for weighing errors (23,452 pounds). Dividing this value by the total number of ice baskets (1,944) yields the proposed revised Technical Specification minimum average ice basket ice weight of 1,273 pounds/basket.

An analysis also was performed that indicates that the existing total ice weight of both Unit 1 and Unit 2 ice condensers is sufficient to account for sublimation that will occur over the remainder of an 18-month period.

In addition, existing Row 9 average ice weights were projected for an 18-month period using the actual Row 9 sublimation rates and also using an assumed sublimation rate of 15%. This analysis showed that the projected average ice weight of Row 9 ice baskets remains above the design basis value over an 18-month period using actual sublimation rate data or an assumed 15% sublimation rate.

The licensee concluded, and the staff agrees that based on the licensee's analysis and evaluation which considered past ice weighing data, that the total ice weight and the minimum average ice weight per basket for the row-group analysis required by the Technical Specifications has always exceeded the increased ice weight limits of the proposed Technical Specification. Therefore, since the required weight of ice as assumed in the LOCA peak containment pressure transient analysis, which is the design basis for the ice condenser, will be present at the end of the 18-month cycle, the ice weighing interval can be extended to 18 months.

Based on the above evaluation, the staff finds that the proposed changes to the Catawba Nuclear Station, Units 1 and 2, Technical Specifications are consistent with the requirements of 10 CFR Part 50, Appendix A, General Design Criteria 16, 38, 39, 40, and 50 and the Standard Technical Specifications and are, therefore, acceptable.

### 3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the requirements with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

### 4.0 CONCLUSION

The Commission's proposed determination that the amendments involve no significant hazards consideration was published in the Federal Register (56 FR 2051) on January 18, 1991. The Commission consulted with the State of South Carolina. No public comments were received, and the State of South Carolina did not have any comments.

The 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 the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: C. Nichols, SPLB:DST

Dated: February 20, 1991

DATED: February 20, 1991

AMENDMENT NO. 83 TO FACILITY OPERATING LICENSE NPF-35 - Catawba Nuclear Station, Unit 1  
AMENDMENT NO. 77 TO FACILITY OPERATING LICENSE NPF-52 - Catawba Nuclear Station, Unit 2

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G. Hill (8) P1-37

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