September 29, 2003

Mr. D. M. Jamil
Vice President
Catawba Nuclear Station
Duke Energy Corporation
4800 Concord Road
York, South Carolina 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MB7531 AND MB7532)

Dear Mr. Jamil:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 209 to Facility Operating License NPF-35 and Amendment No. 203 to facility Operating License NPF-52 for the Catawba Nuclear Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated January 31, 2003, as supplemented by letters dated June 12, and September 2, 2003.

The amendments revise the TS to incorporate revised means of determining the mass of ice in the ice condenser containment.

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

Sincerely,

***/RA/***

Robert E. Martin, Senior Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosures:
1. Amendment No. 209 to NPF-35
2. Amendment No. 203 to NPF-52
3. Safety Evaluation

cc w/encls: See next page

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DUKE ENERGY CORPORATION

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. 209
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 Energy Corporation, acting for itself, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative, Inc. (licensees), dated January 31, 2003, as supplemented by letters dated June 12, and September 2, 2003, 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-35 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 209, which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance. The license amendment shall be implemented within 60 days of issuance, thus requiring the first execution of the applicable surveillance requirements to be performed at the end of operating cycle no. 14 (Fall - Winter 2003).

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Technical Specification Changes

Date of Issuance: September 29, 2003

DUKE ENERGY CORPORATION

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. 203
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 Energy Corporation, acting for itself, North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency (licensees), dated January 31, 2003, as supplemented by letters dated June 12, and September 2, 2003, 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:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 203, which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance. The license amendment shall be implemented within 60 days of issuance, thus requiring the first execution of the applicable surveillance requirements to be performed at the end of operating cycle no. 13 (Fall 2004).

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Technical Specification Changes

Date of Issuance: September 29, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 209

FACILITY OPERATING LICENSE NO. NPF-35

DOCKET NO. 50-413

AND LICENSE AMENDMENT NO. 203

FACILITY OPERATING LICENSE NO. NPF-52

DOCKET NO. 50-414

Replace the following pages of the Appendix A Technical Specifications and associated Bases with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

| Remove | Insert |
|---|---|
| 3.6.12-2 | 3.6.12-2 |
| 3.6.12-3 | 3.6.12-3 |
| B 3.6.12-1 | B 3.6.12-1 |
| B 3.6.12-2 | B 3.6.12-2 |
| B 3.6.12-3 | B 3.6.12-3 |
| B 3.6.12-4 | B 3.6.12-4 |
| B 3.6.12-5 | B 3.6.12-5 |
| B 3.6.12-6 | B 3.6.12-6 |
| B 3.6.12-7 | B 3.6.12-7 |
| B 3.6.12-8 | B 3.6.12-8 |
| B 3.6.12-9 | B 3.6.12-9 |
| B 3.6.12-10 | B 3.6.12-10 |
| B 3.6.12-11 | B 3.6.12-11 |

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 209 TO FACILITY OPERATING LICENSE NPF-35

AND AMENDMENT NO. 203 TO FACILITY OPERATING LICENSE NPF-52

DUKE ENERGY CORPORATION, ET AL.

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

## 1.0 INTRODUCTION

By letter dated January 31, 2003 (Reference 1), as supplemented June 12, 2003 (Reference 6), and September 2, 2003 (Reference 11), Duke Power Company, et al. (the licensee), submitted a request for changes to the Catawba Nuclear Station, Units 1 and 2, (Catawba) and to the McGuire Nuclear Station, Units 1 and 2, (McGuire) Technical Specifications (TS). The proposed changes would revise the current TS Surveillance Requirements (SRs) of Section 3.6.12 for Catawba. There are two primary changes.

Technical Specification Task Force traveler 429 (TSTF-429), Revision 2, (Reference 2) proposes revisions to the Westinghouse Standard Technical Specification 3.6.15 for verifying the required quantity and distribution of ice mass within the ice condenser ice bed. The methodology supporting these changes is described in the Ice Condenser Utility Group's (ICUG) Topical Report (ICUG-001, Revision 2), (Reference 4). The first primary change in the licensee's proposal is that the licensee has adopted TSTF-429 and the ICUG-001 report as the basis for a portion of the changes proposed in Reference 1. The second primary change is that the licensee also proposes an asymmetric ice mass distribution by specifying different ice mass quantities for each of the three radial zones of the ice bed. Associated changes to the TS Bases are also included. Further references to TSTF-429 and to the ICUG-001 topical report in this Safety Evaluation refer to Revision 2 of each of these documents (References 2 and 4).

The letters dated June 12 and September 2, 2003, provided clarifying information that did not change the scope of the January 31, 2003, application, nor the initial proposed no significant hazards consideration determination.

## 2.0 REGULATORY EVALUATION

### 2.1 Ice Condenser and its Safety Function

The containment for each unit consists of a primary containment vessel and a shield building as discussed in References 1, 4, 7, and 8. The interior of the primary containment vessel is divided into three compartments: (1) a lower compartment that houses the reactor and reactor coolant system, (2) an intermediate ice condenser compartment (ICC) that houses the ice bed, and (3) the upper compartment that accommodates the air displaced from the other two

volumes during postulated loss-of-coolant (LOCA) and steam line break design basis accidents (DBAs).

The ICC is contained within an annular compartment formed by the outer containment vessel wall and the inner crane wall. It spans about 300 degrees of the circumference of the perimeter of the containment. The ice bed contains approximately 2,000,000 pounds of borated ice stored in 1,944 cylindrical perforated metal baskets that are 48-feet long. The ice bed consists of nine radial rows of ice baskets, grouped into 24 bays. The rows are designated as 1 through 9. For this licensee, row 1 is on the annulus outer perimeter, and row 9 is adjacent to the inner perimeter crane wall. The spaces between the 48-feet long ice baskets form flow channels for steam and air to pass up through the ICC. Each of the 1,944 baskets is filled with ice, thus, constituting an ice bed for the ICC.

The primary function of the ice bed is to provide a large heat sink in the event of a release of energy from a DBA within the containment. The steam released from a DBA will be condensed as it passes through and melts the ice in the ice bed, thus limiting the peak pressure and temperature of the containment. Limiting the pressure and temperature of the containment reduces the potential for release of fission product radioactivity from containment to the environment.

2.2 Applicable Regulatory Requirements and Guidance

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 16, “Containment Design,” requires that the reactor containment and associated systems shall be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require.

10 CFR Part 50, Appendix A, GDC 50, “Containment Design Basis,” requires that the containment structure and its internal compartments, including the containment heat removal system shall be designed to accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. The margin must include conservatism of the calculation model and input parameters.

GDC 16 and GDC 50 are applicable to the ice condenser and the issues addressed in this Safety Evaluation with respect to ensuring that an adequate ice bed is maintained to provide a sufficient heat sink for the suppression of containment peak pressures and temperature to below safety related design limits following a DBA. The total amount of ice in the ICC, the distribution of ice within the ICC, and the minimum ice mass per basket are important in satisfying the requirements of these GDC.

10 CFR Part 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” provides quality assurance criteria for nuclear power plants. The licensee has stated that its plant-specific maintenance procedures and practices related to the ICC will be maintained pursuant to the requirements of 10 CFR 50, Appendix B. This will include maintaining the ice mass of the ice bed and individual ice baskets, the monitoring of sublimation rates for the ice baskets, and the need for corrective actions, as required.

3.0 TECHNICAL EVALUATION

3.1 SR 3.6.12.4, Verify total weight of stored ice

3.1.1 Ice-bed - Total Ice Mass Requirement

The current SR 3.6.12.4 requirements for Catawba are as follows:

| SURVEILLANCE | FREQUENCY |
|---|---|
| SR 3.6.12.4 Verify total weight of stored ice is ≥ 2,330,856 lb by:<br><br>a. Weighing a representative sample of ≥ 144 ice baskets and verifying each basket contains ≥ 1199 lb of ice; and<br><br>b. Calculating total weight of stored ice, at a 95% confidence level, using all ice basket weights determined in SR 3.6.12.4.a. | 18 months |

The total mass value shown above is determined on an as-left basis following maintenance to replenish ice baskets, during an outage and prior to the initiation of an operating cycle. The total value includes two components: (a) the design basis ice mass requirement of 1,890,000 lbms, as reported in the Updated Final Safety Analysis Report (UFSAR), and (b) an allowance for sublimation expected to occur in the forthcoming operating cycle and weighing uncertainty. The proposed revised SR 3.6.12.4 is as follows:

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.6.12.4 | Verify total mass of stored ice is ≥ 2,132,000 lbs by calculating the mass of stored ice, at a 95 percent confidence, in each of three Radial Zones as defined below, by selecting a random sample of ≥ 30 ice baskets in each Radial Zone, and<br><br>Verify:<br>1. Zone A (radial rows 8, 9), has a total mass of ≥ 324,200 lbs<br>2. Zone B (radial rows 4, 5, 6, 7), has a total mass of ≥ 1,033,100 lbs<br>3. Zone C (radial rows 1, 2, 3), has a total mass of ≥ 774,900 lbs | 18 months |

The proposed revision to the TS SR modifies the requirement for minimum stored ice mass to include only the design basis component value of 2,132,000 lbms for Catawba. Accordingly, this is the minimum total ice mass value that is required to establish operability of the ice bed. This ice mass will be determined on an as-found basis, prior to maintenance activities, at the

end of an operating cycle. This change does not represent a change in the amount of ice required to meet the accident analysis requirements as set forth in the UFSAR. The effect of this change is to move the portion of the previously specified total ice mass that was required to anticipate sublimation and weighing uncertainty from the TS required value to procedural control within the scope of the licensee's maintenance program. This type of change has been submitted to the NRC staff in TSTF-429 and in the ICUG-001 topical report. The NRC staff has evaluated and approved this type of change in its safety evaluation report (SER) of the acceptability of TSTSF-429 and the ICUG-001 report, as presented in Reference 9. The licensee has adopted TSTF-429 and the methodology of the ICUG report, as stated in its application (References 1 and 6).

The ICUG-001 report describes an Active Ice Mass Management (AIMM) methodology for maintaining the total ice mass based on current ice basket mass and known sublimation rates. The licensee states, in Reference 6, response 1c, that it will perform replenishment activities on the ice bed at each outage to manage the sublimation allowances, by adopting the AIMM methodology. The AIMM methodology includes obtaining the as-found basket mass sample data at each outage, and determining the ice required to replenish the ice baskets for the next operating cycle. Then, this new replenishment data obtained at each outage, is incorporated into the licensee's ICEMAN™ database to maintain the historical inspection data for each plant. This updating of the ICEMAN™ database at the end of each outage, provides information on future sublimation patterns and uncertainty values in order to project the ice mass replenishment requirements for the next cycle of operation. This process is performed in accordance with the plant maintenance procedures. The licensee acknowledges in Reference 6, item 1f, that these procedures are controlled pursuant to the requirements of 10 CFR Part 50, Appendix B and 10 CFR 50.59.

3.1.1.1 Staff's Evaluation

The NRC staff evaluated the AIMM process in its SER on the ICUG-001 report and found that the report adequately described the relationship of AIMM maintenance-related practices to the requirement to maintain the total ice mass required by the TS. The proposed total ice mass requirement has two elements: (1) the TS SR to specify the "as-found" total ice mass, and (2) the plant-specific ice maintenance procedures to manage sublimation and weighing variations. The NRC staff found that the combination of these two elements ensures that a sufficient total amount of ice will be provided in the ice condenser for removing heat during DBAs and for meeting sublimation requirements during operating cycles.

The NRC staff has reviewed the licensee's proposed SR for Catawba and finds that it is consistent with the ICUG topical report and TSTF-429. Based on the above discussions and the licensee's adoption of References 2 and 4, the NRC staff finds that the proposed modification, for the ice bed total ice mass requirement, is acceptable since it continues to ensure that the amount of ice required for accident analysis purposes will be maintained in the ICC.

3.1.2 Random Sampling Method and Alternate Basket Sampling

The current SR 3.6.12.4, as shown above, requires weighing a representative sample of 144 baskets and verifying that each basket has a minimum amount of ice. The Bases state that the

sample will include 6 baskets from each of the 24 ice condenser bays, and shall include one basket from each of the radial rows 1, 2, 4, 6, 8, and 9. The requirement is to calculate the total weight of ice in the ICC, at a 95 percent confidence level using these basket weights, and verify that the total is ≥ 2,330,856 lbms for Catawba. The current SR assumes uniform distribution across the ice bed in accounting for the amount of ice to meet sublimation requirements.

The Bases for SR 3.6.12.4 further state that in case a representative sample basket from a designated row is stuck due to surface ice accumulation or physical obstruction, and unable to be weighed, a basket from the same row of an adjacent bay can be weighed. Also, the current Bases state that, if a sampled basket contains less ice than the above required mass, a representative sample of 20 additional baskets from the same bay shall be weighed and the average weight of the ice in these 21 baskets (including the discrepant basket) should be equal to or greater than the minimum value. This is to ensure that no local zone exists that is grossly deficient in ice.

3.1.2.1 Proposed Sampling Method

The proposed changes, shown in the revised SR 3.6.12.4 above, result in selecting a random sample of ≥ 30 individual baskets for each of three radial zones to verify the total as-found (pre-maintenance) ice mass of the ice beds at Catawba. Utilizing this sample data, the mass of stored ice is calculated for each of the 3 radial zones (representing all 1944 baskets of the ice bed). The sum of the three zone masses shall be equal to or greater than the design basis value of the stored ice of the ice bed at each plant (i.e., 2,132,000 lbms for Catawba).

The associated Bases state that the three radial zones for Catawba are defined as: Zone A consists of rows 8 and 9 (innermost rows adjacent to the crane wall); Zone B contains rows 4, 5, 6, and 7 (in the middle of the ice bed), and Zone C includes rows 1, 2, and 3 (outermost zone). The Bases also state that in case the mass of any selected ice basket(s) can not be determined by the approved ice mass determination methods, an alternate randomly selected sample basket(s) may be used. The alternates shall be selected according to the following criteria, which are also included in the Bases:

a) Alternate selection must be from the same bay-zone (i.e., same bay, same Radial Zone) as the original selection, and
b) Alternate selection cannot be a repeated selection (original or alternate) in the current Surveillance, and cannot have been used as an analyzed alternate selection in the three most recent Surveillances.

The initially proposed Bases for SR 3.6.12.4 described the plans for expansion of the sample beyond the initial sample size of ≥ 30 baskets by stating: "The number of sample baskets in any radial zone may be increased as necessary to verify the total mass of that Radial Zone." This is the same process, as described in the ICUG Topical Report and TSTF-429, that the NRC staff found to be unacceptable as stated in section 2.5 of the NRC staff's evaluation in reference 9. The licensee revised this process in its letter dated September 2, 2003, to state: "The number of sample baskets in any Radial Zone may be increased once by adding 20 or more randomly selected baskets to verify the total mass of that Radial Zone."

3.1.2.2 Staff's Evaluation

The methods described above of dividing the ice bed into three radial zones and randomly selecting a $\geq$ 30 basket sample from each zone are presented in References 2 and 4 and have been reviewed and approved by the NRC staff in Reference 9. The basis for the difference in the number of rows assigned to zones A and B in TSTF-429 and in the licensee's proposal, is discussed in Section 3.1.3 below. The ICUG and the licensee have established reasonable criteria for the radial zone groupings in that the groupings are based on the assumption that the baskets in the same radial zone will have similar mean ice mass and sublimation characteristics through their operating lives. These groupings facilitate the licensee's AIMM process of managing each basket weight above the safety analysis mean by creating sub-populations of the baskets with similar characteristics. The NRC staff finds that the licensee's proposed changes to the SRs and the Bases for the random sampling method and the 3 radial zone concept are consistent with TSTF-429, and the ICUG-001 topical report, with the exception of the issue on expanded sampling, as discussed above. The NRC staff finds that the licensee's proposed one-time expanded sample of 20 or more baskets is acceptable because it removes the potential for continuously expanded sampling until such time that the surveillance limits are either met or the licensee determines that the limit is not met. On this basis, the NRC staff finds the revised SR 3.6.12.4 and the associated Bases, with respect to the random sampling method, including expanded sampling, and the alternate basket sampling concepts, to be acceptable for Catawba.

Upon selection of the 30 basket sample in each zone the mass must be determined either by weighing or by projection for Catawba. The methodology for conducting the statistical analysis of the resulting data and determining compliance with the proposed SR 3.6.12.4, SR 3.6.12.5 and the safety analysis mean values for each basket is included in the ICUG-001 topical report. The NRC staff has found that report to be acceptable in this regard, as stated in Reference 9. The licensee has adopted the methodology in the ICUG-001 report, with the exception of expanded sampling, as discussed above. On those bases, the NRC staff finds the licensee's statistical methodology for determining compliance with the proposed SR 3.6.12.4, SR 3.6.12.5 and the safety analysis mean values for each basket, to be acceptable.

3.1.3 Asymmetric Ice Mass Distribution

The aspects of the licensee's revised SR 3.6.12.4 that result in different ice masses and different number of rows in each radial zone were not included in TSTF-429 or the ICUG-001 report and, accordingly, have not previously been reviewed by the NRC staff. The licensee proposes to adopt an asymmetric ice mass distribution over the three radial zones to enhance the efficiency of the ice condenser maintenance program. The licensee proposes an asymmetric ice mass distribution for the ice bed radial zones in Reference 1 for Catawba as follows:

| | | Lbms/Zone | Lbs/Basket |
|---|---|---|---|
| Zone A: | Rows 8 & 9 | 324,000 | 750 |
| Zone B: | Rows 4,5,6 & 7 | 1,033,100 | 1196 |
| Zone C: | Rows 1, 2 & 3 | 774,900 | 1196 |

The ice bed is divided into nine radial rows and three radial zones. The licensee's proposal includes two rows in the innermost Zone A, four rows in the middle zone B and three rows in the

outer zone C. TSTF-429 and the ICUG-001 report defined the three zones as having three rows in each zone with an equal mass in each zone.

The licensee's grouping of the zones is based on specific operating (sublimation) data from each of the ice condensers at Catawba and McGuire. The licensee states in Reference 6 that the data has been evaluated to select a grouping of radial rows that will best allow an asymmetric ice mass profile to be applied to maximize the service life of the stored ice in the ice bed. The licensee further indicates that it analyzed the asymmetric distribution with its GOTHIC containment response analysis model that allows refinement of the mass profile in different sections of the ice bed and determination of the effect of those changes on the DBA containment response. The NRC approved version of the GOTHIC utilized by the licensee is listed as a reference in the licensee's update of the UFSAR, and as Reference 10 in this report. The analyses results were presented in revisions to the Catawba UFSAR in Reference 6. The resulting containment peak pressures showed a small decrease and remain below the containment design pressure of 15 psig.

3.1.3.1 Staff's Evaluation

Based on its review of the results of the licensee's GOTHIC containment response analyses for the asymmetric ice mass distribution that demonstrated the DBA transient pressures remain below the containment design pressures the NRC staff concludes that the asymmetric ice mass distribution in the revised SR 3.6.12.4 for Catawba is acceptable.

3.1.4 Ice Mass Determination Methodology

The current SR 3.6.12.4 for Catawba, as shown above, and the associated Bases, require verification of ice mass and specifies the method of verification to be by weighing of the ice baskets (i.e., manually lifting and weighing of the basket).

The proposed revision to the SR continues to require verification of ice mass but does not specify the method. The licensee stated in Reference 6 that it will utilize two of the three methods for Catawba and McGuire that are described in the ICUG-001 report and TSTF-429: (a) the direct weighing method, and (b) the projection of ice mass using the ICEMAN software. The associated Bases for the SR are revised to state that the methodology for determining sample ice basket mass will be either by direct lifting or by alternate techniques. Also, the licensee stated that "The ice mass projection method will be an option in performing the ice mass surveillances only for those baskets where the condition of the basket is such that the ability to lift the basket with the preferred lifting rig technique is not feasible."

ICEMAN™ is a software program that trends ice basket mass histories and can be used to project future ice basket mass based on valid individual sublimation rates and previous ice basket mass data. The ICEMAN™ technique requires a significant amount of accurate mass data to generate projections. The licensee states in Reference 6 that it has a large historical basket mass database for the use of the projection method. The licensee also states that the use of the ICEMAN™ software in providing input to selecting baskets for replenishment, random selection of baskets for performing the SRs, and the planned use as an alternate mass determination method are considered nuclear safety related uses. Therefore, the licensee

maintains documented validation of this software in accordance with the requirements of 10 CFR Part 50, Appendix B.

3.1.4.1 Staff Evaluation

The two methods to be used by the licensee for Catawba, as discussed above, have been described in the ICUG-001 report and in TSTF-429. These two methods have been reviewed and approved by the staff in Reference 9. The NRC staff finds that the proposed revisions to these SRs and associated Bases are consistent with the ICUG-001 methodology and with the descriptions in TSTF-429. Therefore, the staff concludes that the licensee's proposal to use direct weighing as the first option and the projection method with ICEMAN as an alternate method is acceptable.

The NRC staff's evaluation, as reported in Reference 9, did not find the visual examination mass determination method to be acceptable. Based on that finding and the licensee's current selection of the two methods discussed above, the NRC staff did not evaluate the third potential method (visual inspection), for ice mass determination for applicability to the Catawba and McGuire units.

3.2 SR 3.6.12.5, Ice Mass Requirement for Individual Ice Baskets

The current SR ensures that the azimuthal distribution of ice is reasonably uniform, by verifying that the ice weight in the three azimuthal groups of ICC bays is within the limit, as follows:

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.6.12.5 | Verify azimuthal distribution of ice at a 95% confidence level by subdividing weights, as determined by SR 3.6.12.4.a, into the following groups:<br>a. Group 1 - bays 1 through 8;<br>b. Group 2 - bays 9 through 16; and<br>c. Group 3 - bays 17 through 24.<br>The average ice weight of the sample baskets in each group from radial rows 1, 2, 4, 6, 8 and 9 shall be $\geq$ 1081 lb. | 9 months |

The changes proposed in the licensee's application of January 31, 2003, reflect the adoption of the TSTF-429 changes for this SR and the supporting methodology described in Topical Report ICUG-001. The changes proposed by TSTF-429 delete the azimuthal distribution SR shown above. In its place, a new SR is proposed that requires the ice mass in each ice basket selected for the ice basket sample to be $\geq$ 600 lbms. The proposed revised SR 3.6.12.5 is as follows:

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.6.12.5 | Verify that the ice mass of each basket sampled in SR 3.6.12.4 is $\geq$ 600 lbs. | 18 months |

TSTF-429 indicates that the change in statistical sampling and the crediting of AIMM processes provides inherent verification of ice mass distribution making azimuthal row-group distribution verification redundant. The ICUG Topical, page O-5, states: "Proper azimuthal distribution of ice in the ice bed is no longer assessed by a separate surveillance requirement; it is implemented through established industry-wide maintenance practices that manage each ice basket above the required safety analysis mean and confirmed through as-found random sampling techniques."

The revised TS Bases for SR 3.6.12.5 indicate that any basket identified as containing less than 600 lbms of ice will require entering the TS Required Action for an inoperable ice bed due to the potential that it may represent a significant condition adverse to quality.

In conjunction with consideration of the SR for minimum ice mass per basket, it is noted that the licensee, as discussed above, has also revised the Bases for SR 3.6.12.4 to state that the licensee's maintenance practices will actively manage individual ice basket mass above the required safety analysis mean for each radial zone. The safety analysis mean values per basket are discussed above in section 3.1.3 of this report. Further, the licensee has provided a commitment in Reference 6, as follows: "Duke procedures will direct that if an individual basket is determined to contain less stored ice mass than the required safety analysis mean for its Radial Zone, this condition is to be identified in the corrective action program, including initiating an evaluation to identify the cause and correct any deficiencies with associated maintenance practices." This licensee commitment is also reflected in the Bases for SR 3.6.12.4.

3.2.1 Staff's Evaluation

The NRC staff reviewed the proposed deletion of the azimuthal sampling requirement in Reference 9 and found that, collectively, the AIMM practices to manage each basket to a weight above its safety analysis mean, the minimum individual basket weight requirement, and the random sampling plan implemented over three radial zones of the ice bed, would be redundant to the former azimuthal sampling requirement. Therefore, the NRC staff concluded that deletion of the azimuthal sampling requirement in the Standard TS SR 3.6.15.3 was acceptable. Based on the licensee's adoption of TSTF-429 and the methodology in the ICUG report and the similarity of the proposed action for Catawba to the action that has been approved in Reference 9 for TSTF-429 and the ICUG report, the NRC staff finds the deletion of this SR for Catawba to be acceptable.

The $\geq$ 600 lbm limit for the as-found ice mass per sampled basket is the criterion set forth in TSTF-429 and the ICUG-001 report to ensure that a significant localized degraded mass condition of the ice bed does not arise. The licensee proposes this value in the revised SR 3.6.12.5 for Catawba.

The NRC staff has reviewed the limit of $\geq$ 600 lbm for each sampled basket and has found it to be acceptable as reported in Reference 9. That finding was based on the combination of the following elements: (1) the SR for $\geq$ 600 lbs per basket, and (2) the plant-specific active ice management program to maintain individual ice basket masses above the "safety analysis mean," and (3) consideration of the margin between the containment design pressure and the peak calculated DBA containment pressure. The NRC staff also notes that, as stated in Reference 9, the increase in calculated peak containment pressure during a DBA due to a large

number of baskets decreasing in mass to the 600 lbm value, or even below this value, does not constitute an unacceptable decrease in the margin to the containment design pressure for Catawba.

The NRC staff finds that the licensee's proposed SR is consistent with TSTF-429, as previously approved by the NRC staff in Reference 9. The NRC staff finds that the licensee has provided an adequate discussion of its corrective action program with respect to baskets that are found not to meet the safety analysis mean or the $\geq$ 600 lbm limit. On these bases, NRC staff finds that the licensee's proposed addition of the SR for the $\geq$ 600 lbm limit for Catawba is acceptable. The NRC staff finds the SR frequency of 18 months to be acceptable, as stated above in section 3.1.1.

3.3 SR 3.6.12.6, Visual structural inspection of ice baskets

The current SR 3.6.12.6 requires a visual inspection of the condition of two ice baskets from each of the three azimuthal groups of bays. SR 3.6.12.6 refers to SR 3.6.12.5 for Catawba for a definition of the groups of bays.

The proposed revision to TS SR 3.6.12.6 deletes the word "azimuthal", and removes the reference to SR 3.6.12.5 for Catawba. The elimination of the requirement for verification of an azimuthal distribution of ice in SR 3.6.12.5 for Catawba requires the relocation of the definition of the group of bays into SR 3.6.12.6 for clarity. The section number for this SR remains 3.6.12.6, so there is no proposed renumbering for this SR.

The NRC staff finds that the changes do not change the effective requirements of SR 3.6.12.6 and that the changes provide clarification and consistency with changes that are being proposed to other SRs in TS 3.6.12. Also, these changes are consistent with similar changes proposed in TSTF-429 that were approved in Reference 9. Accordingly, the NRC staff finds these changes to be acceptable.

The licensee revised the Bases for SR 3.6.12.6 to delete the statement: "each ice basket must be raised at least 12 feet for this inspection" to clarify that the SR is for the performance of a full-length inspection of the baskets, and to monitor the impact of the ice condenser environment on the structural integrity of the ice baskets.

3.4 Corrective Action

The NRC staff requested additional information regarding the licensee's planned corrective actions if ice baskets were determined not to meet the safety analysis mean values. The licensees response no. 3.b of its June 12, 2003, letter states as follows:

> Duke Procedures will direct that if an individual basket is determined to contain less stored ice mass than the required safety analysis mean for its Radial Zone, this condition is to be identified in the corrective action program, including initiating an evaluation to identify the cause and correct any deficiencies with associated maintenance practices. This condition would be considered a "condition adverse to quality." Consistent with Duke's corrective action program, "apparent cause" and "extent of condition" evaluations would be completed. [...]

The licensee's response no. 3.b also stated that if an individual basket were determined to contain less than 600 pounds of ice this would be a violation of the proposed surveillance requirements and would represent a "significant condition adverse to quality." This response no. 3.b resolves the NRC staff's concerns in this regard since it defines the corrective action in the case of conditions adverse to quality and in the case of significant conditions adverse to quality. The licensee's letter of June 12, 2003, also provided a specific licensee commitment to essentially the same actions as described in the paragraph above.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC 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 (68 FR 18274). 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 the amendments.

## 6.0 CONCLUSION

The Commission 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

## 7.0 REFERENCES

1. Letter, M.S. Tuckman, Duke Energy Corporation to NRC, Application for License Amendments: "Amendment to Technical Specification 3.6.12 - Ice Bed, Revise Ice Mass Surveillance Requirements," for Catawba and McGuire, dated January 31, 2003.

2. Letter, D. R. Hoffman, Excel Services Corporation, to Dr. W. D. Beckner, NRC, "TSTF-447, TSTF-429, TSTF-450 for NRC Review," transmitting TSTF-429, Revision 2, "Ice Mass Determination Surveillance Requirements," July 15, 2003

3. Letter, R.S. Lytton, Chair, ICUG, to NRC, transmitting responses to requests for additional information, November 26, 2002.

4. Letter, R.S. Lytton, Chair, ICUG, to NRC, "Revision 2 to Ice Condenser Utility Group Topical Report No. ICUG-001: Application of the Active Ice Mass Management Concept to the Ice Condenser Ice Mass Technical Specification," dated June 19, 2003.

5. Letter, NRC to R.S. Lytton, Chair, ICUG, "Draft Safety Evaluation for Ice Condenser Utility Group Topical Report No. ICUG-001, Rev. 0: Application of the Ice Mass Management Concept to the Ice Condenser Ice Mass Technical Specification," May 6, 2003.

6. Letter, M.S. Tuckman, Duke Energy Corporation to NRC, submitting responses to requests for additional information on license amendment applications for Catawba and McGuire, June 12, 2003.

7. Catawba Nuclear Station, Units 1 and 2, UFSAR Chapter 6 & McGuire Nuclear Station Units 1 and 2.

8. NUREG-0422, Safety Evaluation Report related to the operation of McGuire Nuclear Station, Units 1 and 2, March 1978.

9. Letter, NRC to R.S. Lytton, Chair, ICUG, "Safety Evaluation for Ice Condenser Utility Group Topical Report No. ICUG-001, Rev. 2: Application of the Ice Mass Management Concept to the Ice Condenser Ice Mass Technical Specification," September 11, 2003.

10. Letter, M. S. Tuckman, Duke Power Company, to NRC, transmitting approved version of Topical Report DPC-NE-3004-PA, Revision 1, "Mass and Energy Release and Containment Response Methodology," dated December 18, 2000.

11. Letter, H. B. Barron, Duke Energy Corporation to NRC, submitting supplement modifying sample expansion guidance and clarifying implementation plans for Catawba and McGuire, September 2, 2003.

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