UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 11, 2002

Mr. G. R. Peterson
Site Vice President
Catawba Nuclear Station
Duke Energy Corporation
4800 Concord Road
York, South Carolina 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MB1570 AND MB1571)

Dear Mr. Peterson:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 194 to Facility Operating License NPF-35 and Amendment No. 187 to Facility Operating License NPF-52 for the Catawba Nuclear Station (CNS), Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated March 22, 2001, as supplemented by letter dated October 11, 2001.

The amendments revise the current CNS TS surveillance requirement (SR) for the methodology and frequency for the chemical analyses of the ice condenser ice bed. Also, these amendments add a new TS SR to address sampling requirements for ice additions to the ice bed. In addition, the amendments revise the current CNS TS surveillance requirement acceptance criteria and surveillance frequency for the inspection of ice condenser ice basket flow channel areas.

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,

Chandu P. Patel

Chandu P. Patel, 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. 194 to NPF-35
2. Amendment No. 187 to NPF-52
3. Safety Evaluation

cc w/encls: See next page

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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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. 194
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 March 22, 2001, as supplemented by letter dated October 11, 2001, 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. 194 , 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 and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

for

Richard J. Laufer, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: February 11, 2002

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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. 187
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 March 22, 2001, as supplemented by letter dated October 11, 2001, 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. 187 , 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 and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

for

Richard J. Laufer, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: February 11, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 194

FACILITY OPERATING LICENSE NO. NPF-35

DOCKET NO. 50-413

AND LICENSE AMENDMENT NO. 187

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
B3.6.12-1	B3.6.12-1
B3.6.12-2	B3.6.12-2
B3.6.12-3	B3.6.12-3
B3.6.12-4	B3.6.12-4
B3.6.12-5	B3.6.12-5
B3.6.12-6	B3.6.12-6
B3.6.12-7	B3.6.12-7
B3.6.12-8	B3.6.12-8
B3.6.12-9	B3.6.12-9
B3.6.12-10	B3.6.12-10

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.12.2	-------------------------------NOTE------------------------------ The chemical analysis may be performed on either the liquid solution or on the resulting ice. --- Verify, by chemical analysis, that ice added to the ice condenser meets the boron concentration and pH requirements of SR 3.6.12.7.	Each ice addition
SR 3.6.12.3	Verify, by visual inspection, accumulation of ice on structural members comprising flow channels through the ice bed is ≤ 15 percent blockage of the total flow area for each safety analysis section.	18 months
SR 3.6.12.4	Verify total weight of stored ice is ≥ 2,330,856 lb by: a. Weighing a representative sample of ≥ 144 ice baskets and verifying each basket contains ≥ 1199 lb of ice; and 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
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: a. Group 1—bays 1 through 8; b. Group 2—bays 9 through 16; and c. Group 3—bays 17 through 24. The average ice weight of the sample baskets in each group from radial rows 1, 2, 4, 6, 8, and 9 shall be ≥ 1199 lb.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.12.6	Visually inspect, for detrimental structural wear, cracks, corrosion, or other damage, two ice baskets from each azimuthal group of bays. See SR 3.6.12.5.	40 months
SR 3.6.12.7	------------------------------ NOTE ------------------------------ The requirements of this SR are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified below. -- Verify, by chemical analysis of the stored ice in at least one randomly selected ice basket from each ice condenser bay, that ice bed: a. Boron concentration is $\geq$ 1800 ppm and $\leq$ 2330 ppm; and b. pH is $\geq$ 9.0 and $\leq$ 9.5.	54 months

B 3.6 CONTAINMENT SYSTEMS

B 3.6.12 Ice Bed

BASES

BACKGROUND

The ice bed consists of over 2,330,856 lb of ice stored in 1944 baskets within the ice condenser. Its primary purpose is to provide a large heat sink in the event of a release of energy from a Design Basis Accident (DBA) in containment. The ice would absorb energy and limit containment peak pressure and temperature during the accident transient. Limiting the pressure and temperature reduces the release of fission product radioactivity from containment to the environment in the event of a DBA.

The ice condenser is an annular compartment enclosing approximately 300° of the perimeter of the upper containment compartment, but penetrating the operating deck so that a portion extends into the lower containment compartment. The lower portion has a series of hinged doors exposed to the atmosphere of the lower containment compartment, which, for normal unit operation, are designed to remain closed. At the top of the ice condenser is another set of doors exposed to the atmosphere of the upper compartment, which also remain closed during normal unit operation. Intermediate deck doors, located below the top deck doors, form the floor of a plenum at the upper part of the ice condenser. These doors also remain closed during normal unit operation. The upper plenum area is used to facilitate surveillance and maintenance of the ice bed.

The ice baskets contain the ice within the ice condenser. The ice bed is considered to consist of the total volume from the bottom elevation of the ice baskets to the top elevation of the ice baskets. The ice baskets position the ice within the ice bed in an arrangement to promote heat transfer from steam to ice. This arrangement enhances the ice condenser's primary function of condensing steam and absorbing heat energy released to the containment during a DBA.

In the event of a DBA, the ice condenser inlet doors (located below the operating deck) open due to the pressure rise in the lower compartment. This allows air and steam to flow from the lower compartment into the ice condenser. The resulting pressure increase within the ice condenser causes the intermediate deck doors and the top deck doors to open, which allows the air to flow out of the ice condenser into the upper compartment. Steam condensation within the ice condenser limits the

BASES

BACKGROUND (continued)

pressure and temperature buildup in containment. A divider barrier separates the upper and lower compartments and ensures that the steam is directed into the ice condenser.

The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a DBA and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators. During the post blowdown period, the Air Return System (ARS) returns upper compartment air through the divider barrier to the lower compartment. This serves to equalize pressures in containment and to continue circulating heated air and steam from the lower compartment through the ice condenser where the heat is removed by the remaining ice.

As ice melts, the water passes through the ice condenser floor drains into the lower compartment. Thus, a second function of the ice bed is to be a large source of borated water (via the containment sump) for long term Emergency Core Cooling System (ECCS) and Containment Spray System heat removal functions in the recirculation mode.

A third function of the ice bed and melted ice is to remove fission product iodine that may be released from the core during a DBA. Iodine removal occurs during the ice melt phase of the accident and continues as the melted ice is sprayed into the containment atmosphere by the Containment Spray System. The ice is adjusted to an alkaline pH that facilitates removal of radioactive iodine from the containment atmosphere. The alkaline pH also minimizes the occurrence of the chloride and caustic stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation.

It is important for the ice to be uniformly distributed around the 24 ice condenser bays and for open flow paths to exist around ice baskets. This is especially important during the initial blowdown so that the steam and water mixture entering the lower compartment do not pass through only part of the ice condenser, depleting the ice there while bypassing the ice in other bays.

BASES

BACKGROUND (continued)

Two phenomena that can degrade the ice bed during the long service period are:

a. Loss of ice by melting or sublimation; and

b. Obstruction of flow passages through the ice bed due to buildup of ice.

Both of these degrading phenomena are reduced by minimizing air leakage into and out of the ice condenser.

The ice bed limits the temperature and pressure that could be expected following a DBA, thus limiting leakage of fission product radioactivity from containment to the environment.

APPLICABLE SAFETY ANALYSES

The limiting DBAs considered relative to containment temperature and pressure are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. DBAs are not assumed to occur simultaneously or consecutively.

Although the ice condenser is a passive system that requires no electrical power to perform its function, the Containment Spray System, RHR Spray System, and the ARS also function to assist the ice bed in limiting pressures and temperatures. Therefore, the postulated DBAs are analyzed in regards to containment Engineered Safety Feature (ESF) systems, assuming the loss of one ESF bus, which is the worst case single active failure and results in one train each of the Containment Spray System, RHR Spray System, and ARS being inoperable.

The limiting DBA analyses (Ref. 1) show that the maximum peak containment pressure results from the LOCA analysis and is calculated to be less than the containment design pressure. For certain aspects of the transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the cooling effectiveness of the ECCS during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to

BASES

APPLICABLE SAFETY ANALYSES (continued)

conservatively minimize, rather than maximize, the calculated transient containment pressures, in accordance with 10 CFR 50, Appendix K (Ref. 2).

The maximum peak containment atmosphere temperature results from the SLB analysis and is discussed in the Bases for LCO 3.6.5, "Containment Air Temperature."

In addition to calculating the overall peak containment pressures, the DBA analyses include calculation of the transient differential pressures that occur across subcompartment walls during the initial blowdown phase of the accident transient. The internal containment walls and structures are designed to withstand these local transient pressure differentials for the limiting DBAs.

The ice bed satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

The ice bed LCO requires the existence of the required quantity of stored ice, appropriate distribution of the ice and the ice bed, open flow paths through the ice bed, and appropriate chemical content and pH of the stored ice. The stored ice functions to absorb heat during a DBA, thereby limiting containment air temperature and pressure. The chemical content and pH of the ice provide core SDM (boron content) and remove radioactive iodine from the containment atmosphere when the melted ice is recirculated through the ECCS and the Containment Spray System, respectively. The limits on boron concentration and pH of the ice are associated with containment sump pH ranging between 7.5 and 9.3 inclusive following the design basis LOCA.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause an increase in containment pressure and temperature requiring the operation of the ice bed. Therefore, the LCO is applicable in MODES 1, 2, 3, and 4.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, the ice bed is not required to be OPERABLE in these MODES.

BASES

ACTIONS

A.1

If the ice bed is inoperable, it must be restored to OPERABLE status within 48 hours. The Completion Time was developed based on operating experience, which confirms that due to the very large mass of stored ice, the parameters comprising OPERABILITY do not change appreciably in this time period. Because of this fact, the Surveillance Frequencies are long (months), except for the ice bed temperature, which is checked every 12 hours. If a degraded condition is identified, even for temperature, with such a large mass of ice it is not possible for the degraded condition to significantly degrade further in a 48 hour period. Therefore, 48 hours is a reasonable amount of time to correct a degraded condition before initiating a shutdown.

B.1 and B.2

If the ice bed cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.12.1

Verifying that the maximum temperature of the ice bed is ≤ 27°F ensures that the ice is kept well below the melting point. The 12 hour Frequency was based on operating experience, which confirmed that, due to the large mass of stored ice, it is not possible for the ice bed temperature to degrade significantly within a 12 hour period and was also based on assessing the proximity of the LCO limit to the melting temperature.

Furthermore, the 12 hour Frequency is considered adequate in view of indications in the control room, including the alarm, to alert the operator to an abnormal ice bed temperature condition. This SR may be satisfied by use of the Ice Bed Temperature Monitoring System.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.12.2

This SR ensures that initial ice fill and any subsequent ice additions meet the boron concentration and pH requirements of SR 3.6.12.7. The SR is modified by a NOTE that allows the chemical analysis to be performed on either the liquid or resulting ice of each sodium tetraborate solution prepared. If ice is obtained from offsite sources, then chemical analysis data must be obtained for the ice supplied.

SR 3.6.12.3

This SR ensures that the air/steam flow channels through the ice bed have not accumulated ice blockage that exceeds 15 percent of the total flow area through the ice bed region. The allowable 15 percent buildup of ice is based on the analysis of the sub-compartment response to a design basis LOCA with partial blockage of the ice condenser flow channels. The analysis did not perform detailed flow area modeling, but rather lumped the ice condenser bays into six sections ranging from 2.75 bays to 6.5 bays. Individual bays are acceptable with greater than 15 percent blockage, as long as 15 percent blockage is not exceeded for any analysis section.

To provide a 95 percent confidence that flow blockage does not exceed the allowed 15 percent, the visual inspection must be made for at least 54 (33 percent) of the 162 flow channels per ice condenser bay. The visual inspection of the ice bed flow channels is to inspect the flow area, by looking down from the top of the ice bed, and where view is achievable up from the bottom of the ice bed. Flow channels to be inspected are determined by random sample. As the most restrictive ice bed flow passage is found at a lattice frame elevation, the 15 percent blockage criteria only applies to "flow channels" that comprise the area:

a. between ice baskets, and
b. past lattice frames and wall panels.

Due to a significantly larger flow area in the regions of the upper deck grating and the lower inlet plenum support structures and turning vanes, it would require a gross buildup of ice on these structures to obtain a degradation in air/steam flow. Therefore, these structures are excluded as part of a flow channel for application of the 15 percent blockage criteria. Plant and industry experience have shown that removal of ice from the excluded structures during the refueling outage is sufficient to ensure they remain operable throughout the operating cycle. Thus, removal of any gross ice buildup on the excluded structures is performed following outage maintenance activities.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Operating experience has demonstrated that the ice bed is the region that is the most flow restrictive, due to the normal presence of ice accumulation on lattice frames and wall panels. The flow area through the ice basket support platform is not a more restrictive flow area because it is easily accessible from the lower plenum and is maintained clear of ice accumulation. There is not a mechanistically credible method for ice to accumulate on the ice basket support platform during plant operation.

Plant and industry experience has shown that the vertical flow area through the ice basket support platform remains clear of ice accumulation that could produce blockage. Normally only a glaze may develop or exist on the ice basket support platform which is not significant to blockage of flow area. Additionally, outage maintenance practices provide measures to clear the ice basket support platform following maintenance activities of any accumulation of ice that could block flow areas.

Activities that have a potential for significant degradation of flow channels should be limited to outage periods. Performance of this SR following completion of these activities assures the ice bed is in an acceptable condition for the duration of the operating cycle.

Frost buildup or loose ice is not to be considered as flow channel blockage, whereas attached ice is considered blockage of a flow channel. Frost is the solid form of water that is loosely adherent, and can be brushed off with the open hand.

SR 3.6.12.4

The weighing program is designed to obtain a representative sample of the ice baskets. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall consist of one basket from radial rows 1, 2, 4, 6, 8, and 9. If no basket from a designated row can be obtained for weighing, a basket from the same row of an adjacent bay shall be weighed.

The rows chosen include the rows nearest the inside and outside walls of the ice condenser (rows 1 and 2, and 8 and 9, respectively), where heat transfer into the ice condenser is most likely to influence melting or sublimation. Verifying the total weight of ice ensures that there is adequate ice to absorb the required amount of energy to mitigate the DBAs.

SURVEILLANCE REQUIREMENTS (continued)

If a basket is found to contain < 1199 lb of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The average weight of ice in these 21 baskets (the discrepant basket and the 20 additional baskets) shall be ≥ 1199 lb at a 95% confidence level.

Weighing 20 additional baskets from the same bay in the event a Surveillance reveals that a single basket contains < 1199 lb ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a DBA transient, creating a path for steam to pass through the ice bed without being condensed. The Frequency of 18 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses. Operating experience has verified that, with the 18 month Frequency, the weight requirements are maintained with no significant degradation between surveillances.

SR 3.6.12.5

This SR ensures that the azimuthal distribution of ice is reasonably uniform, by verifying that the average ice weight in each of three azimuthal groups of ice condenser bays is within the limit. The Frequency of 18 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses. Operating experience has verified that, with the 18 month Frequency, the weight requirements are maintained with no significant degradation between surveillances.

SR 3.6.12.6

This SR ensures that a representative sampling of accessible portions of ice baskets, which are relatively thin walled, perforated cylinders, have not been degraded by wear, cracks, corrosion, or other damage. Each ice basket must be raised at least 12 feet for this inspection. The Frequency of 40 months for a visual inspection of the structural soundness of the ice baskets is based on engineering judgment and considers such factors as the thickness of the basket walls relative to corrosion rates expected in their service environment and the results of the long term ice storage testing.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.12.7

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration ≥ 1800 ppm and ≤ 2330 ppm as sodium tetraborate and a high pH, ≥ 9.0 and ≤ 9.5 at 25°C, in order to meet the requirement for borated water when the melted ice is used in the ECCS recirculation mode of operation. Additionally, the minimum boron concentration setpoint is used to assure reactor subcriticality in a post LOCA environment, while the maximum boron concentration is used as the bounding value in the hot leg switchover timing calculation (Ref. 4). This is accomplished by obtaining at least 24 ice samples. Each sample is taken approximately one foot from the top of the ice of each randomly selected ice basket in each ice condenser bay. The SR is modified by a NOTE that allows the boron concentration and pH value obtained from averaging the individual samples' analysis results to satisfy the requirements of the SR. If either the average boron concentration or average pH value is outside their prescribed limit, then entry into ACTION Condition A is required. Sodium tetraborate has been proven effective in maintaining the boron content for long storage periods, and it also enhances the ability of the solution to remove and retain fission product iodine. The high pH is required to enhance the effectiveness of the ice and the melted ice in removing iodine from the containment atmosphere. This pH range also minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation. The Frequency of 54 months is intended to be consistent with the expected length of three fuel cycles, and was developed considering these facts:

a. Long term ice storage tests have determined that the chemical composition of the stored ice is extremely stable;

b. There are no normal operating mechanisms that significantly change the boron concentration of the stored ice, and pH remains within a 9.0 – 9.5 range when boron concentrations are above approximately 1200 ppm; and

c. Operating experience has demonstrated that meeting the boron concentration and pH requirements has not been a problem.

BASES

REFERENCES

1. UFSAR, Section 6.2.
2. 10 CFR 50, Appendix K.
3. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
4. UFSAR, Section 6 3.3.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 194 TO FACILITY OPERATING LICENSE NPF-35

AND AMENDMENT NO. 187 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 March 22, 2001, as supplemented by letter dated October 11, 2001, Duke Energy Corporation, et al. (DEC, the licensee), submitted a request for changes to the Catawba Nuclear Station (CNS), Units 1 and 2, Technical Specifications (TS). The requested changes are divided into two parts. Part I affects the current CNS TS surveillance requirement (SR) for the methodology and frequency for the chemical analyses of the ice condenser ice bed (stored ice). Also, these amendments add a new TS SR to address sampling requirements for ice additions to the ice bed. Part II affects the current CNS TS surveillance requirement acceptance criteria and surveillance frequency for the inspection of ice condenser ice basket flow channel areas. The proposed changes also result in renumbering the SRs. Associated changes to the TS Bases were made by the licensee pursuant to 10 CFR 50.59.

The October 11, 2001, letter provided additional information that did not expand the scope of the original Federal Register notice or the initial proposed no significant hazard consideration determination.

2.0 DISCUSSION AND EVALUATION

2.1 Changes to Ice Bed Chemical Analyses and Sampling

These proposed amendments modify the current CNS TS SR 3.6.12.3. The changes involve the methodology and frequency for the chemical analyses of the stored ice. Also, these proposed amendments add a new TS SR to address sampling requirements for ice additions to the ice bed.

Specifically, the current CNS SR 3.6.12.3 requires that every 18 months, ice in the ice bed be verified to have a boron concentration of greater than or equal to 1800 ppm and a pH between 9.0 and 9.5. The proposed amendments include the following changes to SR 3.6.12.3 for sampling of the ice in the ice bed:

- The number of samples is increased from 9 to 24 by requiring one sample from each of the 24 ice condenser bays.

- The interval for the surveillance is increased from once per 18 months to once per 54 months.

- A note is added to the effect that the results of the SR will be based on the average of the 24 individual samples.

- A boron concentration upper limit of 2330 ppm is added to reflect the value required for the post loss-of-coolant hot leg switch-over timing calculation.

- The current SR 3.6.12.3 will be renumbered to SR 3.6.12.7.

In addition a new SR 3.6.12.2 is added with the following changes applicable to each addition of ice:

- For each ice addition, the ice must meet the boron concentration and pH requirements of SR 3.6.12.7, and

- The chemical analysis of the boron concentration and pH may be performed on either the liquid solution or the resulting ice.

The licensee stated that the industry experience has shown that there are no normal operating mechanisms that decrease the boron concentration of the stored ice, and pH remains within a 9.0 to 9.5 range when boron concentrations are above approximately 1100-1200 ppm. The licensee also stated that the review of past history of sampling analysis results at CNS concluded that, consistently, the boron and pH of the ice beds have been well within limits. The proposed surveillance frequency of 54 months is expected to be the length of three fuel cycles, and it is consistent with the improved Standard Technical Specifications for Westinghouse plants with ice condensers. Based on the above considerations, and further assurance provided by the addition of the new CNS SR 3.6.12.2 for the ice that may be added to the ice bed, the staff concludes that changing the performance frequency from 18 to 54 months is acceptable.

The addition of the Note in SR 3.6.12.7 indicating that the SR is satisfied based on the averages of the boron concentration and pH provides clarification that, as the licensee states, the average analysis results of the individual samples should be "consistent with the accident analysis assumption that the bulk containment sump pH and boron concentration will not be altered from their accident analysis assumed values following complete ice melt." The staff agrees with licensee's evaluation regarding the use of average concentrations.

The provision of the additional SR 3.6.12.2 provides further assurance that the boron concentration and pH of ice that may be added to the ice bed as often as each refueling outage will be controlled within the limit values.

The licensee has proposed to add an upper limit of 2330 ppm to the TS surveillance limit on required boron concentration. The licensee stated that the CNS's Updated Final Safety Analysis Report (UFSAR) documents the input parameters for the boron precipitation analysis, and these input parameters establish a maximum boron concentration of 2330 ppm for CNS's ice beds. The licensee further stated that the boron precipitation analysis shows that the maximum boron concentration in the reactor vessel following a hypothetical loss of coolant accident is below the NRC staff accepted maximum limit. The licensee indicated that CNS has procedural controls that have maintained the borax ice making solution within the TS lower limit of 1800 ppm and the UFSAR documented upper limit of 2330 ppm. The addition of the TS upper limit requirement on boron concentration does not require any changes to existing maintenance practices for targeting boron concentration.

The staff has determined that the licensee's proposed changes, as discussed above, should ensure a clearer and more consistent interpretation and implementation of the TS related to boron concentration and pH. In addition, the proposed changes are consistent with the improved Standard Technical Specifications for Westinghouse plants with ice condensers. The staff has approved similar changes at other Westinghouse plants with ice condensers. On these bases, the staff finds these changes to be acceptable.

2.2 Changes To Ice Bed Flow Area Verification

The amendments alter the acceptance criterion and surveillance frequency in the current CNS TS SR 3.6.12.2. Also, due to the addition of the new SR described in the above discussion, the changes result in renumbering the current SR 3.6.12.2 to SR 3.6.12.3.

Specifically, the current CNS SR 3.6.12.2 require a visual inspection of the air/steam flow area within the ice condensers. These proposed amendments replace the current visual inspection requirement that uses a 0.38 inch ice/frost buildup criteria with a visual surveillance program that provides a 95 percent confidence level that flow blockage does not exceed the 15 percent assumed in the accident analysis. Whereas, the 0.38 inch program required inspection of as few as two flow channels per ice condenser bay, the new program will require at least 33 percent of the flow area per bay to be inspected. Also, the proposed changes revise the frequency interval from 9 months to 18 months for flow area inspection of the ice condenser. The surveillance is intended to be performed following outage maintenance as an "as-left" surveillance.

The amendments also revise the applicability from "flow channels through the ice condenser" to "flow channels through the ice bed." An associated revision to the TS Bases clarifies which structures are to be inspected. The revision limits the structures to be inspected to only include "between ice baskets" and "past lattice frames and wall panels." This change also deletes "frost" from the SR. The Westinghouse definitions for frost and ice have been added to the TS Bases to explain why frost is not an impediment to air/steam flow through the ice condenser.

The purpose of the change is to revise the TS such that it is based on the design basis analysis for the plant. The licensee indicated that Westinghouse analysis has shown that over-pressurization of the lower compartment will not occur provided the overall blockage is less than the 15 percent of each safety analysis section that is assumed in the transient mass distribution (TMD) analysis. The TMD analysis lumps the ice condenser bays into six sections of 2.75, 3.25, 6.50, 4.50, 3.50 and 3.50 bays. The analysis concluded that 15 percent effective flow blockage was acceptable. The analysis methodology supports that there can be individual bays with blockage of greater than 15 percent, or even individual channels blocked, provided the highest calculated percent blockage in each of the TMD lumped sections is less than or equal to 15 percent. The 15 percent blockage inspection criterion applies to each of the six analysis sections. The staff concludes that the proposed changes provide a better criterion to assure that the design basis analysis limitations for the plant are not exceeded. The revised inspection requirement will change from requiring inspection of as few as two flow passages per each of the 24 ice condenser bays, to at least 54 passages (33 percent) per bay to be inspected. The staff agrees with the licensee's conclusion that this increased sampling would provide an increased confidence level in the results of the inspection. On these bases, the staff finds the changes to be acceptable.

The scope for a visual inspection of the flow channels in the Bases for the new SR 3.6.12.3 has been changed to include the flow channel area between the ice baskets and past lattice frames and wall panels. This area is the limiting area for flow through the ice bed. The principal effect of this change is to remove the much larger flow areas in the regions of the upper deck grating and the lower inlet plenum and turning vanes from the flow channel area definition. The licensee stated that the plant and the industry experience have shown that removal of ice from these larger structures during the refueling outages is sufficient to ensure their operability. Accordingly the licensee indicated that plant procedures will now require a 100 percent inspection and evaluation for any gross ice buildup on the excluded structures, and the removal of significant ice accumulations.

The NRC staff review of this subject has determined that inspection, during an operating cycle, of the larger components such as the lower inlet plenum and associated components, such as the turning vanes, is not necessary to meet the intent of the SR. The staff recognizes that the lower inlet plenum and associated components (such as the turning vanes) represent a relatively large free volume, such that the available flow area is not significantly affected by any localized frost/ice buildup within the volume. Specifically, the available flow area in the lower inlet plenum is typically 10 to 100 times the flow area within the ice basket matrix. Hence, the literal application of the subject SR to the lower inlet plenum region has no significant physical basis. The staff finds the licensee's proposed changes to the SR to be consistent with the NRC staff's latest guidance in the improved Standard Technical Specifications for Westinghouse plants. On these bases, as discussed above, the staff finds these changes to be acceptable.

The previous SR 3.6.12.2 required that the accumulation of ice or frost would be inspected and compared to the acceptance criterion. The proposed change deletes frost from the SR and adds a definition of frost to the Bases to explain why frost is not an impediment to air/steam flow through the ice condenser. The frost is defined as ice which is loosely adherent, and can be easily brushed or knocked off by hand. The licensee stated that Westinghouse concurs that loose ice is judged to either melt or be blown out very quickly during design basis accident. Thus, excluding frost from the flow blockage determination does not impact the safety analyses. The staff agrees with licensee's conclusion. Therefore, the exclusion of frost from flow blockage determination is acceptable.

Also, the licensee has proposed to revise the frequency interval from 9 months to 18 months for the flow area inspection of the ice condensers. The licensee stated that management of ice condenser maintenance activities has successfully limited activities with the potential for significant flow channel degradation to the refueling outage. By verifying an ice bed condition of less than or equal to 15 percent flow channel blockage following completion of these maintenance activities, the surveillance assures that the ice bed is in acceptable condition for the duration of the operating cycle. During the operating cycle, an expected amount of ice sublimates and reforms as frost on the colder surfaces in the Ice Condenser. However, frost does not degrade flow channel flow area according to the Westinghouse definition of frost. Thus, the licensee states that, the surveillance will effectively demonstrate operability for an allowed 18-month cycle. In addition, the proposed frequency is consistent with the improved

Standard Technical Specifications for Westinghouse plants. On these bases, the staff finds the changes to be acceptable.

3.0 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.

4.0 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 (66 FR 36339). 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.

Principal Contributor: C. Patel

Date: February 11, 2002

Mr. G. R. Peterson
Site Vice President
Catawba Nuclear Station
Duke Energy Corporation
4800 Concord Road
York, South Carolina 29745-9635

February 11, 2002

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MB1570 AND MB1571)

Dear Mr. Peterson:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 194 to Facility Operating License NPF-35 and Amendment No. 187 to Facility Operating License NPF-52 for the Catawba Nuclear Station (CNS), Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated March 22, 2001, as supplemented by letter dated October 11, 2001.

The amendments revise the current CNS TS surveillance requirement (SR) for the methodology and frequency for the chemical analyses of the ice condenser ice bed. Also, these amendments add a new TS SR to address sampling requirements for ice additions to the ice bed. In addition, the amendments revise the current CNS TS surveillance requirement acceptance criteria and surveillance frequency for the inspection of ice condenser ice basket flow channel areas.

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//

Chandu P. Patel, 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. 194 to NPF-35
2. Amendment No. 187 to NPF-52
3. Safety Evaluation

cc w/encls: See next page

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