

September 25, 2006

Mr. Dhiaa Jamil  
Vice President  
Catawba Nuclear Station  
Duke Power Company LLC  
4800 Concord Road  
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2, ISSUANCE OF  
AMENDMENTS REGARDING TEMPERATURE LIMIT FOR THE STANDBY  
NUCLEAR SERVICE WATER POND (TAC NOS. MC7783 AND MC7784)

Dear Mr. Jamil:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 232 to Renewed Facility Operating License NPF-35 and Amendment No. 228 to Renewed Facility Operating License NPF-52 for the Catawba Nuclear Station, Units 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated July 25, 2005, as supplemented July 28, 2005, and August 1, 2005.

The amendments revise the temperature limit for the standby nuclear service water pond from 91.5 °F to 95 °F. The July 25, 2005, application requested the NRC to issue the amendment on an emergency basis on predictions of continued high air temperature, high humidity and no appreciable precipitation. The licensee's August 1, 2005, letter withdrew the request to issue the amendment on an emergency basis.

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/**

John Stang, Senior Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosures:

1. Amendment No. 232 to NPF-35
2. Amendment No. 228 to NPF-52
3. Safety Evaluation

cc w/encls: See next page

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Duke Power Company LLC  
4800 Concord Road  
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Package No.: ML062420502  
Amendment No.: ML062420491  
Tech Spec No.: ML062690114

\*SE input dated

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

Amendment No. 232  
Renewed 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) Renewed Facility Operating License No. NPF-35 filed by the Duke Power Company LLC, acting for itself, North Carolina Electric Membership Corporation and Saluda River Electric Cooperative, Inc. (licensees), dated July 25, 2005, as supplemented July 28, 2005, and August 1, 2005, 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 Renewed 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. 232 , which are attached hereto, are hereby incorporated into this license. Duke Power Company LLC 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 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Evangelos C. Marinos, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-35  
and the Technical Specifications

Date of Issuance: September 25, 2006

DUKE POWER COMPANY LLC  
NORTH CAROLINA MUNICIPAL POWER AGENCY NO. 1  
PIEDMONT MUNICIPAL POWER AGENCY  
DOCKET NO. 50-414  
CATAWBA NUCLEAR STATION, UNIT 2  
AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 228  
Renewed 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) Renewed Facility Operating License No. NPF-52 filed by the Duke Power Company LLC, acting for itself, North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency (licensees), dated July 25, 2005, as supplemented July 28, 2005, and August 1, 2005, 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 Renewed 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. 228 , which are attached hereto, are hereby incorporated into this license. Duke Power Company LLC 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 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Evangelos C. Marinos, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-52  
and the Technical Specifications

Date of Issuance: September 25, 2006



ATTACHMENT TO LICENSE AMENDMENT NO. 232  
RENEWED FACILITY OPERATING LICENSE NO. NPF-35  
DOCKET NO. 50-413  
AND LICENSE AMENDMENT NO. 228  
RENEWED FACILITY OPERATING LICENSE NO. NPF-52  
DOCKET NO. 50-414

Replace the following pages of the Renewed Facility Operating Licenses and the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

License Pages  
NPF-35 page 4  
NPF-52 page 4

TSs  
3.7.9-1  
B3.7.9-1  
B3.7.9-2  
B3.7.9-3  
B3.7.9-4

Insert

License Pages  
NPF-35 page 4  
NPF-52 page 4

TSs  
3.7.9-1  
B3.7.9-1  
B3.7.9-2  
B3.7.9-3  
B3.7.9-4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 232 TO RENEWED FACILITY OPERATING LICENSE NPF-35

AND

AMENDMENT NO. 228 TO RENEWED FACILITY OPERATING LICENSE NPF-52

DUKE POWER COMPANY LLC

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By application dated July 25, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML052160033), as supplemented by letters dated July 28, 2005 (ADAMS Accession No. ML052220088), and August 1, 2005 (ADAMS Accession No. ML052210365), Duke Power Company LLC (Duke, the licensee), requested changes to the Technical Specifications (TSs) for the Catawba Nuclear Station, Units 1 and 2 (Catawba 1 and 2). The supplements dated July 28, 2005, and August 1, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the original proposed no significant hazards consideration determination as published in the *Federal Register* on August 4, 2005, (70 FR 44946).

The proposed changes would revise the temperature limit in the TSs for the standby nuclear service water pond (SNSWP) from 91.5 °F to 95 °F. The July 25, 2005, application requested the Nuclear Regulatory Commission (NRC) to issue the amendment on an emergency basis on predictions of continued high air temperature, high humidity and no appreciable precipitation. The licensee's August 1, 2005, letter withdrew the request to issue the amendment on an emergency basis.

2.0 REGULATORY EVALUATION

The Catawba 1 and 2 SNSWP provides the assured water supply for the Catawba units in the event of a failure of the supply from Lake Wylie. The SNSWP consists of a small impoundment of Lake Wylie, with two surface thermal outfalls and a single submerged intake, and is relied upon by the nuclear service water system (NSWS) as an assured source of cooling water. Catawba 1 and 2 Technical Specification (TS) 3.7.9, "Standby Nuclear Service Water System," specifies requirements that apply to the SNSWP. TS Surveillance Requirement (SR) 3.7.9.2 requires the licensee to verify that the average water temperature of the SNSWP does not exceed 91.5 °F at an elevation of 568 feet in the SNSWP at least once every 24 hours. The licensee has requested NRC approval to increase the maximum allowed SNSWP temperature

to 95 °F. The requirements and criteria that are applicable to the NRC review of the licensee's request are specified by Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, General Design Criterion (GDC) 44, "Cooling water," Standard Review Plan (SRP), Section 9.2.1, "Station Service Water System," and SRP, Section 9.2.5, "Ultimate Heat Sink." Acceptability of the proposed change is judged based upon continued compliance with the provisions of GDC 44 and conformance with the specified review criteria as applied to the Catawba units and reflected primarily in Section 9.2 of the Updated Final Safety Analysis Report (UFSAR) for Catawba 1 and 2.

Increasing the SNSWP water temperature affects the conditions in containment following a postulated accident. The Catawba 1 and 2 licensing basis must comply with the following GDC 1) GDC 16 which requires that the containment remain leak tight following a postulated accident, 2) GDC 38 which requires that the pressure and temperature in containment following a postulated loss-of-coolant accident (LOCA) be rapidly reduced, 3) GDC 50 which requires that the containment accommodate the calculated pressure and temperature following a LOCA without exceeding the design leakage rate with sufficient margin.

### 3.0 TECHNICAL EVALUATION

By letter dated November 19, 1996, ML961120031, the NRC issued a safety evaluation (SE) which evaluated the SNSWP performance. The NRC staff reviewed the analytical methods and modeling that were used by the licensee for evaluating the capability of the SNSWP to perform its function. The NRC staff reviewed considerations that could be affected by the proposed increase in the SNSWP temperature limit that include a) the capability of the SNSWP to provide an adequate supply of cooling water for 30 days of post-accident cooling for the two Catawba units at the specified cooling water supply temperature, b) containment response analyses, c) assessment of peak cladding temperature, and d) the impact of an increased cooling water supply temperature on the capability of the structures, systems, and components (SCCs) to perform their design-basis functions.

#### 3.1 Impact of the Increased SNSWP Supply Temperature on SSCs Important to Safety

The proposed increase in the SNSWP ambient temperature limit will result in an increase in the temperature of water that is provided to SSCs from the SNSWP during postulated transient and accident conditions. The licensee's application evaluated the impact of the proposed increase in the maximum allowed SNSWP ambient temperature on the capability of SSCs important to safety to perform their functions. The licensee indicated that the long-term qualification of safety-related components that are credited for mitigating transients and accidents is based on a maximum cooling water supply temperature of 100 °F. Based upon the SNSWP evaluation that was performed, the licensee has determined that the temperature of the cooling water leaving the pond will not exceed 100 °F if the ambient pond temperature at the 568-foot elevation is limited to 95 °F. The licensee's July 28, 2005, letter, confirmed that measurement uncertainties are accounted for when measuring the ambient SNSWP temperature. This is a necessary consideration to assure that the TS temperature limit will not be inadvertently exceeded thereby assuring that analytical results will remain valid. Based on the NRC staff review the temperature limitations of SSCs will not be exceeded as a consequence of the proposed increase in the SNSWP ambient temperature limit. The licensee evaluated the impact of the proposed increase in the maximum allowed SNSWP ambient temperature on the

functional capabilities of SSCs that are important to safety. Specific areas that were identified and addressed by the licensee includes the following:

1. Heat Transfer Capability of the Containment Spray Heat Exchanger

The licensee confirmed that the containment spray heat exchanger fouling factors, tube plugging limit, and minimum required NSWS flow rate will continue to satisfy heat transfer assumptions that are credited in the containment response analysis. The containment spray heat exchanger was analyzed at an NSWS supply temperature of 100 °F, and the licensee verified that the current heat transfer assumptions for the containment spray heat exchanger will continue to be satisfied. The proposed increase in the maximum allowed ambient SNSWP temperature will not cause the NSWS supply temperature to exceed 100 °F. The NRC staff review determined that the heat transfer capability of the containment spray heat exchanger will continue to be acceptable at the higher TS ambient temperature limit that is proposed for the SNSWP.

2. Heat Transfer Capability of the Component Cooling Water (CCW) and Residual Heat Removal (RHR) Heat Exchangers

The licensee confirmed that the CCW heat exchanger fouling factors, tube plugging limit, and minimum required NSWS flow rate will continue to satisfy heat transfer assumptions that are credited in the containment response analysis. The CCW and RHR heat exchangers were analyzed at an NSWS supply temperature of 100 °F, and the licensee verified that the current heat transfer assumptions for the CCW and RHR heat exchangers will continue to be satisfied. The proposed increase in the maximum allowed ambient SNSWP temperature will not cause the NSWS supply temperature to exceed 100 °F. The NRC staff review determined that the heat transfer capability of the CCW and RHR heat exchangers will continue to be acceptable at the higher TS ambient temperature limit that is proposed for the SNSWP.

3. Reactor Coolant System Cooldown Considerations

The licensee evaluated the capability to adequately cool down the reactor coolant system and mitigate postulated accident conditions based upon the higher SNSWP ambient temperature that is proposed for both the loss-of-coolant accident and the main steamline break (MSLB) event. In the licensee's July 28, 2005, letter, the licensee clarified that the postulated MSLB event is the more-limiting case with respect to SNSWP temperature due to off-site dose considerations. The amount of time required for steaming through the steam generator power-operated relief valves following an MSLB is the controlling factor in this regard (i.e., longer steaming times result in larger offsite doses). The licensee's analysis of the capability to cool down the reactor coolant system following an MSLB assumes a constant NSWS supply temperature of 95.5 °F for 18.8 hours, after which the reactor coolant system reaches 210 °F. The licensee's previous analysis calculated a cooldown time of 31.2 hours, which is bounded by the current licensing basis acceptance criterion for dose considerations of 37.5 hours. The licensee indicated that the reduced cooldown time is due to the reduced number of tubes that are assumed to be plugged in the component cooling water heat exchanger (400 vs. 865). The licensee also determined that the SNSWP outlet temperature will eventually peak at 98.2 °F, which is below the maximum allowed outlet temperature of

100 °F and compares to the previously calculated maximum post-accident SNSWP outlet temperature of 97.0 °F. Similarly, for the LOCA, the licensee determined that the SNSWP outlet temperature will peak at 98.2 °F.

The licensee indicated that the only changes in the analytical methodology and assumptions from what was credited previously and approved by the NRC for the MSLB analysis include a) the number of CCW heat exchanger tubes that are assumed to be plugged is reduced from 865 to 400, b) the previous analysis did not include the heat addition from the reactor coolant pumps whereas the revised analysis includes pump heat, and c) a constant SNSWP outlet temperature of 95.5 °F was assumed for 18.8 hours whereas the previous analysis assumed a constant SNSWP outlet temperature of 92 °F for 31.2 hours. The first two assumptions represent bounding conditions and are determined by the NRC staff to be acceptable. The third assumption depends on the transient behavior of the SNSWP. The licensee's July 28, 2005, letter, indicated that the previous analysis as reviewed and approved by the NRC safety evaluation dated November 19, 1996, originally assumed a constant temperature for 12.5 hours which is more conservative than the 18.8 hours that is assumed in the current analysis.

The licensee's analysis demonstrates that the maximum allowed SNSWP outlet temperature of 100 °F will not be exceeded as a result of the proposed increase in the maximum allowed SNSWP ambient temperature and that the dose consequences will remain bounded by the previous MSLB analysis. Therefore, the NRC staff review of the proposed increase in the maximum allowed SNSWP ambient temperature to be acceptable with respect to reactor cool down considerations.

#### 4. Peak Cladding Temperature

The LOCA peak cladding temperature analysis is affected by changes in the minimum containment pressure that is assumed. Because the time frame of interest in this analysis is prior to initiation of containment sump recirculation (a short-term effect as discussed above), the minimum containment pressure is not effected by the proposed increase in the maximum allowed SNSWP ambient temperature and consequently, the LOCA peak cladding temperature analysis is not affected. The NRC staff has reviewed the effects of the increase in the SNSWP ambient temperature and found the PCT remains bounded. Therefore, the proposed increase in SNSWP ambient temperature is acceptable with respect to the LOCA peak cladding temperature analysis.

### 3.2 Impact of the Increased SNSWP Supply Temperature on Containment Response

The licensee used analysis methods previously found acceptable by the NRC staff.<sup>1</sup> These include both methods to calculate the mass and energy release into the containment, and the containment analysis methods. RELAP/MOD3.1DUKE calculates the mass and energy into the containment following a LOCA. RETRAN-02 MOD5.1DUKE calculates the mass and energy release into the containment following a postulated MSLB accident. The GOTHIC4.0/DUKE computer code was used to perform the containment calculations of peak containment pressure and temperature following these events. In several cases, as discussed in the licensee's July 25, 2005, submittal, re-analysis was not necessary based on the known containment response.

The licensee assumed the worst single failure (loss of one emergency diesel generator) and made other assumptions to overestimate the LOCA peak containment pressure and temperature as discussed in the licensee's July 25, 2005, submittal.

The increased SNSWP temperature is most critical, during the recirculation phase of a LOCA when the emergency core cooling system (ECCS) pumps are taking suction from the sump. The sump water is being cooled by the containment spray heat exchangers and the RHR heat exchangers. The containment spray heat exchangers are cooled directly by the SNSWP while the RHR heat exchangers are cooled by the CCW which is in turn cooled by the SNSWP.

The peak calculated containment pressure as a result of the LOCA is 14.04 psig which is less than the TS value of  $P_a$  (the pressure at which containment leakage rate tests are required to be performed), and is, therefore, acceptable.

The temperature of the sump water during recirculation is important since it has a significant effect on the available net positive suction head (NPSH) of the ECCS and containment spray pumps. The licensee states that the limiting temperature occurs immediately after the suction for these pumps is transferred to the sump. The sump water temperature then decreases as a result of heat exchanger cooling and the addition of the melted ice. Thus, the temperature of the SNSWP does not affect the peak sump temperature since the peak sump temperature occurs before the increased SNSWP temperature can have an effect.

In addition to these calculations, the licensee also considered the effect of increased SNSWP temperature on the short-term blowdown peak pressure, the minimum containment pressure used in the calculation of the peak cladding temperature, the peak containment temperature (which occurs during the MSLB accident) and the peak reverse differential pressure.

Based on the NRC staff review of the progression and response of the containment to events, the NRC staff agrees with the licensee's rationale for why increasing the SNSWP temperature will not adversely affect the response of the containment following a design basis event.

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<sup>1</sup> Letter from M. S. Tuckman, Duke Power Company LLC, to USNRC, "Issuance of Approved versions of Topical Report DPC-NE-3004-PA, Revision 1; Mass and Energy Release and Containment Response Methodology," December 18, 2000.



Therefore, the NRC staff finds the licensee's proposal to increase the SNSWP temperature to 95°F to be acceptable based on conservative assumptions, use analysis methods reviewed and previously approved the NRC staff, and demonstration for the events not reanalyzed that the SNSWP temperature increase will not affect the licensing basis limiting conditions.

#### 4.0 SUMMARY

The NRC staff has reviewed the licensee's assessment of the impact that an increase in the maximum allowed SNSWP ambient temperature (from 91.5 °F to 95 °F) will have on SSCs important to safety. As discussed in the Section 3.0 above, the proposed increase in SNSWP temperature will not cause design limitations or functional capabilities of SSCs important to safety to be compromised. On this basis, the staff finds that the requirements specified by GDC 44, the review criteria specified by SRP Sections 9.2.1 and 9.2.5, and the plant licensing basis as stated in Section 9.2 of the UFSAR for Catawba 1 and 2 will continue to be bounded when the ambient temperature of the SNSWP is at 95 °F.

In addition the licensee's proposal to increase the SNSWP water temperature limit to 95 °F is acceptable since the requirements of GDC 16, 38, and 50 are shown to be satisfied using conservative, acceptable analysis methods.

The NRC staff has reviewed the changes to the TS Bases and finds they are consistent with the changes made to the TSs.

Therefore, the NRC staff considers the change to the TSs to the increase in the maximum allowed SNSWP ambient temperature acceptable.

#### 5.0 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.

#### 6.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. 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 (70 FR 44946). 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.

## 7.0 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 Contributors: J. Tatum  
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L. Lois

Date: September 25, 2005