March 26, 2004

Mr. James Scarola, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Code: Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: DECAY HEAT LOAD FOR SPENT FUEL POOLS C AND D (TAC NO. MB7736)

Dear Mr. Scarola:

The Nuclear Regulatory Commission has issued Amendment No. 115 to Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit 1. This amendment changes the Technical Specifications in response to your application dated February 14, 2003, as supplemented by letters dated November 10 and December 10, 2003, and January 30, 2004.

The amendment changes Technical Specification 5.6.3.d to allow an increase in the decay heat load from 1.0 MBTU/hr to 7.0 MBTU/hr for fuel stored in Spent Fuel Pools C and D at the Shearon Harris Nuclear Power Plant, Unit 1.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's regular bi-weekly Federal Register notice.

Sincerely,

/RA/

Chandu P. Patel, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosures:
1. Amendment No. 115 to NPF-63
2. Safety Evaluation

cc w/enclosures:
See next page

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CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-400

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 115
License No. NPF-63

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Carolina Power & Light Company, (the licensee), dated February 14, 2003, as supplemented by letters dated November 10 and December 10, 2003, and January 30, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   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 amended by 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-63 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, as revised through Amendment No. 115 , are hereby incorporated into this license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 6 months of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA KJabbour for/

William F. Burton, Acting Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 26, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 115

FACILITY OPERATING LICENSE NO. NPF-63

DOCKET NO. 50-400

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove Page	Insert Page
5-7a	5-7a

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 115 TO FACILITY OPERATING LICENSE NO. NPF-63

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated February 14, 2003, as supplemented by letters dated November 10 and December 10, 2003, and January 30, 2004, the Carolina Power & Light Company (the licensee) submitted a request for changes to the Shearon Harris Nuclear Power Plant, Unit 1 (HNP) Technical Specifications (TS). The requested changes would change TS 5.6.3.d to allow an increase in the decay heat load from 1.0 MBTU/hr to 7.0 MBTU/hr for fuel stored in Spent Fuel Pools (SFPs) C and D. This increase in decay heat load at HNP as presently configured would require an increase in the maximum allowed SFP temperature from 140°F to 150°F under normal and emergency conditions except for a design-basis loss-of-coolant accident (LOCA). For a LOCA, the maximum allowed SFP temperature would increase from 150°F to 160°F. The licensee also addressed related technical issues such as redistribution of component cooling water (CCW) flow to SFP heat exchangers and restoration of the fuel pool cooling and cleanup system (FPCCS) cooling following a design-basis LOCA.

In December 2000, the Nuclear Regulatory Commission (NRC) staff issued Amendment 103 that revised TS 5.6.3.a, b, and c to increase the licensed fuel storage capacity. However, at that time the configuration of the component cooling water system (CCWS) allowed only 1.0 MBTU/hr of cooling capacity to be conservatively allocated to operation of the SFPs C and D. Following the issuance of Amendment 103, the CCWS was upgraded as a part of the steam generator and power uprate modifications. CCW pumps were modified and upgraded by installing new impellers. The additional heat removal capability of the CCWS provides additional cooling capacity for the SFPs. The proposed change will increase the decay heat load limit for SFPs C and D to permit balancing spent fuel heat among all four SFPs, utilizing available CCWS cooling capacity. The NRC staff has previously reviewed and approved similar requests for other nuclear plants.

The licensee's November 10 and December 10, 2003, and January 30, 2004, letters provided clarifying information that did not change the scope of the proposed amendment as described in the original notice of proposed action published in the *Federal Register* and did not change the initial proposed no significant hazards consideration determination.

2.0 REGULATORY EVALUATION

Appendix A of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, General Design Criterion (GDC) 44, Cooling water, specifies, in part, that a system to transfer heat from structures, systems, and components important to safety to an ultimate heat sink shall be provided, and that the system safety function shall be to transfer the combined heat load of theses structures, systems, and components under normal operating and accident conditions.

Appendix A of 10 CFR Part 50, GDC 61, Fuel storage and handling and radioactivity control, specifies, in part, that fuel storage systems shall be designed with residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat removal and with the capability to prevent significant reduction in fuel storage coolant inventory under accident conditions.

The extent to which design criteria for plant structures, systems, and components important to safety meet the GDC for nuclear power plants specified in Appendix A to 10 CFR Part 50 is discussed in Section 3.1.4 of the Harris Final Safety Analysis Report (FSAR). As it relates to compliance with GDC 44, the Harris FSAR includes the following statements pertaining to cooling water:

- The cooling water systems important to safety are 1) component cooling water system (CCWS), which is a closed loop system, removes heat from the residual heat removal (RHR) heat exchanger and other essential components, 2) the service water system (SWS), which is an open system, removes heat from the component cooling water system, containment cooling units and other essential components, and 3) essential services chilled water system (ESCWS).

- The service water system transfers its heat to the main or auxiliary reservoir. Either reservoir is capable of providing adequate ultimate heat sink (UHS) capability assuming a design-basis LOCA.

- The piping for the component cooling water system and service water system are independently arranged into essential and non-essential heat loads. The non-essential heat load of each system will be isolated from the essential heat loads during emergency mode operation. The piping, valves, pumps, and heat exchangers in each system are arranged so that the system safety functions can be performed assuming a single system failure.

- A combination of one component cooling water system pump and heat exchanger has sufficient capacity to remove heat from one RHR heat exchanger and various essential auxiliary equipment under postulated accident conditions.

As it relates to compliance with GDC 61, Section 3.1.4 of the Harris FSAR refers to Section 9.1.3, which includes the following statements pertaining to fuel pool cooling:

- The FPCCS provides cooling to remove residual heat from the fuel stored in the SFP.

- The FPCCS is designed with redundancy and testability to assure continued heat removal.

- The FPCCS is designed so that no postulated accident could cause an excessive loss of coolant inventory.

The FPCCS, CCWS, SWS, and UHS are described in Chapter 9 of the HNP FSAR. The system descriptions along with the applicable design-basis information included in Chapter 9 provide criteria needed to evaluate the ability of the systems to comply with the appropriate GDC as they relate to the proposed changes.

3.0 TECHNICAL EVALUATION

3.1 Description of Structures, Systems, and Components Applicable to Proposed Changes

3.1.1 Spent Fuel Pools

The HNP is designed with four SFPs. The four SFPs are divided into two complexes. SFPs A and B (south pool complex) for Unit 1 are located in the south end of the Fuel Handling Building (FHB). SFPs C and D (north pool complex) for Unit 2 are located on the north end of the FHB. A system of transfer canals connects the four SFPs and a cask loading pool. During refueling, spent fuel recently discharged from HNP is stored in SFPs A and B. SFPs A, B, and C contain a combination of pressurized-water reactor (PWR) and boiling-water reactor (BWR) fuel storage racks. SFP D will contain PWR fuel storage racks as needed.

3.1.2 Fuel Pool Cooling and Cleanup System

The FPCCS serves both the south and north SFP complexes. Each SFP complex has related cooling, purification, and skimmer subsystems. The FPCCS subsystems for SFPs C and D were completed as part of the activation of SFPs C and D. Each SFP complex has a dedicated cooling system that is independent of the other. Each cooling system consists of two redundant cooling loops. Each loop consists of a heat exchanger, cooling pump, strainer, and associated piping. Each cooling loop has a piping connection to both SFPs in the complex. Two cooling trains are provided for each complex; a single cooling train is sufficient to remove all of the decay in the SFP complex during normal operation. The two cooling pumps for an SFP complex are powered from separate safety-related electric buses; these busses are powered from an emergency diesel generator in the event of the interruption of the normal power source. The cooling systems are Safety Class 3, Seismic Category I systems. Each SFP complex has a purification subsystem and skimmer subsystem that are non-safety-related.

3.1.3 Component Cooling Water System

The CCWS is an intermediate cooling loop that removes heat from safety-related and non-safety-related components during all plant operating conditions. The CCWS is utilized to prevent the direct leakage of radioactivity from nuclear support systems in the plant to the environment and to prevent the ingress of chlorides and other corrosives into the components to which these chemicals could be harmful. The CCWS is used as part of the emergency core cooling system (ECCS) to remove heat from water being recirculated from the containment building sump to the reactor and to provide cooling water to the low-head safety injection pumps (RHR pumps).

The CCWS is designed to operate during all phases of plant operations, including startup, power operations, shutdown, refueling, loss of offsite power (LOOP), and the injection and recirculation phase of ECCS operation. During normal operation, usually only one CCW pump is operating, but a second pump from the other train will automatically start on low CCWS pressure or a safety injection signal.

The CCWS consists of two safety-related trains and a common header. Cross-connect valves between the safety-related trains allow separation of the safety-related trains during design-basis events. During normal operation, the cross-connect valves are open and the operating train provides flow to a common header that supplies the SFP heat exchangers. CCW is normally supplied to two of the four SFP heat exchangers (one from each SFP complex) during normal operation.

3.2 <u>Impact of Higher SFP Heat Load and Resultant Temperature</u>

The licensee presented its evaluation of higher heat load and resultant normal operating temperature for SFPs C and D in four parts. The evaluation dealt with the following areas:

- impact of higher SFP heat load on CCWS performance
- impact of higher SFP heat load on equilibrium SFP temperature
- SFP makeup water requirements
- impact of operating with higher SFP temperature

3.2.1 CCWS Performance

The licensee analyzed the impact of the higher SFP heat load on the performance of the CCWS using bounding heat load values in the following calculations:

- CCWS supply temperature for each mode of CCW operation
- CCWS flow balance for each mode of CCW operation
- CCWS performance during a LOCA
- reactor coolant system (RCS) cooldown time when on RHR system
- analysis of the UHS during a LOCA

With the exception of RCS cooldown time and CCWS flow balance, current FSAR analyses include sufficient design margin to allow SFPs C and D heat load to be increased to 7.0 MBTU/hr. The licensee prepared new FSAR analyses for RCS cooldown time and CCWS flow balance. The licensee's November 10, 2003, letter provides several examples of FSAR analyses with sufficient design margin to allow the proposed heat load increase for SFPs C and D.

CCWS input to the RCS cooldown time calculation was revised to increase the maximum CCWS supply temperature from 120°F to 125°F. This CCWS temperature increase reduces the time required for the RCS cooldown from 350°F to 200°F. The limiting RCS cooldown time calculation utilized the following inputs:

- single reactor coolant pump in operation
- single cooldown train in operation

- maximum CCW supply temperature of 125°F
- composite SFP heat load of 27.0 MBTU/hr

With the above inputs, the licensee determined that the total duration of RCS cooldown from hot standby to cold shutdown decreased. However, the licensee stated that the RCS cooldown times used in their analyses for previous NRC-approved power uprate and steam generator replacement applications remain bounding.

Increasing the SFPs C and D heat load requires additional CCWS flow to 2&3A and 2&3B heat exchangers. The CCWS flow balance between the heat exchanger for SFPs A and B and SFPs C and D would be changed to provide more cooling flow to SFPs C and D and a reduction in cooling flow to the SFPs A and B heat exchangers. The licensee evaluated the impact of the change in CCWS flow to components other than the SFP heat exchanger and concluded that CCWS flow balance is satisfactory for equipment performance.

The licensee stated that the following plant changes create the margin to allow the increase in the SFPs C and D heat load:

- raising SFP bulk temperature limit to 150°F (from 140°F)
- decreasing CCWS flow to spent fuel heat exchangers for SFPs A and B and increasing CCWS flow to spent fuel heat exchangers for SFPs C and D

The licensee also stated that the changes do not alter the minimum CCWS flow rates to other components on the CCWS. The higher spent fuel heat load causes CCWS supply temperatures to increase by small amounts (less than 5°F) for normal operation and refueling. The licensee further stated that these changes were evaluated and found to be acceptable.

The above scenarios were evaluated using a service water supply temperature of 95°F, which is slightly higher (more conservative) than a limit of 94°F for TS 3.7.5.b. This TS limit ensures that the maximum service water supply temperature at the beginning of design-basis events remains less than or equal to 95°F. The licensee states that, therefore, no change in service water flow balance is required as a result of the proposed changes.

The NRC staff finds that the licensee has adequately analyzed the impact of the change in CCWS flow balance on SFP heat exchangers and other components in providing more cooling flow to SFPs C and D due to the proposed increase in heat load. The NRC staff also finds that the licensee has adequately determined that the CCWS flow balance is satisfactory for equipment performance. Therefore, the NRC staff finds that the licensee's analysis of the impact of higher SFP heat load on CCWS performance is acceptable.

3.2.2 Equilibrium SFP Temperature

The full-core offload is the transfer of the entire reactor core to the storage facility. The incore shuffle is the transfer of only that portion of the reactor core to be discharged to the storage facility. Both of these refueling practices are considered normal (or planned) activity as described in Chapter 9.1.3 of the NRC Standard Review Plan (SRP). The abnormal (or unplanned) activity is the transfer of the entire reactor core to the storage facility following startup of the next plant operating cycle. This activity is the post-outage full-core offload.

The licensee performed analyses to determine the impact of the higher SFP heat load on the equilibrium SFP temperatures assumed in the following operating conditions:

- incore schuffle
- normal full-core offload
- post-outage full-core offload (emergency core offload)
- normal operations
- RCS cooldown

Table A1-3 in the licensee's February 14, 2003, letter shows the proposed SFP heat loads analyzed by the licensee for each of the above operating conditions.

The licensee stated that the methodology for the ORIGEN2 code was utilized to calculate SFP decay heat load. The proposed SFP heat loads referenced in the proposed amendment request are analytical values that are conservative with respect to actual heat loads determined using the ORIGEN2 methodology.

The licensee further stated that after its February 14, 2003, submittal, it has implemented the ORIGEN2 code (Version 2.1) for calculating decay heat using 10 CFR 50.59. This change of methodology (compared to that described in the NRC SRP) was made to allow use of a single methodology for calculating decay heat production for both the licensee's used fuel shipping activities and storage in SFPs, as well as to gain flexibility by using the more precise ORIGEN2 code. The licensee performed ORIGEN2 code calculations for the design heat load cases described in the proposed amendment to confirm that the change in methodology has no impact on the proposed amendment. The ORIGEN2 code results demonstrated that the analytical values for heat loads presented in the proposed amendment remain conservative with respect to the evaluation for the revised temperature limits proposed in the amendment request. The ORIGEN2 code will be used in the future to determine the decay heat load of the actual inventories of the SFPs.

In a comparison of SFP heat loads (normal operations and RCS cooldown) analyzed for the existing analysis versus those analyzed for the proposed amendment (as shown in Table A1-3), the licensee increased the heat loads for SFPs A and B from 16.45 MBTU/hr to 18.31 MBTU/hr to allow for a refueling outage as short as 15 days and to provide additional heat load capacity in SFPs A and B. The heat load in SFPs A and B for the emergency core offload was increased due to a more conservative calculation of the decay heat for this discharged core. The licensee's November 10, 2003, letter provided additional rationale for the changes in SFP heat load values as described in the comparison. Table A1-4 in the licensee's February 14, 2003, letter presented the acceptance criteria applied to existing and proposed SFP temperatures for each operating condition and for a LOCA.

The licensee stated that equilibrium SFP temperature calculations were performed using the SFP heat exchanger design details, CCWS supply temperature, CCWS flow rate, FPCCS flow rate, and SFP heat load. The following features were utilized in the calculations:

- conservatively neglected heat losses due to evaporation, conduction, and convection
- CCW flow rate less than nominal
- fouling factor of 0.0005 BTU/hr-sq ft-°F
- neglected thermal inertia

- solved for the lowest SFP temperature inlet temperature that would result in the removal of required heat load (equilibrium temperature represents the bulk temperature of the water after heated by passing through spent fuel storage racks)

A matrix of the licensee's calculation results for the SFP equilibrium temperature is provided in Table 2 of the licensee's November 10, 2003, letter.

To determine the required maximum SFP operating temperature, calculations utilized the assumption that only one train of CCWS cooling and one train of FPCCS cooling are operating in all the analyses of the above SFP heat load scenarios except emergency core offload. This is consistent with review guidance in the NRC SRP, which allows the assumption of two operable trains of cooling for emergency core offload.

The calculations assume that the FPCCS removes all of the decay heat. Conservatively, as noted above, evaporation or transmission of heat through the FHB structure is ignored, as well as the thermal inertia of the SFP water mass, fuel rack mass, and fuel mass. Neglecting thermal inertia provides additional conservatism in the calculation of the SFP bulk temperature occurring during the RCS cooldown.

The NRC staff finds that the licensee has adequately performed equilibrium SFP temperature analysis using SFP heat exchanger design details, CCWS supply temperature, CCWS flow rate, FPCCS flow rate, and SFP heat load, using conservative input assumptions. Tables 1 and 2 of the licensee's November 10, 2003, letter show that calculated SFP temperatures are below the proposed SFP temperature limits (acceptance criteria) of 150°F for the above operating conditions and 160°F for a LOCA. Therefore, the NRC staff finds the licensee's analysis of the impact of higher SFP heat load on equilibrium SFP temperatures to be acceptable.

3.2.3 SFP Makeup Water Requirements

Normal makeup water for evaporative losses and small amounts of FPCCS leakage from the SFPs is accomplished using the demineralized water system (DWS), although other sources, such as from the reactor makeup water storage tank or the recycle holdup tank, may also be used. The DWS connects to the SFPs and refueling water purification pumps, the SFPs' cooling pumps, and the SFPs' skimmer pumps to permit makeup to the SFPs, or may be directly added to the SFPs via hoses. The seismic Category I RWST may also be aligned to provide borated makeup water to the SFPs, and a seismic Category I source of emergency makeup water is available from the emergency service water system (ESWS) by connecting flexible hoses to connections on the ESWS and FPCCS piping.

Table A1-5 in the licensee's February 14, 2003, letter presents the results of calculations for the required makeup water rates for the heat load scenarios. The makeup water rates use the heat loads from Table A1-3 of the February 14, 2003, letter and use a makeup source temperature of 125°F. This assumed makeup source temperature is conservative because it bounds the TS 3.7.5.b limit of 94°F for the UHS and the TS 3.5.4.d limit of 125°F for the RWST. The ESWS takes water from the UHS and the RWST, which are two possible sources of makeup water to the SFPs.

The total required makeup water rates shown in Table A1-5 do not take credit for heat removal by any of the SFP cooling trains. The total makeup water rate for maximum boil-off is within the capacity of either the DWS Tank or RWST flow path. The backup ESW method is capable of meeting the makeup water rate for normal evaporation from the SFPs.

The licensee stated that the licensing basis for FPCCS requires makeup capacity to offset evaporation from the SFP surface at design temperatures. Complete loss of SFP cooling is not a design-basis event for HNP. In accordance with the review guidance of the NRC SRP, the HNP design includes a backup makeup water system to add coolant to the SFPs. As described in the FSAR, the backup method uses a temporary connection between the ESWS and the FPCCS. This emergency backup system provides a flow rate greater than the evaporation rate from the SFP and canal surfaces. The evaporation rate from the four SFPs and connecting canals is calculated to be less than 20 gpm at a water surface temperature of 160°F. The makeup rate from ESWS is a minimum of 30 gpm. Table 3 of the licensee's November 10, 2003, letter provides a matrix of makeup systems and their capacities.

The NRC staff finds that the licensee has adequately analyzed the required SFP makeup water rates for the heat load scenarios proposed in the amendment request. The maximum required makeup water rate of approximately 102 gpm for the emergency core offload is within the capacity of a makeup water source. Table A1-5 of the licensee's February 14, 2003, letter presents the results of calculations for the required makeup water rates for SFP heat loads; Table 3 of the licensee's November 10, 2003, letter provides a matrix of makeup systems and their capacities. In addition, the licensing basis for FPCCS requires makeup capacity to offset evaporation from the SFP surface at design temperatures. Therefore, the NRC staff finds the licensee's analysis of SFP makeup water requirements to be acceptable.

3.2.4 Impact of Operating with Higher SFP Temperature

3.2.4.1 SFP Cooling Restoration Following LOCA

As described in the FSAR, the CCWS flow to a common header is isolated during the start of the ECCS recirculation operation following a LOCA. The long-term containment analysis for the LOCA uses the assumption that the common header remains isolated until 5 hours after the LOCA or until the containment sump is less than or equal to 200°F. As described in the FSAR, the method of restoration of the CCWS flow remains unchanged from existing practice.

Table A1-6(b) of the licensee's February 14, 2003, letter lists the analyzed time to heat up from the maximum SFP bulk temperature (for normal operations) to 150°F, 160°F, and 212°F, respectively. The SFP heatup rates are based on the heat loads for normal operations listed in Table A1-3 of the February 14, 2003, letter. The proposed heat load increase for the proposed amendment necessarily causes the time-to-boil values to decrease.

The licensee stated that the respective maximum normal operating temperature values are 125.7°F for SFPs A and B and 123.1°F for SFPs C and D (shown in Table A1-6(b) discussed above). The purpose of Table A1-6(b) is to illustrate the time available to restore FPCCS cooling following a LOCA. The values for the remaining cases are presented in Table 5 of the licensee's November 10, 2003, letter.

Due to the heat load in SFPs A and B, that pool complex is the limiting location. The values presented in Table A1-6(b) contain several conservatisms in the inputs for the calculated heatup times. The conservatisms include:

- SFP heat load based on beginning of core life
- CCWS supply temperatures based on SFP composite heat load that bounds proposed composite heat load
- performance of FPCCS conservatively modeled
- water volumes assumed as part of thermal inertia conservatively low
- thermal mass of fuel, fuel rack, and SFP structure neglected

The licensee provided the following explanations as it relates to the above input conservatisms used in calculating SFP heatup times.

With regard to the second conservatism, the phrase “composite heat load” refers to total heat load for all four SFPs.

With regard to the third conservatism, the SFP starting temperatures are an input to Table A1-6(b). The calculation of the performance of the FPCCS determines the SFP starting temperature.

With regard to the fourth conservatism, the water volumes are conservative because the calculation neglects the water volume of the transfer canals and the main transfer canal that would normally be part of the volume subject to heatup. Including the volume of water in the canals would reduce the heatup rates. The gates between SFPs A and B and the Unit 1 transfer canal are inserted infrequently. The gates isolate the SFPs from the transfer canals. The gate between SFP C and the north transfer canal is inserted infrequently. Pending the storage of fuel in SFP D, this pool is isolated.

The time available to perform the restoration of cooling to the SFPs after a LOCA is conservatively calculated and provides sufficient time for the required operator actions to be implemented. As described in the FSAR, the method used to restore forced cooling of SFPs remains unchanged. Therefore, the increase in the SFPs C and D heat load results in acceptable time for restoration of CCWS and FPCCS following a LOCA.

The licensee stated that Table A1-6(b) discussed above presents the time available to restore SFP cooling. As previously described in Section 3.2.2 of this Safety Evaluation, there are adequate conservatisms in calculating both the maximum normal operating temperature and SFP heatup rates. The FSAR describes the restoration of CCWS to FPCCS following a LOCA.

The NRC staff finds that the licensee has adequately analyzed the SFP cooling restoration following a LOCA. Table A1-6(a) lists the analyzed times to heatup from the SFP bulk temperature (for normal operations) to 150°F, 160°F, and 212°F, respectively. Because of the heat load in SFPs A and B, this SFP complex is the limiting location. At a pool heatup rate of 4.73°F/hr, calculations show that SFPs A and B will heat up from a maximum normal operating temperature of 125.7°F to 150°F, 160°F, and 212°F (boiling) in 5.1 hours, 7.2 hours, and 18.2 hours, respectively. The NRC staff concurs that these heatup times are sufficient for corrective operator actions to be implemented. In addition, SFPs A and B heatup times bound those for SFPs C and D. Therefore, the NRC staff finds the licensee’s analysis of SFP cooling restoration following a LOCA to be acceptable.

3.2.4.2 Structural integrity of the SFP

This request proposes to increase the combined total SFPs C and D heat load to 7.0 MBTU/hr. In order to achieve this heat load increase at HNP as proposed, it is necessary to increase the maximum allowed SFP temperature from the existing 140°F to the proposed 150°F under normal and emergency conditions and the existing 150°F to the proposed 160°F for a LOCA condition. ACI 349, "Code Requirements for Nuclear Safety-Related Concrete Structures," specifies that concrete strength would remain substantially unchanged when the concrete temperature is maintained below 150°F for normal operation or any other long-term period, 200°F for local areas, and 350°F for accident or any other short-term period. Therefore, the licensee's proposed acceptance criteria are within the Code-allowable temperatures and, thus, are acceptable to the NRC staff.

The licensee stated that the existing design temperature of the SFP structure was based on a liner temperature of 150°F. As part of the analysis for this license amendment, the SFP structure and liner were reevaluated for a pool temperature of 160°F to account for the new LOCA acceptance criteria. The licensee stated that the evaluation concluded that adequate design margin existed to allow for the higher liner temperature without exceeding the allowable stress.

The NRC staff requested the licensee to clarify whether the reinforcing steel and concrete of the SFP structure were within their respective allowable stresses. In a letter dated November 10, 2003, the licensee stated that the reevaluation confirmed that the reinforcing steel and concrete of the SFP structure were within their respective allowable stresses. The NRC staff finds the response acceptable.

Based on its review of the evaluation performed by the licensee, the NRC staff agrees with the licensee's conclusion that the temperature increase in the SFP water does not affect the integrity of the SFP structure.

The NRC staff also evaluated the effect of higher SFP temperature on the ion exchange resin in the purification demineralizer system. Currently, the maximum temperature of the SFP water for normal plant operations and emergency conditions other than the design-basis LOCA is specified to be 140°F. At this temperature, both cationic and anionic resin cannot be damaged. However, the proposed higher heat load to be absorbed by the spent fuel water will result in increasing its maximum temperature to 150°F. At this temperature, some damage to the ion exchange resin in the purification demineralizer may be expected. The licensee indicated that it will establish procedural controls requiring removal of the purification demineralizers from service whenever SFP temperature during normal plant operation exceeds 140°F. The NRC staff finds that, with this provision, operation of SFPs C and D with higher heat loads from the stored fuel will not cause damage to the ion exchange resins in the pools' purification system.

3.3 <u>Summary</u>

Based on its review of the licensee's rationale and evaluation and the experience gained from its review of increases in SFP heat loads and resultant temperatures for other plants, the NRC staff finds that the proposed changes are acceptable with regard to the following:

- increase of SFPs C and D heat load from 1.0 MBTU/hr to 7.0 MBTU/hr
- increase of maximum operating SFP temperature from 140°F to 150°F for non-accident scenarios and from 150°F to 160°F for a LOCA

The NRC staff concludes that there is no adverse impact on the performance of the FPCCS and associated systems (e.g., redistribution of CCWS flow to SFP heat exchangers) and, as appropriate, compliance with GDCs 44 and 61 is maintained.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (68 FR 12948). Accordingly, the amendment meets 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 amendment.

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

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