March 27, 2000

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: CONTAINMENT PENETRATIONS (TAC NO. MA6414)

Dear Mr. Scarola:

The Nuclear Regulatory Commission has issued Amendment No. 97 to Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit No. 1, in response to your request dated August 26, 1999, as supplemented on February 24, and March 14, 2000. This amendment revises Technical Specification 3/4.9.4, and its associated Bases, to allow the personnel airlock and certain other containment penetrations to remain open during refueling operations provided specific administrative controls are met. This amendment is approved for use during refueling outage 9 and operating cycle 10.

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/

Richard J. Laufer, 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. 97 to NPF-63
2. Safety Evaluation

cc w/enclosures:
See next page

Distribution:
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OFFICIAL RECORD

Template # NRR-058

AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-63 - HARRIS, UNIT 1

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

March 27, 2000

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Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Code: Zone 1
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Richard J. Laufer

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Project Directorate II
Division of Licensing Project Management
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-400

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 97
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 August 26, 1999, as supplemented on February 24, and March 14, 2000, 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. 97 , 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 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard P. Correia, 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 27, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 97

FACILITY OPERATING LICENSE NO. NPF-63

DOCKET NO. 50-400

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

Remove Pages	Insert Pages
3/4 9-5	3/4 9-5
B 3/4 9-1	B 3/4 9-1

3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.9.4 The containment building penetrations shall be in the following status:

a. The equipment door closed and held in place by a minimum of four bolts,

b. A minimum of one door in each airlock is capable of being closed*, and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Be capable of being* closed by a manual or automatic isolation valve, blind flange or equivalent, or

2. Be capable of being closed by OPERABLE automatic normal containment purge and containment pre-entry purge makeup and exhaust isolation valves.

APPLICABILITY: During CORE ALTERATIONS or movement of irradiated fuel within the containment.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or movement of irradiated fuel in the containment building.

SURVEILLANCE REQUIREMENTS

4.9.4 Each of the above required containment building penetrations shall be determined to be either in its closed/isolated condition, capable of being closed/isolated*, or capable of being closed by OPERABLE automatic normal containment purge and containment pre-entry purge makeup and exhaust isolation valves at least once per 7 days during CORE ALTERATIONS or movement of irradiated fuel in the containment building by:

a. Verifying the penetrations are either closed/isolated or capable of being closed/isolated*, or

b. Testing the normal containment purge and containment pre-entry purge makeup and exhaust isolation valves per the applicable portions of Specification 4.6.3.2.

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* Penetrations may be opened under administrative controls except for containment purge and exhaust penetrations. This allowance is permitted for refueling outage 9 and cycle 10 only. Operation under these administrative controls has not been approved for refueling outage 10.

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: (1) the reactor will remain subcritical during CORE ALTERATIONS, and (2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the safety analyses and are specified in the cycle-specific COLR. The boron concentration limit specified in the COLR ensures that a core K_{eff} of ≤ 0.95 is maintained during fuel handling operations. The administrative controls over the required valves during refueling operations precludes the possibility of uncontrolled boron dilution of the filled portion of the RCS. This action prevents flow to the RCS of unborated water by closing flow paths from sources of unborated water.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the Source Range Neutron Flux Monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME - DELETED

3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

The requirements on containment building penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE. Penetrations applicable to Technical Specification 3.9.4.b and 3.9.4.c may be opened provided the following administrative controls are in effect:

1. An individual or individuals shall be designated and available at all times, capable of isolating the breached penetration.

2. The breached penetrations shall not be obstructed unless capability for rapid removal of obstructions is provided (such as quick disconnects for hoses).

3. For the Personnel Air Lock, at least one door must be capable of being closed and secured.

4. Only penetrations that communicate between the Reactor Containment Building atmosphere and the Reactor Auxiliary Building Ventilation System atmosphere are permitted to be open under these administrative controls.

Containment penetrations that provide direct access from containment atmosphere to outside atmosphere must be isolated, or capable of isolation via adminstratvie controls, on at least one side of containment. Isolation may be achieved by an OPERABLE automatic isolation valve, or by a manual isolation valve, blind flange, or equivalent. Equivalent isolation methods include use of a material that can provide a temporary, atmospheric pressure, ventilation barrier for the other containment penetrations during fuel movement.

3/4.9.5 COMMUNICATIONS - DELETED

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated August 26, 1999, as supplemented on February 24, and March 14, 2000, Carolina Power and Light Company (CP&L, the licensee), requested a change to the Technical Specifications (TS) for the Harris Nuclear Plant (HNP). The proposed changes would revise TS 3/4.9.4, "Containment Building Penetrations," and its associated Bases, to allow penetrations which provide direct access from the containment atmosphere to the Reactor Auxiliary Building Ventilation System atmosphere to remain open during refueling operations provided certain administrative controls are met. The proposed amendment would be effective for refueling outage 9 and operating cycle 10, but not for refueling outage 10.

The February 24, and March 14, 2000, supplements provided clarifying information that did not change the scope of the August 26, 1999, application or the proposed no significant hazards consideration determination published in the Federal Register on October 6, 1999 (64 FR 54374).

2.0 BACKGROUND

Containment barriers are provided for nuclear power plants as the final barrier of the defense-in-depth concept to protect against the uncontrolled release of radioactivity to the environs. The containment function, in combination with other fission product barriers and accident mitigation systems, limits the radiological dose consequences of design-basis transients and accidents to less than the regulatory limits defined by 10 CFR 100.

Currently, HNP TS 3/4.9.4 requires that a minimum of one airlock door, as well as all penetrations providing direct access from the containment atmosphere to the outside atmosphere, be closed during core alterations and movement of irradiated fuel within the containment. This requirement was intended to prevent the release of radioactive material in the event of a fuel handling accident (FHA). The current practice of operating the Personnel Air Lock (PAL) doors during core alterations could contribute to premature door system failures. Changes to closure requirements could reduce PAL door cycling and increase PAL door reliability. Additionally, should an FHA occur during fuel movement or core alterations, personnel could be evacuated from containment more quickly if the PAL door was open, thus minimizing occupational exposure.

The licensee's proposed TS revision would allow both doors of the containment airlock, and any of the penetrations to the outside, to be open during fuel movement and core alterations,

provided one airlock door is capable of being closed and the open penetrations are capable of being closed. The proposed TS would require administrative controls to ensure that:

1. An individual or individuals shall be designated and available at all times, capable of isolating the breached penetration,

2. The breached penetrations shall not be obstructed unless capability for rapid removal of obstructions is provided (such as quick disconnects for hoses),

3. For the PAL, at least one door must be capable of being closed and secured, and

4. Only penetrations that communicate between the Reactor Containment Building atmosphere and the Reactor Auxiliary Building Ventilation System atmosphere are permitted to be open under these administrative controls.

3.0 EVALUATION

The staff reviewed the licensee's analysis assumptions, compared them to those in Regulatory Guide (RG) 1.25 and NUREG-0800, Standard Review Plan, (SRP) 15.7.4, "Radiological Consequences of Fuel Handling Accidents," and, using these assumptions, performed a confirmatory analysis which gave comparable results for the projected offsite dose. Table 1 lists these assumptions, and Table 2 shows the licensee's calculated doses.

The licensee's dose analysis, as described in the August 26, 1999, submittal, took credit for manual action to close all breached penetrations within 20 minutes of an FHA in containment, which the NRC staff found unacceptable. The February 24, 2000, supplement revised the dose analysis to credit holdup in the containment and was based on the guidance in RG 1.25 and NUREG/CR-5009. The analysis assumed a core inventory which had decayed for 100 hours following shutdown after extended operation at 102 percent of rated power. CP&L used a peaking factor of 1.73, which is more conservative than the typically used factor of 1.65 from RG 1.25. The analysis used assumptions as listed in RG 1.25 for gap fraction, breathing rate, and release duration. The licensee used a decayed core inventory that included I-129, even though this nuclide is not normally used for evaluating the thyroid dose. The analysis assumed that all of the gap activity in the fuel rods (264) in a single fuel assembly would be instantaneously released from the fuel into the refueling pool and into the containment atmosphere. CP&L assumed that 98.8 percent of the iodine released from the fuel rods would be retained by the 22 ft minimum depth of water above the damaged fuel. No noble gases were assumed retained by the pool water. The activity released from the pool water is conservatively assumed to be completely mixed in 669,000 ft^3, which equals 30 percent of the containment free volume. The release is assumed to immediately exhaust from the containment volume at 500 cfm for two hours, at which time the containment is isolated.

SRP 15.7.4 allows the radiological consequences of an FHA to be reduced by the degree of mixing and dilution occurring prior to containment isolation. The licensee took credit for holdup in the containment building by assuming the activity released from the pool is mixed in 30 percent of the containment free volume. The licensee did not take credit for dilution in the containment atmosphere. With the Reactor Containment Building Ventilation System fans not

running, the air above the reactor cavity would be still and the released activity would spread non-preferentially. The centerline distance from the surface of the refueling pool to the PAL is 45 feet, and since the PAL is located below the pool surface and the air in the containment is assumed to be still, the release would spread upward from the pool the same distance. In this case, when the release begins to reach the PAL, which is the largest penetration permitted to be open by the proposed TS change, the release would approximately fill a cylindrical volume with a radius of 65 feet and a height of 90 feet. This calculated volume equals 1,190,000 ft^3 and is approximately 54 percent of the containment free volume of 2,230,000 ft^3. Therefore, for a given release rate from the volume, the licensee's assumption of mixing in 30 percent of the containment volume is conservative. Additionally, although not credited, further mixing could be provided by two safety-related fan cooler units that recirculate containment atmosphere at 125,000 acfm each, making the assumed mixing of 30 percent even more conservative. The staff concludes that there is reasonable assurance that adequate mixing will occur to reduce the activity release concentrations.

The FHA does not result in a significant pressurization of the containment. Although the containment is ventilated by a purge and exhaust system during refueling, the containment penetration dampers for the system automatically close on high radiation in the containment. With the fans stopped, there is no significant driving force to cause the radioactivity to exit the containment through open penetrations, including the PAL. The licensee conservatively assumed a release flow rate of 500 cfm. For the postulated 2-hour release period, 60,000 ft^3 out of the assumed 669,000 ft^3 would be released. This equals about 9 percent of the activity being released during the first 2 hours. After 2 hours, the remaining activity is exhausted by the containment purge system through filters with a 90 percent efficiency. The staff finds this modeling of the release to be acceptable. No credit is given in the dose analysis for timely isolation of the air lock as provided for in the proposed TS change, which is conservative. Although the licensee conservatively calculated the offsite dose due to a post accident purge of the containment in its submittal, the staff did not make its determination of acceptability based on that information because the purge is not used for mitigation of the consequences of a fuel handling accident in containment. The offsite doses calculated by CP&L (see Table 2) are within the SRP acceptance criteria of 75 rem to the thyroid and 6.25 rem to the whole body, and are acceptable.

Dose to the Control Room Operators

The staff is currently working toward resolution of generic issues related to control room habitability, in particular the validity of control room infiltration rates assumed by licensees in analyses of control room habitability. Recent testing performed by 20 licensees using enhanced test methods have shown that, in all 20 cases, the measured infiltration rates exceeded the values assumed in the design basis analyses. While in each case the affected licensees were able to either reduce the excessive infiltration or demonstrate the acceptability of the observed infiltration, the collective experience has caused concerns regarding those facilities that have not performed the enhanced testing. The staff is currently participating in a NRC-industry initiative to resolve these concerns in which an NEI task force is drafting a paper, NEI 99-03, on control room habitability.

The staff finds the licensee's assertion that doses to the control room staff remain bounded by the loss-of-coolant accident (LOCA) analysis is acceptable for the upcoming fuel cycle, based

on information given in the HNP Final Safety Analysis Report (FSAR). The approval of this amendment does not exempt CP&L from regulatory actions that may be implemented in the future as the control room habitability generic issue is resolved.

Summary:

The staff has reviewed the licensee's dose analysis and has performed an assessment of the radiological consequences of an FHA during refueling operations with the containment PAL and certain penetrations open. The staff concludes that there is reasonable assurance that the radiological consequences associated with an FHA inside containment with penetrations open, as described above, are within the acceptance criteria specified in 10 CFR Part 100 and NUREG-0800, Section 15.7.4, for persons offsite. The staff concludes that the licensee's assertion that doses to the operator in the control room remain bounded by the current FSAR dose analysis for a LOCA is acceptable for refueling outage 9 and operating cycle 10.

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 and changes surveillance requirements. 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 (64 FR 54374). 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.

Principal Contributors: M. Hart
R. Laufer

Date: March 27, 2000

Attachments: Table 1, Fuel Handling Accident Assumptions
Table 2, Licensee Projected Radiological Consequences

TABLE 1

ASSUMPTIONS USED FOR CALCULATING RADIOLOGICAL CONSEQUENCES OF A FUEL HANDLING ACCIDENT INSIDE CONTAINMENT

Parameters	Quantity
Power Level (102 percent Rated), MWt	2830.5
Number of Fuel Rods Damaged	264
Total Number of Fuel Rods in Core	41448
Shutdown Time, hours	100
Power Peaking Factor	1.73
Core Fission Product Inventory per TID-14844	
Fraction of Core Inventory Assumed in Fuel Rod Gap Region	
I-129	0.3
I-131	0.12
Other Iodine	0.1
Kr-85	0.3
Other Noble Gases	0.1
Iodine Forms In Containment Atmosphere	
Elemental	75 percent
Organic	25 percent
Pool Decontamination Factor for Iodine	85
Fission Product Release Duration	2 hrs
Containment Volume, ft^3	2,230,000
Assumed Volume of Release, ft^3	669,000
Assumed Containment Release Rate, cfm	
Before Isolation (0-2 hours)	500
Receptor Point Variables	
Atmosphere Relative Concentration, (χ/Q), sec/m^3	
Exclusion Area Boundary, 0-2 hours	6.17E-04
Low Population Zone, 0-8 hours	1.40E-04

Note: Dose Conversion Factors from ICRP-2

TABLE 2

RADIOLOGICAL CONSEQUENCES PROJECTED BY LICENSEE

	Whole Body (rem)	Thyroid (rem)
Exclusion Area Boundary, 0-2 hours	0.062	23.6
Low Population Zone, duration	0.154	11.1
Criterion	*6.25*	*75.0*

cc:

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