

July 30, 2001

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 REGARDING CONTAINMENT PENETRATIONS DURING CORE
ALTERATIONS AND MOVEMENT OF IRRADIATED FUEL (TAC NO. MB1961)

Dear Mr. Scarola:

The Nuclear Regulatory Commission has issued Amendment No. 104 to Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit 1, in response to your request dated May 18, 2001. The amendment revises Technical Specification (TS) 3/4.9.4 "Containment Building Penetrations" and the associated Bases to permit containment building penetrations to remain open, under administrative controls, during core alterations or the movement of irradiated fuel within the containment. Specifically, the amendment: 1) incorporates an alternate source term methodology in the fuel handling accident analysis; 2) revises TS 3.9.4 to remove portions of a note restricting the applicability of administrative controls with respect to containment penetrations; and 3) includes the use of administrative controls on the equipment hatch and other penetrations that provide access from the containment atmosphere to outside atmosphere.

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

Sincerely,

/RA by N. Kalyanam For/

Richard 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. 104 to NPF-63
2. Safety Evaluation

cc w/enclosures:

See next page

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Shearon Harris Nuclear Power Plant
Unit 1

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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. 104
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 May 18, 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 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. 104 , 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.

Additionally, the license is amended to authorize revision of the Final Safety Analysis Report (FSAR) to reflect the incorporation of an Alternate Source Term methodology in the fuel handling accident analysis. The licensee shall make this update for the FSAR, as authorized by the amendment, in accordance with 10 CFR 50.71(e).

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

/RA/

Patrick M. Madden, 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: July 30, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 104

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

3/4 9-5
B 3/4 9-1
B 3/4 9-2

Insert Pages

3/4.9-5
B 3/4 9-1
B 3/4 9-2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 104 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 May 18, 2001, Carolina Power & Light Company (CP&L, the licensee) submitted a request for a change to the Shearon Harris Nuclear Power Plant (HNP) Technical Specifications (TS). The proposed change would:

- (1) allow the personnel air lock doors, the equipment hatch, and certain other containment building penetrations that provide direct access from the containment atmosphere to the outside atmosphere remain open during core alterations and movement of irradiated fuel provided specific administrative controls are met,
- (2) remove portions of a note in TS 3.9.4 that restricts applicability of administrative controls to refueling outage 9 and Cycle 10 only, and
- (3) allow the implementation of the guidance of Technical Specification Task Force (TSTF)-312 to expand the use of administrative controls to all containment penetrations specified in TS 3/4.9.4.

The licensee submitted this license amendment request as a selective implementation of the alternative source term (AST) as described in Regulatory Guide (RG) 1.183, "Alternative Radiological source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," and pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.67, "Accident Source Term."

2.0 EVALUATION

In August 1999, the licensee requested a change to the HNP TS to allow containment penetrations that 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 staff approved the request in License Amendment 97 issued March 27, 2000, stating that:

- (1) there is reasonable assurance that the radiological consequences associated with a fuel handling accident (FHA) inside containment with containment penetrations open, are within the acceptance criteria specified in 10 CFR Part 100 and NUREG-0800, Section 15.7.4,

- (2) the licensee's assertion that doses to the operator in the control room remain bounded by the current HNP Final Safety Analysis Report dose analysis for a loss-of-coolant accident is acceptable for refueling outage 9 and operating cycle 10, and
- (3) the staff is currently working toward resolution of generic issues related to control room habitability, in particular, the validity of control room unfiltered air infiltration rates assumed by licensees in analyses of control room habitability.

The generic control room habitability issues described in License amendment 97 have not yet been resolved. Meanwhile, the licensee concluded in this license amendment request that the radiological consequence to a control room operator will meet the dose criterion specified in 10 CFR 50.67 with implementation of the AST as described in RG 1.183 pursuant to 10 CFR 50.67. Section 50.67 requires a licensee seeking to use an AST to apply for a license amendment and requires that the request contain an evaluation of the radiological consequences of affected design basis accidents. The licensee's request addresses these requirements in proposing selectively to use the AST described in RG 1.183 in evaluating the radiological consequences of an FHA only. In its analysis, the licensee assumed a 500 cubic feet per minute (cfm) of unfiltered air inleakage into the control room. As part of the implementation of the AST, the total effective dose equivalent acceptance criterion in 10 CFR 50.67 replaces the previous whole body and thyroid dose guidelines in 10 CFR 100.11 and General Design Criteria 19 that were applied in License Amendment 97.

The staff confirmed the licensee's assertion of meeting the control room operator dose criterion of 10 CFR 50.67 by performing an independent dose calculation. The staff's sensitivity studies indicate that the HNP control room can take as much as 2000 cfm of unfiltered outside air following an FHA and still meet the relevant dose criterion. Therefore, the staff concludes that there is reasonable assurance that the control room radiological consequences associated with an FHA are within the acceptable dose criterion specified in 10 CFR 50.67. However, the staff's acceptance of the licensee's unfiltered air inleakage assumption here does not foreclose on any future generic regulatory actions that may result from forthcoming resolution of generic control room habitability issues.

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 50.67. The licensee performed and submitted the radiological consequence for an FHA occurring either inside containment or in the fuel handling building with the air lock doors, equipment hatch, and other penetrations open. In its submittal, the licensee concluded that the release of fission products, subsequent to an FHA, will result in doses that are well within the dose criteria specified in 10 CFR 50.67 for the exclusion area boundary (EAB), low-population zone (LPZ), and for the control room operator.

The licensee reached the above conclusion using these assumptions:

- (1) assuming one whole fuel assembly with the highest radial peaking factor is damaged releasing its fission products in the fuel gap into spent fuel pool water in the containment,
- (2) assuming one whole fuel assembly with the highest radial peaking factor plus 52 boiling-water reactor (BWR) fuel assemblies (from Brunswick Steam Electric Plant)

stored in the spent fuel are damaged releasing fission products in the fuel gap into spent fuel pool water in the fuel handling building,

- (3) using a fission product decay period of 100 hours (time period from the reactor shutdown to the first fuel movement) for pressurized-water reactor fuels and 4 years for BWR fuels stored in the spent fuel pool,
- (4) using an overall decontamination factor of 200 for the iodine isotopes in the spent fuel pool with minimum pool water depth of 22 feet in containment and 21 feet in the fuel handling building, and
- (5) allowing a 500 cfm unfiltered air leakage into the control room.

The staff has reviewed the licensee's analysis and finds that the major assumptions, parameters and methods used by the licensee for its radiological consequence analysis are consistent with those provided in the Standard Review Plan Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," and RG 1.183.

To verify the licensee's analyses, the staff performed a confirmatory radiological consequence dose calculation and compared its results to those calculated by the licensee. The radiological consequences calculated by the staff for the EAB, LPZ, and control room are consistent with those calculated by the licensee. The licensee calculated the control room dose at 24 hours; however, the staff calculates and evaluates control room dose at 30 days. In this case, the control room doses are the same for 24 hours and 30 days since activity in the control room is sufficiently purged. For future analyses, control room dose should be calculated at 30 days. Both the radiological consequences calculated by the licensee and the staff are well within the radiation dose criteria set forth in 10 CFR 50.67. The resulting radiological consequences calculated by the licensee are shown in Table 1, and the major parameters and assumptions used by the licensee and staff are listed in Tables 2 and 3.

The licensee committed by letter dated February 24, 2000, and accepted by the staff in License Amendment 97, to provide the following written procedures:

- (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), and
- (3) for the personnel air lock doors, at least one door must be capable of being closed.

The licensee stated that they have incorporated these changes in the TS Bases and plant procedure OMP-003. The licensee proposed to retain these administrative controls and expand them to include the equipment hatch and other penetrations that provide direct access from the containment atmosphere to the outside atmosphere. The staff finds these changes are consistent with the guidelines provided in TSTF-312.

On the basis of this evaluation, the staff finds that the radiological consequences analyzed and submitted by the licensee are acceptable. The staff determined that the radiological consequences at the EAB, LPZ, and control room calculated by the licensee and by the staff for a postulated FHA in the containment and in the fuel handling building are well within the dose

criteria specified in 10 CFR 50.67. Therefore, the staff concludes that the license amendment requested by the licensee to have the air lock doors, equipment hatch, and other containment penetrations open during core alterations or movement of fuel in containment during refueling operations is acceptable.

3.0 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.

4.0 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 (66 FR 34280). 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.

5.0 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 Contributor: J. Lee

Date: July 30, 2001

Attachments: Table 1, Radiological Consequences for Fuel Handling Accident.

Table 2, Parameters and Assumptions Used in Radiological Consequence Calculations for Fuel Handling Accident.

Table 3, Atmospheric relative concentrations.

TABLE 1

Radiological Consequences for
Fuel Handling Accident
(rem as TEDE)

	In Containment	In Fuel Handling Building	Acceptance Criteria
Exclusion Area Boundary	2.2	0.5	6.3 ⁽¹⁾
Low Population Zone	0.6	0.2	6.3 ⁽¹⁾
Control Room	1.5	0.2	5.0 ⁽²⁾

⁽¹⁾ Standard Review Plan 15.0.1

⁽²⁾ 10 CFR 50.67

Table 2

**Parameters and Assumptions Used in
Radiological Consequence Calculations
Fuel Handling Accident**

<u>Parameter</u>	<u>Value</u>
Radial peaking factors	
PWR fuel assemblies	1.73
BWR fuel assemblies in spent fuel pool	1.5
Fission product decay period	
PWR fuel assemblies	100 hours
BWR fuel assemblies in spent fuel pool	4 years
Number of fuel rods damaged	
In containment	264
In fuel handling building	314 plus 52 BWR fuel assemblies
Fuel pool water depth	
In containment	22 ft
In fuel handling building	21 ft
Fuel gap fission product inventory	
Noble gases excluding Kr-85	5%
Kr-85	10%
I-131	8%
Iodine except I-131	5%
Fuel pool decontamination factors	
Iodine	200
Noble gases	1
Filter efficiencies	
In containment	None assumed
In fuel handling building	
Elemental	95%
Organic	95%
Particulate	95%
Dose conversion factors	FGR 11 and 12

Table 2

**Parameters and Assumptions Used in
Radiological Consequence Calculations
Fuel Handling Accident
(Continued)**

Control room	
Volume	7.1+4 ft ³
Normal ventilation flow rates	
Filtered makeup air	0
Filtered recirculation	0
Unfiltered makeup air	1050 cfm
Post-accident recirculation	
Filtered makeup air	0
Filtered recirculation	4000 cfm
Unfiltered makeup air	500 cfm
Initiation time	15 seconds
Pressurization mode	
Filtered makeup air	400 cfm
Filtered recirculation	3600 cfm
Unfiltered makeup air	500 cfm
Initiation time	2 hours
Filter efficiencies	
Elemental	99%
Organic	99%
Particulate	99%
Duration of accident	30 days
Duration of fission product release	2 hours

Table 3

**Atmospheric relative concentrations
(sec/m³)**

Exclusion area boundary

0 to 2 hours	6.17E-4
--------------	---------

Low Population Zone

0 to 8 hours	1.4E-4
8 to 24 hours	1.0E-4
24 to 96 hours	5.9E-5
96 to 720 hours	2.4E-5

Control room

0 to 8 hours	4.08E-3
8 to 24 hours	1.16E-3
24 to 96 hours	3.25E-4
96 to 720 hours	1.23E-5

July 30, 2001

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 REGARDING CONTAINMENT PENETRATIONS DURING CORE ALTERATIONS AND MOVEMENT OF IRRADIATED FUEL (TAC NO. MB1961)

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/RA by N. Kalyanam For/

Richard Laufer, Project Manager, Section 2
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See next page

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* No major change to SE

** See previous concurrence

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AMENDMENT NO. 104 TO FACILITY OPERATING LICENSE NO. NPF-63 - HARRIS, UNIT 1

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