April 4, 2002

Mr. D. N. Morey
Vice President - Farley Project
Southern Nuclear Operating
Company, Inc.
Post Office Box 1295
Birmingham, Alabama 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MA9918 AND MA9919)

Dear Mr. Morey:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 154 to Facility Operating License No. NPF-2 and Amendment No. 146 to Facility Operating License No. NPF-8 for the Joseph M. Farley Nuclear Plant, Units 1 and 2. The amendments are in response to your application dated August 25, 2000, as supplemented by letter dated November 2, 2001. The November 2, 2001, letter provided additional information requested by the staff, but did not change the August 25, 2000, application nor the initial proposed no significant hazards consideration determination.

The requested changes would revise sections of Chapter 15 of the Updated Final Safety Analysis Report (UFSAR) associated with the main steamline break (MSLB) and steam generator tube rupture (SGTR) accidents. These two accidents were re-analyzed based upon new dose equivalent values of ^{131}I for the primary coolant. These amendments revise the licenses to reflect changes to the UFSAR due to the revisions to the dose equivalent iodine analysis.

The staff's review has concluded that the revised analysis for the SGTR and the MSLB accident meet the staff's acceptance criteria for offsite and control room operator doses for both the accident-initiated spike and the pre-existing spike cases.

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/

Frank Rinaldi, Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-348 and 50-364

Enclosures:
1. Amendment No. 154 to NPF-2
2. Amendment No. 146 to NPF-8
3. Safety Evaluation

cc w/encls: See next page

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Frank Rinaldi, Project Manager, Section 1 **/RA/**
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SOUTHERN NUCLEAR OPERATING COMPANY, INC.

ALABAMA POWER COMPANY

DOCKET NO. 50-348

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 154
License No. NPF-2

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

   A. The application for amendment by Southern Nuclear Operating Company, Inc. (Southern Nuclear), August 25, 2000, as supplemented by letter dated November 2, 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 license 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. Changes the Farley Updated Final Safety Analysis Report (UFSAR) to reflect the revised dose equivalent iodine analyses for the steam generator tube rupture and main steamline break outside containment, as set forth in the application for amendment dated August 25, 2000, as supplemented by letter dated November 2, 2001. These changes are authorized by this amendment with the next update of the UFSAR, in accordance with 10 CFR 50.71(e).

3. This license amendment is effective as of its date of issuance and shall be implemented with the next update of the UFSAR.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Date of Issuance: April 4, 2002

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

ALABAMA POWER COMPANY

DOCKET NO. 50-364

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 146
License No. NPF-8

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

   A. The application for amendment by Southern Nuclear Operating Company, Inc. (Southern Nuclear), August 25, 2000, as supplemented by letter dated November 2, 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 license 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. Changes the Farley Updated Final Safety Analysis Report (UFSAR) to reflect the revised dose equivalent iodine analyses for the steam generator tube rupture and main steamline break outside containment, as set forth in the application for amendment dated August 25, 2000, as supplemented by letter dated November 2, 2001. These changes are authorized by this amendment with the next update of the UFSAR, in accordance with 10 CFR 50.71(e).

3. This license amendment is effective as of its date of issuance and shall be implemented with the next update of the UFSAR.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Date of Issuance: April 4, 2002

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 154 TO FACILITY OPERATING LICENSE NO. NPF-2

AND AMENDMENT NO. 146 TO FACILITY OPERATING LICENSE NO. NPF-8

SOUTHERN NUCLEAR OPERATING COMPANY, INC., ET AL.

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By letter dated August 25, 2000, as supplemented by letter dated November 2, 2001, the Southern Nuclear Company (SNC) proposed to revise the Farley Nuclear Plant, Units 1 and 2 (FNP) Updated Final Safety Analysis Report (UFSAR). Specifically, SNC proposed to revise those portions of Section 15 associated with the main steamline break (MSLB) and steam generator tube rupture (SGTR) accidents. These two accidents were re-analyzed based upon new dose equivalent values of ^{131}I for primary coolant. Existing analyses for these two accidents had been based upon an initial dose equivalent iodine of 1 µCi/g for accident - initiated spike and an initial dose equivalent iodine level of 60 µCi/g of dose equivalent ^{131}I for the pre-existing spike. The proposed changes in analyses were based upon an initial dose equivalent iodine of 0.5 µCi/g for accident-initiated spike and an initial dose equivalent iodine level of 30 µCi/g for the pre-existing spike.

2.0 BACKGROUND

The reduction in primary coolant activity levels was precipitated by the Westinghouse Nuclear Safety Advisory Letter NSAL-00-004**,** "Nonconservatisms in Iodine Spiking Calculations." This letter discussed numerous potential issues. They included the letdown flow utilized to calculate the iodine appearance rate for calculations; letdown demineralizer efficiency; primary coolant leakage; letdown flow rate uncertainty; and primary coolant mass. Of these potential issues, only one, the letdown flow rate, affected FNP. The existing FNP calculations had been based upon 60 gpm. It was determined, based on the Safety Advisory Letter, that the actual flow rate which should be utilized is 145 gpm. FNP currently operates with a maximum flow rate of approximately 130 gpm. The measured flow rate plus indicated uncertainty increases the letdown flow to a maximum value of 145 gpm.

Since the letdown rate is used to calculate the appearance rate of iodine for the accident-initiated spike case, an increase in letdown flow will result in an increase in the amount of iodine release from the fuel necessary to maintain the equilibrium primary coolant at the initial activity level for the accident-initiated spike case. Therefore, for the accident-initiated spike case, the increase in iodine appearance rate will result in a proportional increase in release rate associated with the iodine spike.

Typically, for the pre-existing spike case, it is assumed that the spike has already occurred and that the primary coolant activity level of dose equivalent ^{131}I is at the maximum instantaneous value allowed by technical specifications (TS). For the standard TS or the Improved Standard TS (ISTS), the value is 60 µCi/g. The licensee's submittal indicated that the existing analysis in Chapter 15 for the Farley UFSAR was based upon this value of 60 µCi/g. Their submittal stated that re-analyses had been performed at 30 µCi/g. Presently, the maximum allowable value in the Farley TS is 18 µCi/g.

2.0 EVALUATION

2.1 Steam Generator Tube Rupture

The licensee evaluated the consequences of a postulated SGTR accident. For the SGTR, the primary to secondary leakage was assumed to be occurring at the technical specification value of a maximum of 500 gpd from any one steam generator and a total identified primary to secondary leakage rate of 1 gpm. Two cases were analyzed. The first assumed that a pre-existing spike occurred prior to the SGTR. For the pre-existing spike case, the reactor coolant iodine specific activities were assumed to be at 30 µCi/gm of dose equivalent ^{131}I. The secondary coolant iodine specific activity was assumed to be at the secondary coolant specific activity equilibrium value of 0.10 µCi/g. The second case, referred to as the accident-initiated spike case, assumed the SGTR event itself initiated an iodine spike concurrent with the accident. Immediately prior to the accident, the reactor coolant was assumed to be at a reactor coolant activity level of 0.5 µCi/gm of dose equivalent ^{131}I and the secondary system activity was again assumed to be at 0.10 µCi/gm dose equivalent ^{131}I. The SGTR was assumed to initiate an iodine spike which results in a release of iodine from the fuel gap to the reactor coolant at a rate which is 500 times the normal iodine release rate necessary to maintain the reactor coolant activity level at 0.5 µCi/gm of dose equivalent ^{131}I. Previous analyses performed by the licencee had indicated that a SGTR accident did not result in any melted fuel being released to the reactor coolant.

For both cases, it was assumed that the primary to secondary leak in the intact steam generators (SGs) remained at 940 gpd [1 gpm - 500 gpd] for the duration of the accident. For both cases, it was assumed that offsite power was lost and the main condenser was unavailable for the steam dump. The licensee's assessment assumed that the break flow continued for 0.5 hours after the tube ruptures and that the spike continued for 8 hours.

Table 1 (Attachment 1) presents the assumptions utilized by the staff in its confirmatory analysis of the licensee's assessment of a FNP SGTR. The potential dose consequences calculated by the staff are presented in Table 2 (Attachment 2). Both the on-site doses (the control room) and the off-site doses (EAB and LPZ) were found to meet the acceptance criteria of 5 rem whole body and 30 rem thyroid for the control room operators (Standard Review Plan (SRP) 6.4 of NUREG-0800) and 2.5 rem whole body and 30 rem thyroid for the accident-initiated spike case and 25 rem whole body and 300 rem thyroid for the pre-existing spike case at the EAB and LPZ (SRP 15.6.3 of NUREG-0800).

In conclusion, the staff has assessed the consequences associated with a SGTR accident for FNP. The doses were calculated to determine both the offsite and control room operator doses. As a result of this assessment, the staff has concluded that, for a SGTR accident, the change to the letdown flow rate and in primary coolant activity level of dose equivalent ^{131}I for

the pre-existing and accident-initiated spike cases would not result in doses which would exceed the dose guidelines for a SGTR. Therefore, the staff finds the proposed change acceptable.

2.2 Main Steamline Break Accident

The licensee evaluated the consequences of a postulated MSLB accident. For the MSLB, primary to secondary leakage was assumed to be occurring at the technical specification value of a maximum of 500 gpd to the faulted steam generator and 940 gpd was assumed to be the primary to secondary leakage to the two intact steam generators. Two cases were analyzed.

For both cases, it was assumed that offsite power was lost and the main condenser was unavailable for the steam dump. The first case assumed a pre-existing spike occurred prior to the MSLB. For the pre-existing spike case, the reactor coolant iodine specific activities were assumed to be at 30 µCi/gm of dose equivalent ^{131}I. The secondary coolant iodine specific activity was assumed to be at the secondary coolant specific activity equilibrium value of 0.10 µCi/g. The second case, referred to as the accident-initiated spike case, assumed the MSLB event itself initiated an iodine spike concurrent with the accident. Immediately prior to the accident, the reactor coolant was assumed to be at a reactor coolant activity level of 0.5 µCi/gm of dose equivalent ^{131}I and secondary system activity was again assumed to be at 0.10 µCi/gm dose equivalent ^{131}I. The MSLB was assumed to initiate an iodine spike which results in a release of iodine from the fuel gap to the reactor coolant at a rate which is 500 times the normal iodine release rate necessary to maintain the reactor coolant activity level at 0.5 µCi/gm of dose equivalent ^{131}I. Previous licensee's analyses had indicated that a MSLB accident did not result in any melted fuel being released to the reactor coolant.

In a November 2, 2001 letter, the licensee indicated that the duration chosen for the release from the faulted steam generator had been changed from 30 minutes to 24 hours in the August 25, 2000 submittal. This endpoint was chosen because the driving force for the release (steam production) is eliminated once the temperature is reduced below the boiling point. The licensee reviewed past analyses related to power uprate and replacement steam generators. Normal cooldown with all cooling equipment trains available and with a single cooling train available were considered. The licensee performed simulator runs for various MSLB scenarios with cooldown using one or two trains of equipment. The licensee selected the longest simulator duration, doubled it and then rounded it up to 24 hours. The licensee indicated that the feedwater and steam outlet paths for the faulted steam generator are isolated within 30 minutes of the identification of the event and that the only release for the remainder of the event is the primary to secondary leakage to the faulted and intact steam generators.

Table 3 presents the assumptions utilized by the staff in their confirmatory analysis of the licensee's assessment of a Farley MSLB. The potential dose consequences calculated by the staff are presented in Table 2. Both the on-site doses (the control room) and the off-site doses (EAB and LPZ) were found to meet the acceptance criteria of 5 rem whole body and 30 rem thyroid for control room operators (SRP 6.4 of NUREG-0800) and 2.5 rem whole body and 30 rem thyroid for the accident-initiated spike case and 25 rem whole body and 300 rem thyroid for the pre-existing spike case at the EAB and LPZ (SRP 15.1.5 of NUREG-0800).

The staff has assessed the consequences associated with a MSLB accident for FNP. Doses were calculated to determine both the offsite and control room operator doses. As a result of this

assessment, the staff has concluded that, for a MSLB accident, the changes to the letdown flow rate and the in primary coolant activity level of dose equivalent ^{131}I for the pre-existing and accident-initiated spike case would not result in doses which would exceed the dose guidelines for a MSLB. Therefore, the staff finds the proposed change acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding [66 FR 13807]. 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.

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

Attachments:
1. Table 1 - Assumptions for Steam Generator Tube Rupture
2. Table 2 - Farley Thyroid Doses from SGTR Accident (Rem)
3. Table 3 - Assumptions for Main Steamline Break Accident

Principal Contributor: J. Hayes

Date: April 4, 2002

Table 1 Assumptions for Steam Generator Tube Rupture

Iodine Partition Factor	0.01
Steam Release from Defective Steam Generator	
0-324 seconds	3.67E5
324 seconds -0.5 hours	7.9E4
Steam Release from Intact SGs (lbs)	
0-324 seconds	7.34E5
324 seconds - 2 hours	4.22E5
2-8 hours	9.34E5
Estimated Break Flow to Faulted Steam Generator (lbs)	
0-324 seconds	3.12E4
324 seconds - 30 minutes	1.27E5
Primary to Secondary Leak Rate	
Maximum for any one steam generator (gpd)	500
Total for all steam generators (gpm)	1
Time to Isolate Faulted Steam Generator (sec)	1800
Flashing Fraction	
0-324 seconds	.21
> 324 seconds	.15
Scrubbing Fraction	0
Primary Bypass Fraction for Intact SGs	0
Duration of Plant Cooldown (hrs)	8

Table 1 Assumptions for Steam Generator Tube Rupture (Continued)

Chemical Form of Release	
Organic (%)	100
Breathing Rate	
0-8 hours (m^3/sec)	3.47E-4
Primary coolant concentration of 30 µCi/g of dose equivalent ^{131}I.	Pre-existing Spike Value (Ci)
	^{131}I = 4306
	^{132}I = 1551
	^{133}I = 6897
	^{134}I = 1034
	^{135}I = 3791
Volume and Mass of primary coolant and secondary coolant.	
Primary Coolant Volume (ft^3)	10,230
Mass of Primary Coolant (lb)	4.2E5
Secondary Coolant Mass/Steam Generator (lb)	1.07E5
Primary Coolant DE ^{131}I concentration (µCi/g)	
Maximum Instantaneous Value	30
48 Hour Value	0.5
Secondary Coolant DE ^{131}I concentration (µCi/g)	0.10
Primary to secondary leak rate, total (gpm)	12
Letdown Flow Rate (gpm)	145
Equilibrium Release Rate from Fuel for a Spiking Factor of 500 times the Release Rate for 0.5 µCi/g of Dose Equivalent ^{131}I	Ci/hr
	^{131}I = 4550
	^{132}I = 5520
	^{133}I = 8980
	^{134}I = 7790
	^{135}I = 7150

Table 1 Assumptions for Steam Generator Tube Rupture (Continued)

Control Room	
Free Volume (ft^3)	1.16E5
Makeup Filter Efficiency for elemental and organic forms of Iodine (%)	99
Makeup Air Filtration Rate (cfm)	270
Unfiltered Air Infiltration Rate (cfm)	10
Filtered Recirculation Flow (cfm)	2700
Recirculation Flow Filter System Efficiency for all forms of Iodine(%)	95
Occupancy Factors	
0-1 day	1.0
Atmospheric Dispersion Factors (sec/m^3)	
Control Room	
0-2 hours	3.28E-3
2-8 hours	2.65E-3
EAB	
0-2 hours	7.6E-4
LPZ	
0-2 hours	2.8E-4
2-8 hours	1.1E-4
Breathing Rate (m^3/sec)	3.47E-4
Spiking Factor for Accident Initiated Spike	500

Table 2 Farley Thyroid Doses from SGTR and MSLB Accidents (Rem)

Accident	EAB	LPZ	CONTROL ROOM
SGTR Accident-initiated Spike	30	12	0.6
SGTR Pre-existing Spike	128	51	2.5
MSLB Accident-initiated Spike	1.9	6.3	3.2
MSLB Pre-existing Spike	3.5	7.6	3.4