

September 26, 2001

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. MA9495 AND MA9496)

Dear Mr. Morey:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 150 to Facility Operating License No. NPF-2 and Amendment No. 142 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 June 29, 2000, as supplemented by letter dated August 31, 2001. The August 31, 2001, letter provided additional information requested by the staff, but did not change the June 29, 2000, application nor the initial proposed no significant hazards consideration determination.

Southern Nuclear Operating Company (the licensee) requested an amendment to the license of the Joseph M. Farley Nuclear Plant, Units 1 and 2, for the application of the TORMIS methodology for tornado missile risk analysis. The TORMIS methodology was used to demonstrate that specific plant features that are currently unprotected at the Farley Nuclear Plant do not require additional positive missile protection barriers due to the low probability of a tornado missile strike. The requested changes would revise the design basis as described in the Updated Final Safety Analysis Report by adding a description of the methodology utilized for determining the systems and components that are considered to require protection from tornado missiles.

The staff's review has concluded that the licensee's use of the TORMIS methodology is acceptable. 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. 150 to NPF-2
2. Amendment No. 142 to NPF-8
3. Safety Evaluation

cc w/encls: See next page

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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. 150
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), June 29, 2000, as supplemented by letter dated August 31, 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. Accordingly, by Amendment No. 150, Facility Operating License No. NPF-2 is hereby amended to authorize changes to the Farley Updated Final Safety Analysis Report (UFSAR) by adding a description of the methodology utilized for determining the systems and components that are considered to require protection from tornado missiles, as set forth in the application for amendment dated June 29, 2000, as supplemented by letter dated August 31, 2001. The change allows for the application of the THORMIS methodology for tornado missile risk analysis of specific plant features that are currently unprotected. The licensee shall submit, following implementation, the revised description 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 by December 31, 2004.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by Leonard Olshan for/

Richard L. Emch, Jr., Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: September 26, 2001

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. 142
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), June 29, 2000, as supplemented by letter dated August 31, 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. Accordingly, by Amendment No. _____, Facility Operating License No. NPF-2 is hereby amended to authorize changes to the Farley Updated Final Safety Analysis Report (UFSAR) by adding a description of the methodology utilized for determining the systems and components that are considered to require protection from tornado missiles, as set forth in the application for amendment dated June 29, 2000, as supplemented by letter dated August 31, 2001. The change allows for the application of the THORMIS methodology for tornado missile risk analysis of specific plant features that are currently unprotected. The licensee shall submit, following implementation, the revised description authorized by this amendment with the next update of the UFSAR, in accordance with 10 CFR 50.71(e).

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FOR THE NUCLEAR REGULATORY COMMISSION

/RA by Leonard Olshan for/

Richard L. Emch, Jr., Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: September 26, 2001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 150 TO FACILITY OPERATING LICENSE NO. NPF-2
AND AMENDMENT NO. 142 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 June 29, 2000, as supplemented by letter dated August 31, 2001, the Southern Nuclear Operating Company (the licensee) requested the approval for the application of the TORMIS methodology for tornado missile risk analysis for specific plant features that are currently unprotected at the Joseph M. Farley Nuclear Plant, Units 1 and 2. During a design inspection at the Farley Nuclear Plant in March 1997, two issues arose regarding the design basis for tornado-generated missiles. This amendment proposal is a result of an evaluation that considers the issues from that inspection and incorporates risk information. Specifically, the licensee proposes to amend its Updated Final Safety Analysis Report (UFSAR) in accordance with Regulatory Guide (RG) 1.117. The amended UFSAR will reflect the use of the TORMIS methodology to demonstrate that additional positive missile protection is not necessary for certain identified unprotected components that are required to operate after a tornado.

2.0 BACKGROUND

Nuclear power plants must be designed to withstand the effects of tornado and high wind generated missiles so as not to impact the health and safety of the public in accordance with the requirements of General Design Criteria (GDC) 2 and 4. Farley was designed to meet the then-proposed GDC. Standard Review Plan (SRP) Sections 3.5.1.4 and 3.5.2 provide review guidance for tornado missile protection. SRP Section 3.5.1.4 states that all plants should be designed to protect safety-related equipment against damage from missiles which might be generated by the design basis tornado for that plant. Further, Branch Technical Position AAB 3-2 which was originally referenced by the SRP states that "protection of structures, systems and components (SSCs) necessary to place and maintain the plant in a cold shutdown condition may generally be accomplished by designing protective barriers to preclude missile strikes . . . If protective barriers are not installed, the structure and components themselves should be designed to withstand the effects of the tornado." SRP Section 3.5.1.4 also includes guidance for users to estimate the probability per year of damage to the total of all important structures, systems, and components due to a specific design basis natural phenomenon capable of generating missiles. If the probability is greater than the acceptable probability in RG 1.117, then specific design provisions must be provided to reduce the potential of damage

to an allowable level. RG 1.117 states that the likelihood of a credible tornado strike varies from about 10^{-7} per year to values several orders of magnitude higher. The staff's criterion is that the probability of significant damage to SSCs required to prevent a release of radioactivity in excess of 10 CFR Part 100 following a missile strike, assuming a loss of off-site power, shall be less than or equal to a median value of 10^{-7} per year or a mean value of 10^{-6} per year. The value is considered acceptable if, when combined with reasonable qualitative arguments, the risk can be expected to be lower. Significant damage is damage that would prevent meeting the design basis safety function. SRP Section 2.2.3 supports this probability and identifies an acceptance criterion of 10^{-6} for the expected rate of occurrence for potential exposures in excess of 10 CFR Part 100 guidelines per year when combined with reasonable qualitative arguments that show the realistic probability is lower. The staff believes that the deterministic approach in the current SRP for tornados should be continued to be used, with the probabilistic risk assessment (PRA) approach employed on a case-by-case basis for assessing specific plant features which are currently unprotected from tornado missiles.

The NRC issued a the safety evaluation dated October 26, 1983, regarding the TORMIS methodology proposed in Electric Power Research Institute (EPRI) Report NP-2005. In that evaluation the staff concludes that the methodology is well conceived and well developed and can be utilized when assessing the need for positive tornado missile protection for specific safety-related plant features. At the same time, the staff concluded that the methodology had limitations for its use and that applicants and licensees using the methodology must consider five plant-specific points and provide appropriate information regarding its use.

In addition to the plant-specific information, the NRC safety evaluation prescribed limitations for the application of the TORMIS methodology. These limitations include that the use of the EPRI PRAs or any tornado missile probabilistic study be limited to the evaluation of specific plant features where additional costly tornado missile protective barriers or alternative systems are under consideration, and that the user demonstrates that the probability of damage to unprotected essential safety-related features is sufficiently small. The TORMIS methodology is not approved for justifying the removal of existing missile barriers, either temporarily or permanently. Sufficiently small for the TORMIS methodology shall be less than or equal to a median value of 10^{-7} per year or a mean value of 10^{-6} per year from the total (cumulative) unprotected SSCs for the plant.

The site plant-specific points to be considered by applicants and licensees using the EPRI methodology are:

- 1) Data on tornado characteristic should be employed for both broad regions and small areas around the site. The most conservative values should be used in the risk analysis or justification provided for those values selected.
- 2) The EPRI study proposes a modified tornado classification, F'-scale, for which the velocity ranges are lower by as much as 25-percent than the velocity ranges originally proposed in the Fujita, F-scale. Insufficient documentation was provided in the studies in support of the reduced F'-scale. The Fujita F-scale tornado classifications should therefore be used in order to obtain conservative results.
- 3) Reductions in tornado wind speed near the ground due to surface friction effects are not sufficiently documented in the EPRI study. Such reductions were not consistently

accounted for when estimating tornado wind speeds at 33 feet above grade on the basis of observed damage at lower elevations. Therefore, the user should calculate the effects of assuming velocity profiles with ratios V_0 (speed at ground level)/ V_{33} (speed at 33 foot elevation) higher than that in the EPRI study. Discussion of the sensitivity of the results to changes in the modeling of the tornado wind speed profile near the ground should be provided.

- 4) The assumptions concerning the locations and numbers of potential missiles presented at a specific site are not well established in the EPRI studies. However, the EPRI meteorology allows site-specific information on tornado missile availability to be incorporated in the risk calculation. Therefore, users should provide sufficient information to justify the assumed missile density based on site-specific courses and dominate tornado paths of travel.
- 5) Once the EPRI methodology has been chosen, justification should be provided for any deviations from the calculational approach.

3.0 EVALUATION

In its submittals, the licensee proposed changes to its license due to the as-found condition that involved unresolved inspection items for tornado missile protection of certain safety-related SSCs. This evaluation addresses the licensee's application of the TORMIS code methodology and the licensee's use of the results.

The staff's Safety Evaluation indicated that the application of the TORMIS methodology was limited to specific plant features where additional costly tornado missile protective barriers or an alternative protective system were under consideration. To address this concern, the licensee supplemented its application with a detailed list of the components from the following safety-related SSCs: emergency diesel fuel oil tanks, refueling water storage tank, condensate storage tank, steam dump relief and safety valves, and diesel generators. The licensee stated that these components lacked the required tornado missile protection.

The acceptance criteria for use of the TORMIS methodology for the Farley Nuclear Plant is that the total cumulative probability of a missile strike to the unprotected SSCs must be less than the mean value of 10^{-6} per year for each unit. In the supplement, the licensee stated that no credit is taken for the other unit's equipment in responding to licensing basis events or in the probabilistic risk assessment for the plant. As a result, the licensee believes that the acceptance criteria of the total (cumulative) probability from all unprotected SSCs for each unit can be applied on a per unit basis rather than to the whole plant. The staff agrees with the licensee's determination due to the independence of the unprotected SSCs between the two units following a tornado event.

Additionally, the acceptance criteria of a mean value of 10^{-6} per year is acceptable to the staff if it can be combined with qualitative arguments that the risk can be expected to be lower. To address this issue, the licensee states that conservatism exists in their analysis from the assumption that in all cases a tornado missile strike on the limited portion of a system or component that is exposed results in damage causing a radioactive release, rather than performing specific evaluations as to whether the damage can actually cause releases. This conservatism is included in the analysis to qualitatively ensure that the actual probability is lower than the acceptance criteria. The staff agrees with the licensee's qualitative

determination that due to conservatism in the analysis, it is expected that the actual probability is lower than the acceptance criteria.

The licensee addressed the five plant-specific points for the application of TORMIS in its submittal, as follows:

Point One

The NRC Safety Evaluation for TORMIS specifies that broad and local regions near the site be evaluated and that the most conservative value should be used, or provide justification for the selected values. Section 2.3.1.3 of the Farley UFSAR estimates that the probability of a tornado strike is 7.5×10^{-4} per square mile per year. This probability was based on information for 4000 square miles between the years of 1955 and 1967. For the TORMIS analysis, the licensee uses the National Climatic Data Center files for the years of 1950 -1996 as the basic source of data. The overall tornado occurrence rate computed from the updated regional data was $6.00\text{E-}4$ tornado per square mile per year. While this rate is lower than the value cited in the FSAR, the licensee states that it is a more accurate figure based on the best available data. Further the licensee states that the data is treated conservatively. The staff finds that the value selected by the licensee is acceptable.

Point Two

The licensee states that the Fujita F-scale tornado classification for F_0 to F_5 intensities are used in lieu of the TORMIS wind speeds. The staff finds this acceptable.

Point Three

To address the reductions in tornado missile speed near the ground due to surface friction effects that are not sufficiently documented in the EPRI study, the licensee states that the tornado wind field parameters in the Farley TORMIS analysis were adjusted to increase the wind profile in the lowest 10 m over the original profile in TORMIS. Further, the licensee states that this adjustment applied to the ratio of V_0 / V_{33} is in a conservative manner. The staff finds this acceptable.

Point Four

The licensee states that detailed surveys of the plant site were performed to characterize and quantify potential missiles for the Farley TORMIS analysis. To ensure conservatism, these surveys were performed during a refueling outage when large amounts of material were temporarily stored outside in laydown areas around the site. Additionally, ground and aerial photographs were reviewed to estimate the number and type of missiles that could originate from remote areas of the site. A total of 51,864 missiles were postulated based on the walkdown. This is a reasonable missile density in comparison to some other plants (25,000 - 74,000) that use the TORMIS methodology. Many of the lower missile density plants have a more limited application of the TORMIS methodology. The staff finds the missile density to be acceptable.

Point Five

The licensee states that no deviation occurred from EPRI NP-2005 except as noted in Points 1 to 4 above. The staff finds this to be acceptable.

Based on the above discussions, the staff finds that the use of TORMIS to analyze potential tornado missiles for the unprotected plant safety-related components as identified by the licensee in its supplemental submittal is acceptable. The licensee has satisfactorily addressed the limitations and plant-specific items in the NRC safety evaluation related to the application of the TORMIS methodology. The staff also finds that the acceptance criteria of a mean value of 10^{-6} per year for the total cumulative probability of damage to unprotected components for each unit is acceptable for the Farley Nuclear Plant. The staff finds that the proposed changes to the licensing basis meet the requirements of GDC 2 and 4.

4.0 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.

5.0 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 [65 FR 48758]. 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.

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

Principal Contributor: Diana Jackson

Date: September 26, 2001

Joseph M. Farley Nuclear Plant

cc:

Mr. L. M. Stinson
General Manager -
Southern Nuclear Operating Company
Post Office Box 470
Ashford, Alabama 36312

William D. Oldfield
SAER Supervisor
Southern Nuclear Operating Company
P. O. Box 470
Ashford, Alabama 36312

Mr. Mark Ajluni, Licensing Manager
Southern Nuclear Operating Company
Post Office Box 1295
Birmingham, Alabama 35201-1295

Mr. M. Stanford Blanton
Balch and Bingham Law Firm
Post Office Box 306
1710 Sixth Avenue North
Birmingham, Alabama 35201

Mr. J. D. Woodard
Executive Vice President
Southern Nuclear Operating Company
Post Office Box 1295
Birmingham, Alabama 35201

State Health Officer
Alabama Department of Public Health
434 Monroe Street
Montgomery, Alabama 36130-1701

Chairman
Houston County Commission
Post Office Box 6406
Dothan, Alabama 36302

Resident Inspector
U.S. Nuclear Regulatory Commission
7388 N. State Highway 95
Columbia, Alabama 36319