November 8, 1984

Docket Nos. 50-348
and 50-364

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Mr. R. P. McDonald
Senior Vice President
Alabama Power Company
Post Office Box 2641
Birmingham, Alabama 35291

Dear Mr. McDonald:

The Commission has issued the enclosed Amendment No. 52 to Facility Operating License No. NPF-2 and Amendment No. 43 to NPF-8 for the Joseph M. Farley Nuclear Plant, Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated March 30, 1984, supplemented May 29, 1984.

The amendments modify the Technical Specification values for the reload fuel maximum enrichment. The fuel enrichment would increase from 3.5 weight percent to 4.3 weight percent U-235 in specifications 5.3.1 and 5.6.1.2.

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

Sincerely,

/s/EReeves

Edward A. Reeves, Project Manager
Operating Reactors Branch #1
Division of Licensing

Enclosures:
1. Amendment No. 52 to NPF-2
2. Amendment No. 43 to NPF-8
3. Safety Evaluation

cc: w/enclosures
See next page

ORB#1:DL	ORB#1:DL	C-ORB#1:DL	OELD	AD:OR:DL
CParrish	EReeves/ts	SVarga		GLainas
10/2/84	10/2/84	10/5/84	10/11/84	10/ /84

11/5/84 CPB changes to SE

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cc: Mr. W. O. Whitt
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ALABAMA POWER COMPANY

DOCKET NO. 50-348

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 52
License No. NPF-2

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

   A. The application for amendment by Alabama Power Company (the licensee) dated March 30, 1984, supplemented May 29, 1984, 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, as amended, the provisions of the Act, and the 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, 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-2 is hereby amended to read as follows:

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(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 52 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 8, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 52

AMENDMENT NO. 52 FACILITY OPERATING LICENSE NO. NPF-2

DOCKET NO. 50-348

Revised Appendix A as follows:

Remove Pages	Insert Pages
5-6	5-6
5-7	5-7

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches and contain a maximum total weight of 1766 grams uranium. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.3 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 9723 ± 100 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A K_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes conservative allowances for uncertainties and biases based on a maximum enrichment of 4.3 weight percent U-235.

b. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with a nominal 21 inch center-to-center distance between new fuel assemblies such that K_{eff} will not exceed 0.98, based on maximum enrichment of 4.3 weight percent U-235, assuming aqueous foam moderation.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

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

ALABAMA POWER COMPANY

DOCKET NO. 50-364

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 43
License No. NPF-8

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

   A. The application for amendment by Alabama Power Company (the licensee) dated March 30, 1984, supplemented May 29, 1984, 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, as amended, the provisions of the Act, and the 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, 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-8 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 43 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 8, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 43

AMENDMENT NO. 43 FACILITY OPERATING LICENSE NO. NPF-8

DOCKET NO. 50-364

Revised Appendix A as follows:

Remove Pages	Insert Pages
5-6	5-6
5-7	5-7

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches and contain a maximum total weight of 1766 grams uranium. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.3 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

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DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 9723 ± 100 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A K_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, which includes conservative allowances for uncertainties and biases based on a maximum enrichment of 4.3 weight percent U-235.

b. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with a nominal 21 inch center-to-center distance between new fuel assemblies such that K_{eff} will not exceed 0.98, based on maximum enrichment of 4.3 weight percent U-235, assuming aqueous foam moderation.

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5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO AMENDMENT NO. 52 TO FACILITY OPERATING LICENSE NO. NPF-2 AND AMENDMENT NO. 43 TO FACILITY OPERATING LICENSE NO. NPF-8

ALABAMA POWER COMPANY

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-348 AND 50-364

INTRODUCTION

By letter dated March 30, 1984, supplemented May 29, 1984, Alabama Power Company (APCo) requested changes to the Joseph M. Farley Nuclear Plant Units 1 and 2 Technical Specifications which would increase the fuel enrichment limit form 3.5 to 4.3 weight percent U-235 for new fuel storage and use of new fuel in the core. These changes are requested in order to accommodate the fuel necessary for implementation of 18-month fuel cycles. APCo states that the evaluation of fuel with greater than 3.5 weight percent in the reactor will be made on a cycle specific basis as part of the reload safety evaluation process. A report, "Summary Report Nuclear Criticality Re-Analysis for 4.3 w/o Fuel in New Fuel Storage Rack of Joseph M. Farley Nuclear Plant of Alabama Power Company" by Utility Associates International was submitted in support of the change to the new fuel storage racks. Our discussion and evaluation follows:

DISCUSSION AND EVALUATION

1. Analysis Method

The criticality aspects of the storage of new fuel rods was analyzed using the multigroup, two-dimensional, transport theory code CASMO-2E and the Monte-Carlo transport model KENO-IV/AMPX. The KENO-IV/AMPX code system has been benchmarked against several critical experiments. The results of two particular experiments containing no boron were compared with the KENO-IV/AMPX predictions. The KENO-IV/AMPX results were -0.001 and 0.002 Δk below critical

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values for the two experiments. The CASMQ code has been benchmarked against the KENO-IV/AMPX code for several configurations. The results from 16 configurations showed CASMQ results over-predict the KENO-IV/AMPX results by 0.005 Δk overall.

2. New Fuel Storage Rack Analysis

Although new fuel is normally stored in a dry configuration, the NRC acceptance criteria for new fuel storage is that there is a 95 percent probability at a 95 percent confidence level (including uncertanties) that k_{eff} of the fuel assembly array will be; (1) no greater than 0.95 when fully loaded and flooded with unborated water and (2) no greater than 0.98 under conditions of low density (optimum moderation) if higher reactivities can be attained at achievable moderation conditions other than full density unborated water.

The CASMQ 2E model used 0.1% density water to predict the upper limit of k_∞ for the dry case at 68°F. This was done for an infinite lattice configuration with no boron present. The result was $k_\infty = 0.8883$. Since this case did not include leakage, the true k_{eff} for the dry case would be considerably less. CASMQ 2E was used to determine the k_∞ vs water density curve over a range of 0.001 to 1 gm/cm^3.

Reference cases using nominal rack geometry and 2% and 5% water density were done with KENO-IV. These cases demonstrate that the finite rack configuration is substantially subcritical for all water densities even though no credit was taken for axial leakage. The results were:

	k_{eff}	95% confidence level
k_{eff} 2% density	0.7094 ± .0106	0.6882 to 0.7306
k_{eff} 5% density	0.7480 ± .0113	0.7254 to 0.7706

3. Uncertainties and Tolerances

Uncertainties and tolerances consist of three things:

1. 95% confidence level
2. the bias between KENO-IV and measurements
3. the bias due to positional and dimensional tolerances.

Using the worst of these biases and uncertainties the k_{eff} for the 5% water density case was 0.796 which is much less than the 0.98 level for optimum moderation.

4. Accident Considerations

The two accident conditions considered were flooding of the new fuel pit and a dropped assembly between the periphery of the new fuel rack and the fuel pit wall. For the flooded case the CASMO-2E result was k_∞ = 0.8160 for the infinite lattice configuration. Since this case did not include leakage, the k_{eff} of the fully flooded case would be considerably lower. The dropped assembly case was shown to have a k_{eff} less than 0.883. Thus, these events were shown to have k_{eff} values much less that the acceptance criterion noted in paragraph 3. above.

5. Reactor Core Fuel Assemblies

The licensee requested a change to the maximum reactor core fuel enrichment from 3.5 weight percent U-235 to 4.3 weight percent in the Technical Specification 5.3. Fuel enrichment is not a direct input to the reactor safety analysis. Fuel enrichment is used in conjunction with a number of parameters and considerations in determining safe operation of the reactor. The fuel enrichment, number of fuel assemblies, exposure (burnup) of existing fuel, burnable poisons, and fuel management schemes are used to derive measurable reactor core parameters important to safe operation. These dynamic parameters such as shutdown margin, reactivity coefficients, and power peaking factors are included in the Technical Specifications. The specification of the fuel enrichment in the core design section alone does not uniquely determine nor limit the values of the reactor core parameters which are important for safe operation.

SAFETY SUMMARY

Based on our review of the licensee proposals and the discussion and evaluation contained herein, we conclude that fuel assembies with a maximum enrichment of 4.3 weight percent U-235 can be stored safely in the new fuel racks at Farley Nuclear Plant Units 1 and 2. Our conclusion is based on the following:

1. Criticality calculations were performed with acceptable models and methods.
2. Unertainties have been accounted for as described above.
3. Postulated accidents have been considered.
4. The multiplication factor, including uncertainties, meets our acceptance criteria for this quantity.

Based on our review, we find the proposed change of the enrichment restriction in the Technical Specification 5.3 is also acceptable.

Environmental Consideration

These amendments involve a change in the installation or use of the facilities components located within the restricted areas as defined in 10 CFR 20. The staff has determined that these 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 these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meets the eligibility criteria for categorical exclusion set forth in 10 CFR Sec 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 these amendments.

Conclusion

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: November 8, 1984

Principal Contributors: