April 16, 1986

Docket No.: 50-368

Mr. John M. Griffin
Senior Vice President
Energy Supply
Arkansas Power & Light Company
Post Office Box 551
Little Rock, Arkansas 72203

Dear Mr. Griffin:

Subject: Issuance of Amendment No. 71 to Facility Operating License NPF-6 - Arkansas Nuclear One, Unit No. 2

The Commission has issued the enclosed Amendment No. 71 to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2. The amendment consists of changes to the Technical Specifications in response to your application dated November 20, 1985, as supplemented by letter dated January 29, 1986.

The amendment revises the Technical Specifications to allow storage of new fuel with a maximum enrichment of 4.1 weight percent U-235 in the new fuel storage racks.

A copy of the Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

Sincerely,

151

Robert S. Lee, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosures:
1. Amendment No. 71 to NPF-6
2. Safety Evaluation

cc: See next page

PBD7	PBD7	OELD	DIR PBD7
RSLee/yt	JLee	MCunningham	GWKnighton
4/3/86	4/4/86	4/8/86	4/16/86

cc:
Mr. J. Ted Enos, Manager, Licensing
Arkansas Power & Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Mr. James M. Levine, General Manager
Arkansas Nuclear One
P. O. Box 608
Russellville, Arkansas 72801

Nicholas S. Reynolds, Esq.
Bishop, Liberman, Cook,
Purcell & Reynolds
1200 Seventeenth Street, N.W.
Suite 700
Washington, D.C. 20036

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Office of Executive Director for
Operations
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P. O. Box 2090
Russellville, Arkansas 72801

Mr. Frank Wilson, Director
Division of Environmental Health
Protection
Arkansas Department of Health
4815 West Markam Street
Little Rock, Arkansas 72201

Mr. Robert B. Borsum
Babcock & Wilcox
Nuclear Power Generation Division
Suite 220
7910 Woodmont Avenue
Bethesda, Maryland 20814

Mr. Charlie B. Brinkman, Manager
Washington Nuclear Operations
C-E Power Systems
7910 Woodmont Avenue
Suite 1310
Bethesda, Maryland 20814

Honorable Ermil Grant
Acting County Judge of Pope County
Pope County Courthouse
Russellville, Arkansas 72801

APR 16 1986

ISSUANCE OF AMENDMENT NO. 71 TO FACILITY OPERATING LICENSE NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2

DISTRIBUTION

Docket File 50-368
NRC PDR
Local PDR
PBD7 Reading
FMiraglia
JLee
RSLee
Attorney, ELD
LHarmon
EJordan
BGrimes
JPartlow
TBarnhart (4)
WJones
WRegan
LKopp
ACRS (10)
OPA
LFMB

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

ARKANSAS POWER & LIGHT COMPANY

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 71
License No. NPF-6

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

   A. The application for amendment by Arkansas Power & Light Company (the licensee) dated November 20, 1985, as supplemented January 29, 1986, 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 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-6 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 71 , 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 the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing-B

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 16, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 71

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Replace the following page of the Appendix "A" Technical Specifications with the enclosed page. The revised page is identified by amendment number and contains vertical lines indicating the areas of change. The corresponding overleaf page is also provided to maintain document completeness.

Remove Pages	Insert Pages
5-5	5-5

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,295 ± 400 cubic feet at a nominal T_{avg} of 545°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 - SPENT FUEL

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with a nominal 12.8 inch center-to-center distance between fuel assemblies having a maximum enrichment of 4.3 weight percent U-235 placed in the storage racks to ensure a k_{eff} equivalent to ≤ 0.95 when flooded with unborated water. The k_{eff} of ≤ 0.95 includes a conservative allowance of 1.7% Δk/k for uncertainties as described in Section 9.1.2.3 of the FSAR. In addition, fuel in the storage pool shall have a U-235 loading of ≤ 47.8 grams of U-235 per axial centimeter of fuel assembly.

CRITICALITY - NEW FUEL

5.6.1.2 The new fuel storage racks are designed and shall be maintained with a nominal 25.0 inch center-to-center distance between new fuel assemblies such that K_{eff} will not exceed 0.98 when fuel having a maximum enrichment of 4.1 weight percent U-235 is in place and aqueous foam moderation is assumed and K_{eff} will not exceed 0.95 when the storage area is flooded with unborated water. The calculated K_{eff} includes a conservative allowance of 2.1% Δk/k for uncertainties.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 399' 10 1/2".

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 486 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

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.

TABLE 5.7-1

COMPONENT CYCLIC OR TRANSIENT LIMITS

COMPONENT	CYCLIC OR TRANSIENT LIMIT	DESIGN CYCLE OR TRANSIENT
Reactor Coolant System	500 system heatup and cooldown cycles at rates $\leq$ 100°F/hr.	Heatup cycle - T_{avg} from $\leq$ 200°F to $\geq$ 545°F; cooldown cycle - T_{avg} from $\geq$ 545°F to $\leq$ 200°F.
	500 pressurizer heatup and cooldown cycles at rates $\leq$ 200°F/hr.	Heatup cycle - Pressurizer temperature from $\leq$ 200°F to $\geq$ 653°F; cooldown cycle - Pressurizer temperature from $\geq$ 653°F to $\leq$ 200°F.
	10 hydrostatic testing cycles.	RCS pressurized to 3110 psig with RCS temperature $\geq$ 60°F above the most limiting components' NDTT value.
	200 leak testing cycles.	RCS pressured to 2250 psia with RCS temperature greater than minimum for hydrostatic testing, but less than minimum RCS temperature for criticality.
	400 reactor trip cycles.	Trip from 100% of RATED THERMAL POWER.
	40 turbine trip cycles with delayed reactor trip.	Turbine trip (total load rejection) from 100% of RATED THERMAL POWER followed by resulting reactor trip.
	200 seismic stress cycles.	Subjection to a seismic event equal to one half the design basis earthquake (DBE).

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated November 20, 1985, Arkansas Power and Light Company (AP&L) submitted a proposed Technical Specification change (Ref. 1) which would allow the storage of new (fresh, unirradiated) fuel with an enrichment of 4.1 weight percent U-235 in the fresh fuel storage racks at Arkansas Nuclear One, Unit 2 (ANO-2). The existing ANO-2 Technical Specifications state that the fresh fuel storage racks are capable of storing fuel having an enrichment no greater than 3.7 weight percent U-235.

As a result of the staff's review of the proposed change, the licensee was requested to submit the fresh fuel pit criticality analysis which supports the storage of 4.1 weight percent U-235 fuel assemblies. This analysis was submitted by letter from J. Ted Enos (AP&L) to George W. Knighton (NRC) on January 29, 1986 (Ref. 2).

2.0 SAFETY EVALUATION

Analysis Methods

The analysis of the criticality aspects of the storage of ANO-2 fuel assemblies having a fuel enrichment of 4.1 weight percent U-235 was performed for Arkansas Power and Light Company by Middle South Services, Incorporated (MSS). The MSS analysis methods consist of the KENO-IV/S and NITAWL-S computer codes which are part of the SCALE-2 code package (Ref. 3).

The MSS analysis methods were benchmarked against critical experiments described in Reference 4. These experiments utilized water moderated, aluminum clad, 2.46 weight percent U-235 fuel rods in various configurations. In addition, comparisons were made of KENO calculations with seventy critical experiments as described in Reference 5. The results of these comparisons yield a KENO one-sided upper tolerance limit of 0.021 with a probability of 95% that 95% of the calculated KENO results will be within this limit (95/95 probability/confidence level).

New Fuel Storage Rack Analysis

The criticality of fuel assemblies in the ANO-2 fresh fuel racks is prevented, primarily, by limiting the U-235 enrichment in the fuel rods to 4.1 weight percent and by maintaining a minimum separation of 25 inches between assemblies. Also, since unirradiated fuel contains no radioactive fission products, it requires no shielding or cooling and is normally stored in a dry condition.

The NRC acceptance criteria that the fuel assemblies must meet are that the effective neutron multiplication factor, k_{eff}, shall be no greater than 0.95 when the racks are fully loaded and flooded with pure, unborated water, and k_{eff} shall be no greater than 0.98 when the racks are immersed with low-density hydrogenous material due to such causes as, for example, mist, fog, or fire-fighting foam. The k_{eff} shall include all biases and uncertainties at least at a 95/95 probability/confidence level.

MSS performed calculations for the fresh fuel storage racks at various moderator densities in order to obtain the low water density which resulted in the maximum reactivity. Since ANO-2 fresh fuel is stored in cavities whose internal dimensions are 8.56 inches on a side whereas the outside fuel assembly dimensions are 8.096 inches, there is a ±0.232 inch uncertainty in the lateral placement of any one assembly in its cavity. MSS found that the maximum k_{eff} was obtained for the geometrical configuration in which the fuel assemblies were shifted within the storage cavities to minimize the distance to the center assembly and, therefore, this adverse geometry was used in the calculations.

For the extreme, low-density moderator conditions, the MSS calculations indicated a maximum k_{eff} of 0.926 at a water density of 0.06 gm/cc. After applying the KENO 95/95 probability/confidence reliability factor mentioned previously, the maximum k_{eff} at low-density, optimum moderation conditions was 0.947, well below the NRC 0.98 criterion, and thus acceptable.

A similar calculation at full water density (1.0 gm/cc) resulted in a k_{eff} of 0.893, including the 95/95 probability/confidence reliability factor. This is also well within the NRC 0.95 calculational limit for full density moderation conditions and, therefore, acceptable.

For abnormal events and accidents, the absence of water in the fuel storage racks can be assumed under the "double contingency principle" since assuming its presence would be a second unlikely event. Without water moderation, any postulated event would result in a k_{eff} value very much lower than our acceptance criterion of 0.95 for accidents.

3.0 EVALUATION FINDINGS

Based on our review, we conclude that ANO-2 fuel assemblies having a maximum enrichment of 4.1 weight percent U-235 may be stored in the fresh fuel storage racks and Technical Specification 5.6.1.2 may be revised accordingly. Our conclusion is based on the following:

1. The criticality calculations have been performed with acceptable methods and have been benchmarked.

2. Appropriate uncertainties have been accounted for at the 95/95 probability/confidence level.

3. Abnormal events and accidents have been considered.

4. The effective neutron multiplication factor, including uncertainties, meets our acceptance criteria for all postulated conditions.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The 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 occupation radiation exposure. The Commission has previously published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 §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

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

Principal contributor to this SE was L. Kopp.

Dated: April 16, 1986

4.0 REFERENCES

1. Letter from T. Gene Campbell (AP&L) to James R. Miller (NRC), Arkansas Nuclear One-Unit 2, Docket No. 50-368, License No. NPF-6, Proposed Technical Specification Change Concerning the New Fuel Storage Racks, November 20, 1985.

2. Letter from J. Ted Enos (AP&L) to George W. Knighton (NRC), dated January 29, 1986, submitting "ANO-2 Fresh Fuel Pit Criticality Analysis, Storage of 4.1 Weight Percent U-235 Assemblies," by M. R. Eastburn, Middle South Services, Inc., October 17, 1984.

3. "Scale-2: A Modular Code System for Performing Standardized Computer Analysis for Licensing Evaluation," NUREG/CR-0200, Oak Ridge National Laboratory.

4. N. M. Baldwin et al., "Critical Experiments Supporting Close Proximity Water Storage of Power Reactor Fuel," BAW-1487-7, Babcock and Wilcox, July 1979.

5. R. M. Westfall, J. R. Knight, "Scale System Cross Section Validation with Shipping Cask Critical Experiments," Transactions of the American Nuclear Society, Vol. 33, Pg. 368, 1979.