September 28, 1995

Mr. Jerry W. Yelverton
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ISSUANCE OF AMENDMENT NO. 166 TO FACILITY OPERATING LICENSE NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M92150)

Dear Mr. Yelverton:

The Commission has issued the enclosed Amendment No. 166 to Facility Operating License No. NPF-6 for the Arkansas Nuclear One, Unit No. 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated May 19, 1995, as supplemented July 21, 1995.

The amendment revises the specifications to permit the containment personnel airlock doors to remain open during fuel handling.

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

Sincerely,
Original Signed By:
George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures: 1. Amendment No. 166 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 166
License No. NPF-6

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee) dated May 19, 1995, as supplemented July 21, 1995, 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, 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 Appendix A, as revised through Amendment No. 166 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of the date of issuance, to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

George Kalman

George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: September 28, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 166

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Revise the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE PAGES	INSERT PAGES
3/4 9-3	3/4 9-3
3/4 9-4	3/4 9-4
B 3/4 9-1	B 3/4 9-1
B 3/4 9-3	B 3/4 9-3

REFUELING OPERATIONS

DECAY TIME AND SPENT FUEL STORAGE

LIMITING CONDITION FOR OPERATION

3.9.3.a The reactor shall be subcritical for at least 100 hours.

3.9.3.b In the event of a complete core offload, a full core to be discharged shall be subcritical a minimum of 175 hours prior to discharge of more than 70 assemblies to the spent fuel pool.

APPLICABILITY: During movement of irradiated fuel in the reactor pressure vessel.

ACTION:

With the reactor subcritical for less than 100 hours, suspend all operations involving movement of irradiated fuel in the reactor pressure vessel. With the reactor subcritical for less than 175 hours, suspend all operations involving movement of more than 70 fuel assemblies from the reactor pressure vessel to the spent fuel pool. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.3.a The reactor shall be determined to have been subcritical for at least 100 hours by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor pressure vessel.

4.9.3.b The reactor shall be determined to have been subcritical for at least 175 hours by verification of the date and time of subcriticality prior to movement of the 71st irradiated fuel assembly from the reactor pressure vessel to the spent fuel pool.

REFUELING OPERATIONS

CONTAINMENT BUILDING PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.9.4 The containment building penetrations shall be in the following status:

a. The equipment door closed and held in place by a minimum of four bolts,

b. A minimum of one door in each airlock is capable of being closed, and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Closed by an isolation valve, blind flange, or manual valve, or

2. Exhausting through OPERABLE containment purge and exhaust system HEPA filters and charcoal adsorbers.

APPLICABILITY: During CORE ALTERATIONS or movement of irradiated fuel within the containment.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or movement of irradiated fuel in the containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.4.1 Each of the above required containment penetrations shall be determined to be in its above required condition within 72 hours prior to the start of and at least once per 7 days during CORE ALTERATIONS or movement of irradiated fuel in the containment.

4.9.4.2 The containment purge and exhaust system shall be demonstrated OPERABLE at the following frequencies:

a. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the system by:

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: 1) the reactor will remain subcritical during CORE ALTERATIONS, and 2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the accident analyses.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the source range neutron flux monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor pressure vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

The minimum requirement for reactor subcriticality prior to movement of more than 70 irradiated fuel assemblies to the spent fuel pool ensures that sufficient time has elapsed to allow radioactive decay of the short lived fission products such that the heat generated will not exceed the cooling capacity of the spent fuel pool cooling system. This decay time and total assembly limitation is conservatively within the assumptions used in the accident analyses.

3/4.9.4 CONTAINMENT PENETRATIONS

The requirements on containment penetration closure and OPERABILITY of the containment purge and exhaust system HEPA filters and charcoal adsorbers ensure that a release of radioactive material within containment will be restricted from leakage to the environment or filtered through the HEPA filters and charcoal adsorbers prior to discharge to the atmosphere. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE. Operation of the containment purge and exhaust system HEPA filters and charcoal adsorbers and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

The containment personnel airlock doors may be open during movement of irradiated fuel in the containment and during CORE ALTERATIONS provided a minimum of one door is capable of being closed in the event of a fuel handling accident and the plant is in MODE 6 with 23 feet of water above the fuel seated within the reactor pressure vessel. Should a fuel handling accident occur inside containment, a minimum of one personnel airlock door will be closed following an evacuation of containment.

3/4.9.9 and 3/4.9.10 WATER LEVEL-REACTOR VESSEL AND SPENT FUEL POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 12% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

3/4.9.11 FUEL HANDLING AREA VENTILATION SYSTEM

The limitations on the fuel handling area ventilation system ensure that all radioactive materials released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorbers prior to discharge to the atmosphere. The operation of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

3/4.9.12 FUEL STORAGE

Region 1 of the spent fuel storage racks is designed to assure fuel assemblies of less than or equal to 4.1 w/o U-235 enrichment will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in unborated water. These conditions have been verified by criticality analyses.

Region 2 of the spent fuel storage racks is designed to assure fuel assemblies within the burnup and initial enrichment limits of Figure 3.9.2 will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in unborated water. These conditions have been verified by criticality analyses.

The requirement for 1600 ppm boron concentration is to assure the fuel assemblies will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in the event of a postulated accident.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 166TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

On August 31, 1994, the staff issued amendments to the Calvert Cliffs Nuclear Power Plant Technical Specifications (TSs) revising the TS to permit both doors in the personnel airlock to be open during fuel handling. Prior to issuance of that amendment, at least one of the two doors was required to be closed during fuel handling. Approval of the Calvert Cliffs amendments was based on: (1) the findings of an analysis of radiological consequences of a fuel handling accident (FHA) that the calculated radiological doses are acceptable, and (2) commitments by the licensee that would ensure that containment closure would be promptly established following containment evacuation, in the event of a FHA. Subsequently, similar applications were received and approved for other facilities. It is the staff's policy to approve such applications if (1) confirmatory dose calculations by the staff indicate acceptable radiological consequences and (2) the licensee has committed to implement administrative procedures that ensure that the open airlock can and will be promptly closed following containment evacuation in the event of a refueling accident (even though the containment fission product control function is required to meet acceptable dose consequences criteria).

By application dated May 19, 1995, as supplemented by letter dated July 21, 1995, Entergy Operations, Inc. (the licensee) requested similar amendments for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2). The July 21, 1995, supplement provided clarifying information that did not change the initial proposed no significant hazards consideration determination. Following review of supporting calculations associated with the consequences of a fuel handling accident, the staff found that detailed information was included to address radiological consequences involving ANO-2 fuel. However, similar information to evaluate a fuel handling accident involving ANO-1 fuel was not included. The staff proceeded to evaluate the requested TS amendment for ANO-2 only. The ANO-1 amendment request will be processed when ANO-1 specific information is submitted by the licensee.

Enclosure

2.0 BACKGROUND

The proposed ANO-2 amendment would revise the TSs to permit both doors in the personnel airlock to be open during handling of irradiated fuel in the containment as follows:

- TS 3.9.4 would be revised to allow the containment building personnel airlock doors to remain open during fuel handling as long as at least 23 feet of water is maintained covering the fuel (currently required by TS 3.9.9) seated within the reactor pressure vessel.
- TS 3/4.9.3.a would be revised to increase the minimum decay time from shutdown to the movement of irradiated fuel in containment from 72 to 100 hours.
- The bases for TS 3/4.9.9 and 3/4.9.10 would be revised to reflect an increase in the assumed amount of iodine gap gas activity from 10% to 12%.

3.0 EVALUATION

The containment at ANO-2 is provided with a personnel airlock, a personnel escape (emergency) airlock, an equipment hatch and other penetrations for piping and cables. The airlocks are provided with double doors to permit access while maintaining containment integrity. The double doors are provided with interlocks to ensure that only one door at a time can be open. Per the existing specification, during cold shutdown and refueling the interlocks may be disabled and both doors may be opened, if irradiated fuel is not being moved in containment. Also, during such periods, temporary (less than full strength) hatch covers may be used on the equipment hatches.

The staff has evaluated the application to confirm that (1) confirmatory dose calculations indicate acceptable radiological consequences without taking credit for the containment's fission product control function, and (2) the licensee has committed to implement administrative procedures that ensure that the open airlock can and will be promptly closed, following containment evacuation, in the event of a refueling accident.

3.1 CAPABILITY TO PROMPTLY ESTABLISH CONTAINMENT CLOSURE IN THE EVENT OF A FHA

The licensee's initial application did not explicitly confirm that administrative controls would be implemented to ensure that an open airlock can and would be promptly closed in the event of a fuel handling accident in the containment. After discussions with the staff, the licensee provided a letter dated July 21, 1995, stating that when the airlocks are opened during fuel handling and core alterations, an individual will be assigned to monitor the status of the door and close it following containment evacuation. Procedures will be implemented to ensure that the airlock passages are not obstructed in such a manner as to inhibit prompt closure. Based on the July 21, 1995, commitment, the staff finds that the capability for prompt closure criterion is met.

3.2 RADIOLOGICAL CONSEQUENCES

The staff has completed its evaluation of the potential radiological consequences of a FHA at ANO-2, based upon the conditions of the proposed TS changes. In addition to reviewing the licensee's submittal, the staff performed an independent analysis to determine conformance with the requirements of 10 CFR Part 100 and General Design Criteria (GDC) 19 of Appendix A to 10 CFR Part 50. The staff's analysis utilized the accident source term given in Regulatory Guide (RG) 1.4, the assumptions contained in RG 1.25, and the review procedures specified in Standard Review Plan (SRP) Sections 15.7.4 and 6.4. The licensee stated in its analysis that only four rows of fuel pins (60 pins) would be damaged if a fuel assembly was to drop. The staff reviewed the licensee's analysis in the ANO-2 SAR, Section 15.1.23, Fuel Handling Accident. The staff concludes that the licensee's analysis is consistent with the requirements of the NRC SRP Section 15.7.4, conservative, and adequate to justify the number of fuel rods (four rows) assumed to be damaged in the fuel handling accident. The staff further assumed an instantaneous puff release of noble gases and radioiodines from the gap and plenum of the broken fuel rods. These released gas bubbles would then pass through at least 23 feet of water covering the fuel, prior to reaching the containment atmosphere. All airborne activity reaching the containment atmosphere is assumed to exhaust to the environment within 2 hours. As stipulated in the proposed TS change, the activity of the gases in the fuel gap and plenum is assumed to have decayed for a period of 100 hours.

The staff computed the offsite doses for ANO-2 using the above assumptions and NRC computer code ACTICODE. Control room operator doses were determined using the methodology in Section 6.4. The computed offsite doses and control room operator doses are within the acceptance criteria given in SRP Section 15.7.4 and GDC 19. The assumptions used in calculating those doses and the resulting calculated values are contained in Tables 1 and 2.

TABLE 1

CALCULATED RADIOLOGICAL CONSEQUENCES
(rem)

Exclusion Area Boundary	Dose	SRP 15.7.4 Guidelines
Whole Body	0.16	6
Thyroid	33.0	75
Control Room Operator	**Dose**	**GDC-19 Guidelines**
Whole Body	<0.1	5
Thyroid	1.9	Equivalent to 5 rem whole body*

* The guideline dose provided in Standard Review Plan Section 6.4 defines the dose-equivalent to the thyroid as 30 rem.

TABLE 2

ASSUMPTIONS USED FOR CALCULATING RADIOLOGICAL CONSEQUENCES

Parameters	Quantity
Power Level, Mwt	2,955
Number of Fuel Rods Damaged (4 rows)	60
Total Number of Rods	40,716
Shutdown time, hours	100
Power Peaking Factor	1.65
Fission Product Release Duration	2 hours
Core Fission Product Inventories per TID-14844	
Receptor Point Variables	
Exclusion Area Boundary	
Atmospheric Relative Concentration, X/Q (sec/m^3)	
0-2 hours	6.8×10^{-4}
Low Population Zone	
Atmospheric Relative Concentration, X/Q (sec/m^3)	
0-2 hours	1.2×10^{-4}
8-24 hours	7.6×10^{-5}
1-4 days	3.0×10^{-5}
4-30 days	8.2×10^{-6}
Control Room	
Atmospheric Relative Concentration, X/Q (sec/m^3)	5.6×10^{-4}
Control Room Volume, cubic feet	1.8×10^{6}
Maximum Infiltration Rate, ft^3/min	10
Geometry Factor	32.6
Iodine Protection Factor	144
Recirculation Air Flow	
Flow Rate, ft^3/min	1667
ESF Filter Efficiency	
Elemental Iodine	95%
Organic Iodine	95%
Particulate Iodine	95%

Note: Dose conversion factors from ICRP-30 were utilized for all calculations

4.0 TECHNICAL CONCLUSION

The staff concluded that the radiological consequences associated with a fuel handling accident at ANO-2 during refueling operations with the containment airlocks open are within the acceptance criteria set forth in 10 CFR Part 100 and GDC 19 of Appendix A to 10 CFR Part 50. Additionally, administrative controls are in place to reduce the calculated radiological release substantially, if not completely, by closing the open airlock doors promptly after a fuel handling accident. The staff concludes that the proposed amendment is acceptable for ANO-2.

5.0 STATE CONSULTATION

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

6.0 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 and changes surveillance requirements. 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 (60 FR 39437). 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.

7.0 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 Contributors: W. Long
D. Carter

Date: September 28, 1995