October 20, 1993

Docket No. 50-368

Mr. Jerry W. Yelverton
Vice President, Operations ANO
Entergy Operations, Inc.
Route 3 Box 137G
Russellville, Arkansas 72801

Dear Mr. Yelverton:

SUBJECT: ISSUANCE OF AMENDMENT NO. 151 TO FACILITY OPERATING LICENSE NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M87781)

The Commission has issued the enclosed Amendment No. 151 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 September 24, 1993.

The amendment reduces the minimum number of required incore detectors and detector locations from 75 percent to 50 percent for the remainder of the current operating cycle.

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:
Thomas W. Alexion, Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 151 to NPF-6
2. Safety Evaluation

cc w/enclosures:
See next page

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C. Grimes (11E22)	OPA (2G5)	OC/LFMB (4503)
W. Beckner		

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

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Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

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cc:

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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. 151
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 September 24, 1993, 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. 151, 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 its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

William D. Beckner

William D. Beckner, Director
Project Directorate IV-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 20, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 151

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Revise the following page of the Appendix "A" Technical Specifications with the attached page. The revised page is identified by Amendment number and contains vertical lines indicating the area of change.

REMOVE PAGE	INSERT PAGE
3/4 3-28	3/4 3-28

INSTRUMENTATION

INCORE DETECTORS

LIMITING CONDITION FOR OPERATION

3.3.3.2 The incore detection system shall be OPERABLE with:

a. At least 75% of all incore detectors* with at least one incore detector in each quadrant at each level, and

b. At least 75% of all incore detector locations*, and

c. Sufficient operable incore detectors to perform at least six tilt estimates with at least one tilt estimate at each of three levels.

An OPERABLE incore detector location shall consist of a fuel assembly containing either a fixed detector string with a minimum of three OPERABLE rhodium detectors or an OPERABLE movable incore detector capable of mapping the location.

A tilt estimate can be made from two sets of symmetric pairs of incore detectors. Two sets of symmetric pairs of incore detectors are formed by two pairs of diagonally opposite symmetric incore detectors, one incore detector per quadrant.

APPLICABILITY: When the incore detection system is used for monitoring the AZIMUTHAL POWER TILT, radial peaking factors, local power density or DNB margin.

ACTION:

With the incore detection system inoperable, do not use the system for the above applicable monitoring or calibration functions. The provisions of Specifications 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.2 The incore detection system shall be demonstrated OPERABLE:

a. By performance of a CHANNEL CHECK within 24 hours prior to its use and at least once per 7 days thereafter when required for monitoring the AZIMUTHAL POWER TILT, radial peaking factors, local power density or DNB margin.

b. At least once per 18 months by performance of a CHANNEL CALIBRATION operation which exempts the neutron detectors but includes all electronic components. The neutron detectors shall be calibrated prior to installation in the reactor core.

* For the remainder of Fuel Cycle 10 the incore detection system may be considered OPERABLE with <75% and ≥50% of all incore detectors and detector locations provided the appropriate penalties (based on a full 1.0% increase in overall uncertainty on the CECOR F_{xy} measurement) are applied to the COLSS and CPCs.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 151 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated September 24, 1993, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2) Technical Specifications (TSs). The requested changes would revise the operability requirements of TS 3.3.3.2 for the incore detector system by reducing the minimum number of required incore detector and detector locations from 75 percent to 50 percent for the remainder of the current operating cycle (Cycle 10). The proposed changes are necessary because the plant has experienced an unexpectedly large number of failures thus far in Cycle 10 and further failures could result in shutdown of the plant.

2.0 DISCUSSION

The incore detector system at ANO-2 consists of 44 neutron detector string locations. Each detector string consists of 5 rhodium neutron detector segments located at 10, 30, 50, 70, and 90% of core height. The purpose of the incore detector system is to provide inputs for measuring the planar radial peaking factors, to perform validation of the Core Protection Calculator (CPC) power distribution, and to provide inputs to the Core Operating Limit Supervisory System (COLSS). The COLSS generates the axial shape index, azimuthal power tilt, linear heat rate margin and departure from nucleate boiling(DNB) margin.

TS 3.3.3.2 requires 75% of the 220 possible individual detector positions and 75% of the 44 strings to be operable. To be operable a string must have 3 of the 5 individual detectors operable. TS 3.3.3.2 also requires a sufficient number of operable incore detectors to allow performance of at least six tilt estimates with at least one tilt estimate at each of three levels.

As of September 22, 1993, 174 (79%) of the 220 detector positions and 35 (79.5%) of the strings are operable. Six of these strings have only three operable detectors. With the present detectors ANO-2 has the capability of performing 25 tilt estimates at 5 levels. Thus it is unlikely that the tilt capability will be challenged but the 75% of detectors and 75% of strings operable limits could be violated with only a few more detector failures. It

would take a maximum of 10 more detector failures or a minimum of three failures in specific strings to reach the TS limits.

With less than 75% of the detectors or less than 75% of the detector strings operable, the TSs do not allow use of the incore detection system for monitoring the core. In that case, the plant would be limited to 80% to 85% rated thermal power until time for the next Planar Radial Peaking Factor determination (once per 31 days of accumulated operation in Mode 1) when the plant would be required to shutdown.

ANO-2 typically replaces all 42 detector strings every other refueling outage. The current detectors are in their second cycle of operation. Only six detectors failed in the first cycle of operation and all six were returned to service and are operating at the present time. The previous two batches of detectors had only 13 and 10 detectors failed after two cycles of operation. Before a mid-cycle outage in May 1993, 14 detectors had failed. Since then an additional 17 detectors have failed, including 6 detector failures between September 1 and September 21, 1993. Entergy Operations is continuing to evaluate the failures, but no failure mechanism has been found as yet. All detectors will be replaced at the end of Cycle 10.

3.0 EVALUATION

Essentially all PWR TSs contain a requirement for operability of 75% of the incore detector locations for mapping of the core power distribution. On a number of occasions, for various reasons, failures of detectors in operating PWRs have approached or exceeded 25%, and relaxation of the 75% requirement has been permitted for the duration of the affected operating cycle.

Incore detector data is used to calculate power peaking factors which are then used to verify compliance with fuel performance limits. The incore detector signals are used by the computer code CECOR to calculate the spatial power distribution in the core including the tilt and power peaking factors. As the number of inoperable detector segments increases, the uncertainties in the CECOR power distribution calculation increase. ABB/Combustion Engineering (ABB/CE) has previously analyzed similar situations including Fort Calhoun, Unit 1 Cycle 6; St. Lucie, Unit 1 Cycle 4; and Calvert Cliffs, Unit 1 Cycles 8 and 11.

Entergy Operations has performed a new analysis of the overall CECOR power peaking measurement uncertainties. The present failures and additional randomly selected failures, such that the total number of failed detectors was 50%, were used for the analysis. The overall uncertainty on measured F_{xy} increased by less than 0.5%. ABB/CE has assessed the impact of up to 50% failed detectors locations upon the calculations performed by the monitoring system (COLSS) and the protection system (CPC). For conservatism, new COLSS and CPC constants were calculated assuming a full 1% increase in overall uncertainty on the CECOR F_{xy} measurements. In addition, when the number of incore detectors or detector locations is less than 75%, ANO-2 will increase

the surveillance of the planar radial peaking factor to a 15 day interval, which is twice the frequency of TS 4.2.2.2.b.

It is acceptable to permit use of the incore detector system with less than 75% of the detectors or detector locations because the system is not required for plant safety. Its primary function is to verify that the core power distribution is consistent with the assumptions used in the safety analysis. Although the number of operable detectors and detector locations is relaxed, sufficient locations will be required to adequately verify compliance with power distribution TSs. The current limits on power distribution will still be met. The increased measurement uncertainty factors will compensate for the reduction in the minimum number of incore detectors and/or detector locations. Thus the existing Limiting Conditions for Operation specified for Axial Shape Index, Azimuthal Power Tilt, Radial Peaking Factors, Local Power Density and Departure from Nucleate Boiling Ratio will not be exceeded.

Another safety concern relating to degration of incore mapping ability is the ability to detect anomalous conditions in the core. One of these is the inadvertent loading of a fuel assembly into an improper position. Since this is a loading problem, it is no concern for the remainder of the operating cycle. The startup physics tests at the beginning of Cycle 10 showed excellent agreement with predictions, thus giving assurance that the operating core is similar to the designed core. Other anomalous conditions would produce either an axial or radial effect which would be detected by the tilt estimates. The current TS 3.3.3.2.c requires at least six tilt estimates with at least one tilt estimate of each of three detector elevations. The proposed revision does not change this requirement.

4.0 TECHNICAL SPECIFICATION CHANGES

TS 3.3.3.2 - "For the remainder of Fuel Cycle 10 the incore detection system may be considered OPERABLE with <75% and ≥50% of all incore detectors and detector locations provided the appropriate penalties(based on a full 1.0% increase in overall uncertainty of the CECOR F_{xy} measurement) are applied to the COLSS and CPCs." is added as a footnote. This will allow continued normal operation with less than 75% of the detectors or detector locations operable.

5.0 EXIGENT CIRCUMSTANCES

The Commission's regulations, 10 CFR 50.91, contain provisions for issuance of amendments when the usual 30-day public notice period cannot be met. One type of special exception is an exigency. An exigency is a case where the staff and licensee need to act promptly, but failure to act promptly does not involve a plant shutdown, derating, or delay in startup. The exigency case usually represents an amendment involving a safety enhancement to the plant.

Under such circumstances, the Commission notifies the public in one of two ways: by issuing a Federal Register notice providing an opportunity for hearing and allowing at least two weeks for prior public comments, or by

issuing a press release discussing the proposed changes, using the local media. In this case, the Commission used the first approach.

The licensee submitted the request for amendment on September 24, 1993. It was noticed in the Federal Register on October 4, 1993 (58 FR 51655), at which time the staff proposed a no significant hazards consideration determination. In its letter of September 24, 1993, the licensee requested that the amendment be issued quickly since further incore detector failures could result in the derating and ultimately in the shutdown of ANO-2 (an emergency situation). The staff recognizes that a derating or shutdown of a plant results in additional plant maneuvering with the associated risks of reactor/plant transients and/or additional operator burden. In addition, in the licensee's September 24, 1993, application explains in detail why the increased failure rate of the incore detectors during the current cycle could not have been predicted, and thus, why this situation could not have been avoided. The staff finds that the licensee's explanation is acceptable.

Therefore, the staff is issuing the amendment under exigent circumstances, pursuant to 10 CFR 50.91(a)(6), for the reasons set forth above and in Section 2.0 above. The licensee did not request emergency treatment of the amendment application; the staff does not believe that an emergency situation exists. However, the staff does believe that the amendment should be issued promptly to avoid a future emergency situation.

There were no public comments in response to the exigent circumstances notice published in the Federal Register.

6.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards considerations if operation of the facility in accordance with the amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

The TS change (allowing more incore detectors to be inoperable) does not significantly increase the probability of an accident previously evaluated because no hardware changes are being made, and therefore the change has no effect on postulated accident precursors. The TS change does not significantly increase the consequences of an accident previously evaluated since the increased measurement uncertainty factors will compensate for the reduction in the minimum number of operable incore detectors and detector locations. Thus, the existing TS power distribution limits (axial shape index, azimuthal power tilt, radial peaking factors, local power density, and departure from nucleate boiling ratio) will be protected. The TS power distribution limits ensure that Safety Analysis Report (SAR) analyses (including postulated accident analyses) remain valid.

The TS change does not create the possibility of a new or different kind of accident from any previously evaluated since no hardware changes are being made, and allowing more incore detectors to be inoperable does not create any new accident precursors.

The TS change does not involve a significant reduction in the margin of safety since the current TS limits on power distribution will still be protected. Although the number of operable detectors (and detector locations) is relaxed from 75% to 50%, sufficient operable detectors will be required, along with increased measurement uncertainty factors to compensate for the inoperable detectors, to verify compliance with the current power distribution limits. Thus, the margin of safety for power distribution limits, which is already built in to the TS, is preserved.

7.0 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.

8.0 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. 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 (58 FR 51655). 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.

9.0 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 Contributor: M. Chatterton

Date: October 20, 1993