November 18, 1

Docket No. 50-382

Mr. Ross P. Barkhurst
Vice President Operations
Entergy Operations, Inc.
Post Office Box B
Killona, Louisiana 70066

Dear Mr. Barkhurst:

SUBJECT: ISSUANCE OF AMENDMENT NO. 90 TO FACILITY OPERATING LICENSE NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. M87715)

The Commission has issued the enclosed Amendment No. 90 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 7, 1993, as supplemented by letter dated September 24, 1993.

The amendment changes the Appendix A TSs for the incore detection system to allow less than 75% but more than 50% of the incore locations to be operable provided the appropriate penalties are applied to the core operating limit supervisory system (COLSS) and the core protection calculators (CPCs). This change is effective for the remainder of the current Fuel Cycle 6.

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:

David L. Wigginton, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

290081

Enclosures:
1. Amendment No. 90 to NPF-38
2. Safety Evaluation

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OFC	LA:PD4-1	PM:PD4-1	OGC	D:PD4-1
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COPY	YES/NO	YES/NO	YES/NO	YES/NO

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

November 18, 1993

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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,

David L. Wigginton, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

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2. Safety Evaluation

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See next page

cc:

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 90
License No. NPF-38

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated September 7, 1993, as supplemented by letter 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 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-38 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 90 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

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: November 18, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 90

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace 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 areas of change. The corresponding overleaf page is also provided to maintain document completeness.

REMOVE PAGE	INSERT PAGE
3/4 3-34	3/4 3-34

TABLE 4.3-3 (Continued)

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
3. EFFLUENT ACCIDENT MONITORS				
a. Containment High Range	S	R	M	1, 2, 3, & 4
b. Plant Stack High Range	S	R	M	1, 2, 3, & 4
c. Condenser Vacuum Pump High Range	S	R	M	1, 2, 3, & 4
d. Fuel Handling Building Exhaust High Range	S	R	M	1*, 2*, 3*, & 4*
e. Main Steam Line High Range	S	R	M	1, 2, 3, & 4

*With irradiated fuel in the storage pool.

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 detector locations, and

b. A minimum of two quadrant symmetric incore detector locations per core quadrant.

An OPERABLE incore detector location shall consist of a fuel assembly containing a fixed detector string with a minimum of four OPERABLE rhodium detectors.

APPLICABILITY: When the incore detection system is used for monitoring:

a. AZIMUTHAL POWER TILT,

b. Radial Peaking Factors,

c. Local Power Density,

d. DNB Margin.

ACTION:

a. With the incore detection system inoperable, do not use the system for the above applicable monitoring or calibration functions.

b. The provisions of Specifications 3.0.3 and 3.0.4 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 6 the incore detection system may be considered OPERABLE with $< 75\%$ and $\geq 50\%$ of all incore locations provided that penalties are applied to the COLSS and CPCs to account for a 1% increase (from 6.92% to 7.92%) in overall uncertainty of CECOR measured planar radial peaking factors (F_{xy}) and power distributions calculated by COLSS.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 90 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated September 7, 1993, Entergy Operations Inc., requested a change to the Technical Specifications (TSs) for the Waterford Steam Electric Station, Unit 3. This change would reduce the number of required incore detector strings necessary for continued operation for the remainder of Cycle 6 only. The proposed change is necessary because the plant has experienced an unexpectedly large number of failures thus far in Cycle 6 and further failures could result in shutdown of the plant.

The incore detector system at Waterford 3 consists of 56 neutron detector string locations. Each detector string consists of five 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 56 strings to be operable. To be operable a string must have 4 of the 5 individual detectors operable. In addition, a minimum of two quadrant symmetric incore detector locations per core quadrant are required.

As of September 7, 1993, 230 (82%) of the 280 detector positions and 44 (78.6%) of the strings were operable. Two of these strings have only four operable detectors. Presently there are four operable quadrant symmetric detector locations per core quadrant. Thus it is unlikely that the quadrant symmetric detector locations requirement will be challenged, but the 75% of detector locations operable limit could be violated with only a few more detector failures. It would take as few as two more detector failures in specific strings to reach the TS limit.

With less than 75% of the detector strings operable, the TSs require the excore detection system be used for monitoring the core. In that case, the plant would be limited to approximately 90% rated thermal power until 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.

Waterford 3 replaces detector strings every other refueling outage. The current detectors are in their second cycle of operation. Four detector locations are not functional due to the instrumentation thimble being cut off or the instrument being broken off inside the thimble. An additional 30 detectors have failed. Entergy Operations is continuing to evaluate the failures, but no failure mechanism has been found as yet. Forty-two detector locations will be replaced at the end of Cycle 6.

2.0 EVALUATION

Essentially all pressurized water reactor (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 Cycle 6 at Fort Calhoun, Unit 1; Cycle 4 at St. Lucie, Unit 1; Cycles 8 and 11 at Calvert Cliffs, Unit 1; and Cycle 10 at Arkansas Nuclear One, Unit 2.

Entergy Operations has performed a new analysis of the overall CECOR power peaking measurement uncertainties with as few as 50% of the locations operable. The present failures and additional randomly selected failures, making a total of 50% failed detector locations, were used for the analysis. In this analysis, each failed location was modeled as having all 5 detectors failed when in fact a failed location may have 3 of the 5 detectors operable. The results of the analysis showed that the overall uncertainty on measured F_{xy} increased by less than 1%. ABB/CE has assessed the impact of up to 50% failed detector locations on 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. These new constants will be used if the number of operable strings falls below 75%. In addition, when the number of detector locations is less than 75%, Waterford 3 will increase the surveillance of the planar radial peaking factor to a 15-day interval, which is twice the frequency of TS 4.3.3.2.b.

It is acceptable to permit use of the incore detector system with less than 75% of the 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 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 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 degradation 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 not of concern for the remainder of the operating cycle. Except for the critical boron concentration measurements, the startup physics tests at the beginning of Cycle 6 showed good 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 a radial effect, which would be detected by quadrant symmetric incore detector locations. The proposed revision does not change the requirement for the minimum number of quadrant symmetric incore detector locations per core quadrant.

3.0 TECHNICAL SPECIFICATION CHANGES

TS 3.3.3.2 - "For the remainder of fuel cycle 6 the incore detection system may be considered OPERABLE with <75% and ≥50% of all incore locations provided that penalties are applied to the COLSS and CPCs to account for a 1% increase from (6.92% to 7.92%) in overall uncertainty of CECOR measured planar radial peaking factors (F_{xy}) and power distributions calculated by COLSS." - is added as a footnote. This will allow continued normal operation with less than 75% of the detector locations operable.

Based on the staff evaluation in Section 2.0 above, the staff concludes that the proposed TS change is acceptable. This change is for the remainder of Cycle 6 only.

4.0 STATE CONSULTATION

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

5.0 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 52984). 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.

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 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: November 18, 1993