Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

March 23, 1998

SUBJECT: ISSUANCE OF AMENDMENT NO. 139 TO FACILITY OPERATING LICENSE NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. M98791)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No. 139 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 May 24, 1997.

The amendment changes the Appendix A TSs by modifying Table 3.7-3 of TS 3/4.7.4 to incorporate more restrictive fan operability requirements and revises the TS Bases to reflect changes in the wet cooling tower water consumption. The change is necessary as a result of revised design basis calculations. Specifically, the change to TS Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train," would be revised to eliminate allowance for operation with fewer than 12 dry cooling fans per dry cooling tower.

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:
Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 139 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

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

March 23, 1998

Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
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Docket No. 50-382

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cc w/encls: See next page

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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. 139
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 May 24, 1997, 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. 139 , 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 to be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Chandu P. Patel

Chandu P. Patel, 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: March 23, 1998

ATTACHMENT TO LICENSE AMENDMENT NO. 139

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace 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 areas of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE PAGES	INSERT PAGES
3/4 7-14	3/4 7-14
B 3/4 7-4	B 3/4 7-4

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

c. With a Tornado Watch in effect, all 9 DCT fans under the missile protected portion of the DCT shall be OPERABLE. If the number of fans OPERABLE is less than required, restore the inoperable fan(s) to OPERABLE status within 1 hour, or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

d. With any UHS fan inoperable, determine the outside ambient temperature at least once every 2 hours and verify that the minimum fan requirements of Table 3.7-3 are satisfied.

SURVEILLANCE REQUIREMENTS

4.7.4. Each train of UHS shall be determined OPERABLE:

a. At least once per 24 hours by verifying the average water temperature and water level to be within specified limits.

b. At least once per 31 days, by verifying that each wet tower and dry tower fan that is not already running, starts and operates for at least 15 minutes.

TABLE 3.7-3

ULTIMATE HEAT SINK MINIMUM FAN REQUIREMENTS PER TRAIN

DRY COOLING TOWER

AMBIENT CONDITION	DRY BULB ≥ 98°F	< 98°F DRY BULB ≥ 91°F	< 91°F DRY BULB
Fan Requirements(1)	15	14*	12*

WET COOLING TOWER

AMBIENT CONDITION	WET BULB ≥ 75°F	< 75°F WET BULB ≥ 70°F	WET BULB < 70°F
Fan Requirements(1)	8	7**	4**

(1) With any of the above required UHS fan inoperable comply with ACTION d.

* With a tornado watch in effect, all 9 DCT fans under the missile protected portion of the DCT shall be OPERABLE.

** With any WCT fan(s) out-of-service in any cell, covers must be in place on the out-of-service fan(s) or the entire cell (i.e. 4 fans) must be declared out-of-service. If four fans are out of service in the same cell, the covers do not have to be installed.

3/4.7.4 ULTIMATE HEAT SINK

The limitations on the ultimate heat sink level, temperature, and number of fans ensure that sufficient cooling capacity is available to either (1) provide normal cooldown of the facility, or (2) to mitigate the effects of accident conditions within acceptable limits.

The UHS consists of two dry cooling towers (DCTs), two wet cooling towers (WCTs), and water stored in WCT basins. Each of two 100 percent capacity loops employs a dry and wet cooling tower.

Each DCT consists of five separate cells. Cooling air for each cell is provided by 3 fans, for a total of 15 per DCT. The cooling coils on three cells of each DCT (i.e. 60%) are protected from tornado missiles by grating located above the coils and capable of withstanding tornado missile impact. With a Tornado Watch in effect and the number of fans OPERABLE within the missile protected area of a DCT less than that required by Table 3.7-3, ACTION c requires the restoration of inoperable fans within 1 hour or plant shutdown as specified. This ACTION is based on FSAR analysis (subsection 9.2.5.3.3) that assumes the worst case single failure as, 1 emergency diesel generator coincident with a loss of offsite power. This failure occurs subsequent to a tornado strike and 60% cooling capacity of a DCT is assumed available.

Each WCT has a basin which is capable of storing sufficient water to bring the plant to safe shutdown under all design basis accident conditions. Item a of LCO 3/4.7.4 requires a minimum water level in each WCT basin of 97% (-9.86 ft MSL). The bases for this elevation is WCT water evaporation and drift loss calculations, which concluded that during a LOCA 164,389 gallons (218,155 gallons with the non-essential load of spent fuel cooling) would be consumed from one WCT basin. When the WCT basin water level is maintained at -9.86 ft MSL, each basin has a minimum capacity of 174,000 gallons. Each WCT consists of two cells, each cell is serviced by 4 induced draft fans, for a total of 8 per WCT. There is a concrete partition between the cells that prevents air recirculation between the fans of each cell. Covers are required on fans declared out-of-service to prevent air recirculation between fans within a cell.

Table 3.7-3 specifies increased or decreased fan OPERABILITY requirements based on outside air temperature and humidity. The table provides the cooling tower fan OPERABILITY requirements that may vary with outside ambient conditions. Fan OPERABILITY requirements are specified for each controlling parameter (i.e., dry bulb temperatures for DCT fans and wet bulb temperatures for WCT fans). The calculated temperature values (EC-M95-009) associated with DCT and WCT fan requirements have been rounded in the conservative direction and lowered at least one full degree to account for minor inaccuracies. Failure to meet the OPERABILITY requirements of Table 3.7-3 requires entry into the applicable action. Because temperature and humidity are subject to change during the day, ACTION d requires periodic temperature readings to verify compliance with Table 3.7-3 when any cooling tower fan is inoperable.

The limitations on minimum water level and maximum temperature are based on providing a 30-day cooling water supply to safety-related equipment without exceeding their design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants," March 1974.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 139 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated May 24, 1997, Entergy Operations, Inc. (the licensee) submitted a request to change the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications. The proposed changes would modify Table 3.7-3 of TS 3/4.7.4 to incorporate more restrictive fan operability requirements and revise the TS Bases to reflect changes in the wet cooling tower water consumption. The proposed change is necessary as a result of revised design basis calculations. Specifically, the change to TS Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train," would be revised to eliminate allowance for operation with fewer than 12 dry cooling tower fans (out of 15 total) per dry cooling tower.

2.0 DISCUSSION

The ultimate heat sink (UHS) at Waterford 3 is redundant and consists of two forced draft dry cooling towers (DCTs) and two mechanical draft wet cooling towers (WCTs) with water stored in the basins of the WCTs. Each train of the UHS uses one DCT and one WCT, which are essentially in series. During normal plant operation, two component cooling water (CCW) system loops supply cooling water to all the plant loads using the DCTs for final heat removal. Although the DCTs are the primary heat sink for the CCW system, each CCW loop also has a CCW heat exchanger, which is supplied cooling water from an auxiliary component cooling water (ACCW) system train, which uses one of the two WCTs for heat removal. CCW flows through the CCW heat exchanger whenever the CCW system is in operation; ACCW flow is supplied to the CCW heat exchanger whenever the DCT is not adequate to maintain CCW temperature within the desired range. The ACCW system and WCTs are designed to operate following an accident and whenever the heat rejection capacity of the DCTs is exceeded or ambient environmental conditions prohibit the DCTs from rejecting their design heat load. Each DCT is sized to dissipate approximately 60 percent of the heat removed by the CCW system following a design basis loss of coolant accident (LOCA) while each WCT is sized to dissipate approximately 40 percent of this design basis heat load. Therefore, each train of the UHS, consisting of a DCT train and a WCT train, is designed to dissipate 100 percent of the heat load under the worst case design basis accident conditions.

The DCTs are forced draft, dry type, parallel flow heat exchangers with each tower consisting of five separate cells. Each cell contains two 40 foot finned vertical cooling coils with forced cooling air flow on the outside of the tubes that is supplied by three fans for each cell. Therefore, there is a total of 15 fans for each DCT. The DCT fans are started and secured automatically to maintain the CCW system temperature at a predetermined value measured at the outlet of the CCW heat exchanger. When the CCW temperature in a CCW loop exceeds that value, the associated ACCW pump starts to initiate additional CCW cooling via the WCT.

The WCTs are mechanical draft, wet type, mixed flow heat exchangers with each tower consisting of two cells. Each cell is serviced by four induced draft fans for a total of 8 fans per WCT. There is a concrete partition that prevents air recirculation between the fans of each cell. The WCT fans are automatically started whenever the water temperature in the WCT basin exceeds a predetermined setpoint, and continue to run until they are shut off by the operator. Unlike the DCTs, the forced air actually contacts ACCW during the heat removal process. ACCW enters the WCT and is sprayed downward towards the basin into fill modules separating the water into droplets. Air is drawn upward through the modules and spray area by the fans, which are located at the top of the tower.

Recent analyses by the licensee have determined that the post-accident heat load assumed in the UHS transient heat analysis was not conservative in that the analysis did not consider the condition of maximum heat removal from containment and maximum heat transfer to the UHS as a result of clean heat exchangers. Additionally, the analysis did not consider the spent fuel pool as a possible heat load following a LOCA. The previous analysis, while conservative from the standpoint of containment response, was not conservative as a basis for the minimum number of Operable DCT fans, nor as a basis for the amount of water consumed from the WCT basins following a design basis LOCA. As a result of this determination the licensee has proposed to eliminate operation with fewer than 12 DCT fans operating and is revising the Bases for TS 3/4.7.4 to correct the WCT water consumption following a LOCA.

3.0 EVALUATION

Currently, Table 3.7-3 allows continued plant operation with a minimum of 9 Operable DCT fans per train when dry bulb ambient temperature is less than 77 degrees fahrenheit (77°F). With dry bulb temperature less than 91°F but greater than or equal to 77°F, at least 12 fans are required to be Operable. For dry bulb temperature greater than 91°F but less than 98°F, 14 fans are required to be Operable and for dry bulb temperatures greater than 98°F, all 15 fans are required to be Operable. The proposed change would require at least 12 Operable fans at all temperatures below 91°F. Thus, continued operation with fewer than 12 Operable fans (i.e., more than 3 inoperable fans) will not be allowed regardless of the temperature. The current TS allows operation with more than 3 inoperable fans (up to a maximum of 6 inoperable fans) whenever dry bulb ambient temperature is less than 77°F. The revised analysis has shown that operation with more than 3 inoperable fans could continue at temperatures below 75°F without exceeding any limits. Therefore, the proposed change to require at least 12 Operable fans below 77°F is more conservative than the existing TS and is also conservative with respect to the latest analysis. The proposed change is acceptable on the basis of that conservatism.

The current Bases section for TS 3/4.7.3 identifies that the water consumption of one WCT for the design basis LOCA (assuming only one train is operating) is less than the required minimum

volume of 174,000 gallons for each WCT basin (based on a 30-day post-LOCA analysis). The revised Bases section will still reflect that water consumption following a LOCA will be less than the required minimum volume of one basin without consideration of the spent fuel pool as a heat load. However, the Bases Section has been further revised to reflect that when the spent fuel pool heat load is factored in, the water consumption rate may result in exceeding the minimum required volume of one WCT basin (prior to 30 days). The Bases Section now reflects that up to 218,155 gallons of water would be consumed in the 30 days following a LOCA under the most adverse conditions. The adverse conditions considered in the analysis included: LOCA coincident with a loss of offsite power (LOOP), a single active failure of one electrical division, worst case ambient (meteorological) conditions, inability to restore power to the electrical division within 3 days (if restored the minimum volume of one basin will still last 30 days) and non-essential heat loads (including the spent fuel pool) being cooled by the UHS.

The difference in the WCT water basin consumption rate is not considered safety significant because makeup can be provided from the redundant WCT basin via gravity flow through basin cross-connect valves. Additional backup is provided via a gravity flow path from the circulating water system. In the Safety Evaluation Report (SER) for Waterford 3, NUREG-0787, the staff gave credit for the Category I cross-connect between basins and concluded that the UHS provided sufficient cooling for at least 30 days under all design basis conditions in accordance with the guidance of Regulatory Guide (RG) 1.27 "Ultimate Heat Sink." Because of the seismic Category I cross-connect, it was not necessary to demonstrate that the volume of one WCT basin was sufficient to last 30 days following a design basis LOCA. The staff further concluded that the UHS met the requirements of General Design Criterion 44, "Cooling Water," with respect to decay heat removal capability.

Based on its evaluation, the staff concluded that the proposed changes are consistent with Regulatory Guide 1.27 and GDC 44, are based on conservative analysis assumptions and are necessary to reflect the latest UHS transient heat analysis for the Waterford 3 plant. The staff, therefore, concludes that the proposed changes to TS 3/4.7.4 and its Bases are acceptable.

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 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 (62 FR 33123). 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: W. Lefave

Date: March 23, 1998