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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 95 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 16, 1993, Entergy Operations, Inc. (the licensee) requested an amendment to the ultimate heat sink technical specification (TS) for the Waterford Steam Electric Station, Unit No. 3. The amendment request proposes a revision of TS Section 3/4.7.4 by adding operating conditions and limiting conditions for operation for the forced draft dry cooling towers and the mechanical draft wet cooling towers. The bases for this TS section are also being revised to support the proposed changes.

The changes to TS 3/4.7.4 "Ultimate Heat Sink" resulted from NRC Inspection Report 50-382/93-07 dated May 4, 1993, which discussed a problem with the specified requirements for the wet cooling tower fan covers. The licensee conducted a review of the ultimate heat sink TSs which resulted in other problems with TS 3/4.7.4 being identified. This amendment request includes changes and additions identified in the review which are associated with the ultimate heat sink systems.

2.0 DISCUSSION

The ultimate heat sink, consisting of two 100 percent capacity loops with each loop including a separate dry and a wet cooling tower, is designed to dissipate the heat removed from the reactor and its auxiliaries during normal unit operation, during refueling, or after a design basis accident. The wet cooling towers have water stored in the wet cooling tower basins and the entire ultimate heat sink and systems are located within the nuclear island.

The dry cooling towers (DCTs) are the primary heat sink for the component cooling water system (CCWS) during normal operation. Each DCT has been sized to dissipate to the atmosphere approximately 60% of the heat removed by the CCWS after a loss-of-coolant accident (LOCA) assuming the historically highest ambient dry bulb temperature (102°F). Each dry cooling tower consists of five separate cells, each cell containing two 40 ft long vertical cooling coils arranged in a "V" shape. Cooling air for each cell is provided by three fans, for a total of 15 fans per DCT. The cooling coils on three cells of each DCT are protected from tornado missiles by grating located above the coils. Dry

cooling tower fans and motors are located below grade, and are protected from tornado missiles by building walls and/or access platforms. The motor control centers and the transformers for the dry and wet cooling towers are protected from tornado missiles by grating capable of withstanding tornado missile impact. The dry cooling tower fans are started and shutoff automatically to maintain the CCWS temperature at 90°F.

The wet cooling towers (WCTs) remove heat from the CCWS by the separate auxiliary component cooling water system (ACCWS), and are designed to operate whenever the heat rejection capacity of the CCWS is exceeded. Each WCT is sized to dissipate to the atmosphere approximately 40% of the heat removed by the CCWS after a LOCA, assuming the historically highest ambient wet bulb temperature (83°F). Unlike the DCTs, the forced air actually contacts ACCW during the heat removal process in the WCTs. The ACCWS takes water from the wet cooling tower basin, pumps it through the CCW heat exchanger where its temperature is raised, and then to the wet cooling tower for heat dissipation to the atmosphere. ACCW enters the WCT and is sprayed downward towards the basin into fill modules which separates the water into droplets. Air is drawn upward through the modules and spray area by the fans located on top of the tower. The WCT fans are started automatically whenever the water temperature in the tower basin exceeds 85°F, and shut off by the operator. Each WCT basin contains sufficient water for ultimate heat sink operation without makeup after a LOCA. There is a concrete partition between each cell of a WCT that prevents air recirculation between the fans of each cell and the two WCT basins are interconnected by a valved four inch line to allow 100 percent margin of safety for available water supply. WCTs are not required after approximately seven days following a LOCA.

The licensee has proposed changes to the technical specification governing the ultimate heat sink, TS 3.7.4 "Ultimate Heat Sink," and to Table 3.7-3 "Ultimate Heat Sink Minimum Fan Requirements." The staff has completed its review of the proposed changes as detailed in the following evaluation.

3.0 EVALUATION

The staff evaluations of each of the licensee's proposed changes to TS 3.7.4 "Ultimate Heat Sink" are as follows:

3.1 Changes to TS 3/4.7.4 Table 3.7-3 "Ultimate Heat Sink Minimum Fan Requirements."

(1) The first asterisk on Table 3.7-3 requires covers to be in place on fans in a cell that are not running. The licensee proposes to change the first asterisk on Table 3.7-3 to read:

> 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., four fans) declared out-of-service.

Evaluation: Each WCT train consists of two cells, each cell is serviced by four induced draft fans, and each fan driven by a 30 horsepower, single

speed motor. The WCT fans draw air upward through the fill modules and spray area. With fan(s) not operating within a single cell, outside air would be drawn in through the out-of-service fan air discharge cone above the spray area, thus reducing the cell's cooling efficiency.

The staff finds the clarification more conservative in that out-of-service fans must have covers installed, and out-of-service fans that do not have covers installed will reduce the efficiency of a cell, but not the entire train. In a phone call with the licensee on January 28, 1994, the licensee stated that covers do not need to be installed on fans that are not running as those fans are operable and cycle on as required. The staff finds the change acceptable.

(2) The second asterisk on Table 3.7-3 gives the requirement on the number of DCT fans that shall be operable under the missile protected portion of the DCT with a tornado watch in effect. The licensee has proposed to change the second asterisk to read:

> With a tornado watch in effect, at least 8 of the DCT fans under the missile protected portion of the DCT shall be OPERABLE.

Evaluation: The number of fans located under the missile protected portion of the DCT consists of 3 cells of 3 fans each for a total of nine fans. The staff considers this change, changing "...8 of these 9 DCT fans..." to "...8 of the DCT fans...," to be of an editorial nature that clarifies the number of fans that shall be operable under the missile protected portion of the DCT during a tornado watch. The staff finds the change acceptable.

(3) The first ambient condition on Table 3.7-3 requires 14 DCT fans and 8 WCT fans, or 15 DCT fans and 7 WCT fans. The licensee has proposed to change TS Table 3.7-3 by adding three asterisks to the "14 DCT" fan requirement in the first column of Table 3.7-3. In addition, an editorial change was made to the third asterisk on Table 3.7-3 and has been changed to read:

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

Evaluation: Under those specified ambient conditions, only one fan (of the total 23 DCT and WCT fans) can be inoperable, however, all fans under the missile protected portion of the DCTs must by operable. The staff finds the changes to be more conservative and clarify the requirements in Table 3.7-3, and are therefore acceptable.

(4) The licensee has proposed to add to Table 3.7-3 the following note to ensure compliance with Action "f" which is required when more than one fan is inoperable:

> NOTE: With more than one fan inoperable comply with Action f.

Evaluation: The staff finds this change of an editorial nature and its inclusion into Table 3.7-3 will ensure compliance with Action "f." The staff finds the change acceptable.

(5) Change TS 3/4.7.4 Table 3.7-3 by removing the wet bulb temperature less than 76°F criteria from the third ambient condition, and retaining the dry bulb temperature less than 80°F requirement.

Evaluation: The licensee has stated in its proposal that this requirement can be removed because the wet bulb temperatures are normally lower than dry bulb temperatures and the wet bulb temperature is not a critical factor per Table 3.7-3 until the dry bulb temperature is greater than or equal to 80°F. Atmospheric wet bulb temperature affects the capacity of the WCT. Since Table 3.7-3 requires the same amount of WCT fans at wet bulb temperatures less than 81°F, reference to wet bulb temperature in the third column can be removed. The staff agrees and finds the change acceptable.

3.2 Changes to TS 3/4.7.4 Action items.

(1) Change TS 3/4.7.4 Action "e" to the following:

> With a Tornado Watch in effect, and the number of fans OPERABLE within the missile protected areas of a DCT less than that required by Table 3.7-3, 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.

Evaluation: The original Action "e" was in conflict with the requirement of the second asterisk on Table 3.7-3. The staff finds that changing Action "e" to reference Table 3.7-3 resolves the earlier conflict with Action "e" and Table 3.7-3 and is acceptable.

(2) Change TS 3/4.7.4 Action "c" to the following:

> With the number of OPERABLE fans less than required by Table 3.7-3 on one DCT/WCT train, restore the number of OPERABLE fans to within the requirements of Table 3.7-3 within 72 hours (except as specified in Action e), or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Evaluation: Action "d" references Action "c" by requiring compliance with Table 3.7-3 for 1 DCT/WCT train. Adding the words "on one DCT/WCT train" to Action "c" makes Action "c" consistent with Action "d." The staff finds the change acceptable.

(3) Change TS 3/4.7.4, Action "f" to the following:

> With more than one fan inoperable and the outside air temperature greater than 70°F, determine the dry bulb temperature at least once every 2 hours. If the temperature is greater than or equal to 80°F, determine the wet bulb temperature and verify that the minimum fan requirements of Table 3.7-3 are satisfied.

Evaluation: Three changes have been proposed to Action "f." The first change removes any reference to the type of fan so that Action "f" requires compliance when any type of fan is inoperable and the outside air temperature is greater than 70°F. The staff finds this clarification to Action "f" to be acceptable. The second change to Action "f" increases the time requirement for determining the dry bulb temperature from one hour to two hours. The licensee has stated in its submittal that this time period is adequate with respect to safety based on the redundancy of fans and cooling tower trains available. The staff finds this change to the time period for determining the dry bulb temperature acceptable. The third proposed change revises Action "f" to require 80°F as the initiating temperature for determining wet bulb temperatures. As stated above (3.1(5)), the wet bulb temperature will normally be lower than the dry bulb temperature and the wet bulb temperature is not a critical factor per Table 3.7-3 until the dry bulb temperature is greater than or equal to 80°F. The staff agrees that the wet bulb temperature should not be a determining factor until the dry bulb temperature is greater than or equal to 80°F. The staff finds that this change is consistent with the earlier change to Table 3.7-3 and is acceptable.

3.3 Changes to TS 3/4.7.4 Surveillance Requirements

(1) Change TS 3/4.7.4 (b) by changing the frequency for verifying that each wet tower and dry tower fan that is not already running, starts and operates for at least 15 minutes from "at least once per 7 days" to "at least once per 31 days."

Evaluation: The licensee has proposed to change the surveillance requirements for testing WCT and DCT fans. Current Surveillance Requirement 4.7.4(b) requires the licensee to operate each WCT and DCT fan that is not already running once per 7 days for at least 15 minutes. The licensee has stated in its proposal that based on operating experience, the known reliability of the fan units, the redundancy available, and the low probability of significant degradation of UHS cooling tower fans, that increasing the frequency for testing the UHS cooling tower fans to 31 days will improve the reliability of the fans through reduced stresses associated with testing. The staff finds this acceptable.

3.4 Bases

(1) Change TS 3/4.7.4, BASES to reflect the changes proposed by the licensee.

Evaluation: The UHS Bases Section 3/4.7.4 have been updated to provide additional information and clarification concerning the proposed changes discussed above. The staff reviewed the revised bases and found them to be consistent with the system description and safety function presented in the final safety analysis report (FSAR). The changes to the bases section are acceptable.

3.5 Acceptance

The staff found the proposed TS additions and changes to be acceptable. The additions to the technical specifications and surveillance requirements of the

UHS were conservative in that they reflect data and operating experience gained by plant personnel, and were found to be acceptable based on the physical constraints and regulatory requirements associated with the testing.

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 comment.

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 (58 FR 57851). 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.

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