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Donna Jacobs
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Waterford 3

W3F1-2011-0082

November 25, 2011

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Supplement to License Amendment Request
Proposed Change to Technical Specification 3/4.7.4 Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train"
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

References: (1) Waterford 3 Letter W3F1-2011-0067, License Amendment Request Proposed Change to Technical Specification 3/4.7.4 Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train" (ADAMS Accession No. ML11290A009).

(2) NRC Correspondence, Waterford, Unit 3 Email, Supplemental Information Request for Acceptance Review, License Amendment Request Proposed Change to Technical Specification 3/4.7.4 Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train" (ADAMS Accession No. ML113120470).

Dear Sir or Madam:

In reference 1, Entergy Operations, Inc. (Entergy) requested a license amendment to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specifications (TS) 3/4.7.4 Table 3.7-3, "Ultimate Heat Sink Minimum Fan Requirements per Train." Waterford 3 TS 3/4.7.4 Table 3.7-3 indicates the minimum Dry Cooling Tower (DCT) and Wet Cooling Tower (WCT) fan requirements for given meteorological conditions.

Reference 1 requested modification of the WCT fan requirements by placing a limit on the number of inoperable fans per cell. This change was described as needed because the current TS requirement was found to be non-conservative. It was also indicated that, in concert with the above change, the dry bulb temperature limits for the DCT and wet bulb temperature limits for the WCT will be lowered to maintain existing margin with the increased heat load resulting from the upcoming Replacement Steam Generator project.

In reference 2, the NRC staff requested that Entergy supplement the application to provide additional information as specified in the correspondence by November 25, 2011. Attachments 1 and 2 to this letter provide the additional information requested

As indicated in reference 1, the proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c), and it has been determined that the change involves no significant hazards consideration. This determination remains valid in that the information provided in this letter maintains the original submitted request by providing further explanation with no technical changes in the associated documents.

Entergy requests approval of the proposed amendment by October 13, 2012. Once approved, the amendment shall be implemented within 60 days.

The proposed change involves one new commitment as described in Attachment 3.

Please contact William Steelman, Licensing Manager, at 504-739-6685 if there are any comments regarding the submittal.

I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,

Keith Nichols for Donna Jacobs 11/25/11

DJ/WJS/RJP

Attachments:
1. Supplemental Information to License Amendment Request
2. Summary of Inputs, Assumptions, and Methodology Used in Ultimate Heat Sink Fan Requirement Analysis
3. List of Regulatory Commitments

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Attachment 1 to

W3F1-2011-0082

Supplemental Information to License Amendment Request

Supplemental Information
To License Amendment Request

REQUIRED INFORMATION:

1) In its proposed TS change, the licensee has lowered dry bulb temperature requirements for the DCT and lowered wet bulb temperature requirements for the WCT, "to account for the increased heat duty on the DCT and WCT as a result of the Replacement Steam Generators." The licensee's sole stated technical justification for this change is "This change is supported by calculation ECM 95-009 that used the same CTI Code [ATC-105] methodology that was originally used." This explanation does not provide technical information in sufficient detail as to what extent the RSGs affects the DCT and WCT to allow me to make an independent assessment regarding the acceptability of the proposal in terms of regulatory requirements. Specifically, the licensee's justification does not include a discussion of design inputs, assumptions, and a description of the methodology used. The conclusions of the design calculation should clearly justify the reduction in the TS temperature requirements.

2) In addition to accounting for the RSGs, the licensee states that another reason for the proposed TS changes is to address the non-conservatisms in TS Table 3.7-3. The licensee's proposed change from 4 fans operable to a minimum of 2 fans per cell operable, for the wet bulb temperature range that is less than 68.5°F, is clearly conservative and needs no further justification than what was presented. However, the licensee proposed some new TS requirements in its submittal that are less restrictive than current requirements and did not acknowledge or address this less restrictive requirement. Specifically, the proposed TS requirements for the WCT is less conservative in the 70°F -73.5°F wet bulb temperature (WBT) range where 7 fans are currently required, whereas the proposed change would require only 6 fans (3 fans per cell). This non-conservatism is further made more non-conservative by the added heat duty of the Replacement Steam Generators. The licensee has provided no technical justification for this reduced requirement or even acknowledged that this reduction in air flow exists, other than they stated that they used the CTI code and the Zurn WCT Performance Curves with no explanation as to why 7 fans were once necessary, but now only 6 fans are necessary (3 fans per cell). The licensee should list the design inputs, assumptions, and describe the methodology used. The conclusions of the design calculation should clearly justify the reduction in operable fan requirements.

RESPONSE:

Response to item 1)

Input

ECM95-008, Ultimate Heat Sink (UHS) Design Basis Calculation, was revised for the pending Replacement Steam Generator (RSG) Project. The additional RSG Reactor Coolant System (RCS) inventory, due to the larger steam generator (SG) tube bundle, increases the mass transferred to the containment during a Loss of Coolant Accident (LOCA) RCS blowdown. The additional RSG secondary side SG inventory results in additional energy transferred to the containment for cold leg breaks. This energy in containment is removed by the UHS and raises the heat load demand on the Dry Cooling Tower (DCT) and Wet Cooling Tower (WCT).

The revision concludes that the design basis maximum Ultimate Heat Sink heat load will rise approximately 4.2% after the RSG Project as follows:

Cooling Tower	Current Load	Load After RSG Project
Dry (DCT)	113.38 x 10^6 BTU/hr	117.36 x 10^6 BTU/hr
Wet (WCT)	59.72 x 10^6 BTU/hr	62.94 x 10^6 BTU/hr

The higher RSG heat load is used in the analysis referenced in the TS Change. ECM95-009, Ultimate Heat Sink Fan Requirements under Various Ambient Conditions Calculation, determines the ambient temperature conditions that must be satisfied to allow UHS fans to be out of service (OOS).

ECI91-029, Meteorological Tower Uncertainty Calculation, determines the Technical Specification Surveillance Limits for specific DCT and WCT fan configurations factoring in instrument uncertainty and the analyzed limits from ECM95-009. Technical Specification limits are established less than the values determined in ECI91-029. The proposed Technical Specification limits follow this practice and maintain a conservative margin between the calculated limits and the requested Technical Specification limits.

Refer to attachment 2 for a summary of inputs, assumptions, and methodology used in the UHS analyses.

Dry Cooling Tower

The higher RSG UHS heat load impacts the DCT fan Out of Service (OOS) temperature limits, causing the ambient temperature limits to be lower (more restrictive) in order to allow additional heat transfer to the environment.

The revised analysis in ECI91-029 concludes the following ambient dry bulb temperature limits for DCT fans out of service.

Dry Cooling Tower

Ambient Condition* **(Current)** (T_{db} Dry Bulb Temperature)	Ambient Condition* **(Revised)** (T_{db})	Total DCT Fans	Max DCT Fans Inoperable	Min DCT Fans Operable
$T_{db} > 98.6°F$	$T_{db} > 98.4°F$	15	0	15
$92.3°F < T_{db} \leq 98.6°F$	$92.0°F < T_{db} \leq 98.4°F$	15	1	14
$T_{db} \leq 92.3°F$	$T_{db} \leq 92.0°F$	15	3	12

*Temperatures include 0.9°F instrument uncertainty as determined in ECI91-029.

The proposed TS indicated dry bulb temperature limits for DCT fans with margin added are:

Dry Cooling Tower

Ambient Condition **(Current)** (T_{db} Dry bulb temperature)	Ambient Condition **(Revised)** (T_{db})	Total DCT Fans	Max DCT Fans Inoperable	Min DCT Fans Operable
$T_{db} \geq 98°F$	$T_{db} \mathbf{\geq} 97°F$	15	0	15
$91°F \leq T_{db} < 98°F$	$91°F \mathbf{\leq} T_{db} \mathbf{<} 97°F$	15	1	14
$T_{db} < 91°F$	$T_{db} \mathbf{<} 91°F$	15	3	12

Wet Cooling Tower

ECM95-009 is also revised to correct a non-conservative assumption about the impact of taking an entire cell of the WCT out of service. The analyzed cases for WCT fans out of service (OOS) are changed as follows:

Case Considered	Current	Revised
Small Number OOS	1 Fan OOS 7 Fans Operable	1 Fan OOS/cell 3 Fans Operable/cell
Large Number OOS	4 fans OOS 4 Fans Operable	2 Fans OOS/cell 2 Fans Operable/cell

For the Cooling Tower Institute (CTI) Code ATC-105 methodology to be valid, both WCT cells must be operating. The analysis is simplified and kept consistent with the previously used method by assuming the same number of fans operating per cell. The ATC-105

methodology determines an adjusted cooling water flow rate that is inversely proportional to the cube root of the ratio of fan horsepower.

WCT performance curves provided by the manufacturer are used to develop a relationship between wet bulb temperature (T_{wb}) and the cooling range for a given Auxiliary Component Cooling Water (ACCW) outlet temperature and ACCW flow rate. An adjusted WCT range and associated T_{wb} is determined by interpolation using the adjusted ACCW flow rate derived from the ATC-105 code equation.

The previous analysis and TS limits included cases where only one WCT fan was OOS and where four fans were OOS. The new analysis is performed for cases where one and two WCT fans per cell are OOS. One fan OOS would be allowed only when the ambient temperature limit for 1 fan per cell (two fans total) is met. As expected, the ambient temperature limit for six fans in service is more restrictive than it was for seven fans in service. Thus, the change to provide temperature limits for six fans operable instead of seven fans operable is required to meet the Cooling Tower Institute (CTI) Code ATC-105 methodology.

The revised analysis in calculation ECI91-029 concludes the following ambient wet bulb temperature limits for WCT fans out of service.

Wet Cooling Tower

Current				**Revised**		
Ambient Condition (T_{wb} Wet bulb temperature)	Total Fans	Max Fans Inoperable	Min Fans Operable	Ambient Condition (T_{wb})	Max Fans Inoperable	Min Fans Operable
$T_{wb} > 77.8°F$	8	0	8	$T_{wb} > 75°F$	0	8
$73.1°F < T_{wb} \leq 77.8°F$	8	1	7	$70.3°F < T_{wb} \leq 75°F$	2 (1/cell)	6 (3/cell)
$T_{wb} \leq 73.1°F$	8	4	4	$T_{wb} \leq 70.3°F$	4 (2/cell)	4 (2/cell)

*Temperatures include 1.4°F instrument uncertainty as determined in ECI91-029.

The proposed TS indicated wet bulb temperature limits for WCT fans out of service with margin added are:

Wet Cooling Tower

Current				**Revised**		
Ambient Condition (T_{wb} Wet bulb temperature)	Total Fans	Max Fans Inoperable	Min Fans Operable	Ambient Condition (T_{wb})	Max Fans Inoperable	Min Fans Operable
$T_{wb} \geq 75°F$	8	0	8	$T_{wb} \geq 73.5°F$	0	8
$70°F \leq T_{wb} < 75°F$	8	1	7	$68.5°F \leq T_{wb} < 73.5°F$	2 (1/cell)	6 (3/cell)
$T_{wb} < 70°F$	8	4	4	$T_{wb} < 68.5°F$	4 (2/cell)	4 (2/cell)

Response to item 2)

The TS limits for WCT fans inoperable is being changed in the wet bulb temperature (WBT) range where seven fans are currently required; the proposed change would place more restrictive temperature limits for taking a single fan out of service, which is the limit that applies when two fans are out of service (only 6 fans (3 fans per cell) are in service). This change is being made in concert with the added heat duty of the Replacement Steam Generators. Both of these changes cause the ambient temperature limits for UHS fans out of service to be more restrictive. This change is supported by calculation ECM95-009 that uses the same CTI Code ATC-105 methodology that was originally used. The methodologies used to calculate these TS requirements did not change.

This TS change is acceptable because the analyses in ECM95-009 and ECI91-029 have been revised to credit an equal number of fans in each cell. This approach maintains use of the Cooling Tower Institute (CTI) Code ATC-105 as a valid method for determining the impact of OOS fans.

For the Cooling Tower Institute (CTI) Code ATC-105 methodology to be valid, both WCT cells must be operating. The analysis is simplified and kept consistent with the previously used method by assuming the same number of fans operating per cell. The ATC-105 methodology determines an adjusted cooling water flow rate that is inversely proportional to the cube root of the ratio of fan horsepower.

$$Adj.Flow = Des.Flow\left(\frac{Des.FanHP}{Adj.FanHP}\right)^{\frac{1}{3}}\left(\frac{Adj.\rho}{Des.\rho}\right)^{\frac{1}{3}}$$

Where Adj.Flow is Adjusted Auxiliary Component Cooling Water Flow
Where Des.Flow is Design Auxiliary Component Cooling Water Flow
Where Des.FanHP is Design WCT Fan Horse Power

Where Adj.FanHP is Adjusted WCT Fan Horse Power
Where Des.p is Design ambient air density
Where Adj.p is Adjusted ambient air density

Using this equation, the following table shows the current and revised inputs and results for the wet bulb temperature range where 7 fans are currently required:

	Current TS (1 fan OOS)	Revised (1 Fan per Cell OOS)
Des Flow	5350 gpm	5350 gpm
Des Fan HP	230.4 HP	230.4 HP
Adj Fan HP	201.6 HP	172.8 HP
Adj ρ	0.071 lbm/ft3	0.071 lbm/ft3
Des ρ	0.071 lbm/ft3	0.071 lbm/ft3
Adj Flow	5593.5 gpm	5888.44
T_{wb}	*77.8 F	*75 F

*Temperatures include 1.4°F instrument uncertainty as determined in ECI91-029.

WCT performance curves provided by the manufacturer are used to develop a relationship between T_{wb} and the cooling range for a given ACCW outlet temperature and ACCW flow rate. An adjusted WCT range and associated T_{wb} is determined by interpolation using the adjusted ACCW flow rate derived from the ATC-105 code equation.

ECI91-029, Meteorological Tower Uncertainty Calculation, determines the Technical Specification Surveillance Limits for specific DCT and WCT fan configurations factoring in instrument uncertainty and the analyzed limit from ECM95-009. Technical Specification limits are established less than the values determined in ECI91-029. The proposed Technical Specification limits follow this practice and maintain a conservative margin between the calculated limits and the requested Technical Specification limits. Clarification has also been added to ensure that the entire WCT is declared inoperable if any fan in the WCT has not been physically covered to prevent air flow.

The previous analysis and TS limits included cases where only one WCT fan was OOS and where four fans were OOS. The new analysis is performed for cases where one and two WCT fans per cell are OOS. One fan OOS would be allowed only when the ambient temperature limit for 1 fan per cell (two fans total) is met. As expected, the ambient temperature limit for six fans in service is more restrictive than it was for seven fans in service. Thus, the change to provide temperature limits for six fans operable instead of seven fans operable is required to meet the Cooling Tower Institute (CTI) Code ATC-105 methodology.

Attachment 2 to

W3F1-2011-0082

Summary of Inputs, Assumptions, and Methodology Used in Ultimate Heat Sink Fan Requirement Analysis

**Summary of Inputs, Assumptions, and Methodology
Used in Ultimate Heat Sink Fan Requirement Analysis**

ECM95-008, Ultimate Heat Sink Design Basis

Purpose:

The purpose of this calculation is to determine the Ultimate Heat Sink design basis under LOCA conditions using the worst combination meteorological design parameters.

This calculation also determines the ACCW system design temperature.

This calculation also accounts for the impact of Replacement Steam Generators on the results of this analysis.

Inputs and Assumptions:

Peak UHS Heat Duty Requirements

Containment Heat Duty	165.2×10^6 BTU/hr
Essential Chiller Heat Duty	5.1×10^6 BTU/hr
Auxiliary Heat Duty[1]	10.0×10^6 BTU/hr
Total Heat Duty	180.3×10^6 BTU/hr
Component Cooling Water System Heat Duty	175.2×10^6 BTU/hr

Notes: 1. Includes Diesel Generator and High Pressure Safety Injection (HPSI), Low Pressure Safety Injection (LPSI) and Containment Spray (CS) pumps

Hudson Products DCT Performance Curves - Heat Duty vs. Outlet Temperature as a function of Dry Bulb Temperature.

Zurn Industries WCT Performance Curves - Outlet Temperature vs. Wet Bulb Temperature as a function of Cooling Range.

Hot Air Recirculation Effect:
Dry Bulb Temperature - 1.9°F
Wet Bulb Temperature - 1.0°F

Method of Analysis:

Linear equations can be derived to describe the DCT and WCT performance since their performance curves assume a linear relationship (y = mx +b). Using the "Regression" Tool in Microsoft Excel, the slope and intercept of the DCT and WCT performance curves are calculated. These results provide an equation to describe the DCT performance as a function of dry bulb temperature and CCW flow and a WCT performance as a function of cooling range and wet bulb temperature.

Using the most limiting historical meteorological design parameter as the baseline, a heat balance was performed for various dry bulb temperatures to determine the maximum wet bulb temperature allowed for the UHS to maintain its overall design heat duty capacity.

Conclusions:

The UHS is capable of dissipating the LOCA heat duty requirements for both worst combination meteorological design parameters, 102°F_{db} / 78°F_{wb} and 98°F_{db} / 83°F_{wb}. The 102°F_{db} / 78°F_{wb} meteorological condition would allow less fouling in the CCW heat exchanger (CCWHx) in order to maintain a Component Cooling Water (CCW) outlet temperature of 115°F, and therefore is chosen as the UHS design point. The design conditions for the UHS are given below.

Dry Bulb Temperature (T_{db})	- 102°F
Wet Bulb Temperature (T_{wb})	- 78°F
DCT CCW Inlet Temperature	- 166.68°F
DCT CCW Outlet/CCWHx Inlet Temp.	- 132.06°F
DCT Heat Duty	- 117.36 x 10^6 BTU/Hr
WCT ACCW Outlet/CCWHx Inlet Temp.	- 89.3°F*
CCWHx CCW Outlet Temperature	- 115.0°F
CCWHx ACCW Outlet Temperature	- 115.21°F*
CCWHx Allowable Fouling Factor	- 0.00133*
CCWHx Heat Duty	- 57.84 x 10^6 BTU/Hr
WCT ACCW Inlet Temperature	- 113.01°F*
WCT Heat Duty	- 62.94 x 10^6 BTU/Hr
WCT Cooling Range	-23.71°F

*These values are calculated using an ACCW inlet temperature to the CCWHx of 89.3°F in order to maintain the Tech. Spec. maximum ACCW temperature of 89°F.

ECM95-009, Ultimate Heat Sink Fan Requirements Under Various Ambient Conditions

Purpose:

The purpose of this calculation is to determine the Ultimate Heat Sink (UHS) minimum fan requirements under various ambient conditions. This calculation serves as the technical basis for Technical Specification 3/4.7.

Inputs and Assumptions:

ECM95-008 provides the following UHS Design Basis inputs:

Dry Bulb Temperature (Tdb)	- 102°F
Wet Bulb Temperature (T_{wb})	- 78°F
DCT CCW Inlet Temperature	- 166.68°F
DCT CCW Outlet Temperature	- 132.06°F
DCT Heat Duty	- 117.36 x 10^6 BTU/hr
WCT ACCW Outlet Temperature	- 89.3°F
WCT Heat Duty	- 62.94 x 10^6 BTU/hr
WCT Accident Flow Rate	- 5350 gpm
WCT Cooling Range	- 23.71°F

ECM95-008 uses a WCT ACCW Outlet Temperature of 89.3°F. Using the TS limit of 89.0°F conservatively decreases the wet bulb temperature at which 8, 6, and 4 fans must be operable.

Zurn Industries WCT Performance Curves show outlet temperature vs. wet bulb temperature as a function of cooling range.

The hot air recirculation effect from ECM95-008 is used.

Although some cooling will take place without the DCT fans operating, it is assumed that DCT performance is directly proportional to the number of fans running.

This calculation uses WCT performance curves that are the expected WCT performance. These expected performance curves were demonstrated as conservative during plant start-up.

Linear interpolation will be used to determine the wet bulb temperatures (T_{wb}) at the adjusted WCT flow rate due to fans out of service. If the WCT adjusted flow is not in the range of the performance curves, Microsoft Excel “Regression” Analysis will be used using three WCT flow rates.

WCT inlet air density based on 80% relative humidity (φ).

Covers will be placed on out-of-service fans to prevent recirculation.

Method of Analysis:

The CCW heat exchanger (CCWHx) transfers additional heat load when UHS fans are inoperable. Since the UHS design basis, ECM95-008, determines the minimum CCWHx fouling, adding additional heat duty to the CCWHx would decrease this value. This calculation analyzes the Dry Cooling Tower (DCT) and Wet Cooling Tower (WCT) separately in order not to affect the CCWHx design basis fouling.

The DCT air outlet (Airout) temperature was calculated using the design basis DCT heat duty of 117.36×10^6 BTU/hr at an air inlet of 103.9°F; the UHS design basis dry bulb temperature (Tdb) plus hot air recirculation effect. The maximum Tdb with one and three DCT fans out of service is calculated using the conservation of energy at the DCT calculated Airout temperature. This result is reduced by 1.9°F to account for hot air recirculation.

Linear equations can be derived to describe the WCT performance since the WCT performance curves assume a linear relationship (y = mx +b). Using the "Regression" Tool in Microsoft Excel, the slope and intercept of the WCT performance curves at flow rates of 3250 gpm, 5850 gpm, 6500 gpm and 7150 gpm are calculated. Using these equations, the wet bulb temperatures (T_{wb}) to maintain an ACCW outlet temperature of 89.0°F at the WCT design cooling range were calculated at WCT flow rates of 3250 gpm, 5850 gpm, 6500 gpm and 7150 gpm.

Per CTI Code ATC-105, WCT inlet flow is proportional to [fan brake horsepower]$^{1/3}$. Adjusting the WCT inlet flow with fans out of service, the maximum T_{wb} with two and four WCT fans out of service is calculated by interpolating the results in Section 7.2 at the adjusted WCT inlet flow. This result is reduced by 1.0°F to account for hot air recirculation.

WCT Fans out of service are analyzed assuming each cell has the same number of fans out. This is done such that the air flow through each cell is the same. If the air flow is not the same through each cell then a revised methodology is required; a fan only affects the airflow through its respective cell.

Conclusions:

The tables below provide the minimum UHS fan requirements for various ambient conditions.

Dry Cooling Tower

Ambient Condition* **(Revised)**	Total DCT Fans	Max DCT Fans Inoperable	Min DCT Fans Operable
$T_{db} > 99.3°F$	15	0	15
$92.9°F < T_{db} \leq 99.3°F$	15	1	14
$T_{db} \leq 92.9°F$	15	3	12

Wet Cooling Tower

Ambient Condition **(Revised)**	Total WCT Fans	Max WCT Fans Inoperable	Min WCT Fans Operable
$T_{wb} > 76.4°F$	8	0	8
$71.7°F < T_{wb} \leq 76.4°F$	8	2 (1/cell)	6 (3/cell)
$T_{wb} \leq 71.7°F$	8	4 (2/cell)	4 (2/cell)

ECI91-029, Meteorological Tower Uncertainty Calculation

Purpose:

This calculation evaluates the adequacy of the meteorological tower (MET tower) instrumentation loops for monitoring meteorological conditions to assess actual and potential public exposure due to routine and accidental radiological releases. The determination of adequacy is based on guidelines provided in Regulatory guide 1.23 and 1.97.

This calculation also establishes Met tower dry bulb and wet bulb temperature sensing loops surveillance limits used as the basis for establishing the minimum number operable wet cooling tower fans and dry cooling tower fans in accordance with the plant technical specification acceptance criteria.

Inputs and Assumptions:

ECM95-009 lists the maximum wet bulb and dry bulb analysis temperature limits for the minimum number of dry and wet cooling tower fans to be operable to support the plant ultimate heat sink. This is input to the plant technical specifications. The limits listed in the plant technical specifications should be less than the analysis limits specified in Reference 3.16, accounting for dry bulb or wet bulb instrument uncertainty. The analysis limits from ECM95-009 are listed below:

Must have at least
- 15 dry cooling tower fans operable at: dry bulb temperature >99.3°F
- 14 dry cooling tower fans operable at: dry bulb temperature >92.9°F
- 12 dry cooling tower fans operable at: dry bulb temperature ≤92.9°F

Must have at least
- 8 wet cooling tower fans operable at: wet bulb temperature >76.4°F
- 6 wet cooling tower fans operable at: wet bulb temperature >71.7°F
- 4 wet cooling tower fans operable at: wet bulb temperature ≤71.7°F

Method of Analysis:

The statistical method of the Square-Root-of-the-Sum-of-Squares (SRSS) is used to determine the random error on a component level and for the loop. Non-random errors are combined algebraically with the random error term to establish total error.

Conclusions:

ECI91-029 concludes that the Meteorological Tower dry bulb and wet bulb temperature sensing instrumentation is adequate for establishing the minimum number of operable wet cooling tower fans and dry cooling tower fans in accordance with the plant technical specifications acceptance criteria.

Function: Technical Specification Surveillance – Dry Bulb temperature to determine minimum number of UHS dry cooling tower (DCT) fans to be operable.			
Function Detail	Analysis Limit	End Device Uncertainty	Calculated Limit
15 DCT fans operable	>99.3°F	±0.9°F	>98.4°F
14 DCT fans operable	>92.9°F	±0.9°F	>92°F
12 DCT fans operable	≤92.9°F	±0.9°F	≤92°F
Function: Technical Specification Surveillance – Wet bulb temperature to determine minimum number of UHS wet cooling tower (WCT) fans to be operable.			
Function Detail	Analysis Limit	End Device Uncertainty	Calculated Limit
8 WCT fans operable	>76.4°F	±1.4°F	>75°F
6 WCT fans operable	>71.7°F	±1.4°F	>70.3°F
4 WCT fans operable	≤71.7°F	±1.4°F	≤70.3°F

Attachment 3 to

W3F1-2011-0082

List of Regulatory Commitments

LIST OF REGULATORY COMMITMENTS

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Upon NRC approval of the proposed TS change, the amendment shall be implemented within 60 days.	X		Within 60 days of NRC approval