I. OVERVIEW / SIGNATURES

Facility: Waterford - Unit 3

Document Reviewed: ER-W3-2004-0615-000 **Change/Rev.:** 00
UHS Impact Due to Increased Heat Loads Following a Design Basis Tornado Event

System Designator(s)/Description: Component Cooling Water (CCW), Auxiliary Component Cooling Water (ACCW), Emergency Feedwater (EFW), Fuel Pool Cooling (FPC).

Description of Proposed Change/Activity:

The function of the UHS is to dissipate the heat removed from the reactor and its auxiliaries during normal operation, refueling and design basis accidents. The function of the EFW system is to provide an adequate cooling water supply to the steam generators following design basis accidents that postulate a loss of normal feedwater in order to cooldown the reactor coolant system (RCS) to shutdown cooling entry conditions.

This 50.59 evaluates the UHS and EFW capability to adequately cooldown the plant following a design basis tornado with the following changes to the analysis assumptions:

- An increase in the reactor core power to 3716 MWt to bound the proposed power uprate
- Addition of spent fuel pool heat load to bound the proposed power uprate
- Addition of spent fuel pool heat load with increased storage capacity
- Addition of spent fuel pool heat load due to shorter planned refueling outages (i.e., 15 days)
- Tornado missile damage does not occur to the unprotected portion of the Dry Cooling Tower (DCT) and therefore will be credited for mitigation
- An increase in DCT heat removal capacity from 60% to 80% based on the maximum allowable DCT fans that can be placed out of service per Technical Specification Table 3.7-3.

The UHS and EFW performance following a design basis tornado are described in FSAR Sections 9.2.5.3.3 and 10.4.9.3.2. This activity is a licensing/design basis change that does not require a physical change to plant systems, structures or components (SSC). This activity will show that the UHS and EFW are able to perform their design functions following a design basis tornado event.

The following 50.59 Reviews were performed for ER-W3-2004-0615-000:

- 50.59 Exemption – EFW capability to feed the Steam Generators and Emergency Diesel Generator (EDG) Fuel Oil increases following the extended power uprate.

- 50.59 Evaluation – All other LBD changes as a result of the changes to the inputs and assumptions for the design basis tornado event described in FSAR Section 9.2.5.3.3.

Check the applicable review(s): (Only the sections indicated must be included in the Review.)

☐	**EDITORIAL CHANGE of a Licensing Basis Document**	**Section I**
☐	**SCREENING**	**Sections I and II required**
☒	**50.59 EVALUATION EXEMPTION**	**Sections I, II, and III required**
☒	**50.59 EVALUATION (#: 05-018)**	**Sections I, II, and IV required**

Preparer: Frank Nagode / Frank Nagode /Emerald Coast/ DE-Mechanical/ 5/10/2005
David Viener / / EOI / DE-Mechanical/ 5/10/05
Name (print) / Signature / Company / Department / Date

Reviewer: Matt Touna / / EOI / DE-Mechanical / 5-10-05
Name (print) / Signature / Company / Department / Date

OSRC: Jason Lagke / 5/12/05
Chairman's Name (print) / Signature / Date
[Required only for Programmatic Exclusion Screenings and 50.59 Evaluations.]

II. SCREENINGS

A. Licensing Basis Document Review

1. Does the proposed activity impact the facility or a procedure as described in any of the following Licensing Basis Documents?

Operating License	YES	NO	CHANGE # and/or SECTIONS IMPACTED
Operating License	☐	☒	
TS	☐	☒	
NRC Orders	☐	☒	
If "YES", obtain NRC approval prior to implementing the change by initiating an LBD change in accordance with NMM ENS-LI-113. (See Section 5.2[13] for exceptions.)			

LBDs controlled under 50.59	YES	NO	CHANGE # (if applicable) and/or SECTIONS IMPACTED
FSAR	☒	☐	Chapter 9 - Section 9.2.5 (DRN 05-446) Table 9.2-9 Chapter 10 - Section 10.4.9 (DRN 05-447)
TS Bases	☒	☐	Section 3/4.7.1.3 & 3/4.7.4 (DRN 05-445)
Technical Requirements Manual	☐	☒	
Core Operating Limits Report	☐	☒	
NRC Safety Evaluation Report and supplements for the initial FSAR[1]	☐	☒	
NRC Safety Evaluations for amendments to the Operating License[1]	☐	☒	
If "YES", perform an Exemption Review per Section III OR perform a 50.59 Evaluation per Section IV OR obtain NRC approval prior to implementing the change. If obtaining NRC approval, document the LBD change in Section II.A.5; no further 50.59 review is required. However, the change cannot be implemented until approved by the NRC. AND initiate an LBD change in accordance with NMM ENS-LI-113.			

LBDs controlled under other regulations	YES	NO	CHANGE # (if applicable) and/or SECTIONS IMPACTED
Quality Assurance Program Manual[2]	☐	☒	
Emergency Plan[2, 3]	☐	☒	
Fire Protection Program[3, 4] (includes the Fire Hazards Analysis)	☐	☒	
Offsite Dose Calculations Manual[3, 4]	☐	☒	
If "YES", evaluate any changes in accordance with the appropriate regulation AND initiate an LBD change in accordance with NMM ENS-LI-113. No further 50.59 review is required.			

[1] If "YES," see Section 5.2[5]. No LBD change is required.
[2] If "YES," notify the responsible department and ensure a 50.54 Evaluation is performed. Attach the 50.54 Review.
[3] Changes to the Emergency Plan, Fire Protection Program, and Offsite Dose Calculation Manual must be approved by the OSRC in accordance with NMM OM-119.
[4] If "YES," evaluate the change in accordance with the requirements of the facility's Operating License Condition or under 50.59, as appropriate.

2. **Does the proposed activity involve a test or experiment not described in the FSAR?** ☐ Yes ☒ No

If "yes," perform a 50.59 Evaluation per Section IV OR obtain NRC approval prior to implementing the change AND initiate an LBD change in accordance with NMM LI-113. If obtaining NRC approval, document the change in Section II.A.5; no further 50.59 review is required. However, the change cannot be implemented until approved by the NRC.

---

3. **Basis**

Explain why the proposed activity does or does not impact the Operating License/Technical Specifications and/or the FSAR and why the proposed activity does or does not involve a new test or experiment not previously described in the FSAR. Discuss other LBDs if impacted. Adequate basis must be provided within the Screening such that a third-party reviewer can reach the same conclusions. Simply stating that the change does not affect TS or the FSAR is not an acceptable basis.

Operating License/Technical Specifications/NRC Orders:

A search of the Operating License (OL), Technical Specifications (TS) and the NRC Correspondence has been performed through Autonomy and manual hard copy review. Though the systems, structures or components are within the control of the OL/TS, the proposed activity does not impact the OL/TS. The EFW system, the Condensate Storage Pool (CSP), the CCW system, and the ACCW system are addressed in TS 3/4.7.1.2, 3/4.7.1.3, 3/4.7.3 and 3/4.7.4 respectively. The proposed changes to the licensing/design basis are consistent with the Limiting Conditions for Operation (LCO) given in the mentioned TSs. TS LCO 3.7.1.3 ensures the CSP contains a minimum volume of 170,000 for EFW usage. The analyses determined that additional CSP inventory is not required to mitigate the design basis tornado event. TS LCO 3.7.4.c requires that a minimum of 12 DCT fans are required to be OPERABLE. The analyses only credit 80% DCT capacity which is equivalent to 12 DCT fans being required. TS LCO 3.7.4.c also requires that all DCT fans located under the missile shield be OPERABLE with a tornado watch in effect. This TS LCO is not affected. The heat removal capacity of the DCT is independent of operating fan location; therefore the analyses are not sensitive that at least 9 out of the 12 DCT fans that are required to mitigate the design basis tornado event are to be located under the missile shield. Based on the above, this activity does not impact the OL/TS. There are also no outstanding NRC Orders found as a result of this review.

FSAR/Technical Specification Bases/Technical Requirements Manual/Core Operating Limits Reports/NRC Safety Evaluation Reports

FSAR

A search of the Final Safety Analysis Report (FSAR) has been performed through Autonomy, the EOI Library and manual hard copy review. The proposed activity does impact the FSAR. The FSAR requires revision as follows:

FSAR Chapter 9, Rev. 13A - Auxiliary Systems

Section 9.2.5 - Ultimate Heat Sink - Section will be revised to include the new assumptions and results for the design basis tornado given in calculation MN(Q)-9-17. The key assumption changed in calculation MN(Q)-9-17 is the unprotected portion of Dry Cooling Tower (DCT) will be considered available for heat removal. This is based on the tornado missile strike cumulative probability remaining below the 10^{-6} threshold criteria when updated to include the DCT coils. The evaluation assumes 80% of the DCT is available for heat removal based on the maximum amount of DCT fans that can be out of service given in the Technical Specifications.

Table 9.2-9 - Estimated Wet-Dry Cooling Tower Heat Dissipation for all Operations – Table will be revised to include the results for the design basis tornado givens in calculations and MN(Q)-9-10 and MN(Q)-9-17.

FSAR Chapter 10, Rev. 13A - Steam and Power Conversion System

Section 10.4.9 - Emergency Feedwater System - Section will be revised to include the new EFW demands from the WCT basins for the design basis tornado given in calculation MN(Q)-9-17.

Technical Specification Bases

A search of the Technical Specification Bases (TSB) has been performed through Autonomy and manual hard copy review. The proposed activity does impact the TSB. The TSB requires revision as follows:

Technical Specification Bases, Rev. 37

Section 3/4.7.1.3 - Condensate Storage Pool – Bases will be revised to state that EFW will require additional water from both WCT basins.

Section 3/4.7.4 - Ultimate Heat Sink – Bases will be revised to state that 80% cooling capacity of a DCT is assumed available.

Other sections reviewed do not require revision.

Technical Requirements Manual/Core Operating Limits Reports/NRC Safety Evaluation Reports

A search of the Technical Requirements Manual (TRM) and the NRC Safety Evaluation Reports (SER) has been performed through Autonomy and manual hard copy review. The proposed activity does not impact the TRM or SER.

NRC Safety Evaluation Report (added for information only)

- Section 9.5 - Ultimate Heat Sink - The discussion on the tornado event states "The applicant has shown by analysis that sufficient heat removal capability is provided for 24 hr to maintain plant safety and assure safe shutdown assuming only 60% of the dry towers is available plus the water volume in the wet tower basins and assuming the most limiting single failure coincident with a loss of offsite power." This change does not propose to remove the requirement to mitigate against a design basis tornado event.

LBDs Controlled Under Other Regulations

The design and operation of the UHS is not addressed in the QAPM, E-Plan, Fire Protection Program, and the ODCM. Based on this fact and a cursory review through Autonomy, no changes to these documents are required as a result of this proposed activity.

Tests or Experiments Considerations

There are no new operating conditions or system modes of operation (normal or abnormal) imposed on the UHS or EFW systems which require a new test not described in the FSAR. There are no physical changes to any SSCs as a result of this activity and therefore cannot cause a new test or function to be required.

The Technical Specifications and Bases and the In-Service Inspection and Testing Programs discuss testing requirements applicable to safety-related equipment and components. The dry and wet cooling towers and the EFWS preoperational and functional tests are described in Section 14.2. In-service inspection of cooling tower components is performed in accordance with ASME Section XI. There are no new tests or experiments created or existing ones affected by this activity.

4. References

Discuss the methodology for performing LBD searches. State the location of relevant licensing document information and explain the scope of the review such as electronic search criteria used (e.g., key words) or the general extent of manual searches per Section 5.5.1[5](d) of LI-101. **NOTE: Ensure that manual searches are performed using controlled copies of the documents. If you have any questions, contact your site Licensing department.**

LBDs/Documents reviewed via keyword search:	Keywords:
FSAR	["tornado"], ["ultimate heat sink"] [missile"]
Technical Specification and Bases	
TRM	
Original SER	
SERs	
FSAR Questions	
50.59	
NRC Communications and Correspondences	

LBDs/Documents reviewed manually:	Document Numbers, Chapters, Sections, etc.
FSAR Sections	1.8, 2.3.1.2.4, 3.1, 3.3, 3.5.1.4, 3.5.2, 3.9.6, 6.3.1.2, 7.4.1.1, 6.6, 7.4.1.3, 7.4.2.5, 8.1.4, 9.1.3.2, 9.2.2, 9.2.5, 9.3.6, 10.4.5, 10.4.9, 14.2, 15.2, 15.3
FSAR Tables	2.3-2(a), 3.2-1, 3.5-3, 3.5-3a, 9.1-4, 9.2-1, 9.2-2, 9.2-4, 9.2-8, 9.2-9, 9.2-10, 9.3-16, 10.4-14
FSAR Figures	9.2-5, 9.2-5a
Licensing Amendments	168, 199
Technical Specification and Bases	3/4.7.1.2, 3/4.7.1.3, 3/4.7.3, 3/4.7.4
TRM	All
10CFR50 App A	GDCs 2, 4, 44
Original SER	2.4.5, 3.5.1.4, 3.5.2, 9.2.2, 9.2.5, 10.4.9
FSAR Questions	10.8, 10.19, 371.08, 371.09
Regulatory Guides	1.27, 1.76, 1.117, 1.49
LERs	94-004-00, 96-007-00
NRC Inspection Reports	IR 50-382/93-07, R 50-382/96-202, IR 50-382/97-10, IR 50-382/97-16, IR 50-382/98-201, IR 50-382/99-06
SRP	2.2.3, 2.3.3, 3.5.1.4, 10.4.9

5. Is the validity of this Review dependent on any other change? ☐ **Yes** ☒ **No**

If "YES", list the required changes/submittals. The changes covered by this 50.59 Review cannot be implemented without approval of the other identified changes (e.g., license amendment request). Establish an appropriate notification mechanism to ensure this action is completed.

B. ENVIRONMENTAL SCREENING

If any of the following questions is answered "yes," an Environmental Review must be performed in accordance with NMM Procedure ENS-EV-115, "Environmental Evaluations," and attached to this 50.59 Review. Consider both routine and non-routine (emergency) discharges when answering these questions.

Will the proposed Change being evaluated:

	Yes	No	
1.	☐	☒	Involve a land disturbance of previously disturbed land areas in excess of one acre (i.e., grading activities, construction of buildings, excavations, reforestation, creation or removal of ponds)?
2.	☐	☒	Involve a land disturbance of undisturbed land areas (i.e., grading activities, construction, excavations, reforestation, creating, or removing ponds)?
3.	☐	☒	Involve dredging activities in a lake, river, pond, or stream?
4.	☐	☒	Increase the amount of thermal heat being discharged to the river or lake?
5.	☐	☒	Increase the concentration or quantity of chemicals being discharged to the river, lake, or air?
6.	☐	☒	Discharge any chemicals new or different from that previously discharged?
7.	☐	☒	Change the design or operation of the intake or discharge structures?
8.	☐	☒	Modify the design or operation of the cooling tower that will change water or air flow characteristics?
9.	☐	☒	Modify the design or operation of the plant that will change the path of an existing water discharge or that will result in a new water discharge?
10.	☐	☒	Modify existing stationary fuel burning equipment (i.e., diesel fuel oil, butane, gasoline, propane, and kerosene)?[1]
11.	☐	☒	Involve the installation of stationary fuel burning equipment or use of portable fuel burning equipment (i.e., diesel fuel oil, butane, gasoline, propane, and kerosene)?[1]
12.	☐	☒	Involve the installation or use of equipment that will result in a new or additional air emission discharge?
13.	☐	☒	Involve the installation or modification of a stationary or mobile tank?
14.	☐	☒	Involve the use or storage of oils or chemicals that could be directly released into the environment?
15.	☐	☒	Involve burial or placement of any solid wastes in the site area that may affect runoff, surface water, or groundwater?

[1] See NMM Procedure ENS-EV-117, "Air Emissions Management Program," for guidance in answering this question.

C. SECURITY PLAN SCREENING

If any of the following questions is answered "yes," a Security Plan Review must be performed by the Security Department to determine actual impact to the Plan and the need for a change to the Plan.

Could the proposed activity being evaluated:

	Yes	No	
1.	☐	☒	Add, delete, modify, or otherwise affect Security department responsibilities (e.g., including fire brigade, fire watch, and confined space rescue operations)?
2.	☐	☒	Result in a breach to any security barrier(s) (e.g., HVAC ductwork, fences, doors, walls, ceilings, floors, penetrations, and ballistic barriers)?
3.	☐	☒	Cause materials or equipment to be placed or installed within the Security Isolation Zone?
4.	☐	☒	Affect (block, move, or alter) security lighting by adding or deleting lights, structures, buildings, or temporary facilities?
5.	☐	☒	Modify or otherwise affect the intrusion detection systems (e.g., E-fields, microwave, fiber optics)?
6.	☐	☒	Modify or otherwise affect the operation or field of view of the security cameras?
7.	☐	☒	Modify or otherwise affect (block, move, or alter) installed access control equipment, intrusion detection equipment, or other security equipment?
8.	☐	☒	Modify or otherwise affect primary or secondary power supplies to access control equipment, intrusion detection equipment, other security equipment, or to the Central Alarm Station or the Secondary Alarm Station?
9.	☐	☒	Modify or otherwise affect the facility's security-related signage or land vehicle barriers, including access roadways?
10.	☐	☒	Modify or otherwise affect the facility's telephone or security radio systems?

Documentation for accepting any "yes" statement for these reviews will be attached to this 50.59 Review or referenced below.

III. 50.59 EVALUATION EXEMPTION

Enter this section only if a "yes" box was checked in Section II.A.1.

A. Check the applicable boxes below. If any of the boxes are checked, clearly document the basis in Section III.B, below. If none of the boxes are appropriate, perform a 50.59 Evaluation in accordance with Section IV. Provide supporting documentation or references as appropriate.

☐ The proposed activity meets all of the following criteria regarding design function per Section 5.5[1](a):

The proposed activity does not adversely affect the design function of an SSC as described in the FSAR; **AND**

The proposed activity does not adversely affect a method of performing or controlling a design function of an SSC as described in the FSAR; **AND**

The proposed activity does not adversely affect a method of evaluation that demonstrates intended design function(s) of an SSC described in the FSAR will be accomplished.

☐ An approved, valid 50.59 Review(s) covering associated aspects of the proposed activity already exists per Section 5.5[1](b). Reference 50.59 Evaluation # _____ (if applicable) or attach documentation. Verify the previous 50.59 Review remains valid.

☒ The NRC has approved the proposed activity or portions thereof per Section 5.5[1](c). Reference: Licensing Amendment 199

B. Basis

Provide a clear, concise basis for determining the proposed activity may be exempted such that a third-party reviewer can reach the same conclusions.

The proposed change evaluates the UHS and EFW capability to adequately cooldown the plant following a design basis tornado event assuming a proposed reactor core power of 3,716 MWt and the increased spent fuel pool heat load as a result of shorter planned refueling outages and increased storage capacity.

The acceptance of the EFW system is based on analyses that were performed for the extended power uprate (EPU). The EPU project analyzed the EFW demand events at a reactor power of 3716 MWt and demonstrated that the system is capable of providing the necessary cooling flow and discharge pressure consistent with the accident assumptions. The EFW system capability to feed the steam generators at a reactor power of 3716 MWt was approved via Licensing Amendment 199 (See SER Section 2.5.4.5). The duration and required condensate inventory needed for EFW to mitigate the design basis tornado event are discussed in the 50.59 safety evaluation.

The acceptance of the Emergency Diesel (EDG) Fuel Oil system is also based on analyses performed for the extended power uprate. The EDG Fuel Oil consumption increased as a result of, in part, aligning the spent fuel pool cooling load on the UHS sooner due to the higher heat load. As a result, Technical Specification requirements for EDG fuel oil changed for the extended power uprate. Discussion in the 50.59 evaluation addresses the design basis tornado impact on EDG fuel oil and the comparisons are made to the EDG fuel oil analysis performed for extended power uprate. The acceptance of the Emergency Diesel (EDG) Fuel Oil system at new Technical Specification requirements assuming a reactor power of 3716 MWt was approved via Licensing Amendment 199 (See SER Section 2.5.7.1)

IV. 50.59 EVALUATION

License Amendment Determination

Does the proposed Change being evaluated represent a change to a method of evaluation ONLY? If "Yes," Questions 1 – 7 are not applicable; answer only Question 8. If "No," answer all questions below. ☐ Yes ☒ No

Does the proposed Change:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the FSAR? ☐ Yes ☒ No

   BASIS:

   The UHS is a support system that removes heat from plant auxiliary equipment during normal operation. The UHS does not initiate any design basis accident described in the FSAR. Although an inadvertent start of an EFW pump is evaluated in the FSAR, the proposed changes do not impact the frequency of this initiator. Therefore this proposed change does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the FSAR.

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR? ☐ Yes ☒ No

   BASIS:

   This proposed change will not alter the operation or function of the UHS following a tornado strike or physically alter any component, system or structure. With the increased heat load from the RCS and the spent fuel pool cooling (SFPC) following a design basis tornado event, the analyses conclude the following:

   - The Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants", criteria are met which include:
     a) The UHS is capable of dissipating the increased heat removal requirements for the tornado event and maintain the component cooling water temperature (CCW) at the design limit.
     b) The UHS and EFW system are capable of removing the increased reactor decay heat, the plant auxiliary heat loads, and the increased fuel pool cooling heat load of 20.4×10^6 Btu/hr for 30 days post-tornado.
     c) Adequate UHS and EFW inventory is available to safely shutdown the reactor and maintain it in a safe shutdown condition for 30 days. The combined UHS and EFW water requirements are 512,461 gallons which is less than the water available of 754,084 gallons. This leaves a total cooling water margin of over 240,000 gallons.
   - The maximum amount of time required for the EFW system to maintain the reactor coolant system at hot standby conditions until the shutdown cooling can be entered is 24 hours, therefore the dependence on the EFW system remains unchanged.
   - The additional water required by the EFW system will be provided by the other WCT basin. This is acceptable since there is a Seismic Category I qualified cross-connect between the WCT basins that is available to gravity feed one WCT basin to another. The amount of EFW required is 419,180 gallons which is less than the water available of 503,500 gallons. This meets the requirements of NUREG 0800 Section 10.4.9 that requires the EFW water supply for emergency operation meet Seismic requirements. This interaction is described in SER Section 9.2.5 and is currently credited to ensure the operable Wet Cooling Tower can support the UHS post-tornado and therefore has already been considered as a possible single failure. However, the most limiting single failure for the design basis tornado event, failure of an EDG, will remain unchanged. Failure of the EDG takes out an entire UHS train which considerably minimizes the plant's heat removal capability.

- The demands on the DCT fans, motors, etc. do not increase since all design basis accidents assume the minimum amount of DCT fans as given in the Technical Specifications.
- The increased heat load does not subject any system piping beyond its current analyzed limits; therefore the current analyzed piping and piping support stresses remain bounding.
- This change reduces the minimum time from 11 hours to 6 hours to align SFPC system on the UHS to ensure the spent fuel pool does not exceed its design limit. The 6 hour minimum requirement to align the SFPC system is well within the guidelines given in ANS/ANSI 58.8, "Time Response Design Criteria for Nuclear Safety Related Operator Actions", for operator actions to be taken outside the control room. Additionally the CCW system can supply adequate cooling flow to the SFPC system without impacting essential plant cooling heat loads.
- This change reduces the minimum time to align the WCT basin via the cross-connect to ensure adequate EFW inventory. This action occurs after a previous action to align the Condensate Storage Pool (CSP) to the WCT basins prior to the CSP is exhausted. The minimum time for this action is in approximately 16 hours which is well within the guidelines given in ANS/ANSI 58.8 for operator actions to be taken outside the control room. Emergency Procedure EP-002-100, "Technical Support Center (TSC) Activation, Operation, and Deactivation," is being revised to reflect the reduction in operator response time.

Based on the above, the proposed change will be in compliance with all applicable design criteria and the UHS and supporting systems will continue to operate within their design or analysis limits. The proposed change does not recommend any physical changes to systems, structures, or components since the current design requirements will still be met. Therefore, the proposed changes assumed for the design basis tornado event do not result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR.

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR? ☐ Yes ☒ No

BASIS:

The requirement for the design basis tornado event as described in FSAR Section 9.2.5.3.3 is to fully demonstrate that the UHS can assure a safe plant shutdown. The dose consequences of the design basis tornado event are not explicitly analyzed in FSAR Chapter 15. Therefore, if it can be demonstrated that a safe shutdown is assured following a tornado event at the increased heat loads, it then can be concluded the proposed change will not result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR

With the increased heat load from the RCS and the spent fuel pool cooling (SFPC) following a design basis tornado event, the criteria given in the Regulatory 1.27 will still be maintained, and no SSC (systems, structures, and component) will be subjected above any the their design or analysis limits (See Response to Question 2).

The increase in DCT heat removal capacity is based on total cumulative probability that tornado missile damage would occur during the event. FSAR Section 2.3.1.2.4 states that if the plant configuration exceeds a 10^{-6} acceptance criterion using the TORMIS methodology, missile protective barriers would be utilized to reduce the total cumulative probability below the acceptance criteria. This design criterion became part of Waterford 3's licensing basis by Licensing Amendment 168 (See Document ILN-00-0117). Licensing Amendment 168 concluded, in part, that Waterford 3 demonstrated that identified plant features are not required to have additional protective tornado barriers due to their low probability of tornado missile damage using the application of the TORMIS methodology. Therefore, it is concluded that affected equipment would be available following a tornado strike.

The identified features in Licensing Amendment 168 included the DCT fans, motors, and associated conduits and electrical boxes. Licensing Amendment 168 did not include the DCT cooling coils. The cumulative probability determined by the TORMIS analysis (Calculation EC-C99-008 - "TORMIS Analysis: Tornado Generated Missile Strike at Waterford 3") for all safety related targets including the DCT features (minus the coils) = 6.4×10^{-7}. A total probability of 4.014×10^{-8} is calculated for the unprotected DCT coils for both DCTs. Adding the DCT coils into the TORMIS analysis, the revised probability for the safety related targets with the DCT coils will be 6.8×10^{-7} ($6.4 \times 10^{-7} + 4.014 \times 10^{-8}$) per year which is below the threshold allowable of 10^{-6} given in FSAR Sections 2.3.1.2.4 and 3.5.1.4.1. The probability is also below the 10^{-6} threshold value for not considered credible per NEI 96-07 which is endorsed by Regulatory Guide 1.187, "Guidance for Implementation of 10CFR50.59, Changes, Tests and Experiments". Therefore, it is not credible to postulate that the DCT would experience damage following a tornado event, thus its availability for heat removal following a tornado event would only be limited by Technical Specifications. Technical Specification Table 3.7-3 does allow a maximum of 3 fans to be placed out of service if meteorological conditions are favorable. This proposed change assumes that these 3 fans are not available for DCT heat removal following a tornado strike.

Based on the above, a safe shutdown is assured following a design basis tornado event and therefore the proposed changes do not result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR.

4. Result in more than a minimal increase in the consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR?

☐ Yes
☒ No

BASIS:

The proposed change does not modify, add or remove any SSC required to mitigate the design basis tornado event. The proposed change does not require any SSC to operate in an abnormal manner. The proposed change does not require new operator actions. EP-002-100 is being revised to reflect the reduction in operator response time to cross-connect the WCT basins. The consequences of a response time failure will not change. The failure modes and effects on for the affected systems remain unchanged assuming the higher heat loads from the RCS and SFPC following the design basis tornado event. There is a greater reliance on the DCT heat removal capability to mitigate the design basis tornado event, however the consequences of its failure remains unchanged. Therefore, this proposed change does not result in more than a minimal increase in the consequences of a malfunction of a structure, system or component important to safety previously evaluated in the FSAR.

5. Create a possibility for an accident of a different type than any previously evaluated in the FSAR?

☐ Yes
☒ No

BASIS:

The proposed changes in the design basis tornado analysis do not introduce new system interactions or connections or require any system to be operated in an abnormal manner. The proposed changes do not alter the operation or function of any system or alter any component, system or structure. The requirement that EFW will require inventory from both WCT basins is not a new system interaction since the availability of WCT cross-connect is currently credited to mitigate the design basis tornado event. Therefore, the proposed change does not create the possibility of an accident of a different type previously described in the SAR.

6. Create a possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the FSAR? ☐ Yes ☒ No

BASIS:

The proposed change revises the FSAR and Technical Specification Bases to include the new assumptions and results for the design basis tornado event. These proposed changes do not alter the operation or function of the affected systems or alter any other component, system or structure. The failure modes given in the FSAR Failure Mode and Effects Tables for the affected systems remain unchanged. The actions to manual align the SFPC heat load on the UHS or open the WCT cross-connect header isolation valves are currently credited in the tornado event and therefore are not new operator actions that would introduce a new failure mode. The minimum times to perform these manual actions following a tornado event are also within the guidelines of ANS/ANSI 58.8. Therefore, this change does not create a possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the FSAR.

7. Result in a design basis limit for a fission product barrier as described in the FSAR being exceeded or altered? ☐ Yes ☒ No

BASIS:

The UHS is a support system to remove heat so that fission product barrier design limits are not exceeded. For example, CCW removes heat from the containment via the fan coolers to maintain containment pressure within design limits. Although the changes evaluated here add heat load to the UHS, the analyses show that this additional heat load can be removed by the UHS to maintain the design basis limits for fission product barriers. By crediting the available DCT heat removal capacity following a design basis tornado event, analyses demonstrate RCS cooling can be supported by the EFW system via the steam generators for the first 24 hours and the UHS thereafter dissipating the shutdown cooling system heat load thus maintaining the integrity of the fuel cladding and RCS pressure boundary. Additionally, component cooling water temperature to the plant auxiliaries will be maintained at or below the design temperature limits thus assuring adequate containment cooling following the tornado event. Therefore, this change will not result in a design basis limit for a fission product barrier (i.e., fuel cladding, RCS boundary, containment) as described in the FSAR being exceeded or altered.

8. Result in a departure from a method of evaluation described in the FSAR used in establishing the design bases or in the safety analyses? ☐ Yes ☒ No

BASIS:

The analyses to demonstrate the capabilities of the UHS and EFW system following a design basis tornado event utilize standard calculation practices and methodologies previously used that verify that the systems' design can fulfill their function. For establishing decay heat loads from the RCS and SFPC, the analyses do not deviate from the decay heat standards currently being utilized. However, decay heat uncertainties applied to the RCS heat loads have been removed in the new analyses. The decay heat uncertainty used in the current tornado analyses was based decay heat uncertainties applied for LOCA analyses as stated in FSAR Section 6.3.1.2. There is no regulatory requirement or licensing bases requirement to apply the decay heat uncertainties when analyzing the design basis tornado event. The choice to originally include the RCS decay heat uncertainty was an elected conservatism and is considered an 'input' to the analyses. Therefore, removal of the decay heat uncertainty from the analysis is not considered a departure from a method of evaluation described in the FSAR.

The application of TORMIS to demonstrate that the DCT will not sustain damage following a tornado strike is consistent with the licensing basis given in FSAR Section 2.2.3 and 3.5.1.4. The application of TORMIS was approved for use by Licensing Amendment 168. Licensing Amendment 168 was submitted to seek NRC approval for not requiring protective features on existing unprotected equipment using the application of TORMIS methodology. The SER for Licensing Amendment 168 concluded that existing unprotected plant features meet the acceptance criteria of SRP Sections 3.5.1.4 and 2.3.3 for tornado missiles, and Waterford 3 satisfactorily addressed the limitations and plant-specific items related to the application of the TORMIS methodology. The SER for Licensing Amendment 168 further states that the change to the licensing basis to use the TORMIS methodology meets the requirements of GDC 2 and 4. The equipment considered in Licensing Amendment 168 included the DCT fans, motors, and associated conduits and electrical boxes but did not include the DCT cooling coils. The SER for Licensing Amendment 168 did not limit its application to the affected equipment identified in the original submittal. Adding the DCT cooling coils into the TORMIS analysis indicates that the total probability for tornado missile damage still remains below the threshold allowable of 10^{-6} given in the licensing basis. The application of TORMIS by including the DCT cooling coils was performed within the NRC's prescribed limitations and the five plant-specific points to be considered for its use. An additional limitation for using the TORMIS methodology given in Licensing Amendment 168 is that TORMIS can not be used for justifying removal of existing features. This proposed change does not recommend removal of any tornado missile protective barriers. Therefore, this proposed change is not considered a departure from a method of evaluation described in the FSAR.

If any of the above questions is checked "YES", obtain NRC approval prior to implementing the change by initiating a change to the Operating License in accordance with NMM Procedure ENS-LI-113.