I. OVERVIEW / SIGNATURES

Facility: Waterford 3 SES

Document Reviewed: ER W3-2001-1149-010, Extended Power Uprate - FSAR Chapter 10 **Change/Rev.:** 0/0

System Designator(s)/Description: Steam and Power Conversion System, Main Steam System, Extraction Steam System, Main Condenser Evacuation System, Turbine Gland Sealing System, Steam Bypass System, Circulating Water System, Condensate Clean-Up System, Condensate and Feedwater System, Steam Generator Blowdown System, Emergency Feedwater System, Chemical Feed System

Description of Proposed Change

Waterford 3 will implement a 3716 MWt Extended Power Uprate (EPU) under ER-W3-2001-1149-000 after receiving NRC approval of License Amendment Request NPF-38-249, Extended Power Uprate. ER-W3-2001-1149-010 is an Interdiscipline ER that provides the evaluation of the proposed Extended Power Uprate (EPU) impacts on FSAR Chapter 10. This ER provides input to ER-W3-2001-1149-000. ER-W3-2001-1149-010 revises FSAR Chapter 10 to address EPU-related impacts to steam and power conversion systems. This ER documents the results of evaluations, identifies any needed physical modifications or documentation changes, and documents the basis for changes related to support of operation under EPU conditions. However, this ER does not implement any of the changes. Nuclear Change ER-W3-2001-1149-000 will implement power uprate and identified documentation changes. Separate Nuclear Change ERs will implement physical modifications to upgrade plant systems for EPU operating conditions. The following FSAR Chapter 10 systems are evaluated by this ER:

- Steam and Power Conversion System
- Main Steam System
- Extraction Steam System
- Main Condenser Evacuation System
- Turbine Gland Sealing System
- Steam Bypass System
- Circulating Water System
- Condensate Clean-Up System
- Condensate and Feedwater System
- Steam Generator Blowdown System
- Emergency Feedwater System
- Chemical Feed System

Other systems listed in FSAR Chapter 10 were evaluated separately in ER-W3-2001-1149-001.

The following calculations are converted to study calculations by this ER and are included in this review:

- ECM94-032 (DRN04-512), MOV Design Basis Review Calculation No. AS.001 Rev. 0 for MOVs AS-108 & AS-120
- ECM94-034 (DRN03-1546), MOV Design Basis Review Calculation No. ES.001 for MOVs ES-109, ES-205, ES-315A,B,C & ES-425A,B,C
- ECM94-036 (DRN04-510), MOV Design Basis Review Calculation No. GS.001 Rev. 0 for MOVs GS-101, GS-104
- ECM94-038 (DRN04-509), MOV Design Basis Review Calculation No. MS.004 Rev. 0 for MOVs MS-127A, B, MS-325A,B, MS-327A,B, MS-328A,B, MS-3251A,B, & MS-3261A,B
- 9C2-12-2 (DRN04-1668), Study Calculation for the Condensate Polisher Building

The FSAR changes associated with ER-W3-2001-1149-010 are described below:

1. FSAR Sections 10.3.1 and 10.3.3 are changed to address crediting the Atmospheric Dump Valves (ADVs) with a safety related function of providing decay heat removal during a small break LOCA event. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

2. FSAR Sections 10.3.3, 10.4.1.1, 10.4.1.3, 10.4.4.1, and 10.4.4.2: changes are made to indicate that the steam bypass system is capable of bypassing approximately 60 percent of the full-load main steam flow directly to the condenser and that the condenser is capable of receiving this amount of bypass steam flow. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

3. FSAR Section 10.4.1.2: this section is revised to indicate that storage capacity of the condenser hotwells, in terms of minutes of operation based on condensate system flow rate, is changed from 5 minutes to approximately 4.50 minutes of operation at maximum throttle flow with some additional volume for surge protection. *(This change is evaluated in Section IV)*

4. FSAR Section 10.4.6.1: this section is revised to indicate that the stations' full condensate flow rate increases from 21,500 gpm to 24,200 gpm under EPU, and this higher flow rate is within the Condensate Polisher System design. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

5. FSAR Sections 10.4.7.1 and 10.4.8.1: these sections are revised to eliminate steam generator blowdown rate in terms of per cent of rated flow while retaining the existing maximum blowdown flow rate in terms of gpm. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

6. FSAR Section 10.4.7.1: this section is revised to state, "The feedwater regulating valves are sized to pass the feedwater flow corresponding to 100 percent load (8.294×10^6 lb/hr, plus blowdown, for each valve assuming a feedwater temperature of 446.7°F) with a pressure drop of 50 psi. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

7. FSAR Section 10.4.7.2: this section is revised to state that each steam generator feedwater pump has a capacity of approximately 56 percent of the total calculated system flow at 100% uprate power. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

8. FSAR Section 10.4.8.1: this section is revised to change the statement regarding SGBS design, "to provide a continuous blowdown rate of 0.2 percent maximum steam rate (MSR) (approximately 634 gpm) under normal plant operating conditions" to instead say "to provide a continuous blowdown rate of approximately 150 gpm to 300 gpm under normal plant operating conditions". *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

9. FSAR Section 10.4.2.2 and Table 10.4-1: this textual description and table of main condenser performance data are revised to reflect changes in main condenser performance as a result of EPU. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

10. FSAR Table 10.4-17: this table of Condensate Clean-Up System Design Data is revised to reflect the increased design condensate flow per demineralizer vessel. The values are changed from 4300 gpm (3-35 gpm/sq. ft.) to 4840 gpm (3.78 gpm/sq. ft.). *(This change is evaluated in Section IV)*

11. FSAR Table 10.4-6: this table of Feedwater Heater Data is revised to reflect changes in condensate flow through the various heater strings under EPU conditions. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

12. FSAR Figure 10.2-1: the Steam Pressure Variation With Power curve depicted on this figure is replaced with a modified curve. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

13. FSAR Figures 10.2-2 and 10.2-3 are revised to reflect the new heat balance values for 100% EPU and VWO. *(This change satisfies 50.59 Review Screening Criteria as discussed in Section II)*

14. FSAR Table 10.4.9A-3: this table which compares the Waterford Emergency Feedwater System (EFW) with NRC EFW System Flow Requirements is revised to remove information that is duplicated from FSAR Chapter 15. This is an FSAR-Only change as per LI-113 Attachment 9.6 Criteria A3.2 (Redundant Information) and does not require further review. Changes are also made to Chapter 15 table numbers and figure numbers that are referenced in this table. This is an editorial change per LI-101 Section 3.0 Definition [18](b)(2)a and does not require further review.

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 (#: 04-009)**	**Sections I, II, and IV required**

Preparer: R.S.Nobles ENERCON / Design / 12/22/04
Name (print) / Signature / Company / Department / Date

Reviewer: R.K.Schwartzbeck ENERCON / Design / 12/22/04
Name (print) / Signature / Company / Department / Date

OSRC: R.A. Dodds 23 Dec 2004
Chairman's Name (print) / Signature / Date
[Required only for Programmatic Exclusion Screenings (see Section 5.8) 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 LI-113. (See Section 5.2[13] for exceptions.)			

LBDs controlled under 50.59	YES	NO	CHANGE # (if applicable) and/or SECTIONS IMPACTED
FSAR	☒	☐	DRN 03-2064 (FSAR Sections 10.3.1, 10.3.3, 10.4.1.1, 10.4.1.2, 10.4.1.3, 10.4.2.2, 10.4.4.1, 10.4.4.2, 10.4.6.1, 10.4.7.1, 10.4.7.2, 10.4.8.1, Tables 10.4-1, 10.4-6, 10.4.9A-3, 10.4-17, and Figures 10.2-1, 10.2-2 and 10.2-3)
TS Bases	☐	☒	DRN 04-1243, to be issued by ER-W3-2001-1149-000 (Sections B3/4.7.1.1, B3/4.7.1.3, B3/4.7.1.4, B3/4.7.1.5, B3/4.7.1.6, B3/4.7.1.7)
Technical Requirements Manual	☐	☒	DRN 04-1244, to be issued by ER-W3-2001-1149-000 (Section 3/4.7)
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 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 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. See EOI 50.59 Guidelines Section 5.3.2 for guidance.

ER-W3-2001-1149-010 is an Interdiscipline ER that revises FSAR Chapter 10 to address EPU-related impacts to steam and power conversion systems. This ER documents the results of evaluations, identifies any needed physical modifications or documentation changes, and documents the basis for changes related to support of operation under EPU conditions. However, this ER does not implement any of the changes. Nuclear Change ER-W3-2001-1149-000 will implement power uprate and identified documentation changes. Separate Nuclear Change ERs will implement physical modifications to upgrade plant systems for EPU operating conditions.

Operating License:

The Waterford Unit 3 operating license is impacted by the Extended Power Uprate, however, License Amendment Request NPF-38-249 for the extended power uprate addresses those applicable changes. None of the license conditions contained in the operating license are impacted by the activity within the scope of this ER beyond those beyond those changes addressed in the LAR. Therefore, the proposed activity does not impact the Waterford Unit 3 operating license.

Technical Specifications:

Implementation of EPU is dependent upon NRC acceptance of changes to the Waterford 3 operating license as addressed in LAR NPF-38-249. Since this ER is an integral part of EPU, NRC approval of the license amendment request is required for implementation of this activity.

Technical Specification changes included in LAR NPF-38-249 that are associated with changes made by this ER are as follows:

- Technical Specification section 3.7.1.1 and Table 3.7-2 are revised to address changes in the maximum allowable linear power level – high trip setpoint with inoperable steam line safety valves during operation with both steam generators.
- Technical Specification section 3/4.7.1.3 is revised to increase the condensate storage pool volume limit to 92% to account for process measurement uncertainty. Also, an indicated temperature range requirement of 55°F to 100°F is added and surveillance requirements are restructured accordingly.
- Technical Specification section 3/4.7.1.7 is added to address the Atmospheric Dump Valves
- Technical Specification section 4.7.1.5 is revised to change the full closure time for the main steam isolation valves from 4.0 seconds to 8.0 seconds.
- Technical Specification section 4.7.1.6 is revised to change the full closure time for the main feedwater isolation valves from less than or equal to 5.0 seconds to within 6.0 seconds.

The changes within the scope of this ER do not require revision to the Technical Specifications beyond those included in the EPU LAR as addressed above. The activities within the scope of this ER will not adversely affect the mode of operation of any important to safety equipment or Technical Specification associated equipment. In addition, the activities will not create a system configuration or operating condition such that a Technical Specification LCO or surveillance requirement is no longer adequate. Likewise, the activities will not result in a condition that would bypass or invalidate automatic actuation features required to be operable by the Technical Specifications or exceed any limits specified in the Operating License and Technical Specifications. Therefore, the proposed changes do not require an Operating License or Technical Specification change that is

not included in LAR NPF-38-249.

FSAR:

FSAR Sections, Tables and Figures are revised by DRN No. 03-2064 as follows:

1. FSAR Sections 10.3.1 and 10.3.3 are changed to address crediting the Atmospheric Dump Valves (ADV) with a safety related function of providing decay heat removal during a small break LOCA event. The small break LOCA analysis was submitted as a supplement to the LAR NPF-38-249. Additionally, Technical Specification 3/4.7.1.7 is added by LAR NPF-38-249 to provide LCO/Surveillance Requirements associated with the new safety function. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

2. FSAR Sections 10.3.3, 10.4.1.1, 10.4.1.3, 10.4.4.1, and 10.4.4.2: changes are made to indicate that under EPU the steam bypass system is capable of bypassing approximately 60 percent (rather than 65 percent) of the full-load main steam flow directly to the condenser and that the condenser is capable of receiving this amount of bypass steam flow. PUR Section 2.5.6.3 evaluated the Steam Bypass System and states, "The bypass valve capacities (steam flows) are modeled as they currently exist, and no valve modifications are required, thus the increase in power level results in a reduction in the capacity of the SBCS (as a percentage of full power steam flow rate)". This change simply quantifies the SBCS capacity as a percentage of full power steam flow rate under EPU. The change is consistent with the LAR submittal and, therefore, does not require further evaluation.

3. FSAR Section 10.4.1.2: this section is revised to indicate that storage capacity of the condenser hotwells, in terms of minutes of operation based on condensate system flow rate, is changed from "5 minutes of operation at maximum throttle flow with some additional volume for surge protection" to "approximately 4.50 minutes of operation at maximum throttle flow with some additional volume for surge protection". This change is evaluated in Section IV.

4. FSAR Section 10.4.6.1: this section is revised to indicate that the stations' full condensate flow rate increases from 21,500 gpm to 24,200 gpm under EPU, and this higher flow rate is within the Condensate Polisher System design. PUR Section 2.5.6.4 evaluated increased flows in the condensate and feedwater systems for EPU and determined system adequacy. This change simply quantifies the new condensate flow rate under EPU and states that it is within the polisher system design. This change is consistent with the LAR submittal and, therefore, does not require further evaluation.

5. FSAR Sections 10.4.7.1 and 10.4.8.1: these sections are revised to eliminate steam generator blowdown rate in terms of per cent of rated flow while retaining the existing maximum blowdown flow rate in terms of gpm. PUR Section 2.1.10 evaluated the Steam Generator Blowdown System under EPU conditions and states the following; "Typical operational blowdown rates during normal operation are approximately 1% of current feedwater flow. The blowdown system is sized to handle 2% of the original rated flow or 650 gpm. Although the feedwater flow will be increasing as a result of EPU, the capacity of the SGBS under EPU conditions will still be adequate to maintain chemistry in the secondary system." This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

6. FSAR Section 10.4.7.1: this section is revised to state, "The feedwater regulating valves are sized to pass the feedwater flow corresponding to 100 percent load (8.294×10^6 lb/hr, plus blowdown, for each valve assuming a feedwater temperature of 446.7°F) with a pressure drop of 50 psi. PUR Section 2.5.6.4 evaluated the Condensate and Feedwater systems and states the following, "The main and startup FW regulating valves are adequately sized to pass the higher flow rate required for the EPU." This FSAR change simply quantifies the flow rates through the valves under uprated conditions. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

7. FSAR Section 10.4.7.2: this section is revised to state that each steam generator feedwater pump has a capacity of approximately 56 percent of the total calculated system flow at 100% uprate power. PUR Section 2.5.6.4 evaluated the Condensate and Feedwater systems and states the following, "The required total developed head and flow, horsepower, and net positive suction head (NPSH) available versus NPSH required for the CFWS pumps were evaluated at 102% of the EPU power level. This evaluation demonstrated that the condensate and feedwater equipment is adequate for EPU conditions without modification." This change to the FSAR simply quantifies the capacity of each feedwater pump in percent of rated flow under uprated (100%) conditions. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

8. FSAR Section 10.4.8.1: this section is revised to change the statement regarding SGBS design, "to provide

a continuous blowdown rate of 0.2 percent maximum steam rate (MSR) (approximately 634 gpm) under normal plant operating conditions" to instead say "to provide a continuous blowdown rate of approximately 150 gpm to 300 gpm under normal plant operating conditions". PUR Section 2.1.10 evaluated the Steam Generator Blowdown System under EPU conditions and states the following; "Typical operational blowdown rates during normal operation are approximately 1% of current feedwater flow. The blowdown system is sized to handle 2% of the original rated flow or 650 gpm. Although the feedwater flow will be increasing as a result of EPU, the capacity of the SGBS under EPU conditions will still be adequate to maintain chemistry in the secondary system." This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

9. FSAR Section 10.4.2.2 and Table 10.4-1: this textual description and table of main condenser performance data are revised to reflect changes in main condenser performance as a result of EPU. PUR Section 2.5.6.2 evaluated the impact of EPU on the Main Condenser and states the following, "Power uprate will increase the total mass of steam in the main condenser...Evaluation of the condenser indicated that condenser performance thermal ratings and the steam bypass lines capacity are adequate for the proposed EPU. However, a tube vibration analysis indicated that the existing support plate spacing may be inadequate for the uprate conditions. ..The main condenser, modified as necessary to prevent tube vibration, will perform acceptably under EPU conditions." Condenser tube staking to eliminate vibration issues is addressed separately in ER-W3-2004-0007-000. FSAR Table 10.4-1 changes simply quantify main condenser performance parameters under uprated conditions. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

10. FSAR Table 10.4-17: this table of "Condensate Clean-Up System Design Data" is revised to reflect the increased design condensate flow per demineralizer vessel. The values are changed from 4300 gpm (3-35 gpm/sq. ft.) to 4840 gpm (3.78 gpm/sq. ft.). This change is evaluated in Section IV.

11. FSAR Table 10.4-6: this table of "Feedwater Heater Data" is revised to reflect changes in condensate flow through the various heater strings under EPU conditions. PUR Section 2.5.6.4 evaluated the impact of EPU on the Condensate and Feedwater systems, and states the following, "The effect of the power uprate on the FW heater operating pressure, tube-side pressure drop, tube velocity, and nozzle velocity was evaluated. In addition, the FW heater vibrations and the shell/tube-side relief valve capacities were evaluated. These evaluations determined that the FW heaters are adequately sized for EPU conditions." FSAR Table 10.4-6 changes simply quantify flow rates through the feedwater heaters under uprated conditions. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

12. FSAR Figure 10.2-1: the Steam Pressure Variation With Power curve depicted on this figure is replaced with a modified curve. The purpose of Figure 10.2-1 is stated in FSAR Section 10.2.1, item a), "The turbine generator is designed to operate from 0 to 100 percent load at varying steam pressures shown in Figure 10.2-1". PUR Section 2.5.6.1 evaluated the impact of EPU on the Main Steam Supply System (MSSS). The PUR states that one of the non-safety functions of the MSSS is to deliver steam for power generation from the SGs to the turbine generator set at the required flow rate and steam conditions. It further states: "Operating temperatures and pressures for the MSSS from the SG to the turbine have been reduced at normal operating power levels, while steam mass flow has been increased (which results in a higher steam velocity)". The changes to FSAR Figure 10.2-1 simply quantify the relationship between steam pressure and power under EPU. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

13. FSAR Figures 10.2-2 and 10.2-3 are revised to reflect the new heat balance values for 100% EPU and VWO. LAR NPF-38-249 addresses EPU throughout the document and its attachments. PUR Section 2.5.6.1 discusses changes to the main steam supply system; Section 2.5.6.4 discusses changes to the condensate and feedwater, extraction steam, heater drain and vent systems. The changes to the heat balance diagrams (Figures 10.2-2 and 10.2-3) simply quantify heat balance parameter values under EPU. This change is fully bounded by LAR NPF-38-249 and, therefore, does not require further evaluation.

Technical Specification Bases:

The Waterford Unit 3 Technical Specifications Bases are impacted by the Extended Power Uprate. However, EPU-related changes to the Technical Specifications Bases are included in DRN 04-1243 and are evaluated separately by ER-W3-2001-1149-000. The specific Bases changes associated with ER-W3-2001-1149-010 are:

- The changes to Technical Specification Bases 3/4.7.1.1, Main Steam Safety Valves (MSSVs) include updating system design pressure values under EPU and providing bases discussion for the revised Technical Specification Action statements and revised trip setpoint values in Technical Specification Table

3.7-2 for inoperable MSSVs.

- The changes to Technical Specification Bases 3/4.7.1.3 include changing the condensate storage pool minimum indicated level from 91% to 92% and adding a discussion of the bases associated with minimum and maximum CSP temperature limits. These bases changes support the associated changes to Technical Specification 3/4.7.1.3.
- Technical Specification Bases Section 3/4.7.1.4 is changed to reflect a primary to secondary steam generator tube leak value of 540 gallons per day (as changed in Technical Specification 3.4.5.2c).
- Technical Specification Bases Section 3/4.7.1.5 is revised to provide the basis for a change in the MSIV closure time limit of 4.0 seconds (static test conditions) to the analysis value of 8.0 seconds which includes 1.0 second instrument response time (as changed in Technical Specification 4.7.1.5).
- Technical Specification Bases Section 3/4.7.1.6 is revised to provide the basis for a change in the Main Feedwater Isolation Valve closure time limit of 5.0 seconds to 6.0 seconds which includes 1.0 second instrument response time (as changed in Technical Specification 4.7.1.6).
- Addition of a new Technical Specification Bases Section 3/4.7.1.7 to support new Technical Specification section 3/4.7.1.7 for Atmospheric Dump Valves which are being credited with a safety function under EPU in support of the small break LOCA analysis.

Technical Requirements Manual:

The Waterford Unit 3 Technical Requirements Manual is impacted by the Extended Power Uprate. However, EPU-related changes to the TRM are included in DRN 04-1244 and are evaluated separately by ER-W3-2001-1149-000. The specific TRM changes associated with ER-W3-2001-1149-010 are:

- TRM section 3/4.7 is deleted because the requirements for the Atmospheric Dump Valves (ADVs) are added to the Technical Specifications as discussed previously. Directly associated with this change is the removal of ADVs from TRM Table 3.6-2.

Test or experiment not described in the FSAR:

This activity does not involve a test or experiment that is not described in the FSAR. The activities are restricted to evaluations of FSAR Chapter 10 systems with regard to EPU impacts and associated document changes. There are no tests included within the scope of this ER.

Calculations ECM94-032, ECM94-034, ECM94-036, ECM94-038, and 9C2-12-2 (as listed in Section I) were converted to study calculations by this ER. A review of the revised calculations determined that there are no licensing basis document impacts, outside the bounds of those already described herein, as a result of their conversion from design basis to study.

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 5.4.1[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:

FSAR Sections 1.2.2.5, 1.4, 3.5.1.3, 10.0, 10.1, 10.2, 10.2.2.2.6, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.6, 10.4.1, 10.4.1.1, 10.4.1.3, 10.4.2, 10.4.3, 10.4.4, 10.4.5, 10.4.6, 10.4.7, 10.4.8, 10.4.9, 10.4.9A, 10.4.9B, 10.4.10, 11.3.2.3, 15.0.3.1.4, 15.2.1.3.2, 15.2.1.4.1, 15.2.2.5, 15.3.3.1.2, 15.3.3.1.3.3, 15.4.1.2.4, 15.6.3.2.3.3, Tables 10.2-1, 10.3-1, 10.3-5, 10.4-1, 10.4-2, 10.4-6, 10.4-17, 10.4.9A-3, 15.3-3, 15.3-4a, 15.6-24, Figures 10.2-1, 10.2-2, 10.2-3; Technical Specifications/Bases 3/4.7.1.1, 3/4.7.1.3, 3/4.7.1.4, 3/4.7.1.5, 3/4.7.1.6; TRM 3/4.7.1.7

LBDs/Documents reviewed manually:

FSAR Chapter 10 (in total), FSAR Sections 1.2.2.5, 1.4, 3.5.1.3, 11.3.2.3, 15.0.3.1.4, 15.2.1.3.2, 15.2.1.4.1, 15.2.2.5, 15.3.3.1.2, 15.3.3.1.3.3, 15.4.1.2.4, 15.6.3.2.3.3, Tables 10.4.9A-3, 15.3-3, 15.3-4a, 15.6-24; Technical Specifications/Bases 3/4.7.1.1, 3/4.7.1.3, 3/4.7.1.4, 3/4.7.1.5, 3/4.7.1.6; TRM 3/4.7.1.7

Keywords:

Turbine Generator, Main Steam, Extraction Steam, Condenser, Evacuation System, Gland Seal, Steam Bypass, Circulating Water, Condensate Clean-Up, Condensate, Feedwater, Loss of Normal Feedwater Flow, Blowdown, Emergency Feedwater, Chemical Feed, MSIV, ADV, hotwell, condensate flow, feedwater regulating valve, feedwater heater, heat balance, seven, 63 percent, five minutes, 21,500 gpm, two percent, 109, 7.55.

5. Is the validity of this Review dependent on any other change? (See Section 5.3.4 of the EOI 10 CFR 50.59 Program Review Guidelines.)

☒ 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.

Although this ER does not initiate any operating license or Technical Specification changes, some of the changes within the scope of this ER are necessary because of (and are dependent on) changes included in the Extended Power Uprate License Amendment Request NPF-38-249, which is currently awaiting NRC approval. An ERD action has been created to review this ER and 50.59 Review against the SER (when issued by the NRC) to ensure that they remain in agreement with the approved SER.

B. ENVIRONMENTAL SCREENING

If any of the following questions is answered "yes," an Environmental Review must be performed in accordance with NMM Procedure 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 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.

D. INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) SCREENING

If any of the following questions is answered "yes," an ISFSI Review must be performed in accordance with NMM Procedure LI-112, "72.48 Review," and attached to this Review.

Will the proposed Change being evaluated:

	Yes	No	
1.	☐	☒	Any activity that directly impacts spent fuel cask storage or loading operations?
2.	☐	☒	Involve the Independent Spent Fuel Storage Installation (ISFSI) including the concrete pad, security fence, and lighting?
3.	☐	☒	Involve a change to the on-site transport equipment or path from the Fuel Building to the ISFSI?
4.	☐	☒	Involve a change to the design or operation of the Fuel Building fuel bridge including setpoints and limit switches?
5.	☐	☒	Involve a change to the Fuel Building or Control Room(s) radiation monitoring?
6.	☐	☒	Involve a change to the Fuel Building pools including pool levels, cask pool gates, cooling water sources, and water chemistry?
7.	☐	☒	Involve a change to the Fuel Building handling equipment (e.g., bridges and cask cranes, structures, load paths, lighting, auxiliary services, etc)?
8.	☐	☒	Involve a change to the Fuel Building electrical power?
9.	☐	☒	Involve a change to the Fuel Building ventilation?
10.	☐	☒	Involve a change to the ISFSI security?
11.	☐	☒	Involve a change to off-site radiological release projections from non-ISFSI sources?
12.	☐	☒	Involve a change to spent fuel characteristics?
13.	☐	☒	Redefine/change heavy load pathways?
14.	☐	☒	Fire and explosion protection near or in the on-site transport paths or near the ISFSI?
15.	☐	☒	Involve a change to the loading bay or supporting components?
16.	☐	☒	New structures near the ISFSI?
17.	☐	☒	Modifications to any plant systems that support dry fuel storage activities?
18.	☐	☒	Involve a change to the nitrogen supply, service air, demineralized water or borated water system in the Fuel Building?

IV. 50.59 EVALUATION

License Amendment Determination

Background:

Changes 3 and 10 require a 50.59 Evaluation.

Change 3 - FSAR Section 10.4.1.2: this section is revised to indicate that storage capacity of the condenser hotwells, expressed in terms of minutes of operation based on condensate system flow rate, is changed from "*5 minutes of operation...*" to "*approximately 4.50 minutes of operation...*".

The existing FSAR statement is based on information found in specification LOU-1564.081, Surface Condensers and Accessories. The specification indicates that "*Hotwell volume is 14,500 cu ft or 5 minutes at full load operation of condenser between normal and low water levels*". The value of 5 minutes is based on a ratio of physical hotwell capacity to the existing (pre-EPU) condensate flow rate. EPU does not change hotwell capacity or normal and low water levels in the hotwell, but does increase the condensate system flow rate. The proposed FSAR text change re-quantifies the hotwell capacity in terms of minutes of operation at the increased (EPU) condensate system flow rate.

Functions of the main condenser, as described in FSAR Section 10.4.1.1, include the statement, "*The main condenser is designed to ... deaerate the condensate before it leaves the condenser hotwell. Free oxygen in the condensate will not exceed 0.005 cc/liter over the entire load range*". This statement is also based on main condenser design specification LOU-1564.081. While most of the non-condensibles (including oxygen) are freed from the steam as it condenses to water inside the main condenser, some oxygen remains in the condensate and may be released during the retention time in the hotwell. Since the retention time in the hotwell is decreased under EPU, it is possible that the oxygen level will be slightly higher when the condensate leaves the hotwell. Therefore, this change is considered adverse since oxygen content in the condenser effluent (condensate) may increase.

The FSAR-specified value for condensate oxygen content of 0.005 cc/liter equates to 5,000 ppb. Chemistry procedure CE-002-002, Maintaining Condensate and Feedwater Chemistry, performs sampling of the condensate pump discharge/polisher effluent and has a Dissolved Oxygen limit of $\leq$10.0 ppb which is significantly lower (by a factor of 500) than the FSAR value. The procedure requires that specific action levels be taken when parameter values are outside of the prescribed limits, including power reduction or shutdown.

Change 10 - FSAR Table 10.4-17: this table of "Condensate Clean-Up System Design Data" is revised to reflect the increased design condensate flow per demineralizer vessel. The values are changed from 4300 gpm (3-35 gpm/sq. ft.) to 4840 gpm (3.78 gpm/sq. ft.).

Functions of the Condensate Polisher System, as described in FSAR Section 10.4.6.1, include:

- Remove potentially corrosive and/or scale forming ionic species from the main condensate stream by ion exchange and maintaining a feedwater quality as good or better than required by the steam generator manufacturer during start-up, shutdown and the normal operation of the unit.
- Remove high levels of particulate metal oxides, principally iron oxide and silica by filtration from the condensate stream during unit start-ups.

The section further states that the system is designed to process the station's full condensate flow and to produce an effluent meeting the specifications of Table 10.4-16. Table 10.4-16 specifies water quality parameters of $\leq$10 ppb Dissolved Oxygen and $\leq$0.15 ppb Sodium. The table also lists several water quality parameters that are required to be monitored but does not provide specific limits.

This change does not affect the water quality acceptance limits specified in the FSAR, however it does increase the condensate flow rate through each demineralizer which could adversely affect demineralizer performance. Therefore, this change is considered adverse and is evaluated accordingly.

Chemistry procedure CE-002-002, Maintaining Condensate and Feedwater Chemistry, performs sampling of the condensate pump discharge/polisher effluent. The procedure requires that specific action levels be taken

when parameter values are outside of the prescribed limits, including power reduction or shutdown.

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 only accidents for which the proposed changes potentially affect accident initiators are the Steam System Piping Failures analyses found in FSAR Section 15.1.3, Feedwater System Pipe Break analysis found in FSAR Section 15.2.3.1, and Steam Generator Tube Rupture analysis found in FSAR Section 15.6.3.2. The analyses for piping failures do not address the cause of piping failure but simply assume that failures occur. The steam generator tube rupture analysis states that the most probable modes of failure are formation of etch pits or small cracks in the U-tubes or cracks in the welds joining the tubes to the tube sheet. Water chemistry limits are used to prevent degradation of piping and steam generators in order to minimize the possibility of failures.

   Change 3 – The adverse effect of this change is a potential increase in the oxygen content of the condenser effluent (condensate). This is offset by the fact that Chemistry will continue to monitor condensate system oxygen content and will apply the same allowable limits as currently used. Therefore, the overall effect is that oxygen content will not be allowed to increase above the same limits as currently used and will therefore not result in any increased degradation of piping/components due to the effects of oxidation, etc. As a result, no accident initiators are affected by this change so there is no increase in the frequency of occurrence of an accident previously evaluated in the FSAR.

   Change 10 – The adverse effect of this change is a potential reduction in the effectiveness of the Condensate Polisher System because of the increased flow rate through the demineralizer vessels. Graver Water Systems, Inc. (the system vendor) was contacted to assist in determining the impact on the demineralizer vessels with regard to the increase in condensate flow. They concluded that the existing demineralizer vessels will still provide the required water quality so long as the overall system differential pressure limits currently in place are retained, but the increased flow rate may result in decreased run time for the demineralizers. The differential pressure limits of 25 psid (each vessel) and 35 psid (overall system), as currently specified in OP-003-031, are being retained under EPU. Demineralizer service is not based on a fixed run time but is instead based on filter loading (pressure drop) if a precoat is not used, or on useful ion exchange capacity if a precoat is used. The demineralizers are not normally operated with a precoat and the impact on run time is expected to be relatively insignificant. In either case, filter run time has no effect on any accident initiators and acceptance limits on water quality as specified in the FSAR will continue to be complied with to prevent any impact of water quality on accident initiators. Therefore, there is no 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:

   The condenser, Condensate System and Condensate Polishing System are not SSC's important to safety, however condensate water quality can effect downstream components that are important to safety such as feedwater and main steam piping, feedwater and main steam isolation valves, and steam generators.

   Change 3 – The adverse effect of this change is a potential slight increase in the oxygen content of the condenser effluent (condensate). This is offset by the fact that Chemistry will continue to monitor condensate system oxygen content and will apply the same allowable limit for dissolved oxygen as currently used. Since water quality chemistry limits are not changed by this ER, a minimal increase in dissolved oxygen content which remains below the allowable limit will not result in increased degradation of piping and components. Therefore, the change does not increase the frequency of likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR.

Change 10 – The adverse effect of this change is a potential reduction in the effectiveness of the Condensate Polisher System because of the increased flow rate through the demineralizer vessels. Based on discussions with the system vendor, the existing demineralizer vessels will still provide the required water quality so long as the overall system differential pressure limits currently in place are retained. The differential pressure limits of 25 psid (each vessel) and 35 psid (overall system), as currently specified in OP-003-031, are being retained under EPU. Water quality limits as currently specified in the FSAR are not being changed and will continue to be complied with. The overall effect is that water chemistry parameters will not be allowed to increase above the same limits currently used and, therefore, the effectiveness of the Condensate Polisher System is not decreased. As result, there is no increase in the frequency of 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 proposed changes are associated with the condenser, Condensate System and Condensate Polishing System which do not have any accident mitigating functions. The proposed changes do not affect the function of any structure, system or component that is relied upon to function during an accident or to mitigate the consequences of analyzed accidents. Therefore, change items 3 and 10 will 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 condenser, Condensate System and Condensate Polishing System are not SSC's important to safety, however condensate water quality can effect downstream components that are important to safety such as feedwater and main steam piping, feedwater and main steam isolation valves, and steam generators.

Change 3 – The adverse effect of this change is a potential increase in the oxygen content of the condenser effluent (condensate). This is offset by the fact that Chemistry will continue to monitor condensate system oxygen content and will apply the same allowable limits as currently used. Therefore, the overall effect is that oxygen content will not be allowed to increase above the same limits as currently used, and a minimal increase in dissolved oxygen content which remains below the allowable limit will not result in any increased degradation of piping/components due to the effects of oxidation, etc. As result, there is no increase in the consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR.

Change 10 – The adverse effect of this change is a potential reduction in the effectiveness of the Condensate Polisher System because of the increased flow rate through the demineralizer vessels. Based on discussions with the system vendor, the existing demineralizer vessels will still provide the required water quality so long as the overall system differential pressure limits currently in place are retained. Water quality limits as currently specified in the FSAR are not being changed and will continue to be complied with. The overall effect is that water chemistry parameters will not be allowed to increase above the same limits currently used and will not result in any increased degradation or fouling of piping/components. As a result, there is no 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 effects of the proposed changes are associated with condensate water quality which, if not properly controlled, can cause degradation or fouling of piping/components. However, current water quality limits as specified in the FSAR are not being changed and will continue to be applied during the chemical sampling/analysis process. Effects of the proposed changes are bounded by existing analyses found in the FSAR, and there are no accidents of a different type created by these changes.

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 condenser, Condensate System and Condensate Polishing System are not SSC's important to safety, however condensate water quality can effect downstream components that are important to safety such as feedwater and main steam piping, feedwater and main steam isolation valves, and steam generators.

Change 3 – The adverse effect of this change is a potential increase in the oxygen content of the condenser effluent (condensate). This is offset by the fact that Chemistry will continue to monitor condensate system oxygen content and will apply the same allowable limits as currently used. Therefore, the overall effect is that oxygen content will not be allowed to increase above the same limits as currently used and will not result in any increased degradation of piping/components due to the effects of oxidation, etc. As result, the change does not introduce any new system interactions, does not introduce any new failure modes for associated equipment, and does not create the possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the FSAR.

Change 10 – The adverse effect of this change is a potential reduction in the effectiveness of the Condensate Polisher System because of the increased flow rate through the demineralizer vessels. Based on discussions with the system vendor, the existing demineralizer vessels will still provide the required water quality so long as the overall system differential pressure limits currently in place are retained. Water quality limits as currently specified in the FSAR are not being changed and will continue to be complied with. The overall effect is that water chemistry parameters will not be allowed to increase above the same limits currently used and will not result in any increased degradation or fouling of piping/components. As a result, the change does not introduce any new system interactions, does not introduce any new failure modes for associated equipment, and does not create the 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 proposed changes are limited to potential increases in condensate water quality parameters, but which will continue to be controlled within existing limits/allowable values. Therefore, the changes do not affect any design basis limits for fission product barriers including fuel cladding, RCS boundary, or containment pressure, as described in the FSAR.

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 proposed changes are limited to potential increases in condensate water quality parameters, but which will continue to be controlled within existing limits/allowable values. The changes do not affect any methods of evaluation used in analyses that demonstrate that design basis limits of fission product barriers are met, methods of evaluation used in FSAR safety analyses to demonstrate that consequences of accidents do not exceed regulatory limits, or methods of evaluation for other analyses that demonstrate intended design functions will be accomplished. Therefore, the changes will not result in a departure from a method of evaluation described in the FSAR used in establishing the design bases or in the safety analyses.

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.