



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

July 8, 2022

Site Vice President  
Entergy Operations, Inc.  
Waterford Steam Electric Station, Unit 3  
17265 River Road  
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF  
AMENDMENT NO. 267 RE: REACTOR COOLANT SYSTEM  
PRESSURE/TEMPERATURE LIMITS AND LOW TEMPERATURE  
OVERPRESSURE SETPOINTS APPLICABLE FOR 55 EFFECTIVE FULL  
POWER YEARS (EPID L-2021-LLA-0165)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 267 to Renewed Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of changes to the technical specifications (TSs) in response to your application dated August 25, 2021.

The amendment updates Waterford 3 figures in TS 3.4.8.1, which contain the reactor coolant system, pressure/temperature (P/T) limit curves for 32 effective full power years (EFPY), with curves that are applicable up to 55 EFPY. This amendment also revises the low temperature overpressure protection P/T region pressurizer pressure limit from 554.1 pounds per square inch absolute (psia) to 534 psia to account for three reactor coolant pump operation.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

*/RA/*

Jason J. Drake, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. Amendment No. 267 to NPF-38
2. Safety Evaluation

cc: Listserv



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

ENERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 267  
Renewed License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Entergy Operations, Inc. (EOI), dated August 25, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2 of Renewed Facility Operating License No. NPF-38 is hereby amended to read as follows:

2. Technical Specifications and Environmental Protection Plan

- The Technical Specifications contained in Appendix A, as revised through Amendment No. 267, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Jennifer L. Dixon-Herrity, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to Renewed Facility  
Operating License No. NPF-38 and  
the Technical Specifications

Date of Issuance: July 8, 2022

ATTACHMENT TO LICENSE AMENDMENT NO. 267

RENEWED FACILITY OPERATING LICENSE NO. NPF-38

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

Replace the following pages of Renewed Facility Operating License No. NPF-38 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License

REMOVE

-4-

INSERT

-4-

Technical Specifications

REMOVE

3/4 4-30

3/4 4-31

INSERT

3/4 4-30

3/4 4-31

the NRC of any action by equity investors or successors in interest to Entergy Louisiana, LLC that may have an effect on the operation of the facility.

- C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

1. Maximum Power Level

EOI is authorized to operate the facility at reactor core power levels not in excess of 3716 megawatts thermal (100% power) in accordance with the conditions specified herein.

2. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 267, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. Antitrust Conditions

- (a) Entergy Louisiana, LLC shall comply with the antitrust license conditions in Appendix C to this renewed license.
- (b) Entergy Louisiana, LLC is responsible and accountable for the actions of its agents to the extent said agent's actions contravene the antitrust license conditions in Appendix C to this renewed license.

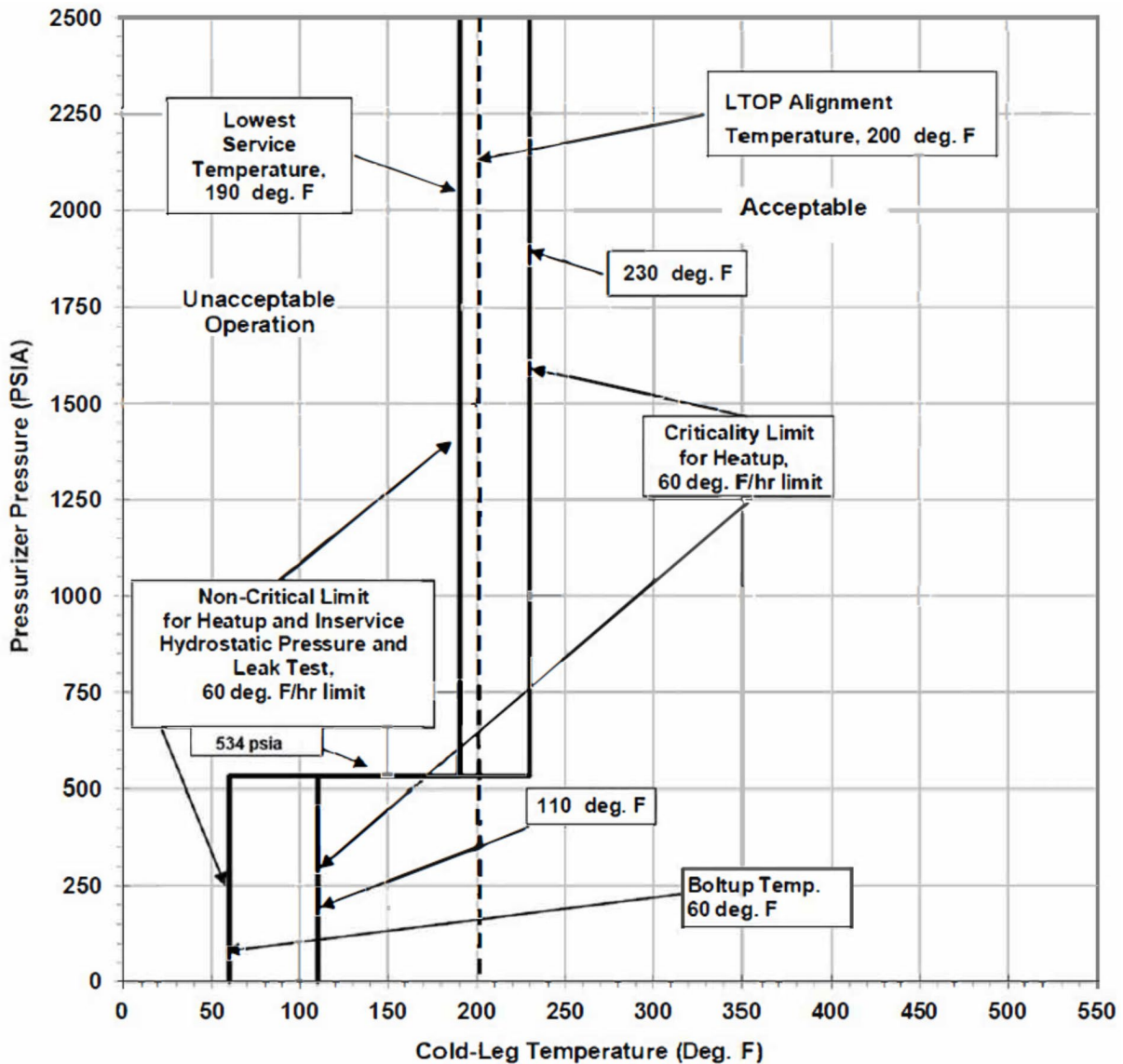


FIGURE 3.4-2

WATERFORD UNIT 3 HEATUP CURVE - 55 EFPY.

REACTOR COOLANT SYSTEM PRESSURE-TEMPERATURE LIMITS

(Curves do not include margins for instrument uncertainties)

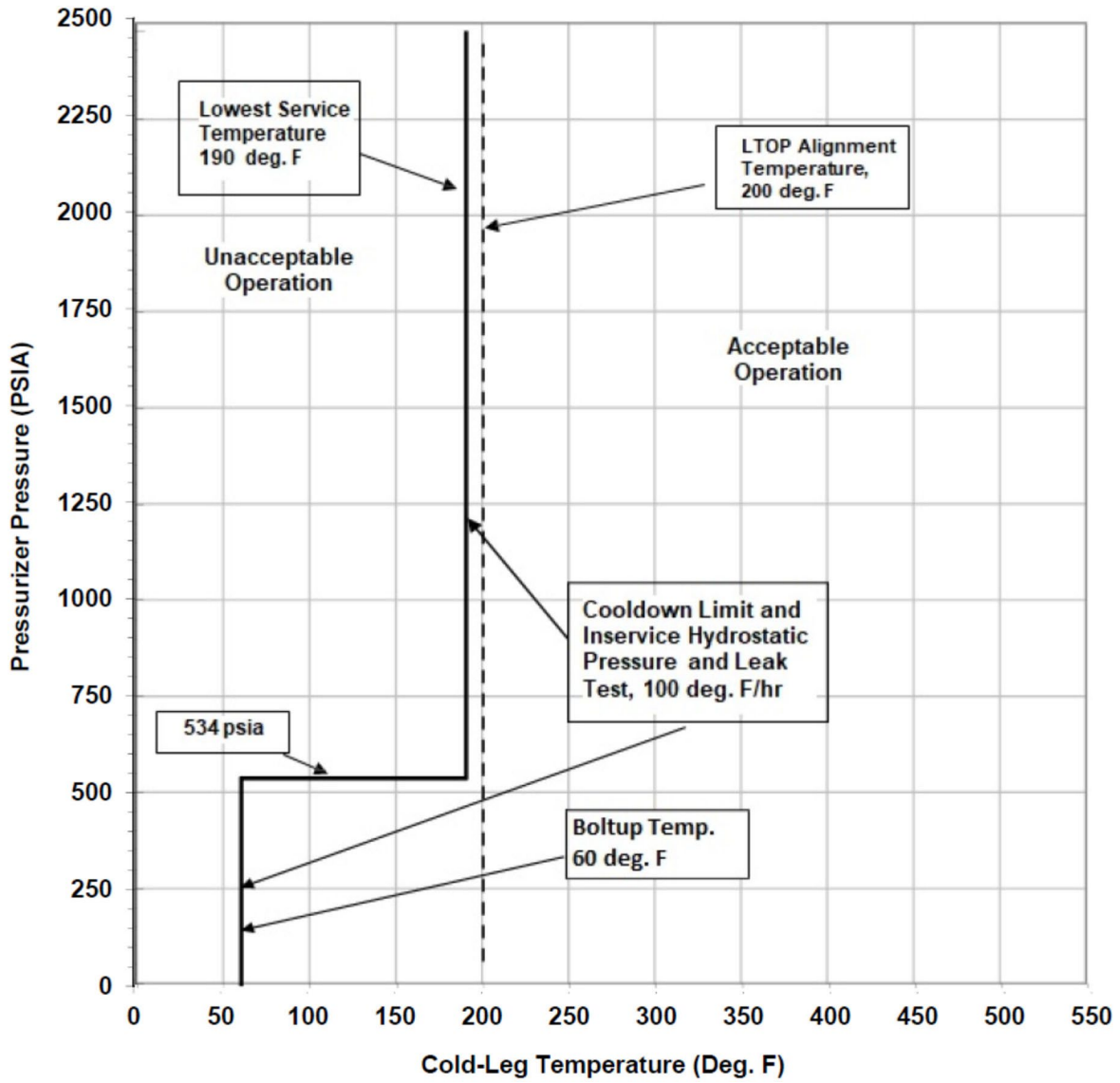


FIGURE 3.4-3

WATERFORD UNIT 3 COOLDOWN CURVE - 55 EFPY

REACTOR COOLANT SYSTEM PRESSURE TEMPERATURE LIMITS

(Curves do not include margins for instrument uncertainties)





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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 267 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO: 50-382

1.0 INTRODUCTION

By application dated August 25, 2021 (Reference 1), Entergy Operations, Inc. (Entergy, the licensee) submitted a license amendment request (LAR) to revise Technical Specifications (TS) 3/4.4.8, "Pressure/Temperature [P/T] Limits– Reactor Coolant System [RCS]" of the Waterford Steam Electric Station, Unit 3 (Waterford 3) to the U.S. Nuclear Regulatory Commission (NRC, the Commission). Specifically, the licensee is proposing to update the figures in TS section 3.4.8.1, which contain the RCS P/T limit curves (hereinafter referred to as "P/T limits") for 32 effective full power years (EFPY), with curves that are applicable up to 55 EFPY. The 32 EFPY P/T limits for Waterford 3 are in figures 3.4-2 "Waterford Unit 3 Heatup Curve – 32 EFPY – Reactor Coolant System Pressure-Temperature Limits" and 3.4-3 "Waterford Unit 3 Cooldown Curve – 32 EFPY – Reactor Coolant System Pressure-Temperature Limits" of TS section 3.4.8.1. The licensee is also proposing to revise the low temperature overpressure protection (LTOP) P/T region pressurizer pressure limit from 554.1 pounds per square inch absolute (psia) to 534 psia to account for three reactor coolant pump (RCP) operation.

2.0 REGULATORY EVALUATION

The NRC has established requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. The NRC staff evaluates the acceptability of a facility's proposed P/T limits based on the NRC regulations and guidance discussed in the following subsections.

2.1 Regulatory Requirements

The regulatory requirements related to the content of the TSs are contained in 10 CFR 50.36, "Technical specifications." The regulations in 10 CFR 50.36(c)(2) require in part, that an applicant for a license must include limiting conditions for operation (LCOs) to assure safe operation of a nuclear reactor in its application.

Section 50.60 of 10 CFR “Acceptance criteria for fracture prevention measures for lightwater nuclear power reactors for normal operation” imposes fracture toughness and material embrittlement surveillance program requirements set forth in Appendices G, “Fracture Toughness Requirements,” and H, “Reactor Vessel Material Surveillance Program Requirements,” to 10 CFR Part 50. Appendix G to 10 CFR Part 50 requires, in part, that facility P/T limits for the reactor pressure vessel (RPV) be at least as conservative as those obtained by applying the linear elastic fracture mechanics methodology of Appendix G, “Fracture Toughness Criteria for Protection Against Failure,” to Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. Appendix H to 10 CFR Part 50 establishes requirements for a facility’s surveillance program for monitoring fracture toughness due to neutron irradiation.

The regulations in 10 CFR Part 50, Appendix A, “General Design Criteria [GDC] for Nuclear Power Plants,” include the following GDCs applicable to fracture prevention of the reactor coolant pressure boundary:

- GDC 14, “Reactor coolant pressure boundary,” requires the “reactor coolant pressure boundary to be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, or rapidly propagating failure, and of gross rupture.”
- GDC 15, “Reactor coolant system design,” which requires that the RCS and associated auxiliary systems be designed with sufficient margin such that design conditions are not exceeded during normal operation and anticipated operational occurrences.
- GDC 30, “Quality of reactor coolant pressure boundary,” which requires, in part, that components comprising the reactor coolant pressure boundary be designed, fabricated, erected, and tested to the highest quality standards practical.
- GDC 31, “Fracture prevention of reactor coolant pressure boundary,” which requires, in part, that the reactor coolant pressure boundary be designed with sufficient margin to assure that boundary behaves in a nonbrittle manner and the probability of rapidly propagating fracture is minimized during normal operation, maintenance, testing and postulated accident conditions. The GDC requires that the design reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining material properties. The effects on irradiation on material properties, residual stresses, and size of the flaws are specifically applicable to this LAR

## 2.2 Regulatory Guidance

Regulatory Guide (RG) 1.99, Revision 2, “Radiation Embrittlement of Reactor Vessel Materials,” dated May 1988 (Reference 2), contains guidance for RPV embrittlement integrity evaluations.

RG 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” dated March 2001 (Reference 3), describes methods and assumptions acceptable to the NRC staff for determining the RPV neutron fluence with respect to the General Design Criteria in Appendix A to 10 CFR Part 50. In consideration of the guidance set forth in RG 1.190, GDC 14, 30, and 31 are applicable (see section 2.1 of this safety evaluation (SE)).

Regulatory Issue Summary (RIS) 2014-11, "Information on Licensing Applications for Fracture Toughness Requirements for Ferritic Reactor Coolant Pressure Boundary Components," dated October 14, 2014 (Reference 4), clarifies that P/T limits for ferritic RPV components, such as RPV inlet and outlet nozzles, could be more limiting because higher stress levels from structural discontinuities could result in a lower allowable pressure. RIS 2014-11 also clarifies that the RPV beltline definition in Appendix G to 10 CFR Part 50 is applicable to all RPV ferritic materials with projected neutron fluence values greater than  $1 \times 10^{17}$  neutrons per square centimeter ( $n/cm^2$ ) ( $E > 1.0$  MeV), and that this fluence threshold remains applicable for the design life, as well as throughout the licensed operating period of the reactor.

Branch Technical Position (BTP) 5-2, Revision 3 (Reference 5), "Overpressurization Protection of Pressurized-Water Reactors while Operating at Low Temperatures," and NUREG-0800, provide guidance to the NRC staff in reviewing overpressurization protection of PWRs while operating at low temperatures. Paragraph B.1 of BTP 5-2 specifies that the LTOP system be capable of relieving pressure during all anticipated overpressurization events at a rate sufficient to satisfy the TS limits while operating at low temperatures.

### 3.0 TECHNICAL EVALUATION

#### 3.1 NRC Staff's Evaluation

The NRC staff reviewed the licensee's assessment of the proposed 55 EFPY P/T limits described in section 2.0 of the enclosure to the LAR. This assessment comprises four major parts: neutron fluence determination, adjusted reference temperature (ART) calculations, 55 EFPY P/T limits, and LTOP settings, each of which the NRC evaluated as discussed below.

##### 3.1.1 Evaluation of Neutron Fluence Determination

The technical basis fluence determination for the Waterford 3 RPV beltline and the extended beltline materials is discussed in Topical Report WCAP-18002-NP, Revision 0, "Waterford Unit 3 Time-Limited Aging Analysis on Reactor Vessel Integrity," dated July 2015 (Reference 6). The licensee stated in section 2.2.1.1 of the LAR that Topical Report WCAP-18002-NP reports the estimated RPV beltline neutron fluence values through 55 EFPY were calculated for the Waterford 3 RPV beltline and extended beltline materials. The licensee stated that a three-dimensional (3D) Westinghouse-developed code, RAPTOR-M3G, was used in the neutron transport calculations and was approved for use for Waterford 3 by the NRC in License Amendment 252 (Reference 7) based on its adherence to the guidance in RG 1.190. The fluence evaluations included plant-specific and cycle-specific analyses for cycles 1 through 19 of Waterford 3, with data up to 24.66 EFPY at the end of cycle 19 and projections through 60 EFPY. The licensee also stated that an evaluation of the most recent dosimetry sensor set from Capsule 83°, withdrawn at the end of cycle 19, was performed in Topical Report WCAP-17969-NP, Revision 2, "Analysis of Capsule 83° from the Entergy Operations, Inc. Waterford Unit 3 Reactor Vessel Radiation Surveillance Program," dated November 2017 (Reference 8) with the capsule testing performed in accordance with 10 CFR Part 50, Appendix H.

In License Amendment 252, the NRC staff noted that the SE for Topical Report WCAP-18124-NP, Revision 0, "Fluence Determination with RAPTOR M3G and FERRET," dated June 15, 2018 (Reference 9), limited the applicability of WCAP-18124-NP, Revision 0, to the traditional RPV beltline region, and is not applicable to the extended beltline region. However, License Amendment 252 determined that the generic aspects of the approved generic

RAPTOR-M3G code, where applicable, may be referenced in the evaluation of the licensee's LAR to adopt the RAPTOR-M3G code for Waterford 3.

The NRC staff reviewed the information contained in section 2, "Calculated Fluence," of Topical Report WCAP-18002-NP, which was requested as part of the WCAP-18002-NP audit. In reviewing this information, the NRC staff determined that the plant-specific fluence calculations were performed in a manner consistent with the NRC-approved methodologies. This includes the use of fuel-cycle specific neutronic data for past operating cycles, the use of an NRC-approved code for discrete ordinates transport methods, a flux synthesis technique to capture three-dimensional aspects of the transport problem, and level of geometric modeling detail.

Since the plant-specific calculations were consistent with an NRC-approved methodology as stated in RG 1.190 for the RPV beltline region, and since the licensee applied the methodology to the RPV extended beltline region consistent with the previously approved NRC methodology for that region, the NRC staff determined that the fluence calculations presented in the licensee's LAR are acceptable. Accordingly, the NRC staff also determined that the calculations performed meet the criteria of GDCs 14, 30, and 31 contained in Appendix A to 10 CFR 50.

### 3.1.2 Evaluation of ART Calculations

The licensee calculated ART values at 55 EFPY for Waterford 3 for the RPV beltline and extended beltline regions at the quarter-thickness and three-quarter-thickness locations in Topical Report WCAP-18002-NP and presented them in tables 2 and 3 of Westinghouse Analysis LTR-SDA-20-041, Revision 0, "Extension of Waterford Unit 3 Pressure-Temperature Limit Curves to 55 Effective Full Power Years" (included as Attachment 3 to the LAR application). The licensee showed in table 4 of Westinghouse Analysis LTR-SDA-20-041, Revision 0, that the limiting ART values at 55 EFPY remain less than or equal to the ART values at 32 EFPY.

The NRC staff verified the ART values in tables 2 and 3 of Westinghouse Analysis LTR-SDA-20-041, Revision 0 by (1) confirming that the values of initial nil-ductility reference temperature ( $RT_{NDT}$ ), margin, and chemistry factor are consistent with the current licensing basis; (2) confirming that credible surveillance capsule data from Vogtle Electric Generating Plant, Unit 1 (a Waterford 3 sister plant) for the lower shell longitudinal welds 101-142A, B, and C was consistent with Position 2.1 of RG 1.99, Revision 2; and (3) calculating the shift in  $RT_{NDT}$  values due to neutron irradiation embrittlement in accordance with RG 1.99, Revision 2, based on the RPV beltline and extended beltline neutron fluence values applicable to 55 EFPY reported in WCAP-18002-NP, which the NRC staff finds acceptable per section 3.1.1 of this SE. Based on this verification, the NRC staff finds that the 55 EFPY ART values shown in tables 2, 3, and 4 of Westinghouse Analysis LTR-SDA-20-041, Revision 0, are acceptable and that the limiting ART value is unchanged because the limiting ART values at 55 EFPY remain less than or equal to the limiting ART values at 32 EFPY. The NRC staff noted that, consistent with the current licensing basis values of initial  $RT_{NDT}$ , the 55 EFPY limiting ART values are less than or equal to the 32 EFPY limiting ART values because the initial  $RT_{NDT}$  value of the limiting RPV material, Lower Shell Plate M-1004-2, was updated from 22 degrees Fahrenheit ( $^{\circ}F$ ) to 0  $^{\circ}F$ .

### 3.1.3 Evaluation of the 55 EFPY P/T Limits

The licensee included replacement figures 3.4-2 and 3.4-3 for the proposed 55 EFPY RCS P/T limits in attachments 1 and 2 to the LAR. These proposed 55 EFPY P/T limits are nearly

identical to those for 32 EFPY, the difference being that the LTOP P/T region pressurizer pressure limit was lowered to 534 psia (from 554.1 psia) to account for three RCP operation. The licensee described the lowering of the pressurizer pressure limit in section 2.2.3 of the enclosure to the LAR application. The licensee stated that the P/T limits currently specified by TS section 3.4.8.1 figures 3.4-2 and 3.4-3 for 32 EFPY were generated in accordance with 10 CFR Part 50, Appendix G and have been approved by the NRC.

The NRC staff reviewed the licensee's proposed 55 EFPY RCS P/T limits shown in replacement TS figures 3.4-2 and 3.4-3 of attachment 1 to the LAR, and finds them acceptable for these reasons:

- (1) P/T limits are based on limiting ART values and since the limiting ART values at 55 EFPY remain less than or equal to those at 32 EFPY, as discussed and evaluated in the previous section on the ART calculations, the 32 EFPY P/T limits remain valid for 55 EFPY.
- (2) The NRC staff finds the revision of pressurizer pressure limit from 554.1 psia to 534 psia applied to the TS section 3.4.8.1, figures 3.4-2 and 3.4-3, to be acceptable, as discussed in section 3.1.4.3 of this SE.
- (3) Since the only difference between the proposed 55 EFPY P/T limits and the 32 EFPY P/T limits currently specified by TS section 3.4.8.1, figures 3.4-2 and 3.4-3, is that the LTOP P/T region pressurizer pressure limit was lowered to 534 psia to account for three RCP operation, and since the 32 EFPY P/T limits were developed in accordance with 10 CFR Part 50 Appendix G (Reference 10) as confirmed by the NRC staff, the proposed 55 EFPY P/T limits are in accordance with 10 Part CFR 50 Appendix G.

In section 2.2.1.3 of the enclosure to the LAR, the licensee addressed the potential for the RPV inlet and outlet nozzle P/T limits to be more limiting than the RPV P/T limits per RIS 2014-11. The licensee stated that the bounding neutron fluence value for the RPV inlet and outlet nozzles is  $3.71 \times 10^{16}$  n/cm<sup>2</sup> (E > 1.0 MeV) from WCAP-18002-NP, which estimated RPV beltline and extended beltline neutron fluence values through 55 EFPY, as discussed in section 3.1.1 of this SE. The licensee further stated that since this bounding neutron fluence value is below the screening criteria of  $4.28 \times 10^{17}$  n/cm<sup>2</sup> (E > 1.0 MeV) from Pressurized Water Reactor Owners Group (PWROG)-15109-NP-A, Revision 0, "PWR Pressure Vessel Nozzle Appendix G Evaluation," dated January 2020 (Reference 11) for RPV nozzles, the Waterford 3 RPV inlet and outlet nozzle P/T limits are not limiting compared to those of the RPV, and that plant-specific nozzle P/T limits are not needed. The NRC staff confirmed that the Waterford 3 RPV inlet and outlet nozzles are not one of the locations that exceeded a neutron fluence value of  $1.0 \times 10^{17}$  n/cm<sup>2</sup> (E > 1.0 MeV) from the Waterford 3 initial license renewal application dated March 16, 2016 (Reference 12), which showed RPV beltline and extended beltline neutron fluence values through 55 EFPY based on Topical Report WCAP-18002-NP. The SE report (SER) of the Waterford 3 initial license renewal application was issued in August 2018 (Reference 13), which confirms the neutron fluence values for the RPV inlet and outlet nozzles. Based on this confirmation and the confirmation of the screening criteria of  $4.28 \times 10^{17}$  n/cm<sup>2</sup> (E > 1.0 MeV) from PWROG-15109-NP-A, the NRC staff finds the licensee's evaluation of the Waterford 3 RPV inlet and outlet nozzle P/T limits not being limiting compared to those of the RPV and not needing plant-specific nozzle P/T limits to be acceptable.

In section 2.2.1.4 of the enclosure to the LAR, the licensee addressed the potential for other ferritic RCS pressure boundary components not in the Waterford 3 RPV beltline or extended beltline to be more limiting per RIS 2014-11. These components include the replacement

closure head, the pressurizer, and replacement steam generators. Based on its review of the  $RT_{NDT}$  of these components, the NRC staff determined that the licensee adequately addressed the consideration of P/T limits of the replacement closure head because its initial  $RT_{NDT}$  is much lower, and therefore not limiting, than the initial  $RT_{NDT}$  of the original closure head. The NRC staff notes that the pressurizer and replacement steam generators are not expected to receive neutron fluence levels such that they do not need to be considered for P/T limits evaluation. The NRC staff, therefore, finds the licensee's consideration of ferritic RCS pressure boundary components that are not part of the Waterford 3 RPV beltline or extended beltline acceptable.

### 3.1.4 Evaluation of LTOP Settings

#### 3.1.4.1 Evaluation of LTOP Enable Temperature

In section 2.2.1.5 of the enclosure to the LAR, the licensee stated that because the limiting ART values and the P/T limits (unadjusted for the lower pressurizer pressure limit) are unchanged, the LTOP enable temperature of 200 °F (without uncertainty) remains valid. The NRC staff finds this acceptable because the LTOP enable temperature is calculated from the limiting ART value, which did not change as a result of the licensee's proposed changes in this LAR application (see section 3.1.2 of this SE).

#### 3.1.4.2 Evaluation of LTOP Controls Applicability Extension for Revised 55 EFPY P/T Limits

In section 2.2.2 of the enclosure to the LAR, the licensee stated that based on the demonstration of the applicability of 32 EFPY P/T limits to 55 EFPY, Westinghouse performed reviews of key design basis analysis of records (AORs) to confirm the continued applicability of the current plant LTOP controls. The pertinent input data and assumptions used in the AORs were identified by the licensee. The licensee verified that all the input data used at the time of the analyses remains unchanged. The licensee stated that where any changes in the inputs were found, a logical assessment was made to confirm that the AORs remain valid or bounding. Based on the review performed, the licensee concluded that the design analyses continue to be applicable for the LTOP controls through 55 EFPY.

Section 5.2B.1 of the Waterford 3 Final Safety Analysis Report (FSAR) (Reference 14) provides a description of the LTOP system, which provides LTOP protection through relief valves SI-486 (2SI-R339A) and SI-487 (2SI-R340B) located in the Shutdown Cooling System (SDCS) suction line. The LTOP protection through these relief valves is required during heat up and cooldown, and during extended periods of cold shutdown. The FSAR mentions that to provide RCS overtemperature protection, the relief valves are aligned at all temperatures below the P/T curve limit corresponding to the pressurizer safety valve setpoint of 2500 psia. Based on section 5.2B.1 of the Waterford 3 FSAR, for temperatures above the P/T operating curve temperature corresponding to the LTOP enable temperature, overpressure protection is provided by the pressurizer safety valves.

The SER for the Waterford 3 initial license renewal application discusses LTOP setpoints as part of the time-limited aging analyses (TLAA), and the fact that the licensee committed to update its LTOP system activation setpoint analysis when the plant-specific P/T limit heatup and cooldown curves are updated. The NRC staff found in the SER that the licensee had provided an acceptable basis for demonstrating that the LTOP TLAA will be adequately managed during the extended period of operation. The licensee stated that Westinghouse performed reviews of key design basis AORs to confirm the continued applicability of the current plant LTOP controls

and concluded that the current design analyses continue to be applicable for the LTOP controls through 55 EFPY.

The NRC staff reviewed the impact of the revised LTOP P/T region pressure limit to account for the 3-RCP operation. Since the LTOP transient peak pressure (491 psia) given in section 5.2B.1 of the Waterford 3 FSAR is lower than the proposed pressurizer pressure limit of 534 psia, the NRC staff determined that the LTOP applicability extension is acceptable.

Based on the justification provided by licensee and the precedent in the SER for the Waterford 3 initial license renewal application for the LTOP TLAA setpoint analysis, the NRC staff finds the evaluation of the LTOP controls applicability extension acceptable and meets the guidance provided in paragraph B.1 of BTP 5-2.

#### 3.1.4.3 Evaluation of RCP Operating Limits in LTOP Enable Region

In section 2.2.3 of the enclosure to the LAR, the licensee noted that while the RCP operating procedure identified an operational limitation between two versus three RCP operation at an indicated temperature limit of 202 °F, the LTOP evaluation of record assumed no more than two RCPs operate within the LTOP region, designated as indicated value of 230 °F. This allowed for theoretical operation of three RCPs in the enable region between 202 °F and 230 °F. The licensee noted that this was outside the analysis evaluation and was documented in its corrective action program.

Per the licensee, Westinghouse developed a pressure correction factor (PCF) that is appropriate for three RCP operation within the LTOP region (91 per square inch differential, excluding instrument uncertainty). Based on the new PCF value used by the licensee, the actual pressurizer pressure limit is revised from 554.1 psia to 534 psia and applied to TS section 3.4.8.1, figures 3.4-2, "Waterford Unit 3 Heatup Curve" and 3.4-3, "Waterford Unit 3 Cooldown Curve".

Section 5.2B.1 of the Waterford 3 FSAR identifies the most limiting transients initiated by a single operator error or equipment failure as:

1. An inadvertent safety injection actuation (mass input), and
2. An RCP starts when a positive steam generator to reactor vessel  $\Delta T$  exists (energy input).

Per the FSAR, for the limiting transient (energy addition), the peak pressure translated to the most limiting location is 491 psia.

Since the LTOP transient peak pressure (491 psia) was within the proposed updated pressurizer pressure limit for the Waterford 3 heatup and cooldown curves, the NRC staff finds the revision of the pressurizer pressure limit from 554.1 psia to 534 psia applied to the TS section 3.4.8.1, figures 3.4-2 and 3.4-3, to be acceptable and that it meets the criteria of GDCs 15 and 31 contained in Appendix A to 10 CFR 50.

#### 3.1.5 Evaluation of Technical Specifications

Based on the NRC staff SE, the modified TS 3.4.8.1 meets the lowest functional capability or performance levels of equipment required for safe operation of the facility and would not impede

other safety systems. Therefore, the proposed addition is in compliance with the 10 CFR 50.36 regulations and the change is acceptable.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified on June 27, 2022, of the proposed issuance of the amendment. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, published in the *Federal Register* on January 25, 2022 (87 FR 3847), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

#### 7.0 REFERENCES

1. Gaston, R., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Application for Technical Specification Change to Revise Pressure/Temperature and Low Temperature Overpressure Protection for 55 Effective Full Power Years," dated August 25, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21237A544).
2. U.S. Nuclear Regulatory Commission, "Radiation Embrittlement of Reactor Vessel Materials," Regulatory Guide (RG) 1.99, Revision 2, dated May 1988 (ML003740284).
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Principal Contributors: D. Dijamco  
S. Bhatt

Date: July 8, 2022

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT NO. 267 RE: REACTOR COOLANT SYSTEM PRESSURE/TEMPERATURE LIMITS AND LOW TEMPERATURE OVERPRESSURE SETPOINTS APPLICABLE FOR 55 EFFECTIVE FULL POWER YEARS (EPID L-2021-LLA-0165) DATED JULY 8, 2022

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