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

May 29, 2026

Mr. Terry J. Brown
Site Vice President
Vistra Operations Company LLC
Perry Nuclear Power Plant
10 Center Rd., Mail Stop A-PY-A290
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 208 RE: RELOCATION OF PRESSURE AND TEMPERATURE LIMIT CURVES TO THE PRESSURE TEMPERATURE REPORT (EPID L-2026-LLA-0035)

Dear Mr. Brown:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 208 to Renewed Facility Operating License No. NPF-58 for Perry Nuclear Power Plant, Unit No. 1. This amendment consists of changes to the license and technical specifications (TSs) in response to your application dated February 26, 2026, as supplemented by letter dated May 5, 2026.

The amendment replaces the existing reactor vessel heatup and cooldown rate limits and the pressure and temperature limit curves with references to the Pressure and Temperature Limits Report.

A copy of the related safety evaluation is also enclosed. A Notice of Issuance will be included in a future Commission *Federal Register* notice.

Sincerely,

/RA/

Scott P. Wall, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:
1. Amendment No. 208 to NPF-58
2. Safety Evaluation
3. Notice and Environmental Finding

cc: Listserv

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

VISTRA OPERATIONS COMPANY LLC

ENERGY HARBOR NUCLEAR GENERATION, LLC

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 208
Renewed License No. NPF-58

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by Vistra Operations Company LLC dated February 26, 2026, as supplemented by letter dated May 5, 2026, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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-58 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 208, are hereby incorporated into the license. Vistra Operations Company LLC 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 its issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

ILKA BERRIOS

Digitally signed by ILKA BERRIOS
Date: 2026.05.29 11:16:51 -04'00'

Ilka Berrios, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License and
Technical Specifications

Date of Issuance: May 29, 2026

ATTACHMENT TO LICENSE AMENDMENT NO. 208

RENEWED FACILITY OPERATING LICENSE NO. NPF-58

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

Replace the following pages of the Renewed Facility Operating Licenses and 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 Licenses

REMOVE	INSERT
Page 3	Page 3

Technical Specifications

REMOVE	INSERT
1.0 – 5	1.0 – 5
3.4 – 26	3.4 – 26
3.4 – 27	3.4 – 27
3.4 – 28	3.4 – 28
3.4 – 29	3.4 – 29
3.4 – 30	3.4 – 30
3.4 – 31	----------
3.4 – 31a	----------
3.4 – 31b	----------
5.0 – 18	5.0 – 18
----------	5.0 – 18a

(3) Vistra Operations Company LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) Vistra Operations Company LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, and special nuclear material such as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and fission detectors in amounts as required;

(5) Vistra Operations Company LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction as to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) Vistra Operations Company LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

(7) Deleted

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

Vistra Operations Company LLC is authorized to operate the facility at reactor core power levels not in excess of 3758 megawatts thermal (100% power) in accordance with the conditions specified herein.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 208, are hereby incorporated into the renewed license. Vistra Operations Company LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

a. Energy Harbor Nuclear Generation LLC shall comply with the antitrust conditions delineated in Appendix C to this renewed license; Appendix C is hereby incorporated into this renewed license.

1.1 Definitions (continued)

MINIMUM CRITICAL POWER RATIO (MCPR)	The MCPR shall be the smallest critical power ratio (CPR) that exists in the core for each class of fuel. The CPR is that power in the assembly that is calculated by application of the appropriate correlation(s) to cause some point in the assembly to experience boiling transition, divided by the actual assembly operating power.
MODE	A MODE shall correspond to any one inclusive combination of mode switch position, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.
OPERABLE – OPERABILITY	A system, subsystem, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)	The PTLR is the document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, for the current reactor vessel fluence period. The pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.7.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3758 MWt.
REACTOR PROTECTION SYSTEM (RPS) RESPONSE TIME	The RPS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RPS trip setpoint at the channel sensor until de-energization of the scram pilot valve solenoids. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for transmitters in the Online Monitoring Program provided that the methodology for verification has been previously reviewed and approved by the NRC. Exceptions are stated in the individual surveillance requirements.

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 RCS Pressure and Temperature (P/T) Limits

LCO 3.4.11 RCS pressure, RCS temperature, RCS heatup and cooldown rates, and the recirculation loop temperature requirements shall be maintained within limits specified in the PTLR.

APPLICABILITY: At all times.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Required Action A.2 shall be completed if this Condition is entered. ---------- Requirements of the LCO not met in MODES 1, 2, and 3.	A.1 Restore parameter(s) to within limits. AND A.2 Determine RCS is acceptable for continued operation.	30 minutes 72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ----------NOTE---------- Required Action C.2 shall be completed if this Condition is entered ---------- Requirements of the LCO not met in other than MODES 1, 2, and 3.	C.1 Initiate action to restore parameter(s) to within limits. AND C.2 Determine RCS is acceptable for operation	Immediately Prior to entering MODE 2 or 3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	----------NOTE---------- Only required to be performed during RCS heatup and cooldown operations and RCS inservice leak and hydrostatic testing. ---------- Verify: a. RCS pressure and RCS temperature are within the limits specified in the PTLR, and b. RCS heatup and cooldown rates are within the limits specified in the PTLR.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.11.2	----------NOTE---------- Only required to be met during control rod withdrawal for the purpose of achieving criticality. ----------	
	Verify RCS pressure and RCS temperature are within the criticality limits specified in the PTLR.	Once within 15 minutes prior to control rod withdrawal for the purpose of achieving criticality
SR 3.4.11.3	----------NOTE---------- Only required to be met in MODES 1, 2, 3, and 4 with reactor steam dome pressure ≥ 25 psig during recirculation pump start. ----------	
	Verify the difference between the bottom head coolant temperature and the reactor pressure vessel (RPV) coolant temperature is within the limits specified in the PTLR.	Once within 15 minutes prior to each startup of a recirculation pump
SR 3.4.11.4	----------NOTE---------- Only required to be met in MODES 1, 2, 3, and 4 during recirculation pump start. ----------	
	Verify the difference between the reactor coolant temperature in the recirculation loop to be started and the RPV coolant temperature is within the limits specified in the PTLR.	Once within 15 minutes prior to each startup of a recirculation pump

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.11.5	----------NOTE---------- Only required to be performed when tensioning the reactor vessel head bolting studs. ---------- Verify reactor vessel flange and head flange temperatures are within the limits specified in the PTLR.	In accordance with the Surveillance Frequency Control Program
SR 3.4.11.6	----------NOTE---------- Not required to be performed until 30 minutes after RCS temperature ≤ 80°F in MODE 4. ---------- Verify reactor vessel flange and head flange temperatures are within the limits specified in the PTLR.	In accordance with the Surveillance Frequency Control Program
SR 3.4.11.7	----------NOTE---------- Not required to be performed until 12 hours after RCS temperature ≤ 100°F in MODE 4. ---------- Verify reactor vessel flange and head flange temperatures are within the limits specified in the PTLR.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.11.8	----------NOTE---------- Only required to be met in single loop operation during increases in THERMAL POWER or recirculation loop flow with the operating recirculation loop jet pump flow ≤ 50% of rated core flow or THERMAL POWER ≤ 30% of RTP, and with reactor vessel steam dome pressure ≥ 25 psig. ---------- Verify the difference between the bottom head coolant temperature and the RPV coolant temperature is within the limits specified in the PTLR.	Once within 15 minutes prior to an increase in THERMAL POWER or an increase in loop flow
SR 3.4.11.9	----------NOTE---------- Only required to be met in single loop operation during increases in THERMAL POWER or recirculation loop flow with the operating recirculation loop jet pump flow ≤ 50% of rated core flow, or THERMAL POWER ≤ 30% of RTP, and the idle recirculation loop not isolated from the RPV. ---------- Verify the difference between the reactor coolant temperature in the recirculation loop not in operation and the RPV coolant temperature is within the limits specified in the PTLR.	Once within 15 minutes prior to an increase in THERMAL POWER or an increase in loop flow
SR 3.4.11.10	The reactor vessel material surveillance specimens shall be removed and examined to determine changes in reactor pressure vessel material properties.	In accordance with the schedule required by 10 CFR 50, Appendix H

5.6 Reporting Requirements

5.6.5 Core Operating Limits Report (COLR) (continued)

4. LCO 3.3.1.1, RPS Instrumentation (SR 3.3.1.1.14),

5. LCO 3.3.1.3, Oscillation Power Range Monitor (OPRM) Instrumentation,

6. The $MCPR_{99.9\%}$ value used to calculate the LCO 3.2.2, "MCPR," limit, and

7. The as-found Overpressure Protection System lift pressures for Specification 3.4.4.

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC in 1). NEDE-24011-P-A, General Electric Standard Application for Reactor Fuel or 2). NEDO-32465 "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications". (The approved revision at the time reload analyses are performed shall be identified in the COLR.)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 Special Reports

Deleted.

5.6.7 Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR)

RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the Limiting Condition for Operation and Surveillance Requirements Section 3.4.11, "RCS Pressure and Temperature (P/T) Limits."

The analytical methods used to determine the RCS pressure and temperature limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

(continued)

5.6 Reporting Requirements

5.6.7 Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR) (continued)

BWROG-TP-11-022-A, Revision 1 (SIR-05-044), “Pressure-Temperature Limits Report Methodology for Boiling Water Reactors,” dated August 2013, (ML13277A557).

The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluence period and for any revision or supplements thereto.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 208 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-58

VISTRA OPERATIONS COMPANY LLC

ENERGY HARBOR NUCLEAR GENERATION, LLC

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By letter dated February 26, 2026 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML26061A012), as supplemented by letter dated May 5, 2026 (ML26125A189), Vistra Operations Company LLC (Vistra, the licensee) submitted a license amendment request (LAR) to modify the technical specifications (TSs) for Perry Nuclear Power Plant (PNPP), Unit No. 1.

The LAR states that the format and content of TS changes proposed are consistent with those defined Technical Specifications Task Force (TSTF) Traveler TSTF-419, "Revise PTLR [Pressure and Temperature Limits Report] Definition and References in ISTS [Improved Standard Technical Specification] 5.6.6, RCS [Reactor Coolant System] PTLR" (ML012690234), and the criteria for relocating pressure and temperature (P-T) limit curves and other RCS limits into a PTLR, as established in the U.S. Nuclear Regulatory Commission (NRC or Commission) Generic Letter (GL) 96-03, "Relocation of Pressure and Temperature Limit Curves and Low Temperature Overpressure Protection System Limits" (ML031110004). The licensee's proposed revisions to the PNPP TSs are given in Attachment 2 of the LAR. The NRC staff performed an audit of the LAR from April 6, 2026, through May 15, 2026. A summary of the staff's audit is provided in the Audit Report of May 15, 2026 (ML26126A005).

Attachment 5 of the LAR included the PTLR, Revision 1, which was developed in accordance with newly proposed TS, Section 5.6.7. Revision 2 of the PTLR was submitted in an enclosure to the May 5, 2026, LAR supplement. In this regard, the May 5, 2026, version of the PTLR replaces the version of the PTLR that was enclosed as Attachment 5 in the February 26, 2026, letter. Therefore, further reference to the PTLR in this safety evaluation (SE) refers to the May 5, 2026, version unless otherwise noted.

A notice of consideration of proposed issuance of amendments with proposed no significant hazards consideration determination was published in the *Federal Register* on March 11, 2026 (91 FR 12005), and there has been no public comment on such finding. The supplemental letter

dated May 5, 2026, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in this notice**.**

Throughout the LAR, the licensee refers to TSTF-419-A as a basis for the requested amendment. The NRC staff notes that the "-A" designation added to TSTF-419 is an industry convention used to indicate that the traveler has been approved by the NRC. TSTF-419 and TSTF-419-A are the same document. However, since TSTF-419-A is not an NRC designation, this SE refers to the technical specification change traveler as TSTF-419.

2.0 REGULATORY EVALUATION

2.1 Proposed TS Changes

The licensee proposed changes that would relocate the P-T limits for the reactor pressure vessel to the licensee-controlled PTLR and adopt TSTF-419. The licensee stated the proposed changes are consistent with the guidance in GL 96-03, as supplemented by TSTF-419.

The LAR proposed to change TS Section 1.0, "Definitions," to add a new definition for PTLR as follows:

> Pressure and Temperature Limits Report (PTLR)
>
> The PTLR is the document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, for the current vessel fluence period. The pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.7.

The LAR proposed the following changes to TS Section 3.4.11, "RCS Pressure and Temperature (P/T) Limits:"

- The text referring to the P-T curves and the associated TS wording in Limiting Condition for Operation (LCO) 3.4.11, and Surveillance Requirements (SR) 3.4.11.1 thru 3.4.11.9 would be replaced with reference to "within the limits specified in the PTLR," and

- P-T curves specified in TS Figures 3.4.11-1(a) through 3.4.11-1(c) would be deleted.

The LAR would add a new Section 5.6.7 "Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR)" as follows:

> 5.6.7 Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR)
>
> RCS pressure and temperature limits for heat up, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the Limiting Conditions for Operation and Surveillance Requirement Section 3.4.11, "RCS Pressure and Temperature (P/T) Limits."
>
> The analytical methods used to determine the RCS pressure and temperature limits shall be those previously reviewed and approved by the NRC, specifically

those described in the following documents:

> BWROG [Boiling Water Reactor Owners Group]-TP-11-022-A, Revision 1 (SIR-05-044), "Pressure Temperature Limits Report Methodology for Boiling Water Reactors," dated August 2013, (ML13277A557).

The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluence period and for any revision or supplement thereto.

2.2 Applicable Regulation and Guidance

The regulation in Title 10 of the *Code of Federal Regulations* (10 CFR), section 50.36, “Technical specifications,” paragraph (a), requires that each operating license application for a production or utilization facility include proposed TS and a summary statement of the bases for such specifications. Paragraph (c) of 10 CFR 50.36 requires, in part, that TS include the following categories related to facility operation: (1) safety limits, limiting safety systems settings, and control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

The regulations in 10 CFR 50.60, “Acceptance Criteria for Fracture Prevention Measures for Light Water Nuclear Power Reactors for Normal Operation,” requires that all operating light-water nuclear power reactors meet the fracture toughness requirements for the reactor coolant pressure boundary (RCPB) set forth in 10 CFR, Part 50, Appendix G, “Fracture Toughness Requirements.”

The regulations in 10 CFR Part 50, Appendix G, “Fracture Toughness Requirements,” require: (1) sufficient fracture toughness for reactor pressure vessel (RPV) ferritic materials to provide adequate safety margins during any condition of normal operation, including anticipated operational occurrences and system hydrostatic tests; (2) P-T limits that satisfy the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Appendix G, and the minimum temperature requirements during normal heatup, cooldown, and pressure test operations; and (3) applicable surveillance data from RPV material surveillance programs developed in accordance with 10 CFR, Part 50, Appendix H , “Reactor Vessel Material Surveillance Program Requirements,” be incorporated into the calculations of P-T limits.

The regulations in 10 CFR, Part 50, Appendix H, “Reactor Vessel Material Surveillance Program Requirements,” require licensees to implement a material surveillance program to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light-water nuclear power reactors which result from exposure of these materials to neutron irradiation and the thermal environment.

GL 96-03, “Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection Systems Limits” dated January 31, 1996 (ML031110004), permits relocation of the P-T limits from the TS to a PTLR. GL 96-03 establishes a position that licensees seeking a license amendment for relocation of the applicable P-T limits into a PTLR should: (1) generate their P-T limits in accordance with an NRC-approved methodology, (2) comply with 10 CFR, Part 50, appendices G and H, (3) reference NRC-approved methodologies in the TS, (4) define the PTLR in TS, section 1.0, (5) develop a PTLR to contain the P-T limit curves, and (6) modify applicable sections of the TS accordingly.

Regulatory Guide (RG) 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence” (ML010890301), describes methods acceptable to the NRC staff for determining the RPV neutron fluence with respect to meeting the regulatory requirements discussed above.

RG 1.99, Revision 2 (RG 1.99), “Radiation Embrittlement of Reactor Vessel Materials,” dated May 1988 (ML003740284), describes procedures for calculating the adjusted nil-ductility transition reference temperature (ART) due to neutron irradiation.

GL 92-01, Revision 1, “Reactor Vessel Structural Integrity, 10 CFR 50.54(f),” dated March 6, 1992 (ML031070438), requested that licensees submit their plant specific RPV data to the NRC staff for review. GL 92-01, supplement 1, dated May 19, 1995 (ML031070449), requested that licensees provide and assess data from other licensees that could affect their RPV integrity.

The NRC 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 (ML14149A165), provides evaluation guidance for P-T limit curves and PTLRs, including the consideration of neutron fluence and structural discontinuities in the development of P-T limit curves.

The NRC guidance in NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition” (SRP), section 5.3.2, Revision 2, “Pressure-Temperature Limits, Upper-Shelf Energy, and Pressurized Thermal Shock” (ML070380185), provides an acceptable method for determining the P-T limits based on the requirements in 10 CFR, Part 50, Appendix G, and 10 CFR 50.61.

By letter dated September 4, 2013 (ML13277A557), BWROG issued BWROG-TP-11-022-A, Revision 1, “Pressure-Temperature Limits Report Methodology for Boiling Water Reactors”.

2.3 Proposed Changes to Technical Specification Bases

Consistent with 10 CFR 50.36(a)(1), the licensee submitted corresponding changes to the TS Bases, for information only, that provide the reasons for the proposed TSs changes. The NRC regulation at 10 CFR 50.36(a)(1) states that a summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TS. The licensee shall make changes to the plant TS Bases in accordance with the “TS Bases Control Program,” found at TS 5.5.11 for PNPP.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the LAR and the proposed PTLR implementation in accordance with the guidance in GL 96-03 and TSTF-419. As such, the NRC staff evaluated the updated ART and P-T limit calculations included in the PTLR, as assessed in accordance with methods or guidance in BWROG-TP-11-022-A, RG 1.99, and SRP 5.3.2, and the applicable requirements for P-T limit assessments in 10 CFR, Part 50, Appendix G, and RPV material surveillance programs in 10 CFR, Part 50, Appendix H.

3.1 Evaluation of the PTLR Information with the Criteria in GL 96-03

The NRC staff evaluated the proposed PNPP PTLR in accordance with the criteria in Attachment 1 to GL 96-03, as discussed below.

3.1.1 Criterion 1 – Neutron Fluence Values

GL 96-03, Criterion 1, establishes that the PTLR should provide the values of neutron fluences that are used in the calculations of ART.

3.1.1.1 Conditions and Limitations

The NRC SE for the BWROG-TP-11-022-A, contained one condition for future potential applicants to address in their application of this licensing technical review (LTR) to their plant-specific P-T limits or PTLR submittal:

> Each applicant referencing this LTR shall confirm that, in addition to the requirements in the ASME Code, Section XI, Appendix G, the lowest service temperatures for all ferritic RCPB components that are not part of the RPV, are below the lowest operating temperature in the proposed P-T limits.

PNPP has confirmed the lowest service temperatures for all ferritic reactor RCPB components that are not part of the RPV, are below the lowest operating temperature in the proposed P-T limits. This confirmation has been included in section 4.0, “Operating Limits,” of PNPP PTLR. The NRC staff confirms that the changes are, therefore, acceptable.

3.1.1.2 Pressure and Temperature Limits Report

Three regions of the RPV were evaluated to develop the revised P-T curves: the beltline region, the bottom head region, and the non-beltline region. These regions bound all other regions with respect to brittle fracture. The methodology used to generate the P-T curves in this submittal is approved by the NRC and uses ART values determined in accordance with RG 1.99, Revision 2. The revised P-T curves and outputs from the integrated surveillance program (ISP) ensure that adequate RPV safety margins against non-ductile failure will continue to be maintained during normal operations, anticipated operational occurrences, and inservice leak and hydrostatic testing. Together, these measures ensure that the integrity of the RCPB will be maintained for the life of the plant. These proposed changes are consistent with the guidance provided in GL 96-03, as supplemented by TSTF-419. The NRC staff finds that the changes are, therefore, acceptable.

3.1.1.3 Neutron Fluence Calculations

During its review of the licensee’s license renewal application (LRA), the NRC staff previously determined fluence calculational method acceptability by confirming that the methodology used to determine 54 effective full power years (EFPY) fluence values was the same as the NRC-approved methodology used to produce 32 EFPY fluence values (see SE report dated August 21, 2025, Revision 1 (ML25231A221)). The licensee stated that the LAR was prepared in accordance with the guidelines of GL 96-03 and TSTF-419. The regulations in 10 CFR, Part 50, Appendix G, require reactor vessel beltline materials to be tested in accordance with the surveillance program requirements of 10 CFR, Part 50, Appendix H.

The LAR stated that neutron fluence is calculated in accordance with RG 1.190, using the Radiation Analysis Modeling Application (RAMA) computer code. The ART values for the limiting beltline materials are calculated in accordance with NRC RG 1.99. The LAR stated that GL 96-03 allows plants to relocate their P-T curves and associated numerical limits (such as heatup and cooldown rates) from the plant TS to a PTLR, which is a licensee-controlled document. As stated in GL 96-03, during the development of the improved STS, a change was proposed to relocate the P-T limits currently contained in the plant TS to a PTLR. As one of the improvements to the STS, the NRC staff agreed with the industry that the curves may be relocated outside the plant TS to a PTLR so that the licensee could maintain these limits efficiently. One of the prerequisites for having the PTLR option is that the P-T curves and limits be derived using methodologies approved by the NRC, and that the associated licensing topical reports describing the approved methodologies be referenced in the plant TS.

The NRC staff evaluated the proposed PNPP PTLR in accordance with the criteria in Attachment 1 to GL 96-03, as discussed below.

Criterion 1 provides that the PTLR methodology should describe the transport calculation methods including computer codes and formula used to calculate neutron fluence values. As stated in the LAR, the licensee utilized the BWROG-TP-11-022-A, report methodology to generate the P-T limits. The methodology is an NRC-approved method for use in generating PTLRs. The PTLR methodology describes the transport calculation methods, including computer codes and formula used to calculate neutron fluences. The NRC staff finds that PNPP PTLR has satisfied Criterion 1 of Attachment 1 to GL 96-03 because the PTLR provides appropriate transportation calculation methods that satisfy RG 1.190.

PNPP has replaced the original RPV material surveillance program with the Boiling Water Reactor Vessel and Internals Project (BWRVIP) ISP. PNPP is committed to using the BWRVIP ISP during the current licensed period. Use of the BWRVIP ISP for PNPP was approved by the NRC in NUREG-2205. PNPP, Units 1 and 2, have made a license renewal commitment to use the ISP during the period of extended operation. The Reactor Vessel Surveillance program is based on BWRVIP-86, Revision 1-A, “BWR Vessel and Internals Project Updated BWR Integrated Surveillance Program (ISP) Implementation Plan,” (BWRVIP-86) dated May 2013 (ML13176A097). The NRC staff finds that the use of the BWRVIP ISP acceptable.

Based on the above, the NRC staff finds: (1) the fluence calculational method inputs are representative of past operating conditions, and (2) the licensee has provided confidence that current and future operating conditions will be appropriately accounted for and will result in updated fluence projections when necessary. The fluence calculational method described is acceptable for use with the PTLR methodology based on appropriate 54 EFPY fluence projections made using an RG 1.190 adherent methodology. The licensee stated that the LAR was prepared in accordance with the guidelines of GL 96-03 and TSTF-419. Therefore, the NRC staff has reasonable assurance that the proposed PTLR and subsequent updates will use appropriate fluence calculational method inputs with an acceptable fluence calculational method adherent to RG 1.190.

3.1.2 Criterion 2 – RPV Surveillance Capsule Withdrawal Schedule

The reviewers’ notes included with the model TSs in GL 96-03 states that “The Reactor Vessel Material Surveillance Program shall comply with Appendix H to 10 CFR, Part 50. The reactor vessel material irradiation surveillance specimen removal schedule shall be provided, along with

how the specimen examinations shall be used to update the PTLR curves."

GL 96-03, Criterion 2, establishes that the PTLR shall provide the RPV surveillance capsule withdrawal schedule, or reference (by number and title) the record(s) that provide the RPV surveillance withdrawal schedule. GL 96-03, Criterion 2, also establishes that the PTLR should provide or reference applicable RPV surveillance capsule reports if the ART values are calculated using surveillance data.

Consistent with the NRC staff's approval of BWRVIP-86, the NRC staff noted that the licensee defined how the BWRVIP ISP is applied to the PNPP current licensing basis (CLB) in chapter 5, "Reactor Coolant System and Connected Systems" (ML25273A416), of the PNPP Updated Safety Analysis Report (USAR) with USAR, section 5.3.1.6 and USAR table 5.3-3, providing the times of the past RPV surveillance capsule withdrawals and future capsule withdrawal schedules of PNPP RPV surveillance capsules implemented under the BWRVIP ISP.

The NRC staff confirmed that the PTLR identifies that the licensee has removed two RPV surveillance capsules from the PNPP RPV, one at 5.5 EPFY and a second capsule at 20.0 EPFY. The licensee indicates that one additional (supplemental) capsule is available in the PNPP RPV for further use under the BWRVIP ISP, and that the capsule will be removed (for testing of test specimens in the capsule) at a time that is consistent with the proprietary schedule for the capsule's removal in BWRVIP-86. The NRC staff finds this acceptable for implementation because it is based on the time specified for the PNPP supplemental capsule withdrawal in BWRVIP-86, and the licensee's withdrawal schedule for PNPP surveillance capsules in USAR, table 5.3-3.

Thus, based on its review, the NRC staff concludes that the PTLR conforms to GL 96-03, Criterion 2, because: (1) the PTLR adequately describes the application implementation of BWRVIP ISP withdrawal schedule (as referenced to BWRVIP-86) for the PNPP CLB, and (2) the PTLR addresses the future PNPP supplemental capsule withdrawal and testing needs consistent with the staff's October 20, 2011, SE for BWRVIP-86, and the NRC staff's approval for PNPP implementation of BWRVIP-86, in SE report dated August 21, 2025, Revision 1.

3.1.3 Criterion 3 – Description of the Low-Temperature Overpressure Protection System Limits

GL 96-03, Criterion 3, establishes that, for pressurized-water reactor (PWR) designs, the PTLR should provide the low-temperature overpressure protection (LTOP) system setpoint curves or setpoint values. LTOP does not apply to PNPP because it is a BWR design and the criterion is only applicable to PWR designs. Thus, the NRC staff finds that the PNPP PTLR did not need to address conformance with GL 96-03, Criterion 3.

3.1.4 Criterion 4 – Methods for Calculating ART Values and Identification of Limiting ART Values

GL 96-03, Criterion 4, establishes that the PTLR methodology shall describe the method for calculating the ART values using the methods of analysis in RG 1.99. GL 96-03, Criterion 4, establishes that the PTLR identify the limiting materials and limiting values of ART at the one-quarter thickness (¼T) and three-quarter thickness (¾T) locations of the RPV.

Section 3.0 of the PTLR states that the calculations of RPV beltline material ART values are performed in accordance with RG 1.99. The NRC staff also confirmed that Appendix A of the

BWROG-TP-11-022-A, methodology defines how the ART values will be calculated consistent with methods contained in RG 1.99. The NRC staff performed an independent calculation and verified that the licensee's ARTs for the limiting materials were calculated in accordance with RG 1.99, Revision 2. Therefore, the NRC staff finds that PNPP PTLR has satisfied Criterion 4.

3.1.5 Criterion 5 – Description of the Fracture Toughness Methods and Inclusion of P-T Limit Curves in the PTLR

GL 96-03, Criterion 5, establishes that the PTLR methodology should describe the application of fracture mechanic methods used in the construction of P-T limit curves based on the methods of analysis in ASME Code, section XI, Appendix G, and in SRP, section 5.3.2. For the contents of the PTLR, GL 96-03, Criterion 5, establishes that the PTLR should provide the P-T limit curves for plant heatups, cooldowns, critical operations, and RCS leak rate or hydrostatic pressure testing.

In Section 3 of the LAR, the licensee states that the P-T curves were calculated in accordance with NRC-approved BWROG-TP-11-022-A, Revision 1 which is based on the ASME Code, Section XI, Appendix G, and SRP Section 5.3.2. The NRC staff confirmed that the methodology criteria in chapter 3 of BWROG-TP-11-022-A, includes the applicable fracture mechanics basis for calculating P-T limit heatup and cooldown curves associated with RCS leak rate or hydrostatic pressure test conditions, normal operations - core non-critical conditions, and normal operations with the unit in the core critical condition. Consistent with the fracture mechanics methods defined in BWROG-TP-11-022-A, Revision 1, the staff confirmed that the licensee provides its P-T limit heatup/cooldown curves for these types of operating conditions in PTLR, with each P-T limit curve figure containing individual P-T limit curves for the beltline, non-beltline, and bottom head regions of the RPV and a composite P-T limit curve that was derived from the most bounding P-T points.

Therefore, based on this review, the NRC staff finds that the PTLR conforms to GL 96-03, Criterion 5, because the PTLR contains the appropriate P-T limit curves for the applicable pressure test, normal – core not critical, and normal – core critical operating conditions.

3.1.6 Criterion 6 – Incorporation of 10 CFR, Part 50, Appendix G, Minimum Temperature Requirements into Derivation of the P-T Limit Curves

GL 96-03, Criterion 6, establishes that the PTLR methodology should describe how the minimum temperature requirements in table 1 of 10 CFR, Part 50, Appendix G, for the RCS during leak rate or hydrostatic pressure test operating conditions, normal operations of the unit with the unit in the non-critical condition, and normal operations of the unit with the unit in the core critical condition, will be factored into the development of the P-T limit curves. For the contents of the PTLR, GL 96-03, Criterion 6, establishes that the PTLR should identify the minimum temperatures that are accounted for and included in the P-T limit calculations.

Consistent with the minimum temperature criteria defined and discussed in section 2.7 of BWROG-TP-11-022-A, the NRC staff confirmed that the licensee accounted for all appropriate 10 CFR, Part 50, Appendix G, minimum temperature requirements in the licensee's development of the P-T limit curves of the beltline, non-beltline and bottom head regions and the composite P-T limit curves that were included in the P-T limit figure of the PTLR.

Therefore, based on this review, the NRC staff finds that the PTLR conforms to GL 96-03, Criterion 6, for inclusion of minimum service temperature requirements in the P-T limit curves

because the NRC staff has confirmed that the P-T limit curves appropriately account for the minimum temperature requirements specified in table 1 of 10 CFR, Part 50, Appendix G, for the applicable operating condition categories.

3.1.7 Criterion 7 – Incorporation of RPV Surveillance Data into ART Calculations

GL 96-03, Criterion 7, establishes that the PTLR methodology should describe how the data from multiple surveillance capsules are used in the ART calculations, and describe the procedure that is used if the measured ART value exceeds the predicted ART value (i.e., describe the procedure for assessing data credibility). For the contents of the PTLR, GL 96-03, Criterion 7, establishes that the PTLR should provide the supplemental data and calculations of the chemistry factor in the PTLR if the surveillance data are used in the ART calculations, evaluate the surveillance data to determine if they meet the credibility criteria in RG 1.99, and provide the results of the ART calculations.

The NRC staff confirmed that the licensee provided the BWRVIP ISP surveillance data and calculations of chemistry factor using the surveillance data. The NRC staff also confirmed that the licensee provided the 54 EPFY ART data and results for the BWRVIP ISP surveillance plate materials and surveillance weld materials representing PNPP in Table 8 of the PTLR. The NRC staff also confirmed that the licensee included the applicable surveillance data credibility assessments for the designated PNPP surveillance materials in the BWRVIP-135 report.

The NRC staff determined that the PNPP PTLR is consistent with the procedure in BWRVIP-86, with respect to the use of BWRVIP ISP capsule surveillance data in the ART calculation, and therefore finds that PNPP PTLR satisfied Criterion 7.

3.1.8 Conclusion of GL 96-03 Criterion

As discussed above, the NRC staff finds that the PNPP PTLR has satisfied all seven criteria in Attachment 1 to GL 96-03. Therefore, the proposed changes require that the PTLR establish PNPP RCS P-T Limits using the BWROG methodology and be submitted to the NRC upon issuance, which provides recordkeeping and reporting requirements necessary to assure operation of the facility in a safe manner, as required by 10 CFR 50.36(c)(5).

3.2 P-T Limits Evaluation

The proposed PNPP PTLR is presented in Attachment 5 of the LAR. The licensee stated that it prepared the P-T limit curves and PTLR in accordance with GL 96-03; TSTF-419-A; ASME Code, Section XI, Appendix G; and BWROG-TP-11-022-A, Revision 1. Specifically, the licensee calculated (1) the P-T limits in accordance with BWROG-TP-11-022-A, Revision 1, and the ASME Code, Section XI, Appendix G; (2) neutron fluence in accordance with RG 1.190 using the RAMA computer code, and (3) ART values for the limiting beltline materials in accordance with RG 1.99, Revision 2.

The licensee referenced supporting data and calculations from BWRVIP-135, “Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program Data Source Book and Plant Evaluations,” for determining the proprietary Integrated Surveillance Program (ISP) material chemistry factor values listed in the PTLRs.

The licensee constructed P-T curves for three plant operating conditions (i.e., the hydrostatic pressure and leak test condition (Curve A), normal operation with core not critical condition

(Curve B), and normal operation with core critical condition (Curve C)). In each of Curves A, B, and C, the licensee also constructed a P-T curve for each of three RPV regions – the beltline region, non-beltline region, and bottom head region. The licensee stated that its composite P-T curves contain the bounding P-T curves from the three regions of the RPV, including the shell plates and structural discontinuities such as nozzles.

The licensee used finite element models to generate the thermal and pressure stress distributions for feedwater (FW) nozzles, water level instrument (WLI) nozzles, and the RPV cylinder and bottom head shells. The licensee used the thermal and pressure stress distributions to derive the thermal stress intensity factor, K_{IT}, and pressure stress intensity factor, K_{ip}. Finally, the licensee constructed P-T curves by comparing K_{IT} and K_{ip} to the material toughness of the RPV materials.

The NRC staff performed independent calculations to verify the proposed P-T limit curves using BWROG-TP-11-022-A, Revision 1; the ASME Code, Section XI, Appendix G; SRP 5.3.2; and 10 CFR, Part 50, Appendices G and H. Specifically, the NRC staff verified the temperature rate limits, ART calculations, and P-T limit curves as discussed below.

3.2.1 Temperature Limits

The PNPP PTLR specifies the following temperature rates and limits as follows:

- Heat-up/cool-down rate limit during Hydrostatic Class 1 Leak Testing: ≤ 25°F/hour.
- Heat-up/cool-down rate limit during normal operating: ≤ 100°F/hour.
- The difference between the bottom head coolant temperature and the RPV coolant temperature is ≤ 100°F.
- The difference between the reactor coolant temperature in (a) the recirculation loop not in operation, or (b) the recirculation loop to be started, and the RPV coolant temperature is ≤ 50°F.
- Reactor vessel flange and head flange temperatures are ≥ 70°F.

The NRC staff finds the above temperature rates and limits acceptable because they are consistent with the limits in typical BWR P-T curves and are consistent with those used in the licensee's P-T curve calculations.

3.2.2 Adjusted Nil-Ductility Transition Reference Temperature

The NRC staff notes that a typical P-T curve is constructed based on the fracture toughness of the RPV material resisting a postulated flaw with a depth of ¼ T (T = RPV shell wall thickness) at the inside surface (i.e., at the ¼ T location) and a postulated flaw at the outside surface (i.e., at the ¾ T locations) of the RPV shell wall thickness. As such, the adjusted nil-ductility transition reference temperature, ART, of the RPV material is calculated at the ¼ T and ¾ T locations as specified in RG 1.99, Revision 2. However, the licensee calculated the ART at the ¼ T location only because BWROG-TP-11-022-A considers that the thermal gradient stresses at the ¼T location are assumed to be tensile for both heat-up and cool-down operation. The licensee explained that this approach is conservative because irradiation effects cause the allowable toughness at the ¼ T location to be less than that at the ¾ T location for a given metal temperature. The NRC staff performed an independent calculation based on the licensee's approach and confirmed that the licensee's approach is conservative because the licensee's methodology results in higher reactor coolant pressures and temperatures that the operators

have to meet during the normal operation to minimize embrittlement in the reactor vessel materials. Therefore, the NRC staff finds the licensee's simplified approach results in conservative P-T curves and, therefore, is acceptable.

As part of P-T curves, the licensee also presented the stress intensity factors of the FW nozzle and WLI nozzle. The WLI nozzle is located in the lower-intermediate shell beltline region. As such, the licensee used the ART value for the limiting material in the beltline for the P-T curve analysis.

For PNPP, Unit No. 1, the NRC staff verified that the limiting beltline material is lower intermediate RPV shell axial weld No. BD, BF, heat number 627260 with an ART of 69.6°F that is projected to 54 EFPY.

The NRC staff finds that the ART values for the limiting materials are acceptable because the licensee calculated the ARTs based on RG 1.99, Revision 2 and the BWRVIP ISP data.

4.3.3 P-T Curves

The NRC staff evaluated each of Curves A, B, and C which contains three sub-category curves. The sub-category curves are the beltline region curve, non-beltline region curve, and bottom head region curve. In addition, Curves A, B, and C contain the bounding curve representing the beltline region, non-beltline region and bottom head region as discussed below.

4.3.3.1 RPV Beltline Region Curve

The licensee stated that its P-T curves are developed to bound all ferritic materials in the RPV, including the structural discontinuities such as nozzles. The licensee further stated that the RPV beltline region includes the FW nozzle, the WLI nozzle, and the beltline shell plates and welds. For the beltline region, the licensee constructed three P-T curves-- one for the limiting beltline component (e.g., shell weld), one for the FW nozzle, and one for the WLI nozzle. From these three P-T curves, the licensee selected a single bounding P-T curve representing the beltline region to be used in Curves A, B, and C.

To construct the P-T curve for the limiting beltline shell plate, the licensee derived the maximum K_{ip}, and K_{it}, used the ART, and constructed the curve in accordance with equations in BWROG-TP-11-022-A, Revision 1.

To construct the PT curve for the FW nozzle, the licensee used a three dimensional symmetric one quarter size finite element model. The licensee postulated a ¼ T wall thickness flaw located at the FW nozzle blend radius, derived the maximum K_{ip}, and K_{it}, and constructed the PT curve for the FW nozzle in accordance with BWROGTP11022A, Revision 1. The licensee used the temperature-dependent material properties from the ASME Code, Section III, 1971 Edition with 1972 Winter Addenda, and the ASME Code, Section III, 2007 Edition with 2008 Addenda for the density and Poisson's ratio. The PNPP, Unit No. 1, reactor vessel is made of SA533, Grade B material.

The NRC staff evaluated the P-T curves for the beltline shell plate, FW nozzle and WLI nozzle. The NRC staff verified that the P-T curve representing the beltline region in Curves A, B and C for the Unit 1 PTLR and Unit 2 PTLR are acceptable because (1) it was constructed based on BWROG-TP-11-022-A, Revision 1, and BWROG-TP-11-023-A, Revision 0, and (2) it bounds curve from the P-T curves for the beltline shell plate, LPCI nozzle, and Instrument nozzle.

4.3.3.2 RPV Non-Beltline Region Curve

Appendix G to 10 CFR, Part 50 requires that the P-T limit curves be developed for the ferritic materials not in the RPV beltline region. In addition, RIS 2014-11 clarifies that P-T curve calculations for ferritic RPV components that are not beltline shell materials may define P-T curves that are more limiting than those calculated for the RPV beltline shell materials.

The licensee stated that the PT curve for the non-beltline region is represented by the feedwater nozzles because they are the limiting component. The licensee used finite element analyses to develop the thermal and pressure stress distributions in a feedwater nozzle, from which K_{ip}, and K_{it} were derived to construct the PT curve in accordance with BWROGTP11022A, Revision 1. The licensee considered the temperature and pressure in the power uprated conditions as part of stress analysis.

The NRC staff notes that RPV closure flange is also part of non-beltline region that must be considered in the PT curves in accordance with 10 CFR, Part 50, Appendix G. The NRC staff finds that the bounding PT curve representing the non-beltline region in Curves A, B, and C for PNPP, Unit No. 1, PTLR is acceptable because it was constructed based on BWROGTP11022A, Revision 1, and it includes the PT limits from the limiting materials (i.e., feedwater nozzles and closure flange).

4.3.3.3 RPV Bottom Head Region Curve

For the bottom head region, the licensee calculated K_{ip}, and K_{it}, and constructed the P-T curves based on BWROG-TP-11-022-A, Revision 1. The NRC staff finds that the bounding P-T curve representing the bottom head region in Curves A, B, and C for the PNPP, Unit No. 1, PTLR is acceptable because it is appropriately constructed based on BWROG-TP-11-022-A, Revision 1.

4.3.3.4 Curve A

The licensee stated that Curve A is for the hydrostatic pressure and leak test; therefore, the thermal stress is considered negligible. As such, the licensee set the stress intensity factor, K_{it} to zero. In addition, the licensee limited the heat-up or cool-down rate during hydrostatic leak test to be ≤ 25°F/hour. The NRC staff finds it acceptable to set K_{it} to zero because temperature gradient in the RPV shell wall is too small to produce any significant K_{it} during the hydrostatic and leakage tests. As specified in BWROG-TP-11-022-A, Revision 1, for Curve A, the licensee set the safety factor for the pressure stress intensity factor, K_{ip} to 1.5.

Item 1.a in 10 CFR, Part 50, Appendix G, Table 1, requires that when the operating pressure is ≤ 20 percent of the preservice system hydrostatic test pressure, the minimum temperature must be the highest reference temperature of the material in the closure flange region that is highly stressed by the bolt preload. The NRC staff verified that the proposed Curve A in the Unit No. 1, PTLR satisfied Item 1.a.

Appendix G to 10 CFR, Part 50, Table 1, “Pressure and Temperature requirements for the Reactor Pressure Vessel,” Item 1.b requires that when the pressure is > 20 percent of the preservice system hydrostatic test pressure (1,563 pounds per square inch gauge (psig)), the minimum temperature must be the highest reference temperature of the material in the closure flange region that is highly stressed by the bolt preload plus 90 ˚F. In addition, the Item 1.b requirement creates a notch (or bend) in the non-beltline P-T curve at 312.6 psig (20 percent of 1,563 psig) because the closure flange is part of the non-beltline region. The NRC staff verified

that the proposed Curve A in the PNPP, Unit No. 1, PTLR satisfied Item 1.b.

The NRC staff finds that the overall Curve A in Figure 1 of the PNPP, Unit No. 1, PTLR is acceptable because it satisfies Items 1.a and 1.b in 10 CFR, Part 50, Appendix G, and bounds the maximum P-T curves of the bottom head region, non-beltline region and beltline region.

4.3.3.5 Curve B

The NRC staff verified that as specified in BWROG-TP-11-022-A, Revision 1, to construct Curve B, the licensee used the safety factor of 2.0 and 1.0 for the pressure and thermal stress intensity factor, respectively.

With regard to the required minimum temperature, 10 CFR, Part 50, Appendix G, Table 1, Item 2.a requires that when the operating pressure is ≤ 20 percent of the preservice system hydrostatic test pressure, the minimum temperature must be the highest reference temperature of the material in the closure flange region that is highly stressed by the bolt preload. The NRC staff verified that the proposed Curve B in the PNPP, Unit No. 1, PTLR has satisfied Item 2.a.

Appendix G to 10 CFR, Part 50, Table 1, Item 2.b, requires that when the pressure is greater than (>) 20 percent of the preservice system hydrostatic test pressure, the minimum temperature must be the highest reference temperature of the material in the closure flange region that is highly stressed by the bolt preload plus 120°F. The Item 2.b requirement creates a notch (or bend) for the non-beltline P-T curve at 312.6 psig because the closure flange is part of the non-beltline region. The NRC staff verified that the proposed Curve B in the PNPP, Unit No. 1, PTLR has satisfied Item 2.b.

The NRC staff noted that Curve B for PNPP, Unit No. 1, contains a minimum temperature for the beltline region of 70°F. The NRC staff verified that these two minimum temperatures are derived based on the RPV pressure set to zero. The NRC staff noted that this minimum temperature is not part of requirements in 10 CFR, Part 50, Appendix G; however, these temperatures are appropriately included in the P-T curves to ensure that the RPV material is protected from embrittlement even when the RPV pressure is zero.

The NRC staff finds that the overall Curve B in Figure 2 of the PNPP, Unit No. 1, PTLR is acceptable because it satisfies Items 2.a and 2.b in 10 CFR, Part 50, Appendix G and bounds the maximum P-T curves of the bottom head region, non-beltline region and beltline region.

4.3.3.6 Curve C

Appendix G to 10 CFR, Part 50, Table 1, Items 2.c, 2.d, and 2.e require that the P-T curves for the core critical condition (Curve C) be 40°F greater than the P-T limit curves for the core not critical (Curve B) under all operating pressure conditions. The NRC staff verified that the bottom head region curve, non-beltline region curve and beltline region curve in Curve C are 40°F more than the corresponding curves in Curve B. The NRC staff finds that the proposed Curve C in the PNPP, Unit No. 1, PTLR satisfied the 40°F requirement of Items 2.c, 2.d, and 2.e.

Appendix G to 10 CFR, Part 50, Table 1, Item 2.c requires that when the operating pressure is ≤ 20 percent of the preservice system hydrostatic test pressure, the minimum temperature must be larger of the minimum permissible temperature for the inservice system hydrostatic pressure test or the closure flange RTNDT plus 40°F. The NRC staff verified that the proposed Curve C in the PNPP, Unit No. 1, PTLR has satisfied Item 2.c.

Appendix G to 10 CFR, Part 50, Table 1, Item 2.d requires that when the pressure is > 20 percent of the preservice system hydrostatic test pressure, the minimum temperature must be larger of the minimum permissible temperature for the inservice system hydrostatic pressure test or closure flange RTNDT plus 160°F. The NRC staff finds that there is a notch (or bend) in the non-beltline P-T curve at 312.6 psig. The NRC staff verified that the proposed Curve C in the PNPP, Unit No. 1, PTLR has satisfied Item 2.d.

Appendix G to 10 CFR, Part 50, Table 1, Item 2.e requires that for BWRs, 60°F be added to the highest reference temperature of the material in the closure flange region that is highly stressed by the bolt preload when the operating pressure is less than 20 percent of preservice system hydrostatic test pressure. The NRC staff verified that the proposed Curve C in the PNPP, Unit No. 1, PTLR has satisfied Item 2.e.

The NRC staff finds that the overall Curve C in Figure 3 of the PNPP, Unit No. 1, PTLR is acceptable because it satisfies Items 2.c, 2.d, and 2.e in 10 CFR, Part 50, Appendix G and bounds the maximum P-T curves of the bottom head region, non-beltline region, and beltline region.

4.3.3.7 Composite P-T Limit Curves

The NRC staff verified that the composite P-T curves in Figures 4, 5, and 6 of the PNPP, Unit No. 1, PTLR consist of curves representing the hydrostatic pressure and leak test condition (Curve A), the normal operation with core not critical condition (Curve B), and the normal operation with core critical condition (Curve C). The NRC staff further verified that Curves A, B, and C in Figure 4 of the PNPP, Unit No. 1, PTLR contains the bounding curves from the bottom head region, non-beltline region and beltline region. Therefore, the NRC staff finds that the final composited P-T Curves A, B, and C in Figures 4, 5, and 6 of the PNPP, Unit No. 1, PTLR are acceptable because they satisfy the fracture toughness provisions in 10 CFR, Part 50, Appendix G, and the surveillance program provisions in 10 CFR, Part 50, Appendix H.

4.3.4 P-T Limits

To evaluate the proposed P-T limits for PNPP, Unit No. 1, the staff reviewed the PTLR submittal as well as the fluence calculations. The NRC staff reviewed the selection of materials, the ART values used, as well as the adherence to approved methodologies.

The licensee' s calculation stated that the P-T limits were derived by: using BWROG LTR BWROG-TP-11-022-A (SIR-05-044 Revision 1-A) neutron fluence calculated in accordance with RG 1.190 using the RAMA computer code as approved by the NRC. The ART values for the limiting beltline materials were calculated in accordance with RG 1.99.

The proposed P-T limits in the PTLR were generated using the BWROG report methodology based on ASME B&PV Code, Section XI, Appendix G. The curves are developed for three categories of operation: hydrostatic pressure tests and leak tests, core not critical operation, and core critical operation. The licensee used minimum temperature limits in accordance with 10 CFR, Part 50, Appendix G.

The adjusted reference temperature of the limiting beltline material is used to adjust beltline P-T curves to account for irradiation effects. PNPP discusses the use of RG 1.99 to determine a chemistry factor for welds and for plates and forgings. The Cu and Ni values that were used were obtained from the evaluation of vessel plate, weld, and forging materials. The licensee

used fluence values calculated in the supplied fluence evaluation to come up with a limiting value for ART. The ART value for beltline plates and welds that were found to be limiting is 69.6°F. PNPP has two sets of nozzles in the RPV beltline. The FW nozzles and the WLI nozzles were evaluated to ensure that the P-T limits are bounding. The Limiting ART value for nozzles and welds was found to be 69.6°F.

During the P-T curve development the ¼ T and ¾ T locations are looked at for a given EFPY. PNPP simplified the approach to consider tensile stress for both heat up and cool down at the ¼ T location. This approach is conservative because at the ¼ T location the irradiation effects cause the allowable toughness to be less than that at the ¾ T location.

The staff verified that the proposed P-T limits are consistent with the requirements in 10 CFR, Part 50, Appendix G, for the minimum temperature of the closure flange regions. For all proposed P-T limit curves, the far left straight line corresponds to the minimum bolt up temperature. For PNPP, Unit No. 1, this is 70°F. Table 1 of Appendix G to 10 CFR, Part 50 requires different minimum temperatures for P-T limits depending on whether the pressure is less than or greater than 20 percent of the preservice hydrostatic test pressure. This requirement creates a notch in the P-T curves. In the proposed P-T curves a notch is observed for the non-beltline P-T limits because this region contains the closure flange. For the non-beltline P-T limits the NRC staff verified that the requirements of Table 1 of Appendix G to 10 CFR, Part 50 are met by confirming the notch temperatures of 100°F for PNPP, Unit No. 1, for Curve A. For Curve C the temperatures of 170°F was verified. Therefore, the staff determined that the proposed P-T limits meet the minimum temperature requirements listed in Table 1 of Appendix G to 10 CFR, Part 50.

Ferritic RCPB Components Outside of the RPV

The SE for the BWROG report requires licenses to confirm that all ferritic RCPB components that are not part of the RPV will not define a more restrictive operating temperature than the proposed P-T limits. The licensee stated in the LAR that it confirmed that the lowest service temperatures for all ferritic RCPB components that are not part of the RPV are below the lowest operating temperature in the proposed P-T limits. The confirmation is included in the Operating Limits section of the PNPP, Unit No. 1, PTLR. The NRC staff concludes that the lowest service temperatures for all ferritic RCPB components that are not part of the RPV are below the lowest operating temperature in the proposed P-T limits. Therefore, the NRC staff finds that the revised P-T limit curves satisfy this criterion and are acceptable.

3.3 NRC Staff Evaluation Conclusion

3.3.1 Relocation of P-T Limits

Based on its evaluation, as documented above, the NRC staff finds that the P-T limit curves for the RPV beltline, non-beltline, and bottom head regions, and the final composite P-T limit curves in the Curves A, B, and C figures of the PTLR (i.e., PTLR, figures 4 – 6) are acceptable because the licensee has provided adequate demonstration that:

- the P-T limit curves incorporate and satisfy all requirements as defined and specified in section IV.A of 10 CFR, Part 50, Appendix G, including the requirement in 10 CFR, Part 50, Appendix G, that requires the calculations of the ARTs to account for the impacts of neutron irradiation exposures and to incorporate the results of applicable RPV

surveillance data from the licensee's 10 CFR, Part 50, Appendix H, RPV materials surveillance program (i.e., the BWRVIP ISP for the PNPP units),

- the P-T limit curves for the beltline, non-beltline, and bottom head regions and composite P-T limit curves in the Curve A, B, and C P-T limit figures of PTLR have been calculated in accordance with the approved methods in BWROG-TP-11-022-A,

- the contents of PTLR are in conformance with all criteria in GL 96-03 for technical contents of PTLRs that apply to BWR designs, and

- the PTLR does not need to address the criteria for LTOP system setpoints in Criterion 3, GL 96-03, as the criteria only apply to PWR light water reactor designs.

The NRC staff also finds that the licensee has relocated all other RCS limits (previously specified in the subsections of TS, section 3.4.11) into the PTLR, and that the revised maximum heatup/cooldown rate limit established for heatup and cooldown operations during ASME Code hydrostatic or leakrate pressure testing conditions (i.e., a maximum rate change of ≤ 25°F/hr) is consistent with the maximum heatup/cooldown rate limit set for these types of conditions in BWROG-TP-11-022-A.

3.3.2 Conformance with TSTF-419

The NRC staff reviewed the proposed changes to determine whether they conform to TSTF-419. The NRC staff initially approved TSTF-419, Revision 0, by letter dated March 21, 2002. By letter dated August 4, 2011 (ML110660285), the NRC staff modified that approval by clarifying that requests for amendments to implement TSTF-419, Revision 0, need to include a full citation to the NRC-approved topical reports used in the PTLR methodology, including the revision number and date of the topical report.

The NRC staff noted that Perry TSs are formatted according to a precursor to the current format of NUREG-1434 (ML21271A582 (Volume 1) and ML21271A596 (Volume 2), respectively), but the differences between the Perry TSs and NUREG-1434 STSs do not affect the applicability of TSTF-419 to Perry TSs.

Based on its review of the proposed changes to Perry TSs, the NRC staff finds that the proposed revisions to TS Section 1.0 define the PTLR and proposed revisions to TS Section 5.0 require that the PTLR establish RCS P-T Limits for TS 3.4.11, using the BWROG methodology, which is properly referenced as BWROG-TP-11-022-A, Revision 1, dated August 2013. The new TS 5.6.7 requires that the PTLR be submitted to the NRC upon issuance and LCO 3.4.11 and applicable SRs are revised to indicate that limits are specified in the PTLR. The NRC staff also finds the proposed TS changes appropriately adopted TSTF-419 and in a format compatible with the format of the Perry TSs. The NRC staff also finds the proposed changes require that the PTLR provides recordkeeping and reporting requirements necessary to assure operation of the facility in a safe manner, as required by 10 CFR 50.36(c)(5).

3.3.3 Technical Conclusion

Based on the information submitted, the NRC staff has determined that (1) the proposed P-T curves in the PTLR for PNPP considered all ferritic RPV materials, (2) the proposed P-T curves are constructed based on the methodology in BWROG-TP-11-022-A, Revision 1; BWROG-TP-11-023-A, Revision 0; SRP 5.3.2; and the ASME Code, section XI, Appendix G, and (3) the proposed PNPP PTLR satisfies 10 CFR, Part 50, appendices G and H, 10 CFR 50.36, 10 CFR 50.60, GL 96-03, and TSTF-419. Therefore, the NRC staff concludes that the TSs, as amended by the proposed changes, will continue to meet the requirements of 10 CFR 50.36.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of Ohio official was notified of the proposed issuance of the amendment on May 5, 2026. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment relates to changes to inspection or surveillance requirements and authorizations under, or changes to requirements in 10 CFR, Part 50 or 52 with respect to installation or use of a facility component. The NRC staff has determined that any ground disturbance is limited to previously disturbed areas. Additionally, the NRC staff has determined that the action involves no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, no significant increase in individual or cumulative public or occupational radiation exposure, and no significant increase in the potential for or consequences from radiological accidents. Finally, the NRC staff has determined that a categorical exclusion applies and that special circumstances are not present that would preclude reliance on the categorical exclusion. Accordingly, this action meets the eligibility criteria for categorical exclusion set forth in paragraphs (d)(1) and (d)(8) of 10 CFR 51.22, "Categorical exclusions." Pursuant to 10 CFR 51.22, no environmental impact statement or environmental assessment need be prepared in connection with the action.

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.

Date of Issuance: May 29, 2026

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 208 RE: RELOCATION OF PRESSURE AND TEMPERATURE LIMIT CURVES TO THE PRESSURE TEMPERATURE REPORT (EPID L-2026-LLA-0035) DATED MAY 29, 2026

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