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

June 12, 2015

Mr. Ernest J. Harkness
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-PY-A290
P.O. Box 97, 10 Center Road
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT CONCERNING CHANGES TO PRESSURE TEMPERATURE CURVES (TAC NO. MF4351)(L-14-150)

Dear Mr. Harkness:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 168 to Facility Operating License No. NPF-58 for FirstEnergy Operating Company's Perry Nuclear Power Plant, Unit No. 1. This amendment updates the technical specification pressure and temperature (P/T) figures and makes editorial changes related to the P/T figures including clarifications and updates to the associated titles, labeling, and notes in response to your application dated June 23, 2014, as amended by a letter dated February 27, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14174A633 and ML15069A235, respectively).

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

Sincerely,

Kimberly Green, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:
1. Amendment No. 168 to NPF-58
2. Safety Evaluation

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

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 168
License No. NPF-58

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

   A. The application for license filed by FirstEnergy Nuclear Operating Company, et al., (the licensee, FENOC) dated June 23, 2014, as supplemented by a letter dated February 27, 2015, 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.

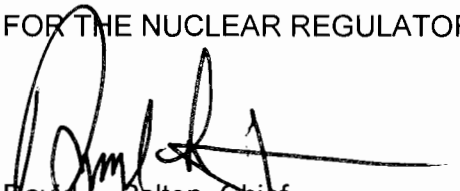
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-58 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 168 are hereby incorporated into this license. FENOC 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



David L. Pelton, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Facility Operating License

Date of Issuance: June 12, 2015

ATTACHMENT TO LICENSE AMENDMENT NO. 168

FACILITY OPERATING LICENSE NO. NPF-58

DOCKET NO. 50-440

Replace the following pages of the Facility Operating License 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.

Remove	Insert
License NPF-58	License NPF-58
Page 4	Page 4
TSs	TSs
3.4-27	3.4-27
3.4-31	3.4-31
3.4-31a	3.4-31a
3.4-31b	3.4-31b
3.4-31c	
3.4-31d	
3.4-31e	

renewal. Such sale and leaseback transactions are subject to the representations and conditions set forth in the above mentioned application of January 23, 1987, as supplemented on March 3, 1987, as well as the letter of the Director of the Office of Nuclear Reactor Regulation dated March 16, 1987, consenting to such transactions. Specifically, a lessor and anyone else who may acquire an interest under these transactions are prohibited from exercising directly or indirectly any control over the licenses of PNPP Unit 1. For purposes of this condition the limitations of 10 CFR 50.81, as now in effect and as may be subsequently amended, are fully applicable to the lessor and any successor in interest to that lessor as long as the license for PNPP Unit 1 remains in effect; these financial transactions shall have no effect on the license for the Perry Nuclear facility throughout the term of the license.

(b) Further, the licensees are also required to notify the NRC in writing prior to any change in: (i) the terms or conditions of any lease agreements executed as part of these transactions; (ii) the PNPP Operating Agreement; (iii) the existing property insurance coverage for PNPP Unit 1; and (iv) any action by a lessor or others that may have an adverse effect on the safe operation of the facility.

C. This 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 and hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

FENOC 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. 168, are hereby incorporated into the license. FENOC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

a. FirstEnergy Nuclear Generation Corp. and Ohio Edison Company

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:	30 minutes
	a. RCS pressure and RCS temperature are within the limits of Figure 3.4.11-1; and	
	b. RCS heatup and cooldown rates are within the limits of Figure 3.4.11-1.	

(continued)

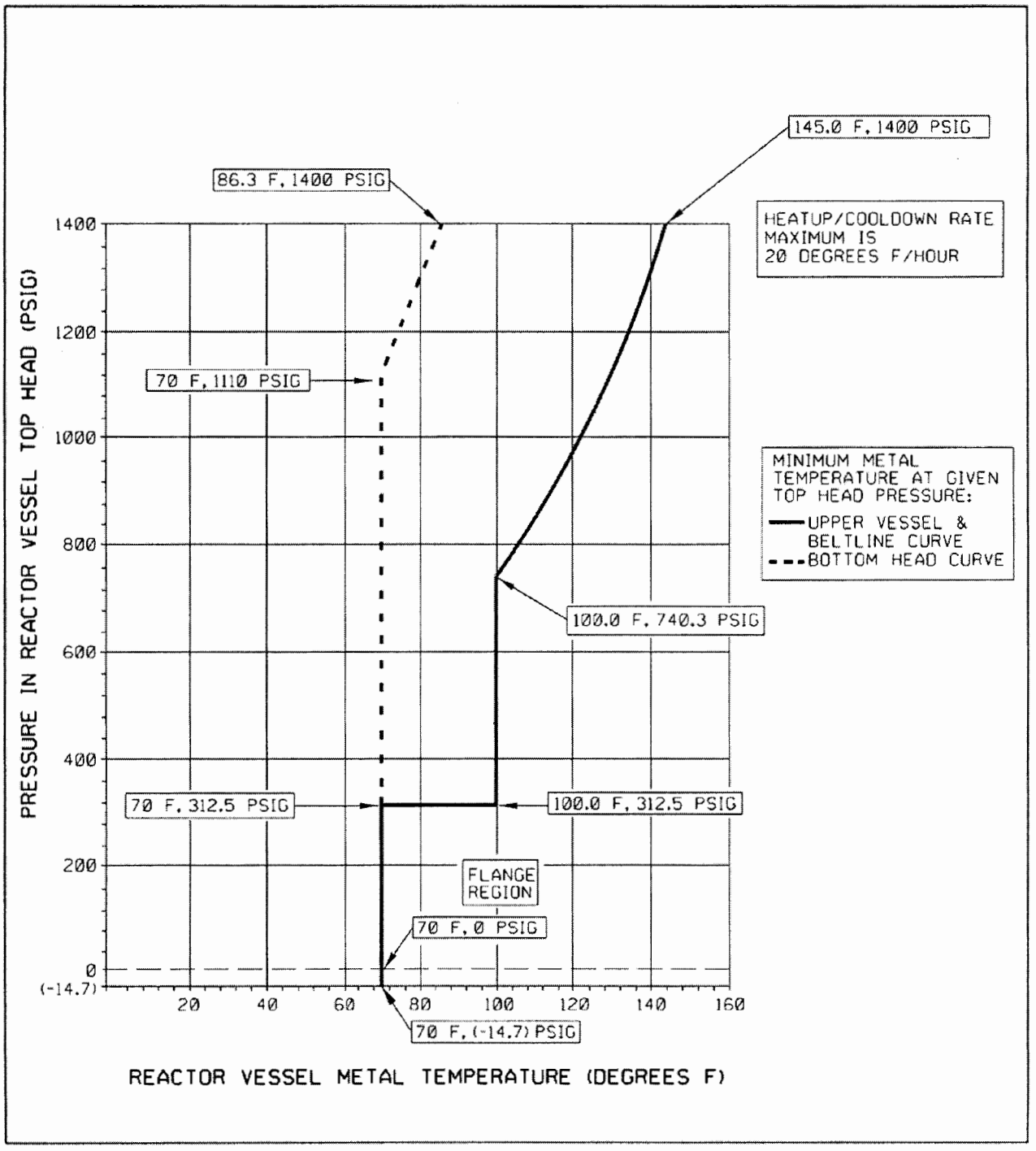


FIGURE 3.4.11-1(a): PRESSURE TEST CURVES (VALID UP TO 32 EFPY)

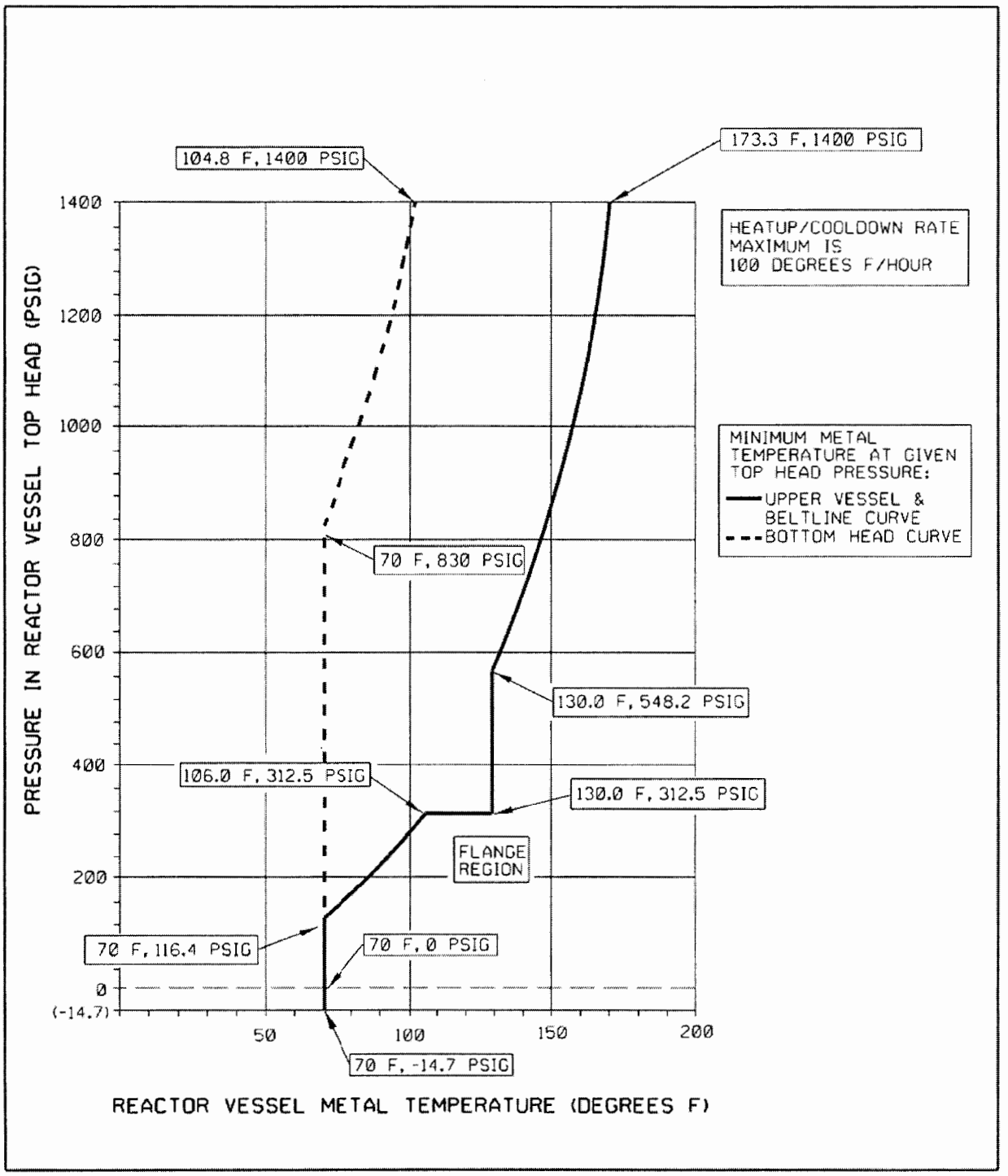


FIGURE 3.4.11-1(b): NON-NUCLEAR HEATUP/COOLDOWN CURVES (VALID UP TO 32 EFPY)

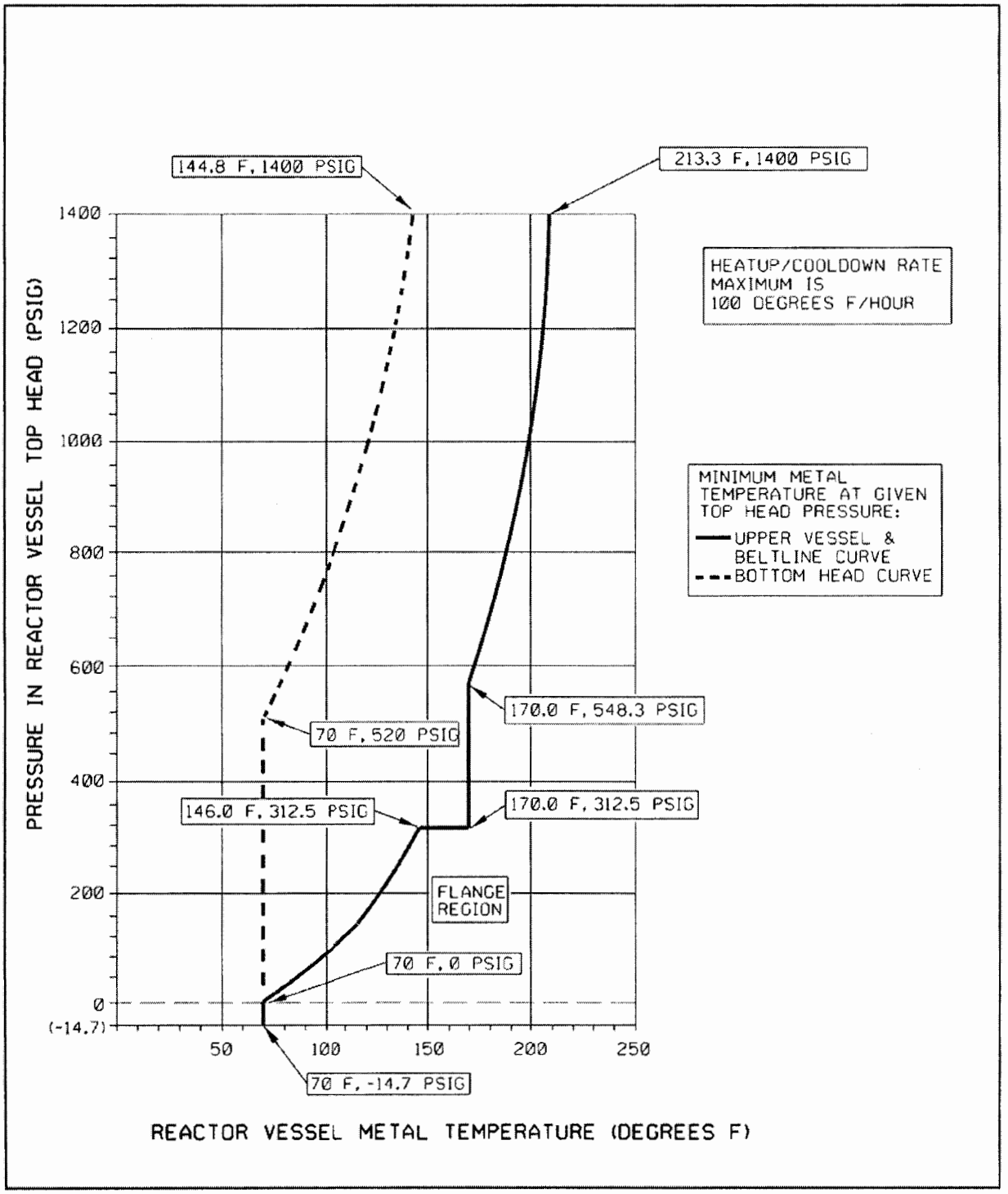


FIGURE 3.4.11-1(c): CORE CRITICAL OPERATION CURVES (VALID UP TO 32 EFPY)

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 168 TO FACILITY OPERATING LICENSE NO. NPF-58

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC, the Commission) dated June 23, 2014, as supplemented by a letter dated February 27, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14174A663 and ML15069A235 respectively). FirstEnergy Nuclear Operating Company (the licensee, or FENOC) requested changes to the technical specifications (TSs) for the Perry Nuclear Power Plant, Unit 1 (PNPP or Perry). The proposed amendment updates the TS pressure and temperature (P/T or P-T) figures using an NRC approved methodology to adjust the P/T limit curves for the previously missing data, addresses the reactor coolant system (RCS) vacuum condition that can occur under certain conditions, and aligns the heatup/cooldown requirements of the TS with the limits in the associated P/T figures. Additionally, editorial changes are proposed related to the P/T figures including clarifications and updates to the associated titles, labeling, and notes.

The February 27, 2015, supplement contained clarifying information and did not change the NRC staff's initial proposed finding of no significant hazards consideration.

2.0 REGULATORY EVALUATION

2.1 Background

The current TS 3.4.11 contains two sets of P/T limits, valid for 22 effective full power years (EFPYs) and 32 EFPYs. The licensee's proposed P/T limits for 32 EFPYs are based on a methodology documented in GE-NE-0000-0000-8763-01, Revision 0, "Pressure-Temperature Curves For FirstEnergy Corporation, Using the KIC Methodology, Perry Unit 1," April 2002, and Topical Report (TR) BWROG-TP-11-023-A, Revision 0, "Linear Elastic Fracture Mechanics Evaluation of General Electric Boiling Water Reactor Water Level Instrument Nozzles for Pressure-Temperature Curve Evaluations," May 2013 (referred to henceforth as the TR). The methodology in GE-NE-0000-0000-8763-01, Revision 0, was approved on April 29, 2003, in a

safety evaluation (SE) for the current TS regarding the P/T limits for 22 EFPYs and the P/T limits for the 32 EFPYs. The 32 EFPYs P/T limits in the current TS will be referred to as "the current TS32 EFPY P/T limits" instead of "the current P/T limits" because the current P/T limits are the 22 EFPY P/T limits in the TS. Although the 32 EFPYs P/T limits are also in the TS, so far they have not been used by FENOC to operate the PNPP reactor pressure vessel (RPV).

2.2 System Description

The RCS is designed to withstand the effects of cyclic loads due to system pressure and temperature changes. The RCS is introduced to these loads via startup (heatup) and shutdown (cooldown) operations, power transients, and reactor trips. The pressure and temperature changes are limited during heatup and cooldown, within the design assumptions and the stress limits for cyclic operation.

The RPV contains the reactor core and all associated support and alignment devices. The RPV acts as part of the reactor coolant system pressure boundary, the second barrier to the release of fission products to the environment.

2.3 Regulatory Requirements and Guidance

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. In Section 50.36, "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR), the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings, (2) limiting condition for operations, (3) surveillance requirements (SRs), (4) design features, and (5) administrative controls.

In general, there are two classes of changes to TSs: (1) changes needed to reflect contents of the design basis (TSs are derived from the design basis), and (2) voluntary changes to take advantage of the evolution in policy and guidance as to the required content and preferred format of TSs over time. Licensees may revise the TSs provided that plant-specific review supports a finding of continued adequate safety because: (1) the change is editorial, administrative or provides clarification (i.e., no requirements are materially altered), (2) the change is more restrictive than the licensee's current requirement, or (3) the change is less restrictive than the licensee's current requirement, but nonetheless still affords adequate assurance of safety when judged against current regulatory standards.

Section 50.60 to 10 CFR states that all light-water nuclear power reactors, other than reactor facilities for which the certifications required under 50.82(a)(1) have been submitted, must meet the fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary set forth in appendices G and H to this part.

The NRC has established requirements in 10 CFR 50 to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. Appendix G to 10 CFR Part 50 requires that facility P/T limits for the RPV be at least as conservative as those obtained by applying the linear elastic fracture mechanics methodology of Appendix G to Section XI of the American

Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The most recent version of Appendix G to Section XI of the ASME Code which has been endorsed in 10 CFR 50.55a, and therefore by reference in 10 CFR Part 50, Appendix G, is the 2010 Edition of the ASME Code. This edition of Appendix G to Section XI of the ASME Code incorporates the provisions of ASME Code Case N-588, "Attenuation to Reference Flaw Orientation of Appendix G for Circumferential Welds in Reactor Vessels," and ASME Code Case N-640, "Alternative Reference Fracture Toughness for Development of P-T Limit Curves." Additionally, Appendix G to 10 CFR Part 50 imposes minimum head flange temperatures when system pressure is at or above 20 percent of the pre-service hydrostatic test pressure.

Appendix H to 10 CFR Part 50 establishes requirements related to facility RPV material surveillance programs.

Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials;" contains methodologies for determining the increase in transition temperature and the decrease in upper-shelf energy resulting from neutron radiation.

RG 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," describes methods and assumptions acceptable to the U.S. Nuclear Regulatory Commission (NRC) staff for determining the pressure vessel neutron fluence with respect to the General Design Criteria (GDC) contained in Appendix A of 10 CFR 50.

Generic Letter (GL) 92-01, Revision 1, "Reactor Vessel Structural Integrity;" requested that licensees submit the RPV data for their plants to the staff for review, and the Supplement requested that licensees provide and assess data from other licensees that could affect their RPV integrity evaluations.

Section 5.3.2 to NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," provides an acceptable method for determining the P/T limits for ferritic materials in the beltline of the RPV based on the ASME Code, Appendix G, methodology.

Section III, Subparagraphs NB-3133.3 and NB-3133.4 of the ASME Code prescribe a step-by-step method to determine the minimum thicknesses of cylindrical shells, tubular products, and spherical shells.

Boiling Water Reactor Owners Group (BWROG)-TP-11-023-A, Revision 0, "Linear Elastic Fracture Mechanics Evaluation of General Electric Boiling Water Reactor Level Instrument Nozzles for Pressure-Temperature Curve Evaluations," (ADAMS Accession No. ML13183A017) provides a bounding partial penetration style water level instrument nozzle (WLIN) fracture mechanics solution which can be used to obtain plant-specific stress intensity factors for an internal pressure load case and a 100 degree Fahrenheit/hour (°F/hr) thermal ramp load case for use in developing plant specific P/T curves, without having to develop and analyze a plant specific finite element model.

3.0 TECHNICAL EVALUATION

The proposed P/T limits valid for 32 EFPYs of facility operation were documented in Attachment 2, "Proposed Technical Specification Changes (RETYPED)," to the June 23, 2014, submittal, and the development of the P/T limits using the GE-NE-0000-0000-8763-01, Revision 0, and the TR methodologies was documented in Attachment 4, "Development of P/T Limit Curves for Technical Specification 3.4.11." In the June 23, 2014, submittal, the licensee indicates that the proposed P/T limits for 32 EFPYs are based on the same limiting beltlinematerial adjusted reference temperatures (ARTs) and supporting fluence calculations for the current TS 32 EFPYs P/T limits, but considers the impact due to the WLIN using the TR methodology.

The licensee included detailed information regarding the PNPP P/T limits valid for 32 EFPY was contained in Attachment 4 (the attachment) to the submittal dated June 23, 2014. For RPV beltline materials, this attachment includes ARTs for all beltline plate and weld materials, the equations and procedures for development of the P/T limits using pressure and thermal stress intensity factors (K_{Im} and K_{It}) and the plane-strain fracture toughness (K_{Ic}) of the crack-tip material at the one-quarter thickness of the RPV wall (1/4T), and the adjustments to account for vessel static head.

For WLIN surrounding shell material, the attachment includes numerical $K_{Ip\text{-}applied}$ value for 1000 psi (pounds per square inch) and the maximum K_{It} values from the TR. Use of the equations and adjustment of the vessel static head to generate WLIN P/T limits are similar to the beltline materials. The licensee presented the proposed, the current TS 32 EFPYs, and the WLIN P/T limits in figures, along with their underlying numerical values on the last six pages of the attachment. The proposed P/T limits are the more limiting parts of the current TS 32 EFPYs and the WLIN curves.

3.2 Staff Evaluation

The proposed P/T limits are composite curves based on the current TS 32 EFPYs P/T limits and the WLIN curves, using the more limiting portions of them. Therefore, the NRC staff's evaluation and independent calculations focused on the development of the WLIN curves.

3.2.1 Deletion of the 22 EFPYs P/T limits

As discussed in Section 1.0 of the June 23, 2014, submittal, the licensee requests the deletion of three figures (TS Figures 3.4.11-1(a) – 3.4.11-1(c)). The NRC staff reviewed the application for the neutron fluence calculations used to support the removal of the 22 EFPY P/T limit curves expiring in June 2015, in the licensee's application for implementation into TS 3.4.11. The NRC staff determined that the version of the submitted 32 EFPY curves had been previously approved as discussed in a SE dated April 29, 2003 (ADAMS Accession No. ML030700189). The NRC staff reviewed the information provided including information from a previous submittal dated November 20, 2013 (ADAMS Accession No.ML 13330A905) for the Boiling Water Reactor Vessels Internal Program (BWRVIP) Integrated Surveillance Program (ISP). Based on that review the NRC staff determined that the current neutron fluence values remain applicable for the updated 32 EFPYs P/T limit curve, due to no identified revisions to the neutron fluence calculation since the curves were last approved by the NRC.

The NRC previously approved the P/T limit curves for operation through 22 EFPYs and 32 EFPYs with the current neutron fluence calculations as described in the April 29, 2003, SE. The methodology used for calculating neutron fluence has not changed from that previously approved by the NRC. The NRC staff notes that licensee provided the update for the 32 EFPYs P/T limit curves, in part, to reflect a recent update to the BWROG P/T limits methodology, BWROG-TP-11-023-A, Revision 0. This update to BWROG-TP-11-023-A, Revision 0 did not change the current neutron fluence calculations, but included the WLIN data in the reactor pressure vessel beltline region. The impact of the WLIN data is reviewed below.

Based on the deletion of these figures being needed to reflect the existing design basis, that is that the PNPP will soon be beyond 22 EFPYs and therefore the curves will no longer be valid, and the existence of appropriate P/T as revised by the associated amendment to this SE, the NRC staff determined that deletion of the 22 EFPYs TS Figures 3.4.11-1(a) – 3.4.11-1(c) is acceptable. Based on the deletions of these TS Figures, the NRC staff also finds it appropriate to renumber the current TS Figures 3.4.11-1(d) – TS Figures 3.4.11-1(f) to TS Figures 3.4.11-1(a) – 3.4.11-1(c), respectively.

3.2.2 32 EFPYs P/T Limits

3.2.2.1 Adjusted Reference Temperature

The NRC staff reviewed the current TS 32 EFPYs P/T limits to ensure that the information supporting the current TS 32 EFPYs P/T limits, which form part of the proposed P/T limits is valid.

The attachment states under "A. Evaluation of surveillance data in accordance with Appendix A of the report," that, "another seam weld material was controlling." The NRC staff questioned the change of material information since the last license amendment request (LAR) approval in 2003. In a letter dated February 27, 2015 (the Supplement), the licensee clarified that the only ART value that was changed since 2003 is the surveillance weld 5P6214B in Table 1 of the Supplement. Since the ART of this weld is too low to make the relevant beltline weld the new limiting material for the P/T limits, the current TS 32 EFPYs P/T limits remains valid.

In January 2004, AREVA raised an issue of non-conservatism in applying SRP, Section 5.3.2, Branch Technical Position (BTP) 5-3 to determine initial nil-ductility transition reference temperature (RT_{NDT}) for RPV plate or forging materials. The NRC staff questioned whether the initial RT_{NDT} values for Perry's RPV plates and closure flange were determined in accordance with the ASME Code, Section III, NB-2331, using test data from transverse Charpy specimens. In its supplemental response, the licensee confirmed that BTP 5-3 was not used in determining the RT_{NDT} values for its RPV materials, and, therefore, the initial RT_{NDT} values of the RPV plates and forging remain unchanged from the 2003 LAR.

The attachment states under "J. Inclusion of Vessel Static Head in P/T Curves," that:

> [t]his value [the vessel static head] is used to decrease the allowable pressure for the upper vessel and beltline curves. The bottom head curves were not changed in this update....

The NRC staff was concerned that inclusion of vessel static head might not be applied to all proposed P/T limits. The licensee in the supplement clarified that the bottom head curves already considered vessel static head, but did not mention the upper vessel and beltline curves. The NRC staff identified, in the current TS 32 EFPYs P/T limits in Attachment 1 to the June 23, 2014, submittal, "Proposed Technical Specification Changes (MARK-UP)," that the horizontal segment of the upper vessel and beltline curves indicate a pressure of 312.5 pounds per square inch gage (psig), which is the calculated pressure of 343.3 psig minus the vessel static head of 30.8 psig. This indicated that, like the current TS 32 EFPYs bottom head curves, the current TS 32 EFPYs upper vessel and beltline curves have also considered the vessel static head.

In summary, the NRC staff has reviewed the basis for the continued use of the current TS 32 EFPYs P/T limits for part of the proposed P/T limits and did not identify any concerns with their continued use. Based on the portion of the proposed P/T limits being based on the current TS 32 EFPY P/T limits, the NRC staff finds the proposed P/T limits continue to meet the requirements of Appendix G to Section XI of the ASME Code and Appendix G to 10 CFR Part 50.

3.2.2.2 Water Level Instrument Nozzle Curves

In the June 23, 2014 submittal indicates that the portion of the proposed P/T limits based on the WLIN curves was obtained from applying the TR methodology. As stated in Attachment 4 Section I, "Development of P/T Curves," the WLIN material is stainless steel and, therefore, does not require P/T limit evaluation. This is because the fracture toughness requirements of 10 CFR Part 50 Appendix G are only for ferritic materials of a RPV. However, the integrity of the adjacent shell with a cylindrical hole must still be evaluated in accordance with 10 CFR 50, Appendix G. The TR was developed in 2011 to address this relatively new issue, and the WLIN curves generated by the licensee are the results of applying the TR methodology,

Since the four WLINs lie in shell Ring # 2 (located at the top of active fuel, designated at N12), the licensee used the highest ART for all plates and welds in Ring # 2 (Table 1 of Section I of Attachment 4) to generate the WLIN curves. This approach is conservative and, therefore, acceptable. The selected ART value of 59 °F for the subsequent generation of the proposed WLIN curves is also acceptable because as the licensee indicated in the February 27, 2015, supplement, the ART value underlying the current TS 32 EFPYs P/T limits remains unchanged for the proposed P/T limits.

The licensee used the stress intensity factor due to 1000 psig of applied pressure ($K_{Ip\text{-}applied}$) and maximum K_{It} from the TR ($K_{Ip\text{-}applied}$ = 69.4 ksi$\sqrt{in}$; K_{It} = 38.6 ksi$\sqrt{in}$) to generate the proposed P/T limits for WLINs. Attachment 4 reports at one place a lower $K_{Ip\text{-}applied}$ value. This discrepancy prompted the staff to question whether the assumptions for the TR methodology might not be completely followed. In the February 27, 2015, supplement, the licensee indicates that the lower K_{It} value is a typographical error. The NRC staff performed independent calculations using these $K_{Ip\text{-}applied}$ and K_{It} values and the ART value for the limiting shell plate in Ring # 2 to validate the licensee's WLIN curves and found that for a given pressure along the WLIN curve in Attachments 2, 4, or 6 of the attachment for various operating conditions, the difference between the NRC staff's calculated temperature and the licensee's temperature is within 2 percent. Therefore, the staff determined that the licensee has applied the TR methodology for WLINs adequately.

The NRC staff identified concerns with the licensee's examination of the operating data from the last three refueling outages to assess the potential effects of the proposed P/T limits on future plant operation and testing. In the February 27, 2015, supplement, the licensee clarified that:

> [examination of information] covering the last three outage cycles did not identify any violations or insignificant violations of the current P/T limit curves.

Also, as a result of examination of this historical data, the licensee concluded that,

> [t]he minimum temperature of the leak test needs to be increased to satisfy the impact of the WLIN Leak Test curve at 32 EFPY, Attachment 2.

Based on confirmation of the appropriate application of the NRC-approved methodology and the determination that the proposed P/T limits for the WLIN portion of the curves sufficiently bound the identified beltline materials, the NRC staff finds the revision to the WLIN portion of the P/T curves acceptable.

3.2.2.3 Neutron Fluence

The NRC staff reviewed the application for the neutron fluence calculations used to determine the proposed 32 EFPYs P/T limit curves, in the licensee's application for implementation into TS 3.4.11. As discussed in Section 3.2.1, the NRC staff determined that the current neutron fluence values remain applicable for the updated 32 EFPYs P/T limit curve, due to no identified revisions to the neutron fluence calculation since the curves were last approved by the NRC. As the fuel type for the current operating cycle includes Global Nuclear Fuel (GNF) 2. The NRC staff reviewed the February 27, 2015, supplement, which addresses whether the existing neutron fluence analyses bounds the addition of GNF 2 fuel into the reactor core for the current fuel cycle. The licensee had previously changed the fuel for reload from (General Electric (GE)14 fuel to GNF2 fuel.

The NRC staff determined in its review that the Perry neutron fluence values are determined using an NRC-approved neutron fluence calculation methodology. The fluence values are periodically updated in accordance of the results of the NRC-approved BWRVIP-86-A, "BWR [boiling-water reactor] Vessel and Internals Project, Integrated Surveillance Program (ISP) Implementation Plan," material surveillance specimen initiative. As the results of the BWRVIP report indicate that the GNF2 fuel is more efficient compared to the GE14 fuel design, the transition from GE14 to GNF2 fuel design results in a reduced number of new fuel bundles needed in each reload batch. The reduced number of new fuel bundles per reload results in more twice-burned fuel bundles being used for a third operating cycle. These twice-burned fuel bundles are loaded into the core periphery, which will result in a reduction in peripheral fuel bundle power. The reduced peripheral fuel bundle power thus reduces the neutron fluence seen by the RPV. The transition to GNF2 fuel design reduces the neutron fluence seen by the RPV.

Based on the considerations discussed above, the NRC staff determined the neutron fluence calculations supporting the proposed P/T limits are bounded for both GE14 and GNF2 fuel designs and should remain valid through the transition from GE14 to GNF 2 fuel in the core to

32 EFPYs.

3.2.2.4 Minimum Temperature Requirements

Appendix G to 10 CFR 50 contains additional requirements for the minimum metal temperature of the closure head flange and vessel flange regions. These considerations were reflected in the "notches" of the P/T limits. The NRC staff has verified that when P > 20 percent of the hydro test pressure (~ 313 psig), the minimum temperature of 100 °F for the pressure test curve, 130 °F for the normal operation/core not critical curve, and 170 °F for the normal operation/core critical curve are derived from adding the RT_{NDT} of 10 °F for the limiting flange material temperature to 90 °F, 120 °F, and 160 °F that were specified in 10 CFR Part 50, Appendix G for the three operating conditions. The RT_{NDT} of 10 °F for the limiting flange material temperature was not reported in the June 23, 2014, submittal. However, it is reported in the June 4, 2002, submittal for the current P/T limits. As discussed above, the initial RT_{NDT} value for the closure flange remains valid. Instead RT_{NDT} was determined in accordance with the ASME Code, Section III, NB-2331, using test data from transverse Charpy specimens. The NRC staff has also verified that when P ≤ 313 psig, the minimum temperature of 70 °F (10 °F + 60 °F) for the pressure test curve and the normal operation/core not critical curve is also determined in accordance with the limiting flange material temperature that was specified in 10 CFR 50, Appendix G.

Based on the above evaluation, the NRC staff determined that the licensee's proposed P/T limits, which are valid for 32 EFPYs, are in accordance with the approved methodologies in GE-NE-0000-0000-8763-01, Revision 0, and TR BWROG-TP-11-023-A, Revision 0, and, therefore, satisfy the requirements of Appendix G to Section XI of the ASME Code and Appendix G to 10 CFR Part 50.

3.2.2.5 Vacuum in the Vessel

Structural calculations were provided by the licensee to demonstrate that structural integrity will be maintained for the vessel in the newly considered cases of a vacuum in the vessel, that may exist prior, during, of after a Leak Test, Non-Core Critical, or Core Critical operation. The reactor vessel was designed to meet ASME Code, Section III, Subsection NB, requirements, and must meet NB-3133 requirements for "Components Under External Pressure." For simplicity, an analysis was provided by the licensee assuming the case with atmospheric pressure (14.7 pounds per square inch absolute (psia)) loading the outside of the vessel, and a perfect vacuum (0 psia) on the inside of the vessel, which the licensee indicates is a conservative assumption that is expected to envelope all actual cases of vacuum in the vessel, and external pressure loading.

The NRC staff reviewed the assumptions and calculations provided for the vessel and found that they conservatively follow the procedures prescribed in NB-3133.3 and NB-3133.4 for Cylindrical Shells and Tubular Products, and for Spherical Shells, respectively. Based on the licensee's verification using the ASME Code, Section III, Subsection NB, that structural integrity will be maintained in cases of a vacuum in the vessel, the NRC staff concludes that the reactor vessel is not in danger of collapse from either external pressure loading, or vacuum inside the vessel from the condenser.

3.2.2.6 Technical Conclusion

The NRC staff performed independent evaluations and verified that the P/T limits were developed appropriately using the approved methodologies, and the proposed P/T limits valid for 32 EFPYs satisfy the requirements of Appendix G to Section XI of the ASME Code and Appendix G to 10 CFR Part 50. Therefore, based on the proposed RPV P/T limits being sufficiently bounding for the identified materials and having used an approved methodology as documented in GE-NE-0000-0000-8763-01, Revision 0, and BWROG-TP-11-023-A, Revision 0, the NRC staff finds the revisions to the P/T curves in TS Figures 3.4.11-1(d) – 3.4.11-1(f) acceptable.

3.3 Technical Specification Editorial/Administrative Revisions

In Section 2.0 of the June 23, 2014, submittal, the licensee describes various changes to text elements of current TS Figures 3.4.11-1(d) – 3.4.11-1(f). The NRC staff reviewed the proposed revisions to the identified TS Figures and determined that the changes provide greater parity with the intent of the curves as discussed in Attachment 4 to the June 23, 2014, submittal. As the proposed changes to text elements on the TS figures reflect the technical discussions reviewed above and do no materially alter the TS requirements, the NRC staff finds the revisions to current TS Figures 3.4.11-1(d) – 3.4.11-1(f) acceptable.

Further, in Section 2.0, the licensee describes the deletion of TS SR 3.4.11.1.b to delete the requirement to ensure that the RCS heatup and cooldown rates are less than 100 °F in any 1-hour period and add the language "within the limits of Figure 3.4.11-1." The NRC staff reviewed the current TS Figures 3.4.11-1(d) – 3.4.11-1(f) and noted that with the exception of current TS Figure 3.4.11-1(d) the TS Figures already included a note that the heatup/cooldown rate was 100 °F/hr. Current TS Figure 3.4.11-1(d) has a note that is more restrictive (20 °F/hr) than the current SR 3.4.11.1.b. Verification that operation is within the pressure-temperature limits report is required when RCS pressure and temperature conditions are undergoing planned changes. As discussed in Section II of the attachment the 20 °F/hr limit is consistent with the hydrostatic leak test assumptions the curve is included to address. Therefore, as the proposed changes ensure consistency with the design bases for the curve and element a conflict between the less restrictive TS SR requirements and the more restrictive TS Figure, the NRC staff finds the proposed change to TS SR 3.4.11.1.b acceptable.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component 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 effluent 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 this amendment involves no

significant hazards consideration and there has been no public comment on such finding (79 FR 58817; September 30, 2014). Accordingly, this 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 this amendment.

6.0 CONCLUSION

The NRC staff 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date of Issuance: June 12, 2015

June 12, 2015

Mr. Ernest J. Harkness
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-DB-3080
5501 North State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT CONCERNING CHANGES TO PRESSURE TEMPERATURE CURVES (TAC NO. MF4351)(L-14-150)

Dear Mr. Harkness:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 168 to Facility Operating License No. NPF-58 for FirstEnergy Operating Company's Perry Nuclear Power Plant, Unit No. 1. This amendment updates the Technical Specification pressure and temperature (P/T) figures and makes editorial changes related to the P/T figures including clarifications and updates to the associated titles, labeling, and notes in response to your application dated June 23, 2014 as amended by a letter dated February 27, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14174A633 and ML15069A235 respectively).

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

Sincerely,
/RA/
Kimberly Green, Senior Project Manager
Plant Licensing III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:
1. Amendment No. 168 to NPF-58
2. Safety Evaluation

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