NRR-DMPSPEm Resource

From: Galvin, Dennis
Sent: Friday, August 31, 2018 9:55 AM
To: Grzeck, Lee (Lee.Grzeck@duke-energy.com)
Cc: Mark Turkal (Mark.Turkal@duke-energy.com); Sheng, Simon; Patel, Amrit
Subject: Brunswick RAIs – LAR to Revise TS to Relocate the Pressure-Temperature Limits to the Pressure and Temperature Limits Report (EPID L 2018-LLA-0094)
Attachments: Brunswick Relocation of P-T Limits to PTLR RAI Final L-2018-LLA-0094 2018-08-31.pdf

Mr. Grzeck,

By letter dated April 4, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18094B058), as supplemented by letter dated May 29, 2018 (ADAMS Accession No. ML18149A487) Duke Energy Progress, LLC (the licensee) submitted a license amendment request (LAR) for Brunswick Steam Electric Plant Unit Nos. 1 and 2 (Brunswick). The proposed amendments would modify the Brunswick Technical Specifications (TSs) to relocate the pressure temperature limit curves to a licensee-controlled Pressure and Temperature Limits Report (PTLR). The amendment request was submitted in accordance with guidance provided in U.S. Nuclear Regulatory Commission (NRC) Generic Letter 96-03, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protections System Limits," dated January 31, 1996.

The U.S. Nuclear Regulatory Commission (NRC) staff has determined that additional information is needed to complete its review. The enclosed RAI was e-mailed to the licensee in draft form on August 10, 2018 (ADAMS Accession No. ML18225A012). A clarification call was held on August 30, 2018. The licensee agreed to provide responses to the RAI by September 28, 2018. The NRC staff agreed with this date.

If you have any questions, please contact me at (301) 415-6256.

Respectfully,

Dennis Galvin
Project Manager
U.S Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Operating Reactor Licensing
Licensing Project Branch 2-2
301-415-6256

Docket No. 50-325, 50-324

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO LICENSE AMENDMENT REQUEST TO REVISE THE PRESSURE-TEMPERATURE LIMITS AND TO RELOCATE THEM TO A LICENSEE-CONTROLLED PRESSURE TEMPERATURE LIMITS REPORT

DUKE ENERGY PROGRESS, LLC

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

EPID: L-2018-LLA-0094

By letter dated April 4, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18094B058), as supplemented by letter dated May 29, 2018 (ADAMS Accession No. ML18149A487), Duke Energy Progress, LLC (the licensee) submitted a license amendment request (LAR) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2 to relocate its Technical Specifications pressure-temperature (P-T) limits to a licensee-controlled Pressure and Temperature Limits Report (PTLR). Additionally, the licensee proposed to replace the current P-T limits for 32 effective full power years (EFPY), which were submitted on June 26, 2002 (ADAMS Accession Nos. ML021890061 and ML021890087) by the proposed P-T limits for 54 EFPY based on the Boiling Water Reactor (BWR) Owners' Group (BWROG) Topical Report (TR): BWROG-TP-11-022-A, "Pressure Temperature Limits Report Methodology for Boiling Water Reactors" (ADAMS Accession No. ML13277A557). The U.S. Nuclear Regulatory Commission (NRC) staff evaluates the acceptability of a facility's proposed P-T limits based on primarily Title 10 of *Code of Federal Regulations* (10 CFR) Part 50 Appendix G, "Fracture Toughness Requirements" and Appendix H, "Reactor Vessel Material Surveillance Program Requirements." The NRC staff's review of the submittal indicated that additional information is needed to ensure that the proposed P-T limits and PTLR are in accordance with the TR and meet the 10 CFR Part 50 Appendices G and H requirements.

Enclosure Attachment 6 of the LAR provides the licensee's proposed PTLR.

MVIB RAI-1

Appendix A to Attachment 1 to the proposed PTLR states:

> "Representative surveillance capsule materials for the BSEP Unit 1 and 2 limiting beltline plate are contained in the River Bend and Supplemental Surveillance Program (SSP) Capsules C, F, and H. Representative materials for the BSEP Unit 1 and 2 limiting beltline weld are in the Duane Arnold and SSP-F surveillance capsules."

The NRC staff notes that the information quoted above is inconsistent with that contained in Table 4-4 of BWRVIP-86, Revision 1-A (ADAMS Accession No. ML131760082). Please explain this apparent discrepancy and correct the PTLR if warranted.

MVIB RAI 2

Page 9 of Attachment 1 to the proposed PTLR (in Section 5.0) states:

> "The representative heat of the plate material for both BSEP Unit 1 and Unit 2 (B0673-1) in the ISP is not the same as the target plate material in BSEP Unit 1 (B8496-1) or BSEP Unit 2 (C4500-2)…. The representative heat of the weld material for both BSEP Unit 1 and Unit 2 (5P6756) is not the same heat number as the target weld material in BSEP Unit 1 (1P4218) or BSEP Unit 2 (S3986)…. Therefore, for all BSEP Unit 1 and Unit 2 beltline materials, the CF values are calculated using table values from R.G. 1.99, Revision 2, Position 1.1."

Notwithstanding the licensee's statement above the staff notes:

1) BSEP is a member of the BWRVIP-ISP;
2) BWRVIP-ISP's selection of the representative surveillance plate and weld for BSEP units based on material characteristics instead of heat number was accepted by the NRC.
3) Regulatory Guide (RG) 1.99, "Radiation Embrittlement of Reactor Vessel Materials," Revision 2, Position 2.1 provides guidance for evaluating the adjusted reference temperature used in establishing the plant's P-T limits when two or more credible surveillance data sets becomes available;
4) Table 4-8 of BWRVIP-86, Revision 1-A indicated that two or more surveillance data (i.e., sufficient data) exist for the target reactor pressure vessel limiting plate and weld.

Therefore, please revise the submittal to utilize the BWRVIP-ISP data in accordance with RG 1.99, Revision 2, provide a basis using BWR fleet surveillance data to demonstrate that the BWRVIP-ISP's selection of the representative surveillance plate and weld for BSEP units is inadequate, or provide a justified alternate approach to support failure to use available surveillance data.

MVIB RAI-3

Section 3 of the PTLR states that, "The 54 EFPY limiting material in Unit 1 is plate heat number B8496 which is located in the lower intermediate shell. The limiting material in Unit 2 are the N16 nozzles, heat number Q2Q1VW." This statement indicated that there is only one limiting material in the beltline region for each BSEP unit. However, the abrupt change of curve pattern regarding the P-T limits for the beltline region of Unit 2 shown in Figures 5 and 6 of Attachment 1 to the PTLR suggests that two limiting materials exist for Unit 2. Please explain this apparent discrepancy.

MVIB RAI-4

Page 5 of Attachment 1 to the PTLR (in Section 4.0) states, "The Single Relief or Safety Valve (SRV) Blowdown thermal transient event…has a maximum cooldown rate of 954 °F/hr and is the limiting Service A/B event used in the calculations of Limit Curve B and Curve C." Please confirm that, in addition to the beltline region, a cooldown rate of 954 °F/hr was also used for developing the P-T limits for the instrument nozzle, the bottom head, and the non-beltline region. If a different cooldown rate was used, please justify its use. Confirm that the composite curve is the only P-T limits monitored during operation.

MVIB RAI-5

Whenever a new TR methodology is applied to generate the P-T limits, the NRC performs confirmatory calculations to verify successful implementation of the methodology. For the present submission, insufficient information has been provided to permit the NRC staff to perform these calculations. Therefore,

1) For the beltline region, using Table 2 on page 29 of Attachment 1 (BSEP Unit 1, Core Not Critical, Curve B, Beltline Region) to the PTLR as an example, provide fluid temperature, the temperature at a quarter thickness of the vessel wall (1/4T temperature), the pressure K (K_{IP}), and K_{IT} value for a sufficient number of pairs of pressure and temperature in the Table, so that the NRC staff can verify the P-T limits.

2) For the non-beltline region, since the P-T limits for it first appeared in the proposed P-T limits, please explain the assumptions, including those specific to the BSEP units, made to ensure that the BSEP P-T limits based on the feedwater nozzle bound the non-beltline region (e.g., recirculation inlet and outlet nozzles and core spray nozzle). Using Table 2 on page 31 of Attachment 1 (BSEP Unit 1, Core Not Critical, Curve B, Non-Beltline Region) to the PTLR as an example, provide fluid temperature, 1/4T temperature, the RT_{NDT} value, and K_{IP} and K_{IT} values for a typical temperature and pressure pair, so that the NRC staff can verify the P-T limits.

3) For the bottom head region, due to lack of neutron embrittlement, the P-T limits for it should remain unchanged. Please explain why the proposed bottom head P-T limits are different from that in the current licensing basis. Using Table 2 on page 30 of Attachment 1 (BSEP Unit 1, Core Not Critical, Curve B, Bottom Head Region) to the PTLR as an example, provide similar information requested in Item 2, so that the NRC staff can verify the P-T limits. Please also elaborate the details of the K_{IT} calculation.

SNPB RAI 1

In the supplement to the LAR dated May 29, 2018, the licensee submitted WCAP-17660-NP, "Neutron Exposure Evaluations for Core Shroud and Pressure Vessel Brunswick Units 1 and 2," dated November 2012. Section 1.0 of WCAP-17660-NP states that the neutron fluence calculational methodology used in the fluence analysis has been applied to the Brunswick reactors in the past and was previously reviewed and accepted in the NRC staff in BSEP Units 1 and 2 Amendment Nos. 228 and 256, respectively, issued on June 18, 2003 (ADAMS Accession No. ML031710175). Section 1.0 states that neutron fluence calculational methodology complies with RG 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence." These amendments contain the NRC staff evaluation of the Brunswick neutron fluence calculational methodology used to determine the fluence for the current P-T limits. The same neutron fluence calculational methodology was used as part of license renewal in 2006.

However, Section 3.0 of WCAP-17660- states that the neutron fluence calculational methodology has been enhanced:

> Several enhancement[s] to the analytical model to better describe the [boiling water reactor] fuel and bypass coolant features for the outermost row of peripheral assemblies, which are the most influential to the neutron exposures at

> the core shroud and the reactor vessel. The results of this evaluation indicate that, in general, the projected neutron exposures of critical components are less than those reported in [the 2003 license amendment request].

Confirm that the methodology to be used as part of the proposed pressure temperature limits report methodology is the same as the previously approved Brunswick neutron fluence calculational methodology in Amendment Nos. 228 and 256 so the NRC staff can confirm continued adherence to RG 1.190. If not, describe and justify the differences.

SNPB RAI 2

In the supplement to the LAR dated May 29, 2018, (WCAP-17660-NP), in Section 2.1 in the subsection titled, “Fuel Cycle Modeling,” the licensee described the approach used to determine the reactor pressure vessel neutron fluence for future nominal Maximum Extended Load Line Limit Analysis Plus (MELLLA+) equilibrium fuel cycles. The licensee also provided tables with assumed relative power fraction (RPF), axial power, and axial void fraction distribution inputs to the fluence calculational model for operating under MELLLA+ conditions to be used to confirm that the actual core design is comparable to the nominal. If the actual RPFs, axial power, or axial void fraction distributions are not bounded by those nominally assumed when MELLLA+ is implemented at Brunswick, updated fluence values be would need to be determined for input to P-T limits re-assessment. However, the licensee does not describe an approach for determining updated fluence values.

Describe the approach for determining updated fluence values if the actual RPFs, axial power, or axial void fraction distributions are not bounded by those assumed in the WCAP-17660-NP fluence analysis when MELLLA+ is implemented at Brunswick.