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10 CFR 50.55a

RS-24-038

May 2, 2024

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Limerick Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Nine Mile Point Nuclear Station, Unit 2
Renewed Facility Operating License No. NPF-69
NRC Docket No. 50-410

Subject: Relief Request Concerning Extension of Permanent Relief from Ultrasonic Examination of Reactor Pressure Vessel Circumferential Shell Welds

In accordance with 10 CFR 50.55a(z)(1), Constellation Energy Generation, LLC (CEG) is requesting a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." Specifically, this proposed alternative concerns examination of RPV circumferential shell welds. Constellation proposes to utilize the methodology and technical basis of BWRVIP-329-A, “Updated Probabilistic Fracture Mechanics Analyses for BWR RPV Welds to Address Extended Operations.”

There are no regulatory commitments contained in this letter.

CEG requests your review and approval of this request by May 1, 2025.

If you have any questions, please contact Christian Williams at 732-281-9104.

Respectfully,

David T. Gudger

David T. Gudger
Senior Manager - Licensing and Regulatory Affairs
Constellation Energy Generation, LLC

Attachment: Request for Alternative to the Ultrasonic Examination of Reactor Pressure Vessel Circumferential Shell Welds

cc: Regional Administrator - NRC Region I
Regional Administrator - NRC Region III
NRC Senior Resident Inspector - LaSalle County Station
NRC Senior Resident Inspector - Limerick Generating Station
NRC Senior Resident Inspector - Nine Mile Point Nuclear Station
NRC Project Manager - LaSalle County Station
NRC Project Manager - Limerick Generating Station
NRC Project Manager - Nine Mile Point Nuclear Station

Attachment
Request for Alternative to the Ultrasonic Examination of Reactor Pressure Vessel Circumferential Shell Welds

Proposed Alternative to the Ultrasonic Examination of Reactor Pressure Vessel Circumferential Shell Welds in Accordance with 10 CFR 50.55a(z)(1)

1. ASME Code Component(s) Affected:

Component:	Reactor Pressure Vessel (RPV)
Code Class:	1
Examination Category:	B-A
Item No.:	B1.11
Description:	Circumferential Pressure Retaining Welds in Reactor Vessel

2. Applicable Code Edition and Addenda:

PLANT	INTERVAL	EDITION	START	END
LaSalle County Station, Units 1 and 2	Fourth	2007 Edition, through 2008 Addenda	October 1, 2017	September 30, 2027
Limerick Generating Station, Units 1 and 2	Fourth	2007 Edition, through 2008 Addenda	February 1, 2017	January 31, 2027
Nine Mile Point Nuclear Station, Unit 2	Fourth	2013 Edition	October 6, 2018	August 22, 2028

3. Applicable Code Requirements

ASME Section XI, Section IWB-2500 and Table IWB-2500-1, Examination Category B-A, Item Number B1.11 (2007 Edition with 2008 Addenda and 2013 Edition) requires volumetric examination of all RPV circumferential pressure retaining welds each inspection interval.

4. Reason for Request:

Constellation Energy Generation, LLC (CEG) has previously utilized BWRVIP-74-A, “BWR Vessel and Internals Project BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines for License Renewal,” or BWRVIP-05, “BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations,” to obtain examination relief of RPV beltline circumferential welds and to address embrittlement of RPV beltline axial welds during extended plant operation. The U.S. Nuclear Regulatory Commission (NRC) safety evaluation (SE) of BWRVIP-74-A issued October 18, 2001 (Reference 3) specified actions to obtain examination relief of RPV beltline circumferential welds and to monitor embrittlement of RPV beltline axial welds, both of which were based on results of probabilistic fracture mechanics (PFM) analyses in the staff’s SE and supplemental SE of BWRVIP-05. As stated in BWRVIP-329, the objective of the report is to use NRC safety goals and PFM analysis procedures that have been developed since the publication of BWRVIP-05 to update the evaluation procedure and acceptance criteria specified in

BWRVIP-74-A for providing relief from examination of RPV circumferential welds and assessing axial weld integrity.

By letter dated August 22, 2019 (Reference 1), the Electric Power Research Institute (EPRI) submitted to the NRC for review BWRVIP-329, "Updated Probabilistic Fracture Mechanics Analyses for BWR RPV Welds to Address Extended Operations." NRC acceptance is documented in the email from J. Holonich (U.S. Nuclear Regulatory Commission) to D. Rouse and W. McGruder (Electric Power Research Institute), "BWRVIP-329 Final Safety Evaluation," dated April 21, 2021 (Reference 2).

In BWRVIP-329-A, a PFM analysis was performed to identify the combination of RPV beltline material conditions that would ensure NRC safety goals are satisfied for RPVs for a postulated, low temperature isothermal pressure transient, which had been determined to dominate the BWR RPV failure frequency. The methodology for this PFM analysis is consistent with previous industry and regulatory evaluations but applies more recent analysis procedures. The results of the PFM analysis identify the combination of beltline material conditions for the BWR fleet that will ensure regulatory safety goals are satisfied for the postulated transient. Section 3 and Section 4 of BWRVIP-329-A provide the complete details of the PFM analysis and inputs as well as the PFM analysis results. The PFM results are used to demonstrate that RPVs in the BWR fleet have margin against failure and satisfy NRC safety goals through at least 80-years of operating for the postulated transient. BWRVIP-329-A demonstrates that the RPVs included in this proposed alternative have margin against failure and satisfy NRC safety goals for the postulated transient. Application of BWRVIP-329-A provides continuing basis to justify relief from examination of RPV circumferential welds (B-A, B1.11) and demonstrates acceptable integrity of RPV axial welds.

This proposed alternative also serves to satisfy any applicable license renewal commitments associated with RPV circumferential and axial weld inspections which may include submittal of an amended relief request in accordance with the requirements of 10 CFR 50.55a to obtain continued relief from the subject ASME Code inspection requirements through the period of extended operation.

5. Proposed Alternative and Basis for Use:

CEG is requesting relief from the ultrasonic examination requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-A, Item No. B1.11 circumferential pressure retaining welds in RPVs, for the units identified in Section 2, based upon the PFM analysis methodology, results, and conclusions of BWRVIP-329-A. CEG will continue to comply with all other applicable ASME Section XI examination requirements associated with the RPVs including inspection of the RPV vertical pressure retaining welds (Category B-A, Item No. B1.12) and performance of the Class 1 system leakage test (Category B-P, Item Nos. B15.10 & B15.20) each refueling outage.

In BWRVIP-329-A, a bounding PFM analysis was performed to evaluate the safety significance of a postulated, low temperature isothermal pressure transient in BWR RPVs; identify the combination of beltline material conditions that will ensure regulatory safety goals are satisfied for the postulated transient; and determine if there is adequate margin against vessel failure during the postulated transient.

Table 5-1 in Section 5 of BWRVIP-329-A provides a means to verify that the PFM analysis documented in BWRVIP-329-A is applicable to a specific BWR RPV. BWRVIP-329-A states that "since the evaluation approach explicitly considered the RPV dimensions of all U.S. BWRs, these plants are by definition enveloped by this study." Table 1 below identifies the site-specific dimensions for the CEG Units included in this proposed alternative in order to demonstrate that they are bounded by the RPV dimensions in Table 5-1 of BWRVIP-329-A.

Table 1: Site Specific Information for Verification of Vessel Dimensions

Dimension	LaSalle Unit 1	LaSalle Unit 2	Limerick Unit 1	Limerick Unit 2	Nine Mile Point Unit 2
Reactor Vessel Inside Radius to CBMI, in.	127.0	126.7	126.7	126.7	126.7
Base Metal Wall Thickness, in.	6.1	6.4	6.4	6.4	6.4
Radius / thickness	20.7	19.7	19.7	19.7	19.7
Cladding Thickness, in.	5/16	3/16	3/16	3/16	3/16

Table 5-2 in Section 5 of BWRVIP-329-A provides a template for showing that the plant-specific limiting RPV beltline mean reference temperature at the vessel inner surface (RT_{MAX}) values are less than the limiting RT_{MAX} values analyzed in BWRVIP-329-A, therefore demonstrating that the plant-specific conditional probability of failure (CPF) values through the extended period of operation are below the acceptance criteria defined in the Technical Report. This plant-specific comparison for the requested CEG Units is shown in Table 2 through 6 below. Table 5-2 of BWRVIP-329-A contains the limiting RT_{max} value based on Category 1 and Category 2 Vessels. As used in Table 5-2 of BWRVIP-329-A, LaSalle Unit 1, LaSalle Unit 2, and Nine Mile Point Unit 2 are Category 1 Vessels; Limerick Unit 1 and Limerick Unit 2 are Category 2 Vessels.

Table 2: LaSalle County Station (LCS), Unit 1 Parameter Verification

LCS, Unit 1 Parameter	Limiting Plate	Limiting Circumferential Weld	Limiting Axial Weld
Heat/Lot Identification Number	C6345-1	6329637	1P3571
Copper Content (wt. %)	0.14*	0.205	0.21*
Nickel Content (wt. %)	0.54*	0.105	0.75*
Chemistry Factor (CF) (°F) [1]	152*	98	440*
EOI Neutron Fluence (f) (n/cm^2) [2]	9.77E+17	8.45E+17	8.23E+17
$RT_{NDT(U)}$ (°F) [3]	-20	-50	-30
EOI ΔRT_{NDT} (°F) [4]	63	38	167
EOI RT_{MAX} (°F) [5]	43	-12	137
Category 1 Vessel Limiting RT_{MAX} (°F) [6]	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2
EOI RT_{MAX} < Limiting RT_{MAX}? [7]	Yes	Yes	Yes

*Values for limiting plate and axial weld are based upon test data included in the Integrated Surveillance Program as documented in BWRVIP-135 Revision 4.

Note: Values were taken from the LaSalle County Generating Station Units 1 and 2 Pressure and Temperature Limits Report (PTLR) for 54 Effective Full-Power Years (EFPY) submitted to the NRC in support of a License Amendment Request dated 11/10/2022 (ML22332A449) and supplemented 1/10/2023 (ML23010A227).

Table 3: LaSalle County Station (LCS), Unit 2 Parameter Verification

LCS, Unit 2 Parameter	Limiting Plate	Limiting Circumferential Weld	Limiting Axial Weld
Heat/Lot Identification Number	C9404-2	5P6771/342	3P4966/1214
Copper Content (wt. %)	0.07	0.034*	0.025*
Nickel Content (wt. %)	0.49	0.934*	0.913*
Chemistry Factor (CF) (°F) [1]	44	46*	34*
EOI Neutron Fluence (f) (n/cm^2) [2]	1.07E+18	9.11E+17	1.01E+18
$RT_{NDT(U)}$ (°F) [3]	52	-34	-6
EOI ΔRT_{NDT} (°F) [4]	19	18	14
EOI RT_{MAX} (°F) [5]	71	-16	8
Category 1 Vessel Limiting RT_{MAX} (°F) [6]	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2
EOI RT_{MAX} < Limiting RT_{MAX}? [7]	Yes	Yes	Yes

*Values for limiting circumferential weld and axial weld are based upon best estimate chemistry values as documented in BWRVIP-135 Revision 4.

Note: Values were taken from the LaSalle County Generating Station Units 1 and 2 Pressure and Temperature Limits Report (PTLR) for 54 Effective Full-Power Years (EFPY) submitted to the NRC in support of a License Amendment Request dated 11/10/2022 (ML22332A449) and supplemented 1/10/2023 (ML23010A227).

Table 4: Limerick Generating Station (LGS), Unit 1 Parameter Verification

LGS, Unit 1 Parameter	Limiting Plate	Limiting Circumferential Weld	Limiting Axial Weld
Heat/Lot Identification Number	C7677-1	07L857/B101A27A	662A746/H013A27A
Copper Content (wt. %)	0.11	0.03	0.03
Nickel Content (wt. %)	0.50	0.97	0.88
Chemistry Factor (CF) (°F) [1]	73	41	41
EOI Neutron Fluence (f) (n/cm^2) [2]	1.09E+18	8.08E+17	8.89E+17
$RT_{NDT(U)}$ (°F) [3]	20	-6	-20
EOI ΔRT_{NDT} (°F) [4]	32	15	16
EOI RT_{MAX} (°F) [5]	52	9	-4
Category 2 Vessel Limiting RT_{MAX} (°F) [6]	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2
EOI RT_{MAX} < Limiting RT_{MAX}? [7]	Yes	Yes	Yes

Note: Values were taken from the Limerick Generating Station Unit 1 Pressure and Temperature Limits Report (PTLR) for 57 Effective Full-Power Years (EFPY) submitted to the NRC in support of a License Amendment Request dated 9/29/2020 (ML20273A215).

Table 5: Limerick Generating Station, Unit 2 Parameter Verification

LGS, Unit 2 Parameter	Limiting Plate	Limiting Circumferential Weld	Limiting Axial Weld
Heat/Lot Identification Number	B3416-1	07L857/B101A27A	432A2671/ H019A27A
Copper Content (wt. %)	0.14	0.03	0.04
Nickel Content (wt. %)	0.65	0.97	1.08
Chemistry Factor (CF) (°F) [1]	101	41	54
EOI Neutron Fluence (f) (n/cm^2) [2]	7.69E+17	7.69E+17	8.71E+17
$RT_{NDT(U)}$ (°F) [3]	40	-6	-12
EOI ΔRT_{NDT} (°F) [4]	37	15	21
EOI RT_{MAX} (°F) [5]	77	9	9
Category 2 Vessel Limiting RT_{MAX} (°F) [6]	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2
EOI RT_{MAX} < Limiting RT_{MAX}? [7]	Yes	Yes	Yes

Note: Values were taken from the Limerick Generating Station Unit 2 Pressure and Temperature Limits Report (PTLR) for 57 Effective Full-Power Years (EFPY) submitted to the NRC in support of a License Amendment Request dated 9/29/2020 (ML20273A215).

Table 6: Nine Mile Point Nuclear Station (NMP), Unit 2 Parameter Verification

NMP, Unit 2 Parameter	Limiting Plate	Limiting Circumferential Weld	Limiting Axial Weld
Heat/Lot Identification Number	C3147-1	4P7216(S)/0751	5P5657(S)/0931
Copper Content (wt. %)	0.11	0.045	0.07
Nickel Content (wt. %)	0.63	0.80	0.71
Chemistry Factor (CF) (°F) [1]	74.5	61	95
EOI Neutron Fluence (f) (n/cm^2) [2]	1.62E+18	1.58E+18	1.62E+18
$RT_{NDT(U)}$ (°F) [3]	0	-50	-60
EOI ΔRT_{NDT} (°F) [4]	39	32	50
EOI RT_{MAX} (°F) [5]	39	-18	-10
Category 1 Vessel Limiting RT_{MAX} (°F) [6]	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2	See BWRVIP-329-A Table 5-2
EOI RT_{MAX} < Limiting RT_{MAX}? [7]	Yes	Yes	Yes

Note: Values were taken from the Nine Mile Point Unit 2 Pressure and Temperature Limits Report, PTLR-2 approved by SER dated May 29, 2014 (ML14057A554).

Notes applicable to Table 2 through 6

1. Regulatory Guide 1.99 Chemistry Factor: Determined per Position 1.1 using Table 1 for Welds and Table 2 for Plates when less than two points of surveillance data are available or determined per position 2.1 when two or more points of surveillance data are available.
2. The end-of-interval (EOI) peak neutron fluence (E > 1.0 MeV) at the RPV inner surface for the limiting weld or plate being evaluated.
3. Unirradiated (initial) reference temperature.
4. Increase in reference temperature due to irradiation at end of the interval for which the analysis is to be applied: $\Delta RT_{NDT} = (CF)\, f^{(0.28-0.10 \log f)}$, where fluence (f) is expressed in units of 10^{19} n/cm^2 (E > 1.0 MeV).
5. RT_{MAX} at the end of the interval for which the analysis is to be applied: $RT_{MAX} = RT_{NDT(U)} + \Delta RT_{NDT}$.
6. Bounding RT_{MAX} values that satisfy risk goals (from BWRVIP-329-A, Figure 4-3) For Category 1 Vessels, RT_{MAX} values are set to ensure Total CPF ≤ 1E-3. For Category 2 vessels, RT_{MAX} values are set to ensure Total CPF ≤ 5E-4 which conservatively accounts for a potential increase in CPF for field-fabricated welds of ~1.4x.
7. If the EOI RT_{MAX} values for the limiting plate, circumferential weld, and axial weld are ALL less

than the corresponding limiting RT_{MAX} values, the safety goals defined by BWRVIP-329-A remain satisfied.

Table 1 of the proposed alternative demonstrates plant specific applicability of the PFM analysis in BWRVIP-329-A for LaSalle Units 1 and 2, Limerick Units 1 and 2, and Nine Mile Point Unit 2. Table 2 through 6 of the proposed alternative demonstrates that the plant-specific limiting RPV beltline RT_{MAX} values are less than the limiting RT_{MAX} values analyzed in BWRVIP-329-A for LaSalle Units 1 and 2, Limerick Units 1 and 2, and Nine Mile Point Unit 2. Therefore, the safety goals defined in Section 4 of BWRVIP-329-A are met. Based on the information presented, BWRVIP-329-A provides an acceptable technical basis for continued relief from the ASME Code, Section XI examinations for the RPV circumferential welds, provides an acceptable technical evaluation for the embrittlement of RPV axial welds, and demonstrates an acceptable level of quality and safety for the duration of the proposed alternative.

6. Duration of Proposed Alternative:

The proposed alternative is requested for the remainder of the renewed facility operating license as shown in the table below.

PLANT	END OF EXTENDED OPERATING LICENSE	ANALYZED EFFECTIVE FULL POWER YEARS (EFPYs)
LaSalle County Station, Unit 1	April 17, 2042	54
LaSalle County Station, Unit 2	December 16, 2043	54
Limerick Generating Station, Unit 1	October 26, 2044	57
Limerick Generating Station, Unit 2	June 22, 2049	57
Nine Mile Point Nuclear Station, Unit 2	October 31, 2046	54

7. References

1. Letter from N. Palm (Electric Power Research Institute) to J. Holonich (U.S. Nuclear Regulatory Commission), “Transmittal of BWRVIP-329: BWR Vessel and Internals Project, Updated Probabilistic Fracture Mechanics Analysis for BWR RPV Welds to Address Extended Operations," dated August 22, 2019 (ML19238A075).

2. Letter from J. Holonich (U.S. Nuclear Regulatory Commission) to D. Rouse and W. McGruder (Electric Power Research Institute), “BWRVIP-329 Final Safety Evaluation,” dated April 12, 2021 (ML21084A088).

3. Letter from C. Grimes (U.S. Nuclear Regulatory Commission) to C. Terry (Niagara Mohawk Power Company), “Acceptance for Referencing of EPRI Proprietary Report TR-113596, BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP-74) and Appendix A, Demonstration of

Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR 54.21)," dated October 18, 2001 (ML012920549).

8. Precedent:

None