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

June 28, 2017

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – ISSUANCE OF SAFETY EVALUATION FOR REQUEST RE: INSERVICE INSPECTION INTERVAL PROPOSED ALTERNATIVE (I5R-08) (CAC NOS. MF8090 AND MF8091)

Dear Mr. Hanson:

By letter dated June 30, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16187A295), as supplemented by letter dated August 22, 2016 (ADAMS Accession No. ML16236A251), Exelon Generation Company, LLC (the licensee) submitted a request to the Nuclear Regulatory Commission (NRC) proposing the use of an alternative[1] to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at Dresden Nuclear Power Station (DNPS), Units 2 and 3.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

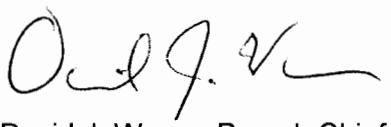
The NRC staff has reviewed the licensee's proposed alternative and the evaluation of the five plant-specific criteria specified in the safety evaluations (SEs) for the BWRVIP-108 and BWRVIP-241 reports, which provides the technical bases for the use of ASME Code Case N-702 to examine Reactor Pressure Vessel (RPV) nozzle-to-vessel welds and nozzle inner radii at DNPS, Units 2 and 3. Meeting the technical basis for the use of ASME Code Case N-702 ensures that the proposed alternative provides an adequate level of quality and safety, as set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC authorizes the licensee's proposed alternative for inspection of nozzle-to-vessel shell welds and nozzle inner radii sections of RPV nozzles listed in Section 3.1 of the enclosed SE for the remaining term of the DNPS, Units 2 and 3, renewed operating licenses, which currently expire on December 22, 2029, and January 12, 2031, respectively. Code Case N-702 notes that "Code Cases will remain available for use until annulled by the applicable Standards Committee." This authorization is based on Code Case N-702 as conditionally approved for use in RG 1.147, Revision 17 and the information and analysis provided in the submittal.

[1] ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1," and Boiling Water Reactor Vessel and Internals Project (BWRVIP)-241, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii."

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact Mr. Russell Haskell at (301) 415-1129 or email at Russell.Haskell@nrc.gov.

Sincerely,



David J. Wrona, Branch Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosure:
As stated

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE REQUEST I5R-08

NOZZLE-TO-VESSEL WELD AND INNER RADII EXAMINATIONS

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

EXELON GENERATION COMPANY, LLC

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By letter dated June 30, 2016, (Agencywide Documents Access and Management System, (ADAMS), Accession No. ML16187A295), as supplemented by letter dated August 22, 2016, (ADAMS Accession No. ML16236A251), Exelon Generation Company, LLC (EGC, the licensee), requested U.S. Nuclear Regulatory Commission (NRC) approval of a request for alternative I5R-08, to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Table IWB-2500-1, Nozzle-to-Vessel Welds and Nozzle Inside Radius Section examination requirements for Dresden Nuclear Power Station (DNPS), Units 2 and 3. The request was submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 50.55a(z)(1). An alternative in accordance with ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds was proposed.

2.0 REGULATORY EVALUATION

Inservice inspection (ISI) of the ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as a means of detecting anomaly and degradation indications so that structural integrity of these components can be maintained. This is required by 10 CFR 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC or Commission) pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(z) states that alternatives to the requirements of paragraphs (b) through (h) of 10 CFR 50.55a or portions thereof may be used when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation. The applicant or licensee must demonstrate that: (1) the proposed alternative would provide an acceptable level of quality and safety; or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

For all reactor pressure vessel (RPV) nozzle-to-vessel shell welds and nozzle inner radii, ASME Code, Section XI, requires inspection of 100 percent of the nozzles during each 10-year ISI interval. However, ASME Code Case N-702 provides an alternative which reduces the inspection of RPV nozzle-to-vessel shell welds and nozzle inner radius areas from 100 percent to 25 percent of the nozzles for each nozzle type during each 10-year interval. The NRC has

approved the [Boiling Water Reactor Vessel Internals Project] BWRVIP-108 report, "BWRVIP-108: BWR Vessel and Internals Project, Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Inner Radii" and the BWRVIP-241 report, "BWRVIP-241: BWR Vessel and Internals Project, Probabilistic Fracture Mechanics [PFM] Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," which contain the technical basis supporting ASME Code Case N-702. The BWRVIP-241 report contains additional PFM results supporting revision of the evaluation criteria in the BWRVIP-108 report. Hence, the conditions and limitations specified in the April 19, 2013, safety evaluation (SE) (ADAMS Accession No. ML13071A240) for the BWRVIP-241 report supplement those in the December 19, 2007, SE (ADAMS Accession No. ML073600374) for the BWRVIP-108 report.

The staff reviewed License Renewal Appendix A for BWRVIP-241-A and BWRVIP-108-NP and concluded that the License Renewal Appendix A provides an acceptable basis for the continued use of ASME Code Case N-702 during the period of extended operation (PEO), as documented in the SE dated April 26, 2017 (ADAMS Accession No. ML17114A096). Revision 17 of Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," identifies the Code Cases that the NRC has determined to be acceptable alternatives to applicable parts of Section XI. RG 1.147 identifies Code Case N-702 accepted with the following condition (as stated):

> The technical basis supporting the implementation of this Code Case is addressed by BWRVIP-108: BWR Vessel and Internals Project, "Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," EPRI Technical Report 1003557, October 2002 (ML023330203) and BWRVIP-241: BWR Vessel and Internals Project, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," EPRI Technical Report 1021005, October 2010 (ML11119A041). The applicability of Code Case N-702 must be shown by demonstrating that the criteria in Section 5.0 of NRC Safety Evaluation regarding BWRVIP-108 dated December 18, 2007 (ML073600374) or Section 5.0 of NRC Safety Evaluation regarding BWRVIP-241 dated April 19, 2013 (ML13071A240) are met. The evaluation demonstrating the applicability of the Code Case shall be reviewed and approved by the NRC prior to the application of the Code Case.

The ASME Code of record for DNPS, Units 2 and 3, for the fifth 120-month interval ISI program is the 2007 Edition of the ASME Code, Section XI, through the 2008 Addenda.

PLANT-SPECIFIC CRITERIA SUPPORTING ASME CODE CASE N-702

The SE for the BWRVIP-241 report specified plant-specific requirements which must be met for applicants proposing to use this alternative of ASME Code Case N-702. These plant-specific requirements are reproduced from the SE for the BWRVIP-241 report in the following:

(1) the maximum RPV heatup/cooldown rate is limited to less than 115 °F/hour;

For recirculation inlet nozzles

(2) $(pr/t)/C_{RPV} \leq 1.15$

p = RPV normal operating pressure (psi),
r = RPV inner radius (inch),
t = RPV wall thickness (inch), and
C_{RPV} = 19332;

(3) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} \leq 1.47$

p = RPV normal operating pressure (psi),
r_o = nozzle outer radius (inch),
r_i = nozzle inner radius (inch), and
C_{NOZZLE} = 1637;

For recirculation outlet nozzles

(4) $(pr/t)/C_{RPV} \leq 1.15$

p = RPV normal operating pressure (psi),
r = RPV inner radius (inch),
t = RPV wall thickness (inch), and
C_{RPV} = 16171; and

(5) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} \leq 1.59$

p = RPV normal operating pressure (psi),
r_o = nozzle outer radius (inch),
r_i = nozzle inner radius (inch), and
C_{NOZZLE} = 1977.

Meeting the above five criteria using plant-specific information was required by the NRC staff to ensure that the PFM analysis documented in the BWRVIP-241 report applies to the RPV of the licensee's plant.

The following plant-specific requirements are specified in the December 19, 2007, SE for the BWRVIP-108 report supporting use of the ASME Code Case N-702:

(1) The maximum RPV heatup/cooldown rate is limited to less than 115 °F/hour;

For recirculation inlet nozzles

(2) $(pr/t)/C_{RPV} < 1.15$

p = RPV normal operating pressure,
r = RPV inner radius,
t = RPV wall thickness, and
C_{RPV} = 19332 (i.e., 1000 psi x 110 inch/5.69 inch, based on the BWRVIP-108 recirculation inlet nozzle/RPV FEM model);

(3) $[p(r_o^2 + r_i^2)/(r_o^2 - ri^2)]/C_{NOZZLE} < 1.15$

p = RPV normal operating pressure,
r_o = nozzle outer radius,
r_i = nozzle inner radius, and
C_{NOZZLE} = 1637; [i.e., 1000 psi x$(13.988^2 + 6.875^2)/ (13.988^2 - 6.875^2)$], based on the BWRVIP-108 recirculation inlet nozzle/RPV FEM model];

For recirculation outlet nozzles

(4) $(pr/t)/C_{RPV} < 1.15$

p = RPV normal operating pressure,
r = RPV inner radius,
t = RPV wall thickness, and
C_{RPV} = 16171 (i.e., 1000 psi x 113.2 inch/7.0 inch, based on the BWRVIP-108 recirculation outlet nozzle/RPV FEM model); and

(5) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$

p = RPV normal operating pressure,
r_o = nozzle outer radius,
r_i = nozzle inner radius, and
C_{NOZZLE} = 1977 [i.e., 1000 psi x$(22.31^2 + 12.78^2)/ (22.31^2 - 12.78^2)$], based on the BWRVIP-108 recirculation outlet nozzle/RPV FEM model].

This plant-specific information was required by the NRC staff to ensure that the PFM analysis documented in the BWRVIP-108 report applies to the RPV of the licensee's plant.

3.0 TECHNICAL EVALUATION

3.1 Licensee Evaluation

ASME Code Requirements for which Alternative is Requested

The licensee requested use of a proposed alternative to the following requirements of the ASME Code, Section XI, 2007 Edition with 2008 Addenda.

The licensee's submittal states:

> Table IWB-2500-1 "Examination Category B-D, Full Penetration Welds of Nozzles in Vessels." Class 1 nozzle-to-vessel weld and nozzle inner radii examination requirements are delineated in Item Number B3.90 "Nozzle-to-Vessel Welds," and B3.100 "Nozzle Inside Radius Section." The required method of examination is volumetric. All nozzles with full penetration welds to the vessel shell (or head) and integrally cast nozzles are examined each interval. All the nozzle assemblies identified in Tables 5-3 and 5-4 [of the submittal] are full penetration welds.

Component(s) for which Alternative is Requested (ASME Code Class 1)

> Reactor Vessel Nozzles: N1, N2, N3, N8, N18, N19, and N20

Examination Category

> B-D, "Full Penetration Welded Nozzles in Vessels"

Examination Item Number

> B3.90, "Nozzle-to-Vessel Welds," and B3.100, "Nozzle Inside Radius Section"

Applicable Code Edition and Addenda

The licensee's submittal states:

> The current interval of the Dresden Nuclear Power Station (DNPS), Units 2 and 3 Inservice Inspection (ISI) Program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 2007 Edition with the 2008 Addenda. Additionally, for ultrasonic examinations, ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," of the 2007 Edition with the 2008 Addenda is implemented, as required and modified by 10 CFR 50.55a(b)(2)(xv).

Proposed Alternative to the ASME Code

The licensee's submittal states:

> As an alternative for the welds and inner radii identified in Tables 5-1 and 5-2, Exelon Generation Company, LLC (EGC) proposes to examine a minimum of 25% of the DNPS, Units 2 and 3 nozzle-to-vessel welds and inner radius sections, including at least one nozzle from each system and nominal pipe size, during each inspection interval in accordance with ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1." For the applicable nozzle assemblies identified in Tables 5-1 and 5-2, this would mean at least one from each of the groups identified below:

Table 5-1: DNPS, Unit 2 Summary

Group	Total Number	Minimum Number to be Examined
Recircualtion Inlet (N1)	2	1
Recircualtion Inlet (N2)	10	3
Main Steam (N3)	4	1
Core Spray (N19)	2	1
Nozzles on Vessel Top Head (N8, N18)	3	1
Jet Pump Instrumentation (N20)	2	1

Table 5-2: DNPS, Unit 3 Summary

Group	Total Number	Minimum Number to be Examined
Recircualtion Inlet (N1)	2	1
Recircualtion Inlet (N2)	10	3
Main Steam (N3)	4	1
Core Spray (N19)	2	1
Nozzles on Vessel Top Head (N8, N18)	3	1
Jet Pump Instrumentation (N20)	2	1

Tables 5-3 and 5-4 [of the submittal] provide a complete list of DNPS, Units 2 and 3 applicable nozzle component identification numbers.

Basis for Alternative

The licensee's submittal states:

> Electric Power Research Institute (EPRI) Technical Report (TR)-1003557, "BWRVIP-108: BWR Vessel and Internals Project, 'Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii,'" provides the basis for the use of ASME Code Case N-702. The evaluation found that failure probabilities at the nozzle blend radius region and nozzle-to-vessel shell weld due to a low temperature overpressure event are very low (i.e., less than (<) 1 x 10-6 for 40 years) with or without inservice inspection. The report concludes that inspection of 25% of each nozzle type is technically justified.

This EPRI report was approved by the NRC in a safety evaluation (SE) dated December 19, 2007 (i.e., ADAMS Accession No. ML073600374). Section 5.0, "Plant Specific Applicability," of the SE indicates that each licensee who plans to request relief from the ASME Code, Section XI requirements for RPV nozzle-to-vessel shell welds and nozzle inner radius sections may reference the BWRVIP-108 report as the technical basis for the use of ASME Code Case N-702 as an alternative. However, each licensee should demonstrate the plant-specific applicability criteria from the BWRVIP-108 report to its units in the relief request by showing that all the general and nozzle-specific criteria addressed below are satisfied as described in Section 8 [of the submittal].

(1) The maximum RPV heatup/cooldown rate is limited to < 115 °F per hour. DNPS Technical Specification (TS) 3.4.9, "RCS Pressure and Temperature (P/T) Limits," provides a limiting condition for operation (LCO) and a corresponding surveillance requirement (SR) that ensure the reactor coolant system heatup and cooldown rates are less than or equal to (≤)100 °F/hr. The SR (i.e., monitoring of reactor vessel heatup and cooldown rates) is referenced in the DNPS Updated Final Safety Analysis Report (UFSAR) Section 5.3.2, "Pressure-Temperature Limits," and UFSAR Table 5.1-1, "Reactor Coolant System Data."

(2) For the Recirculation Inlet Nozzles, the following criteria must be met:

   a. $(pr/t)/C_{RPV}<1.15$; The calculation for the DNPS, Units 2 and 3 N2 Nozzle results in 1.065 which is less than 1.15.

   b. $[p(r_0^2 + r_i^2)/(r_0^2 - r_i^2)]/C_{NOZZLE}<1.15$; The calculation for the DNPS, Units 2 and 3 N2 Nozzle results in 0.972, which is less than 1.15.

(3) For the Recirculation Outlet Nozzles, the following criteria must be met:

   a. $(pr/t)/C_{RPV}< 1.15$; The calculation for the DNPS, Units 2 and 3 N1 Nozzle results in 1.273 which is higher than 1.15.

   b. $[p(r_0^2+r_i^2)/(r_0^2 - r_i^2)]/C_{NOZZLE}<1.15$; The calculation for the DNPS, Units 2 and 3 N1 Nozzle results in 0.840 which is less than 1.15.

Based upon the above information, all applicable DNPS, Units 2 and 3 RPV nozzle-to-vessel shell welds and nozzle inner radii sections, with the exception of the recirculation outlet nozzles, meet the general and nozzle-specific criteria in BWRVIP-241, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," and therefore ASME Code Case N-702 is applicable. The recirculation outlet nozzles do not meet all of the criteria in BWRVIP-241. BWRVIP-241, Section 6.0 notes that for plants having recirculation outlet nozzles with Condition 4 greater than 1.15 such as for DNPS, Units 2 and 3, a plant specific analysis following the approach described in this report may be able to justify values greater than 1.15. Additional discussion is provided in Section 8 [of the submittal].

> Attachment 3 in this request considers the nozzle-to-shell weld and nozzle blend radius on the N1 nozzle in accordance with Attachment 3, References 3 and 4, and confirms that the nozzle still meets the acceptable failure probability considering the bounding fluence at the end of the DNPS period of extended operation. Attachment 3, Reference 6 [ADAMS Accession No. ML16187A296] shows the highest fluence at 5.59 x $[10]^{17}$ neutrons per square centimeter [n/cm^2].
>
> Because the DNPS [Units 2 and 3] N1 nozzles did not meet the BWRVIP-241 criteria, a bounding analysis was performed to qualify all the nozzles. This bounding analysis is contained in Structural Integrity Associates, Inc. (SIA) File Nos. 1400735.301, Revision 1 and 1400735.302, Revision 1. As required by BWRVIP-241, these analyses have been included as Attachments 2 and 3 [of the submittal] [ADAMS Accession No. ML16187A296], respectively. The methods approved in BWRVIP-108 and BWRVIP-241 were followed. The site specific analysis concluded that the failure per reactor year for the nozzle-to-shell-weld and nozzle blend radii for the DNPS, Units 2 and 3 N 1 nozzles is below the acceptance criterion of 5 x 10^{-6} per year. This analysis shows that the N1 nozzles meet the acceptable failure probability even when considering elevated fluence level, thus qualifying all DNPS, Units 2 and 3 RPV nozzles with full penetration welds, with the exception of the feedwater and control rod drive return nozzles, for reduced inspection using ASME Code Case N-702 to the end of the DNPS, Units 2 and 3 periods of extended operation.
>
> Therefore, use of ASME Code Case N-702 provides an acceptable level of quality and safety in accordance with 10 CFR 50.55a(z)(1) for all applicable full penetration RPV nozzle-to-vessel shell welds and nozzle inner radii sections [of the submittal] for the remaining term of the renewed facility operating licenses for DNPS, Units 2 and 3 [ending on December 22, 2029, and January 12, 2031], respectively.

Duration of Proposed Alternative

The licensee's submittal states:

> Relief is requested for the remaining term of the DNPS, Units 2 and 3, renewed [facility] operating licenses [DPR-19 and DPR-29], which currently expire on December 22, 2029, and January 12, 2031, for DNPS, Units 2 and 3, respectively.

3.2 NRC Staff Evaluation

This proposed alternative was requested for the remaining term of the DNPS, Units 2 and 3, renewed facility operating licenses (DPR-19 and DPR-29), which expires on December 22, 2029, and January 12, 2031, respectively. This is inconsistent with the end date of the current fifth 10-year ISI interval ending on January 19, 2023. The NRC staff requested additional information to clarify the duration of the proposed inspection interval as annotated in the submittal. By supplemental letter dated August 22, 2016 (ADAMS Accession No. ML16236A251), the licensee's submittal states:

> Each inspection interval described in Attachment 1, Section 5 of the June 30, 2016, submittal refers to the Dresden Nuclear Power Station (DNPS), Units 2 and 3 current fifth and upcoming sixth 120-month Inservice Inspection (ISI) Program intervals. The Code Case N-702 examination requirements will be met during this entire timeframe. Specifically, a minimum of 25% of nozzle inner radii and nozzle-to-shell welds, including at least one nozzle from each system and nominal pipe size, as identified in Relief Request I5R-08 will be examined during each 120-month ISI inspection interval in accordance with the conditions for the implementation of Code Case N-702. These conditions are defined in NRC Regulatory Guide 1.147, Rev. 17, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." EGC will adhere to these requirements during both of the remaining DNPS, Units 2 and 3 120-month ISI Program intervals which span the balance of the DNPS, Units 2 and 3 period of extended operation.

The NRC staff finds this clarification to be consistent with the required 120-month period for the fifth 10-year ISI program interval and is acceptable for the implementation of ASME Code Case N-702.

The BWRVIP-241 report documents additional PFM results supporting revision of the five evaluation criteria in the SE for the BWRVIP-108 report. Since the objective of the BWRVIP-241 report is limited, i.e., revision of the limitations and conditions specified in the December 19, 2007, SE for the BWRVIP-108 report, it is considered as a supplement to the BWRVIP-108 report, not a replacement. The conditions and limitations specified in the SE for the BWRVIP-241 report supplement those in the SE for the BWRVIP-108 report. Applicants requesting relief from the ASME Code, Section XI, inspection requirements on the subject RPV nozzles for their plants must demonstrate that the five plant-specific criteria are satisfied, so that BWRVIP-241 report results apply to their plants.

The December 19, 2007, SE on BWRVIP-108 established that: (1) the fracture toughness-related reference temperature (RT_{NDT}) used in the PFM analyses were based on data from the entire fleet of BWR RPVs, making the PFM analyses bounding with respect to fracture resistance and leaving the driving force of the underlying PFM analyses the only item to be evaluated, and (2) except for the RPV heatup/cooldown rate, the plant-specific criteria are for the recirculation inlet and outlet nozzles only because the probabilities of failure for other nozzles are an order of magnitude lower. Based on the above, the BWRVIP-241 report documents additional PFM analyses on the recirculation inlet and outlet nozzles having the highest driving force among the BWR fleet to demonstrate that the associated vessel failure probability for the normal operation is still consistent with the NRC safety goal, thus supporting the proposed revision of the five evaluation criteria. The SE for the BWRVIP-241 report accepted the proposed revision of the five evaluation criteria in the BWRVIP-108 report.

In the submittal dated June 30, 2016, the licensee provided its evaluation of the five driving force factors, using plant-specific RPV data, and compared them against the criteria established in the safety evaluations for BWRVIP-108 and BWRVIP-241. The NRC staff verified the licensee's evaluation and confirmed that Criterion 4, based on the generic analysis of BWRVIP-108 and BWRVIP-241, for the recirculation outlet nozzles was not met. This is consistent with Table 3-1, "Ranking of Recirculation Nozzles Based on NRC Additional Requirements," of BWRVIP-241 which highlights nozzles not meeting NRC additional requirements. Therefore, the licensee performed a plant-specific PFM analysis for the recirculation outlet nozzles using the methodology and input variables (with generic design data

replaced by plant-specific design data) approved in the BWRVIP-108 and BWRVIP-241 SEs and provided the detailed stress analysis and the PFM analysis in Attachments 2 and 3 to the June 30, 2016 submittal.

The NRC staff reviewed the stress analysis and the PFM analysis reports based on the plant-specific design data and found that the PFM approach and the input variables that are discussed in the reports are consistent with BWRVIP-108 and BWRVIP-241 SEs. Therefore, although Criterion 4 for the recirculation outlet nozzle, which is based on the generic analysis of BWRVIP-108 and BWRVIP-241, was not met, the plant-specific PFM results indicated that the DNPS, Units 2 and 3, recirculation outlet nozzles have probability of failures below the NRC criterion of 5×10^{-6} per year. Therefore, based on the plant-specific PFM results, the NRC staff determined that the reduced inspection requirements in ASME Code Case N-702 apply to all proposed DNPS, Units 2 and 3 RPV nozzles (as referenced above in Section 3.1). The proposed alternative also provides an acceptable level of quality and safety because the plant-specific PFM results for the recirculation outlet nozzles meet the NRC safety goal on probability of failures.

It should be noted that RPV feedwater nozzles and control rod drive return line nozzles are outside the scope of ASME Code Case N-702 and are, accordingly, outside the scope of this application.

4.0 CONCLUSION

As set forth above, the NRC staff has reviewed EGC's proposed alternative the evaluation of the five plant-specific criteria specified in the SEs for the BWRVIP-108 and BWRVIP-241 reports, which provide technical bases for the use of ASME Code Case N-702 to examine RPV nozzle-to-vessel welds and nozzle inner radii at DNPS, Units 2 and 3. Meeting the technical basis for the use of ASME Code Case N-702 ensures that the proposed alternative provides an adequate level of quality and safety. Based on the evaluation in Section 3.2 of this SE, the NRC staff determined that the licensee's proposed alternative provides an acceptable level of quality and safety and applies to all requested DNPS, Units 2 and 3 RPV nozzles. The NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1) and is in compliance with the ASME Code's requirements and is therefore acceptable.

Therefore, the NRC authorizes the licensee's proposed alternative for inspection of nozzle-to-vessel shell welds and nozzle inner radii sections of RPV nozzles listed in Section 3.1 of this SE for the remaining term of the DNPS, Units 2 and 3, renewed operating licenses, which currently expire on December 22, 2029, and January 12, 2031, respectively. Code Case N-702 notes that "Code Cases will remain available for use until annulled by the applicable Standards Committee." This authorization is based on Code Case N-702 as conditionally approved for use in RG 1.147, Revision 17 and the information and analysis provided in the submittal.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Fairbanks, NRR

Date of issuance: June 28, 2017

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – ISSUANCE OF SAFETY EVALUATION FOR REQUEST RE: INSERVICE INSPECTION INTERVAL PROPOSED ALTERNATIVE (I5R-08) (CAC NOS. MF8090 AND MF8091) DATED JUNE 28, 2017

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DATE	3/13/17	3/16/17	6/28/17	6/28/17

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