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RS-16-130

10 CFR 50.55a(z)(1)

June 30, 2016

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Dresden Nuclear Power Station Inservice Inspection Interval Relief Request I5R-08

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), Exelon Generation Company, LLC (EGC) requests NRC approval of the attached relief request for Dresden Nuclear Power Station (DNPS), Units 2 and 3. DNPS, Units 2 and 3 are currently within their fifth inservice inspection (ISI) interval, which complies with the 2007 Edition with 2008 Addenda of the American Society of Mechanical Engineers (ASME) Code, Section XI. The fifth interval began on January 20, 2013, and is currently scheduled to end on January 19, 2023; however, EGC is requesting approval of this relief request 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, for DNPS, Units 2 and 3, respectively.

The subject relief request is regarding the implementation of 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 Inspection Program (BWRVIP)-241, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," as documented in the attachments to this letter. The NRC provided a safety evaluation approving the generic technical bases and acceptability criteria for application of Code Case N-702 and BWRVIP-241, which EGC has followed as detailed in the attachments. EGC requests approval of the proposed alternative on or before June 30, 2017, to accommodate its application during an upcoming refueling outage. EGC plans to implement this alternative for the remaining term of the DNPS, Units 2 and 3 renewed operating licenses.

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NRR

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Mr. Mitchel A. Mathews at (630) 657-2819.

Sincerely,

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

(1.) Dresden Nuclear Power Station 10 CFR 50.55a Request No. I5R-08

(2.) Structural Integrity Associates, Inc. File No. 1400735.301, Revision 1, "Finite Element Model Development and Thermal/Mechanical Stress Analyses for the N1 Nozzle," dated January 22, 2016

(3.) Structural Integrity Associates, Inc. File No. 1400735.302, Revision 1, "Code Case N-702 Evaluation for Dresden and Quad Cities Recirculation Outlet (N1) Nozzle," Proprietary, dated January 22, 2016

ATTACHMENT 1
Dresden Nuclear Power Station, Units 2 and 3, 10 CFR 50.55a Request No. I5R-08
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1)
--Alternative Provides Acceptable Level of Quality and Safety--

1. ASME Code Component(s) Affected:

Code Class:	1
Reference:	IWB-2500, Table IWB-2500-1
Examination Category:	B-D
Item Number:	B3.90 and B3.100
Description:	Alternative to Nozzle to Vessel Weld and Inner Radius Examinations
Component Numbers:	N1, N2, N3, N8, N18, N19, and N20 Nozzles (See Tables 5-3 and 5-4 below for complete list of nozzle component identification numbers)

2. Applicable Code Edition and Addenda:

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 10CFR50.55a(b)(2)(xv).

3. Applicable Code Requirement:

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 of the nozzle assemblies identified in Tables 5-3 and 5-4 are full penetration welds.

ATTACHMENT 1
Dresden Nuclear Power Station, Units 2 and 3, 10 CFR 50.55a Request No. I5R-08
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1)
--Alternative Provides Acceptable Level of Quality and Safety--

4. Reason for Request:

Pursuant to 10CFR50.55a(z)(1), relief is requested from performing the required examinations on 100% of the RPV nozzle assemblies at DNPS, Units 2 and 3 that are identified in Tables 5-1 and 5-2, and further delineated in Tables 5-3 and 5-4 below.

Tables 5-3 and 5-4 provide a complete listing of the applicable RPV nozzles.
The proposed alternative provides an acceptable level of quality and safety, and the reduction in scope could provide a dose savings of as much as 14 person-roentgen equivalent man (rem) for Unit 2 and 16 person-rem for Unit 3, over the remaining term of the renewed operating licenses.

5. Proposed Alternative and Basis for Use:

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
Recirculation Inlet (N1)	2	1
Recirculation 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
Recirculation Inlet (N1)	2	1
Recirculation 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 5-3: DNPS, Unit 2 Applicable Nozzles

Component ID	Exam Category	Item Number	System	Nominal Pipe Size
N1A Nozzle	B-D	B3.90	Recirc Outlet	28"
N1A IRS	B-D	B3.100	Recirc Outlet	28"
N1B Nozzle	B-D	B3.90	Recirc Outlet	28"
N1B IRS	B-D	B3.100	Recirc Outlet	28"
N2A Nozzle	B-D	B3.90	Recirc Inlet	12"
N2A IRS	B-D	B3.100	Recirc Inlet	12"
N2B Nozzle	B-D	B3.90	Recirc Inlet	12"
N2B IRS	B-D	B3.100	Recirc Inlet	12"
N2C Nozzle	B-D	B3.90	Recirc Inlet	12"
N2C IRS	B-D	B3.100	Recirc Inlet	12"
N2D Nozzle	B-D	B3.90	Recirc Inlet	12"
N2D IRS	B-D	B3.100	Recirc Inlet	12"
N2E Nozzle	B-D	B3.90	Recirc Inlet	12"
N2E IRS	B-D	B3.100	Recirc Inlet	12"
N2F Nozzle	B-D	B3.90	Recirc Inlet	12"
N2F IRS	B-D	B3.100	Recirc Inlet	12"
N2G Nozzle	B-D	B3.90	Recirc Inlet	12"
N2G IRS	B-D	B3.100	Recirc Inlet	12"
N2H Nozzle	B-D	B3.90	Recirc Inlet	12"
N2H IRS	B-D	B3.100	Recirc Inlet	12"
N2J Nozzle	B-D	B3.90	Recirc Inlet	12"
N2J IRS	B-D	B3.100	Recirc Inlet	12"
N2K Nozzle	B-D	B3.90	Recirc Inlet	12"
N2K IRS	B-D	B3.100	Recirc Inlet	12"
N3A Nozzle	B-D	B3.90	Main Steam	20"
N3A IRS	B-D	B3.100	Main Steam	20"
N3B Nozzle	B-D	B3.90	Main Steam	20"
N3B IRS	B-D	B3.100	Main Steam	20"
N3C Nozzle	B-D	B3.90	Main Steam	20"
N3C IRS	B-D	B3.100	Main Steam	20"
N3D Nozzle	B-D	B3.90	Main Steam	20"
N3D IRS	B-D	B3.100	Main Steam	20"
N19A Nozzle	B-D	B3.90	Core Spray	10"
N19A IRS	B-D	B3.100	Core Spray	10"
N19B Nozzle	B-D	B3.90	Core Spray	10"
N19B IRS	B-D	B3.100	Core Spray	10"
N18A Nozzle	B-D	B3.90	Head Spray	6"
N18A IRS	B-D	B3.100	Head Spray	6"
N18B Nozzle	B-D	B3.90	Head Spray Spare	6"
N18B IRS	B-D	B3.100	Head Spray Spare	6"
N8 Nozzle	B-D	B3.90	Head Vent	4"
N8 IRS	B-D	B3.100	Head Vent	4"

Table 5-3: DNPS, Unit 2 Applicable Nozzles

Component ID	Exam Category	Item Number	System	Nominal Pipe Size
N20A Nozzle	B-D	B3.90	Jet Pump Instrumentation	4"
N20A IRS	B-D	B3.100	Jet Pump Instrumentation	4"
N20B Nozzle	B-D	B3.90	Jet Pump Instrumentation	4"
N20B IRS	B-D	B3.100	Jet Pump Instrumentation	4"

Table 5-4: DNPS, Unit 3 Applicable Nozzles

Component ID	Exam Category	Item Number	System	Nominal Pipe Size
N1A Nozzle	B-D	B3.90	Recirc Outlet	28"
N1A IRS	B-D	B3.100	Recirc Outlet	28"
N1B Nozzle	B-D	B3.90	Recirc Outlet	28"
N1B IRS	B-D	B3.100	Recirc Outlet	28"
N2A Nozzle	B-D	B3.90	Recirc Inlet	12"
N2A IRS	B-D	B3.100	Recirc Inlet	12"
N2B Nozzle	B-D	B3.90	Recirc Inlet	12"
N2B IRS	B-D	B3.100	Recirc Inlet	12"
N2C Nozzle	B-D	B3.90	Recirc Inlet	12"
N2C IRS	B-D	B3.100	Recirc Inlet	12"
N2D Nozzle	B-D	B3.90	Recirc Inlet	12"
N2D IRS	B-D	B3.100	Recirc Inlet	12"
N2E Nozzle	B-D	B3.90	Recirc Inlet	12"
N2E IRS	B-D	B3.100	Recirc Inlet	12"
N2F Nozzle	B-D	B3.90	Recirc Inlet	12"
N2F IRS	B-D	B3.100	Recirc Inlet	12"
N2G Nozzle	B-D	B3.90	Recirc Inlet	12"
N2G IRS	B-D	B3.100	Recirc Inlet	12"
N2H Nozzle	B-D	B3.90	Recirc Inlet	12"
N2H IRS	B-D	B3.100	Recirc Inlet	12"
N2J Nozzle	B-D	B3.90	Recirc Inlet	12"
N2J IRS	B-D	B3.100	Recirc Inlet	12"
N2K Nozzle	B-D	B3.90	Recirc Inlet	12"
N2K IRS	B-D	B3.100	Recirc Inlet	12"
N3A Nozzle	B-D	B3.90	Main Steam	20"
N3A IRS	B-D	B3.100	Main Steam	20"
N3B Nozzle	B-D	B3.90	Main Steam	20"
N3B IRS	B-D	B3.100	Main Steam	20"
N3C Nozzle	B-D	B3.90	Main Steam	20"
N3C IRS	B-D	B3.100	Main Steam	20"
N3D Nozzle	B-D	B3.90	Main Steam	20"
N3D IRS	B-D	B3.100	Main Steam	20"
N19A Nozzle	B-D	B3.90	Core Spray	10"
N19A IRS	B-D	B3.100	Core Spray	10"

Table 5-4: DNPS, Unit 3 Applicable Nozzles

Component ID	Exam Category	Item Number	System	Nominal Pipe Size
N19B Nozzle	B-D	B3.90	Core Spray	10"
N19B IRS	B-D	B3.100	Core Spray	10"
N18A Nozzle	B-D	B3.90	Head Spray	6"
N18A IRS	B-D	B3.100	Head Spray	6"
N18B Nozzle	B-D	B3.90	Head Spray Spare	6"
N18B IRS	B-D	B3.100	Head Spray Spare	6"
N8 Nozzle	B-D	B3.90	Head Vent	4"
N8 IRS	B-D	B3.100	Head Vent	4"
N20A Nozzle	B-D	B3.90	Jet Pump Instrumentation	4"
N20A IRS	B-D	B3.100	Jet Pump Instrumentation	4"
N20B Nozzle	B-D	B3.90	Jet Pump Instrumentation	4"
N20B IRS	B-D	B3.100	Jet Pump Instrumentation	4"

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 below.

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

Attachment 3 in this relief 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 shows the highest fluence at 5.59 x 17 neutrons per square centimeter.

Because the DNPS 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, 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 N1 nozzles is below the acceptance criterion of 5×10^{-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 for the remaining term of the renewed operating licenses for DNPS, Units 2 and 3.

6. Duration of Proposed Alternative:

Relief is requested 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, for DNPS, Units 2 and 3, respectively.

7. Precedents:

- LaSalle County Station, Units 1 and 2, Relief from the Requirements of the ASME Code Re: RR I3R-14, Proposed Alternative To The Examination Requirements For Nozzle-to-Vessel Welds and Inner Radii Sections in Accordance with 10 CFR 50.55a(z)(1) (TAC NOS. MF5654 AND MF5655) was authorized by NRC SE dated October 31, 2015 (i.e., NRC Accession No. ML15226A412).
- Pilgrim Nuclear Power Plant – Relief Request PRR-24 Regarding Nozzle-to-Vessel Welds and Nozzle Inner Radii Examination (TAC NO MF4187) was authorized by NRC SE dated April 21, 2015 (i.e., NRC Accession No. ML15103A069).
- DNPS, Units 2 and 3 Fourth Inspection Interval Relief Request I4R-16 was authorized by and NRC SE dated November 3, 2009 (i.e., NRC Accession No. ML092940436). The Fifth Inspection Interval Relief Request utilizes a similar approach to that which was previously approved.
- Quad Cities Nuclear Power Station, Units 1 and 2 Fourth Inspection Interval Relief Request I4R-17 was authorized by an NRC SE dated February 2, 2010 (i.e., NRC Accession No. ML092860259).

8. Plant Specific Applicability

EGC performed the following analysis to demonstrate the plant specific applicability of criteria from the BWRVIP-108 report to DNPS, Units 2 and 3 by showing that all the general and nozzle-specific criteria addressed below are satisfied:

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Dresden Nuclear Power Station, Units 2 and 3, 10 CFR 50.55a Request No. I5R-08
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1)
--Alternative Provides Acceptable Level of Quality and Safety--

(1) The maximum Reactor Pressure Vessel (RPV) heatup/cooldown rate is limited to < 115 °F/hour.

Response: DNPS Technical Specification 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 ≤ 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 Recirculation Inlet Nozzles

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

p=RPV Normal Operating Pressure	1005
r=RPV inner radius	125.5
t=RPV wall thickness	6.125
C_{RPV}=	19332

$(pr/t)/C_{RPV}$ = 1.065 <1.15

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

p=RPV Normal Operating Pressure	1005
r_o=nozzle outer radius	12.5
r_i=nozzle inner radius	5.941
C_{NOZZLE}	1637

$[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE}$ = 0.972 <1.15

(3) For Recirculation Outlet Nozzles

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

p=RPV Normal Operating Pressure	1005
r=RPV inner radius	125.5
t=RPV wall thickness	6.125
CRPV=	16171

$(pr/t)/C_{RPV}$ = 1.273 >1.15

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

p=RPV Normal Operating Pressure	1005
r_o=nozzle outer radius	26.5
r_i=nozzle inner radius	13.1375
C_{NOZZLE}	1977

$[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE}$ = 0.840 <1.15