



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

April 14, 2020

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

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 –  
ISSUANCE OF RELIEF REQUEST RE: LIMITED EXAMINATION COVERAGE  
DURING FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL  
(EPID L-2019-LLR-0103)

Dear Mr. Hanson:

By application dated October 31, 2019 (Agencywide Documents Access and Management System Accession No. ML19308A011), as supplemented by letter dated March 18, 2020 (ADAMS Accession No. ML20078H029), Exelon Generation Company, LLC (the licensee) submitted a relief request to the U.S. Nuclear Regulatory Commission (NRC) for a proposed alternative to certain examination coverage requirements for specified American Society of Mechanical Engineers (ASME), Section XI Boiler and Pressure Vessel Code (Code) Class 1 and 2 component welds for the Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief for inservice inspection items on the basis that achieving the ASME Code-required examination coverage for the subject welds in the relief request is impractical.

The NRC staff has reviewed the request and finds that compliance with ASME Code examination coverage requirements is impractical for the subject welds listed in Relief Request I4R-63, as amended. Further, based on the coverage obtained, it is reasonable to conclude that, if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. In addition, the NRC staff concludes that the best effort examinations obtained during the licensee's examinations provide reasonable assurance of structural integrity of the welds. The staff also concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Accordingly, the NRC staff concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Therefore, the NRC authorizes the use of this alternative at Peach Bottom, Units 2 and 3, for the fourth 10-year inservice inspection interval.

All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested and authorized by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

B. Hanson

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If you have any questions please contact the Peach Bottom Project Manager, Jennifer Tobin, at 301-415-2328 or [Jennifer.Tobin@nrc.gov](mailto:Jennifer.Tobin@nrc.gov).

Sincerely,

*/RA/*

James G. Danna, Chief  
Plant Licensing Branch 1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure:  
Safety Evaluation

cc: Listserv



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
REGARDING RELIEF REQUEST I4R-63 FOR LIMITED EXAMINATION COVERAGE

EXELON GENERATION COMPANY, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By letter dated October 31, 2019, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19308A011), as supplemented by letter dated March 18, 2020 (ADAMS Accession No. ML20078H029), Exelon Generation Company, LLC (the licensee), submitted Relief Request (RR) I4R-63 to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for the fourth 10-year inservice inspection (ISI) intervals at Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3. In RR I4R-63, the licensee requested relief from the examination coverage requirements of Section XI, "Rules for Inservice Inspection [ISI] of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), applicable to certain ASME Code Class 1 and 2 component welds.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief on the basis that achieving the ASME Code-required examination coverage for the subject welds in RR I4R-63 is impractical.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(g)(4) require that, throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components classified as ASME Code Class 1, 2, and 3 meet the requirements, except the design and access provisions and preservice examination requirements, set forth in Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(a)(1)(ii), 12 months prior to the start of the 120-month interval, subject to the conditions listed in 10 CFR 50.55a(b)(2).

When conformance to these requirements is determined to be impractical, relief may be granted by the NRC pursuant to 10 CFR 50.55a(g)(5)(iii). Additionally, pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee must notify the NRC and submit, as specified in 10 CFR 50.4, information to support the determination. Requests for relief made in accordance with 10 CFR 50.55a(g)(5)(iii), must be submitted no later than 12 months after the expiration of the initial or subsequent 10-year inspection interval.

Pursuant to 10 CFR 50.55a(g)(6)(i), the Commission will evaluate determinations of impracticality under 10 CFR 50.55a(g)(5). After its evaluation, the Commission may grant relief and may impose alternative requirements that, as it determines, are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

### 3.0 TECHNICAL EVALUATION

RR I4R-63 is for multiple ASME Code Class 1 and 2 component welds applicable to the fourth 10-year ISI interval at Peach Bottom, Units 2 and 3. The NRC staff evaluated the information provided by the licensee in RR I4R-63 for these welds and documented the bases for disposition in the following subsections, organized by examination category. By electronic correspondence dated March 10, 2020 (ADAMS Accession No. ML20070R228), the staff issued requests for additional information (RAIs) to support the review of RR I4R-63. The ASME Code of record at Peach Bottom, Units 2 and 3, for the fourth 10-year ISI interval is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI. The fourth 10-year ISI interval at Peach Bottom, Units 2 and 3, ended on December 31, 2018.

#### 3.1 Examination Category B-A, Pressure Retaining Welds in Reactor Vessel, Item No. B1.12, Longitudinal Shell Welds

##### 3.1.1 Component Identification and Applicable Code Requirements

Eight B1.12 components were identified in Tables I4R-63.1 and I4R-63.2 (four per unit) as requiring relief.

ASME Code, Section XI, IWB-2500-1, requires volumetric (ultrasonic) coverage of essentially 100 percent of these components.

##### 3.1.2 Licensee's Reason for Request – Impracticality and Burden of Compliance

The licensee stated that access to the subject components was limited due to permanently installed components, including restrainer brackets, jet pump adapter ring, feedwater spargers, core spray internal piping, and core spray piping brackets.

##### 3.1.3 NRC Staff Evaluation

The examination coverage for the subject components ranged from 71.8 to 88.7 percent. The NRC staff concurred that permanently installed components as described above present an impediment to achieving essentially complete examinations. Removing this impediment would require redesign and refabrication of several components, while presenting little chance of improving the likelihood of detection of degradation. The NRC staff concluded that this is a sufficient basis for granting relief based on impracticality.

### 3.2 Examination Category B-A, Pressure Retaining Welds in Reactor Vessel, Item No. B1.30, Shell-to-Flange Weld

#### 3.2.1 Component Identification and Applicable Code Requirements

Two B1.30 components were identified in Table I4R-63.1 and Table I4R-63.2 (one per unit) as requiring relief.

ASME Code, Section XI, IWB-2500-1, requires volumetric (ultrasonic) coverage of essentially 100 percent of these components.

#### 3.2.2 Licensee's Reason for Request – Impracticality and Burden of Compliance

The licensee stated that access to the subject components was limited due to permanently installed guide rods, main steam plug hardware, and “excessive weld beads.”

#### 3.2.3 NRC Staff Evaluation

The examination coverage for the subject components ranged from 83.9 to 86.8 percent. The NRC staff determined that permanently installed components as described above present an impediment to achieving essentially complete examinations. Removing this impediment would require redesign and refabrication of several components, while presenting little chance of improving the likelihood of detection of degradation. The NRC staff concluded that this is a sufficient basis for granting relief based on impracticality.

### 3.3 Examination Category B-D, Full Penetration Welded Nozzles in Vessels – Inspection Program B, Item No. B3.90, Reactor Nozzle-to-Vessel Welds

#### 3.3.1 Component Identification and Applicable Code Requirements

Thirty B3.90 components were identified in Table I4R-63.1 and Table I4R-63.2 (16 and 14 for Peach Bottom, Units 2 and 3, respectively) as requiring relief.

#### 3.3.2 Licensee's Reason for Request – Impracticality and Burden of Compliance

The licensee stated that access to the subject components was limited due primarily due to nozzle configuration.

#### 3.3.3 NRC Staff Evaluation

The examination coverage for the subject components ranged from 32.6 to 77.0 percent. The licensee noted for all subject components that “essentially 100% coverage was achieved for inner radius examination[s].” The NRC staff determined that the nozzle configurations present an impediment to achieving essentially complete examinations. Removing this impediment would require redesign and refabrication of the subject nozzles. As the licensee, in aggregate, achieved significant coverage, especially of the inner radius of the nozzles, the staff believes that the likelihood of pertinent undetected degradation is acceptably low. The NRC staff concludes that this is an acceptable basis for granting relief based on impracticality.

3.4 Examination Category B-D, Full Penetration Welded Nozzles in Vessels – Inspection Program B, Item No. B1.51, Repair Welds – Beltline Region

3.4.1 Component Identification and Applicable Code Requirements

One B1.51 component was identified in Table I4R-63.2 as requiring relief.

3.4.2 Licensee’s Reason for Request – Impracticality and Burden of Compliance

The licensee stated that access to the subject components was limited due the jet pump riser brace and specimen holder (Table I4R-63 and page 52 of Enclosure 2 to the application).

3.4.3 NRC Staff Evaluation

The examination coverage for the subject component was 78.1 percent. The staff determined that the jet pump riser bracket and specimen holder present an impediment to achieving essentially complete examinations. Removing this impediment would require redesign and refabrication of the jet pump riser and specimen holders, and the redesign and refabrication of several other components, while presenting little chance of improving the likelihood of detection of degradation. The NRC staff concluded that this is a sufficient basis for granting relief based on impracticality.

3.5 Examination Category R-A, Risk-Informed Piping Examinations, Item Nos. F-1.40, R1.11, R1.16, and R1.20 Welds Subject to Intergranular Stress Corrosion Cracking

3.5.1 Component Identification and Applicable Code Requirements

Details of the piping welds under Examination Category R-A are shown in Table 1 below. Item No. F-1.40 is not included, as it was withdrawn from the request as discussed in Section 3.5.5 of this safety evaluation.

**Table 1  
Examination Category R-A, Item Nos. R1.11, R1.16, and R1.20  
Limited Volumetric Examination Coverage**

Weld Identification	Component Description	Weld Material	Examination Limitation	Percent Coverage Achieve
23-2T116-2 (Unit 2)	Reducer to Valve (High Pressure Coolant Injection)	Carbon Steel	Examination was limited due to single-sided access.	76.5%
14-B-3 (Unit 2)	Penetration Pipe to Penetration (Core Spray (CS))	A376 TP304 Stainless Steel	Examination was limited due to penetration configuration.	50.0%
14-B-2B (Unit 2)	Pipe to Pipe (CS)	A376 TO304 Stainless Steel	Examination was limited due to component configuration.	70.5%

12-I-2 (Unit 2)	Valve to Elbow (Reactor Water Clean-up (RWCU))	Dissimilar to Metal Weld (Carbon Steel/Stainless Steel (CS/SS))	Examination limitation was due to a complex geometry and configuration.	55.0%
14-B-3 (Unit 3)	Penetration Pipe to Penetration (CS)	A376 TP304 Stainless Steel	Examination was limited due to component configuration.	75.0%
12.1-2R (Unit 3)	Valve to Pipe (RWCU)	Dissimilar Metal Weld (CS/SS)	Examination was limited due to component configuration.	33.5%

The examination requirements for the subject piping welds for Peach Bottom, Units 2 and 3, are governed by a risk-informed ISI (RI-ISI) program that was approved by the NRC in a safety evaluation dated February 9, 2001 (ADAMS Accession No. ML090400967). The RI-ISI program was developed in accordance with Electric Power Research Institute (EPRI) Topical Report TR-112657, "Risk-Informed Inservice Inspection Evaluation Procedure."

Table 1 of ASME Code Case N-578-1 ("Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI"), assigns Examination Category R-A, Item R1.16, to piping inspection elements not subject to a known damage mechanism, and Item R1.20 to piping inspection elements subject to a known damage mechanism. The table requires 100 percent coverage of the ASME Code examination volume, as described in Figures IMB-8, 9, 10, or 11 (and IMB-7 for R1.20 only), as applicable, to be completed for select Class 1 circumferential piping welds. ASME Code Case N-460 ("Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1"), allows reduction of the examination volume to 90 percent.

### 3.5.3 Licensee's Reason for Request – Impracticality and Burden of Compliance

The licensee could not achieve the required examination coverage for the welds listed in Table I4R-63.1 (for Unit 2) and Table I4R-63.2 (for Unit 3) of the licensee's relief request (and listed in Table 1 of this safety evaluation) due to single-sided access, penetration configuration, and component configuration. The licensee achieved 33.5 to 76.5 percent coverage. The licensee stated that due to the limitations, complying with the ASME Code-required examination coverage is impractical, and the licensee is, therefore, requesting relief pursuant to 10 CFR 50.55a(g)(5)(iii).

In addition, the licensee requested relief from performing VT-3 visual examinations on Examination Category F-A, Item F1.40 welds for the emergency service water system pumps in Peach Bottom, Unit 2. The licensee stated that a VT-3 visual examination of the seismic restraints could not be performed due to the clarity of the water within the pump bays. The licensee stated that it was requesting relief pursuant to 10 CFR 50.55a(g)(iii). The licensee later withdrew this portion of the request as discussed in Section 3.5.5 of this safety evaluation.

Due to the access limitations, compliance with the applicable ASME Code, Section XI volumetric examination requirements could only be accomplished if the welds and their associated components are redesigned or refabricated. Due to the physical interferences

causing these limitations, the licensee stated that there are no alternative examination techniques currently available to increase coverage. The licensee stated there were no cases in any of the listed examinations where the component's outside diameter surface features (i.e., weld crowns, weld shrinkage, surface roughness, etc.) could have been conditioned to obtain the required coverage without major modification to the components. In lieu of the ASME Code-required examination coverage, the licensee examined the welds to the maximum extent practical by ultrasonic testing, achieving the coverage indicated in Table 1 above.

### 3.5.5 NRC Staff Evaluation

The licensee stated that, for the RI-ISI weld population for Examination Category R-A welds, a case-by-case review was performed to determine whether additional or alternative welds could have been examined to supplement the reduced volumetric coverage examination. The licensee determined that there were no other welds to select that would have resulted in better examination coverage. This decision was based on configurations of the weld assembly, delta core damage frequency values, the systems involved, and inspection history.

For the welds listed in Table 1 above, the licensee achieved less than 90 percent of the required volumetric examination coverage due to single-sided access, component configuration, and valve configuration. Obtaining the ASME Code-required coverage of 90 percent or greater for the piping welds listed in this request would require modification and/or disassembly beyond their current design. The NRC staff finds these limitations to be an acceptable basis for impracticality of conforming to the requirements and finds the modification necessary to achieve the required coverage constitutes a burden upon the licensee.

The licensee examined the welds per the requirements in ASME Code Case N-578-1, Table 1, for Examination Category R-A. The licensee performed the required volumetric examination of the welds using UT to the extent practical and achieved 33.5 to 76.5 percent coverage. The NRC staff reviewed the scan diagrams the licensee provided which showed that the examined volumes included welds and base materials in the inner region where the degradation would occur. The NRC staff finds that despite the limited coverage, the examination was adequately performed.

For the Examination Category R-A welds susceptible to intergranular stress corrosion cracking, the examination history shows satisfactory results for the fourth interval. Peach Bottom, Units 2 and 3, also applied hydrogen water chemistry control for the full duration of the fourth interval. The licensee elected to conservatively utilize the inspection requirements related to normal water chemistry for the fourth interval inspection schedule. The NRC staff concluded that inspections with satisfactory results of the welds provide reasonable assurance that the aging effects due to intergranular stress corrosion cracking were adequately managed by the licensee during the fourth ISI interval at Peach Bottom, Units 2 and 3.

For the Examination Category F-A seismic restraints, the NRC staff submitted an RAI (ADAMS Accession No. ML20070R228), which stated that the NRC has not found any precedent for granting a relief request due to impracticality under 10 CFR 50.55a(g)(5)(iii) for water clarity or surface corrosion on a component. In response to the RAI (ADAMS Accession No. ML20078H029), the licensee withdrew the request for relief related to the inspection of the Examination Category F-A seismic restraints.

Based on the above discussion, the NRC staff determined that obtaining the ASME Code-required examination volume for the R-A welds listed in Table 1 above is impractical



because of the stated limitations and that the modifications necessary to obtain the required coverage would impose a burden upon the licensee. The NRC staff determined that the volumetric examination performed to the maximum extent practical provides reasonable assurance of structural integrity of the welds.

#### 4.0 CONCLUSIONS

The NRC staff has reviewed the licensee's submittal and concludes that compliance with ASME Code examination coverage requirements are impractical for the subject welds listed in Relief Request I4R-63, as amended. Further, based on the coverage obtained, it is reasonable to conclude that, if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. In addition, the NRC staff concludes that the best effort examinations obtained during the licensee's examinations provide reasonable assurance of structural integrity of the welds. The staff also concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii).

Accordingly, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC grants Relief Request I4R-63 for the fourth 10-year ISI interval at Peach Bottom, Units 2 and 3.

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

Principal Contributors: E. Reichelt  
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Date: April 14, 2020

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 –  
 ISSUANCE OF RELIEF REQUEST RE: LIMITED EXAMINATION COVERAGE  
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**ADAMS Accession No.: ML20097D644**

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