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

December 2, 2019

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 I5R-10 RE: EXAMINATION OF STANDBY LIQUID CONTROL NOZZLE INSIDE RADIUS SECTION IN LIEU OF SPECIFIC ASME CODE REQUIREMENTS (EPID L-2019-LLR-0076)

Dear Mr. Hanson:

By application dated August 21, 2019 (Agencywide Documents Access and Management System Accession No. ML19233A133), Exelon Generation Company, LLC (the licensee) submitted Relief Request I5R-10 to the U.S. Nuclear Regulatory Commission (NRC) for a proposed alternative to the requirements of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code (ASME Code), Section XI, for the Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3. The proposed alternative would allow the licensee to perform a visual inspection at operating pressure of the reactor pressure vessel head during Class 1 pressure boundary system leakage testing conducted at the end of each outage. The ASME Code requires 100 percent volumetric examination of the subject reactor pressure vessel nozzle inner radius sections. However, the nozzle is inaccessible for examination from inside the vessel due to the location of the nozzle in the reactor pressure vessel lower head area and due to the standby liquid control piping inside the vessel, which is fillet welded into the nozzle socket. These restrictions make the ASME Code-required examinations impractical to perform.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(6)(i), the licensee requested relief and to use an alternative, for inservice inspection items on the basis that the ASME Code requirement is impractical.

The NRC staff has reviewed the subject request and finds that the proposed alternative provides reasonable assurance that the standby liquid control nozzle will maintain its structural integrity, leaktightness, and functionality during the service. Accordingly, the NRC staff concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC authorizes the use of this alternative at Peach Bottom, Units 2 and 3, for the fifth 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.

If you have any questions please contact the Peach Bottom Project Manager, Jennifer Tobin, at 301-415-2328 or 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

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

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# REGARDING ALTERNATIVE REPAIR

# FOR HIGH PRESSURE SERVICE WATER SYSTEM PIPING

# EXELON GENERATION COMPANY, LLC

# PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

# DOCKET NOS. 50-277 AND 50-278

## 1.0 INTRODUCTION

By application dated August 21, 2019 (Agencywide Documents Access and Management System Accession No. ML19233A133), Exelon Generation Company, LLC (the licensee) submitted a relief request to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for a proposed alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for the Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3. The proposed alternative would allow the licensee to perform a visual inspection, at operating pressure, of the reactor pressure vessel (RPV) head during Class 1 pressure boundary system leakage testing conducted at the end of each outage. The ASME Code requires 100 percent volumetric examination of the subject RPV nozzle inner radius sections. However, the nozzle is inaccessible for examination from inside the vessel due to the location of the nozzle in the RPV lower head area and due to the standby liquid control (SLC) piping inside the vessel, which is fillet welded into the nozzle socket. These restrictions make the ASME Code required examinations impractical to perform.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(6)(i), the licensee requested to use the alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety.

## 2.0 REGULATORY EVALUATION

The licensee's request proposes an alternative to the requirements of the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.100. Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except design and access provisions and preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests

conducted during 120-month inspection intervals subsequent to the first inspection interval comply with the latest edition and addenda of the ASME Code, incorporated by reference in 10 CFR 50.55a(a), 12 months before the start of the 120-month inspection interval.

The regulations in 10 CFR 50.55a(g)(5)(iii) state that if a licensee determines that conformance with an ASME Code requirement is impractical for its facility, the licensee must notify the NRC and submit information in support of its determination. Determinations of impracticality must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements during the inservice inspection (ISI) interval for which the request is being submitted. Requests for relief must be submitted to the NRC no later than 12 months after the expiration of the 120-month inspection interval for which relief is sought.

The regulations in 10 CFR 50.55a(g)(6)(i) state that the NRC will evaluate determinations that ASME Code requirements are impractical. The NRC may grant such relief and may impose such alternative requirements 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.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request the use of an alternative, and the NRC to authorize the proposed alternative for the fifth ISI interval, but not for the life of the plant.

## 3.0 TECHNICAL EVALUATION

### 3.1 Background

The relief request addresses the examination of the inside radius section of the SLC nozzle for the fifth ISI interval at Peach Bottom, Units 2 and 3. The examination category and item numbers are addressed in Table IWB-2500-1 of the ASME Code, 2001 Edition through 2003 Addenda.

### 3.2 ASME Code Requirements

Table IWB-2500-1, Examination Category B-D, Item No. B3.100, requires a volumetric examination to be performed on the inner radius section of all reactor vessel nozzles each inspection interval. Table IWB-2500-1, Examination Category B-D, Item No. B3.100, refers to the nozzle configurations shown in Figure No. IWB-2500-7.

### 3.3 Applicable ASME Code Edition and Addenda

For the fifth 10-year ISI interval at Peach Bottom, the Code of record for the inspection of ASME Code Class 1, 2, and 3 components is the ASME Code, Section XI, 2001 Edition through the 2003 Addenda.

### 3.4 Licensee's Proposed Alternative

In its August 21, 2019, submittal, the licensee stated, in part, the following:

> The Standby Liquid Control (SLC) nozzle, as shown in Figure 1, is designed with an integral socket to which the boron injection piping is fillet welded. This

design is different from the configurations shown in ASME, Section XI, Figure No. IWB-2500-7. The SLC nozzle is located in the bottom head of the vessel in an area that is inaccessible for ultrasonic examinations from the inside of the vessel. Therefore, ultrasonic examinations can only be performed from the outside diameter of the vessel. As shown in Figure 1, the ultrasonic scan would need to travel through the full thickness of the vessel into a complex cladding/socket configuration. These geometric and material reflectors inherent in the design prevent a meaningful examination from being performed on the inner radius of the SLC nozzle. In addition, the inner radius socket attaches to piping that injects boron at locations far removed from the nozzle. Therefore, the SLC nozzle inner radius is not subjected to turbulent mixing conditions that are a concern at other nozzles.

The licensee also stated that conformance with the ASME Code required examinations is impractical, as it would require extensive structural modifications to the component and surrounding structure, which would be cost prohibitive.

### 3.5 Proposed Alternative and Basis for Use

As an alternative examination, a system leakage test of the Class 1 pressure boundary is conducted at the end of each outage at operating pressure. The RPV bottom head penetrations, including the SLC penetration, are visually inspected during the leakage test with the acceptance criteria being zero leakage.

### 3.6 Duration of Proposed Alternative

The licensee requested relief for the fifth ISI interval for Peach Bottom, Units 2 and 3, which began on January 1, 2019, and is scheduled to conclude on December 31, 2028, and for the remainder of the plant life. The NRC staff finds that regulatory authority exists for the Commission to grant the relief requested by the licensee for the fifth ISI interval, but not for the life of the plant.

## 4.0 NRC STAFF EVALUATION

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee submitted this request for relief from the examination requirements of the ASME Code, Section XI. The NRC staff's evaluation of the licensee's request for relief focused on (1) whether the ASME Code requirement is impractical, (2) whether the imposition of the ASME Code required inspections would result in a burden to the licensee, and (3) whether the licensee's examination coverage provides reasonable assurance of structural integrity and leaktightness of the subject welds.

The ASME Code requires 100 percent volumetric examination of the subject RPV nozzle inner radius sections. However, as shown in the drawing provided by the licensee in the application, the nozzle configuration and inside geometry prevent obtaining meaningful examination results from the outside of the RPV. The nozzle is inaccessible for examination from inside the vessel due to the location of the nozzle in the RPV lower head area and due to the SLC piping inside the vessel, which is fillet welded into the nozzle socket. These restrictions make the ASME Code-required examinations impractical to perform. To complete the examinations as required by the ASME Code, the licensee would have to redesign and modify the RPV and SLC piping. The NRC staff finds that imposition of the Code required examinations on the subject welds would result in a considerable and unnecessary burden on the licensee and is impractical.

The licensee is not able to obtain coverage of the 2-inch SLC nozzle inner radius section. In addition, because of the design of the nozzle, the SLC nozzle inner radius is not subjected to turbulent mixing conditions that are a concern at other nozzles. However, there are several other inner radius sections on similarly-sized nozzles in the RPV that are examined per ASME Code requirements. Therefore, any significant patterns of degradation should be detected by the other examinations in a timely manner. Therefore, the staff has determined that the licensee's corrective action, trending, and monitoring programs provide reasonable assurance that if any emerging aging degradation were to be detected in the SLC nozzle, the corrective actions would be expected to resolve the issue in a timely manner. The staff noted that previous operating experience to date in the SLC nozzle indicates that there is no active aging degradation mechanism, including intergranular stress corrosion cracking. During each outage, a system leakage test at operating pressure was conducted for the ASME Code Class 1 pressure boundary components and, to date, no leakage was detected in the SLC nozzle.

Based on the licensee's information provided and the staff evaluation as stated above, the staff determined that there is reasonable assurance that the SLC nozzle will maintain its structural integrity, leaktightness, and functionality during the service. The staff's evaluation was based on the following: (1) the SLC nozzle inner radius is not subjected to turbulent mixing conditions, which is validated by the operating experience (no cracking) to date in the SLC nozzle inner radius; (2) there is no active aging degradation mechanism, including intergranular stress corrosion cracking in the SLC nozzle; and (3) the licensee will perform system leakage test and associated VT-2 visual examination every refueling outage.

## 5.0 CONCLUSION

As set forth above, the NRC staff determines that the licensee has demonstrated that the proposed alternative provides reasonable assurance of structural integrity of the SLC nozzle. The NRC staff determines that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law, will not endanger life or property or the 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. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants the use of this alternative for the fifth ISI interval for Peach Bottom.

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

Principal Contributor: S. Cumblidge

Date: December 2, 2019

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 – ISSUANCE OF RELIEF REQUEST I5R-10 RE: EXAMINATION OF STANDBY LIQUID CONTROL NOZZLE INSIDE RADIUS SECTION IN LIEU OF SPECIFIC ASME CODE REQUIREMENTS (EPID L-2019-LLR-0076) DATED DECEMBER 2, 2019

**DISTRIBUTION:**
PUBLIC
PM File Copy
RidsACRS_MailCTR Resource
RidsNrrDorlLpl1 Resource
RidsNrrDnlrNphp Resource
RidsNrrLALRonewicz Resource
RidsNrrPMPeachBottom Resource
RidsRgn1MailCenter Resource
JQuichocho, OEDO
MMcCoppin, OEDO
SCumblidge, NRR

**ADAMS Accession No.: ML19330C644** *by e-mail

| OFFICE | NRR/DORL/LPL1/PM | NRR/DORL/LPL1/LA | NRR/DNRL/NPHP/BC* |
|---|---|---|---|
| NAME | JTobin | LRonewicz | MMitchell |
| DATE | 11/26/2019 | 11/26/2019 | 11/22/2019 |
| OFFICE | NRR/DORL/LPL1/BC | NRR/DORL/LPL1/PM | |
| NAME | JDanna | JTobin | |
| DATE | 12/02/2019 | 12/02/2019 | |

**OFFICIAL RECORD COPY**