



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

December 6, 2018

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: BRAIDWOOD STATION, UNITS 1 AND 2 – RELIEF FROM THE
REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL
ENGINEERS CODE (EPID L-2018-LLR-0032)

Dear Mr. Hanson:

By letter dated March 19, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18078A185), Exelon Generation Company, LLC (Exelon, the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, requirements at Braidwood Station (Braidwood), Units 1 and 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(z)(2), the licensee requested to use the proposed alternative to the pressure testing requirements of the post-accident hydrogen monitoring system piping on the basis that compliance with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that Exelon has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of relief request I4R-02 for the fourth inservice inspection intervals at Braidwood, Units 1 and 2, currently scheduled to start on August 29, 2018, and end on August 29, 2028 (Unit 1) and start on October 17, 2018, and end on October 17, 2028 (Unit 2).

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

B. Hanson

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If you have any questions, please contact the Project Manager, Joel Wiebe at 301-415-6606 or via e-mail at Joel.Wiebe@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "David J. Wrona". The signature is cursive and somewhat stylized, with the first name being the most prominent.

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

Docket Nos. 50-456 and 50-457

Enclosure:
Safety Evaluation

cc: Listserv



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST I4R-02 REGARDING PRESSURE TESTING REQUIREMENTS

OF THE POST ACCIDENT HYDROGEN MONITORING SYSTEM PIPING

EXELON GENERATION COMPANY, LLC

BRAIDWOOD STATION, UNITS 1 AND 2

DOCKET NOS. 50-456 AND 50-457

1.0 INTRODUCTION

By letter dated March 19, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18078A185), Exelon Generation Company, LLC (Exelon or the licensee) requested relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The licensee's proposed alternative I4R-02, addresses pressure testing requirements of the post-accident hydrogen monitoring system piping at Braidwood Station (Braidwood), Units 1 and 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(z)(2), the licensee requested to use the proposed alternative on the basis that compliance with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(g)(4) state, in part, that ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in Section XI of the ASME Code to the extent practical within the limitations of design, geometry, and material of construction of the components.

Paragraph 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 licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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 alternative proposed by the licensee.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Alternative

3.1.1 Components Affected

ASME Code Class 2, Examination Category C-H, Item No. C7.10 piping outside of containment, between valves 1(2)PS228A to 1(2)PS230A, and 1(2)PS228B to 1(2)PS230B, of the post-accident hydrogen monitoring system and process sampling system piping.

3.1.2 Code Requirements

The code of record (COR) at Braidwood during the fourth 10-year inservice inspection (ISI) interval is the 2013 Edition of ASME Code, Section XI. Examinations according to ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, Item No. C7.10, require a system leakage test in accordance with the requirements of IWC-5220, and VT-2 visual examinations in accordance with the requirements of IWA-5240, at a frequency of each inspection period. Additionally, IWC-5210(b)(1) states, in part, that the contained fluid in the system shall serve as the pressurizing medium, and IWC-5210(b)(2) states, in part, that when gas is the pressurizing medium, the test procedure shall include methods for detection and location of through-wall leakage from components of the system tested.

3.1.3 Licensee's Basis for Relief

In its letter dated March 19, 2018, the licensee stated that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and requested relief in accordance with 10 CFR 50.55a(z)(2).

In its letter dated March 19, 2018, the licensee stated that the system medium is air and consists of two separate trains for each of the Braidwood units. The piping is ½ inch stainless steel (SS) nominal pipe size and/or ¼ inch SS tubing (SA-312, Type 304 SS piping and SA-213, Type 304 or Type 316 SS tubing). The licensee also stated that the nominal system operating pressure ranges across the system from vacuum on the suction side to a maximum of 10 pounds per square inch gauge (psig) at the pump discharge side. The licensee further stated that in the past it performed the test by pressurizing the volume and performing a soap bubble or "snoop" test on all the welds and piping. The licensee stated that review of surveillance results in 2005 revealed that a portion of the supply and return piping on the 1A train is located in a pipe tunnel and is inaccessible for VT-2 visual examination.

The licensee further stated that there are additional portions of piping for both trains A and B which are located at high elevation where the performance of the VT-2 visual examinations using a bubble test presents a potential safety hazard for personnel performing the test. Additionally, the licensee stated that it considered using an ultrasonic gun for leakage testing the inaccessible piping; however, the existing obstructions significantly reduced the ability of an ultrasonic system to detect and locate a leak.

3.1.4 Licensee's Proposed Alternative

In its letter dated March 19, 2018, the licensee proposes to apply an alternate examination to the ASME Code required examinations for the system piping between valves 1(2)PS228A to 1(2)PS230A, and 1(2)PS228B to 1(2)PS230B. Specifically, the licensee proposes to apply the testing requirements of 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to the system piping between valves 1(2)PS228A to 1(2)PS230A, and 1(2)PS228B to 1(2)PS230B, as an alternate to the ASME Code-required testing for the applicable piping. The licensee stated that the safety-related ASME Code, Class 2, sections of piping and valves associated with process sampling system at other containment penetrations in the system are tested in accordance with requirements of 10 CFR, Part 50, Appendix J.

The licensee's proposed alternative to the required ASME Code system pressure test essentially extends the test boundary of the leak-rate test of Appendix J to cover the remainder of the system outside the containment, in lieu of performing the ASME Code required leakage test. In its letter dated March 19, 2018, the licensee stated that the current acceptance criteria for the leak-rate test per Appendix J will be less than or equal to 10 standard cubic feet per hour, and would be applied independently to the supply and return piping for each hydrogen monitor train. The licensee stated that if the test results indicate leakage that exceeds the acceptance criteria, the licensee will generate an Issue Report in accordance with the Exelon corrective action program, investigate the source of leakage, and the appropriate corrective actions would be employed to identify and correct the source of leakage. The licensee further stated that any leakage would most likely be from valve packing or threaded connections, as it is not aware of any degradation mechanisms or previous failures for this system.

In its letter dated March 19, 2018, the licensee stated that a similar request was previously authorized for use at Braidwood, Units 1 and 2, during the third 10-year ISI interval, by NRC letter dated July 20, 2010 (ADAMS Accession No. ML101970288).

3.1.5 Licensee's Duration of Relief Request

The proposed alternative will be used during the fourth 10-year ISI interval for Braidwood, Units 1 and 2, which will start on August 29, 2018, and end on August 29, 2028 (Unit 1) and start on October 17, 2018, and end on October 17, 2028 (Unit 2).

3.2 NRC Staff Evaluation

The COR during the fourth 10-year ISI interval at Braidwood, Units 1 and 2, is the ASME Code, Section XI, 2013 Edition. ASME Code, Section XI, IWA-5240 requires a VT-2 visual examination for evidence of leakage by examining accessible external exposed surfaces of pressure retaining components for evidence of leakage during every inspection period. The NRC staff notes that portions of the specified piping are either inaccessible or would present a safety hazard for personnel performing the required examinations. Therefore, the NRC staff finds that the required ASME Code examinations for the noted piping in the licensee's request 14R-02, cannot be performed without hardship or unusual difficulty.

As stated above, the subject system is fabricated from stainless steel piping 1/4 inch and 1/2 inch diameter with socket weld joints. The highest system operational pressure in the piping is approximately 10 psig on the discharge side of the pump. The NRC staff notes that during operation the system is normally subjected to low stresses. Additionally, for the materials of fabrication (i.e., austenitic stainless steel) and the operating environment (i.e., air), there are no

known degradation mechanisms for the subject piping. The NRC staff also notes that the licensee's proposed alternative testing, by extending the test boundary of the leak-rate test of Appendix J to cover the remainder of the system outside the containment will expose the subject system piping to the Appendix J test pressure, which is much greater than the normal system operating pressure inside the subject piping.

The NRC staff finds that the periodic leak-rate testing of Appendix J, conducted at the Appendix J test pressure, will provide a leak detection method similar to the ASME Code, Section XI, required soap bubble solution pressure test at 10 psig along with the VT-2 visual examination. The NRC staff notes that the Appendix J test pressure used for the requested alternate testing will be significantly higher than the 10 psig operating pressure and, therefore, is acceptable for the testing of structural integrity and leak tightness of the subject piping. The NRC staff further notes that currently there are no known degradation mechanisms for the subject piping, or history of failures. Therefore, the NRC staff finds the proposed alternative testing provides reasonable assurance of structural integrity and leak tightness. Additionally, as stated earlier, the NRC staff finds that the ASME Code-required system pressure test would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the licensee has demonstrated that the proposed alternative provides reasonable assurance of structural integrity and leak tightness of the subject components, and that complying with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, NRC staff authorizes the use of the proposed alternative I4R-02, for the fourth 10-Year inservice inspection interval at Braidwood, Units 1 and 2.

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: R. Kalikian

Date of issuance: December 6, 2018

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – RELIEF FROM THE REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE (EPID L-2018-LLR-0032) DATED DECEMBER 6, 2018

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