



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

May 7, 2018

Bryan B. Wooten
Director – Organizational Effectiveness
Brunswick Steam Electric Plant
8470 River Rd., SE
M/C BNP001
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2 – RELIEF FROM THE REQUIREMENTS OF THE ASME CODE, SECTION XI, ISI-11 REGARDING SYSTEM LEAKAGE TEST OF CLASS 1 PIPING (EPID L-2018-LLR-0038)

Dear Mr. Wooten:

By letter dated March 23, 2018, as supplemented by letter dated April 5, 2018, Duke Energy Progress, LLC (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The licensee proposed to perform the end of fourth interval IWB-5222(b) system leakage test during refueling outage B2R24 in the fifth 10-year Inservice Inspection interval. Refueling outage B2R24 is scheduled for March 2019 at the Brunswick Steam Electric Plant (Brunswick), Unit 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(z)(2), the licensee submitted Relief Request ISI-11 in which it proposed an alternative system leakage test on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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, the NRC staff authorizes the use of Relief Request ISI-11 at Brunswick, Unit 2, for the remainder of the fourth 10-year ISI interval, which is scheduled to end on May 10, 2018, up to and including the refueling outage B2R24 that is scheduled for March 2019 in the fifth 10-year ISI interval.

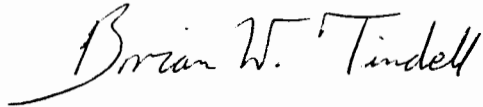
All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the staff remain applicable, including the third party review by the Authorized Nuclear In-service Inspector.

B. Wooten

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If you have any questions, please contact the Project Manager, Andy Hon, at 301-415-8480 or Andrew.Hon@nrc.gov

Sincerely,

A handwritten signature in black ink that reads "Brian W. Tindell". The signature is written in a cursive style with a long horizontal stroke at the end.

Brian W. Tindell, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-324

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST ISI-11 REGARDING SYSTEM LEAKAGE TEST OF CLASS 1 PIPING

DUKE ENERGY PROGRESS, LLC

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

DOCKET NO. 50-324

1.0 INTRODUCTION

By letter dated March 23, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18082A037), as supplemented by letter dated April 5, 2018 (ADAMS Accession No ML18095A026), Duke Energy Progress, LLC (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The licensee proposed to perform the end of fourth interval IWB-5222(b) system leakage test during refueling outage B2R24 in the fifth 10-year ISI interval. Refueling outage B2R24 is scheduled for March 2019 at the Brunswick Steam Electric Plant (Brunswick), Unit 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee submitted Relief Request ISI-11 in which it proposed an alternative system leakage on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

Adherence to Section XI of the ASME Code is mandated by 10 CFR 50.55a(g)(4), which states, in part, that ASME Code Class 1, 2, and 3 components will meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI.

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 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.

Based on the above, and subject to the following technical evaluation, the U.S. Nuclear Regulatory Commission (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.

Enclosure

3.0 TECHNICAL EVALUATION

3.1 Component Affected

ASME Code Class 1 pressure retaining components classified as Examination Category B-P, Item No. B15.10, in Table IWB-2500-1 are affected. The licensee identified the affected lines as:

- Piping between valve numbers 2-E21-F006A and 2-E21-F005A
- Piping between valve numbers 2-E21-F006B and 2-E21-F005B
- Piping between valve numbers 2-E41-V159 and 2-E41-F006
- Piping between valve numbers 2-C41-F007 and 2-C41-F006

Piping Systems	First Isolation Valve	Affected Line	Line Size (Inch)	Second Isolation Valve
Core Spray (CS) Injection (A Loop)	2-E21-F006A	2-E21-3-10-600	10	2-E21-F005A
Core Spray Injection (B Loop)	2-E21-F006B	2-E21-7-10-600	10	2-E21-F005B
High Pressure Coolant Injection (HPCI)	2-E41-V159	2-E41-3-14-901	14	2-E41-F006
Standby Liquid Control (SLC) Injection	2-C41-F007	2-C41-9-1 1/2-902	1.5	2-C41-F006

3.2 Applicable Code Edition and Addenda

The code of record for the fourth 10-year ISI interval is the 2001 Edition with 2003 Addenda of the ASME Code.

3.3 ASME Code Requirement

The ASME Code, Section XI, paragraph IWB-5222(b) requires the pressure retaining boundary during the system leakage test extend to all Class 1 components within the system boundary.

3.4 Reason for Request

The licensee stated that an End of Interval Leakage Test (EOILT) is required during the fourth 10-year ISI interval to satisfy the requirement of ASME Code, Section XI, IWB-5222(b), which states, in part, that "...The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary...".

The licensee stated that during the B2R23 refueling outage in 2017 and the B2R22 refueling outage in 2015, the EOILT was not performed during the Reactor Pressure Vessel (RPV) pressure test.

3.5 Proposed Alternative

The licensee stated that in accordance with 10 CFR 50.55a(z)(2), the proposed alternative is to allow the required fourth 10-year EOILT to be completed on the above piping segments no later

than the end of refueling outage B2R24 (i.e., currently scheduled for March 2019) during the RPV pressure test. This test would include the piping which meets the criteria of IWB-5222(b) which is not exempted per ASME Code Case N-798 "Alternative Pressure Testing Requirements for Class 1 Piping Between the First and Second Vent, Drain, and Test Isolation Devices, Section XI" and existing NRC-approved Relief Request PT-01 for the fourth 10-year ISI interval of Brunswick, Units 1 and 2 (ADAMS Accession No. ML082760533).

The licensee stated that the EOILT will be performed in the same manner as the regular 10-year test in accordance with the approved RPV pressure test procedure. The licensee stated that it will pressurize the portions of piping that meet the IWB-5222(b) criteria and are not exempted by a code case to the RPV test pressure range of 1030 to 1070 pounds per square inch gauge (psig). The licensee will conduct the leakage test using temporary hose connections to bypass the injection check valves of the CS, HPCI, and SLC systems. The remainder of piping that meets the criteria of IWB-5222(b) will be exempt per NRC-approved ASME Code Case N-798.

According to the licensee, qualified VT-2 examiners will perform visual examinations of the test boundaries as part of the leakage test in accordance with the approved RPV pressure test procedure.

3.6 Basis for Alternative

The licensee requested an extension of the EOILT to be performed in the refueling outage in 2019 (i.e., B2R24) for fourth interval credit. The request would not alter the May 11, 2018, start date for the fifth interval and subsequent ISI intervals. With the NRC-approval, the EOILT would be performed twice during the fifth ISI interval, once during the first outage of the fifth interval for credit to the fourth interval and once at or near the end of the fifth Interval for credit to the fifth interval.

The licensee stated that it performed the EOILT of the subject pipe segments on April 8, 2007, during the third ISI interval. That test included the Class 1 injection lines for CS, HPCI, and SLC systems. The additional portion of Class 1 piping (i.e., vents, drains, and test lines) included in the IWB-5222(b) criteria was bounded by NRC-approved Relief Request PT-01 (ADAMS Accession No. ML082760533) and was not tested during the 2007 test, but was visually examined.

The licensee noted that the subject piping is not susceptible to thermal fatigue due to the piping being upstream of the first isolation valve from the reactor vessel. Additionally, there are no known degradation mechanisms in the subject line systems that would lead to degradation of the piping causing it to impact the structural integrity of the piping or piping welds.

The licensee performed the EOILT in 2007, however additional testing has been performed on the applicable portions of piping during each refueling outage since 2007. The testing of applicable portions of piping provides a reasonable level of assurance that the integrity of the piping is adequate to support performance of the EOILT during the next refueling outage in 2019.

The licensee provided tables in the relief request showing a summary of Operational, ASME Code, Section XI, or Appendix J, Local Leak Rate Testing that has been completed on the subject piping since the last performance of the EOILT in 2007.

3.7 Basis for Hardship

The licensee stated that compliance with the IWB-5222(b) requirements would result in an unplanned reactor shutdown if the required leakage test is performed on the subject piping segments prior to May 10, 2018 (i.e., the end of the fourth 10-year ISI interval).

3.8 Duration of Relief Request

The licensee submitted this relief request for the remainder of the fourth 10-year ISI interval up to and including the refueling outage B2R24, which is scheduled for March 2019 in the fifth 10-year ISI interval. The licensee stated that the fourth 10-year ISI interval of Brunswick, Unit 2, commenced on May 11, 2008, and is scheduled to end on May 10, 2018.

3.9 NRC Staff Evaluation

The NRC staff noted that the ASME Code, Section XI, Table IWB-2500-1, Examination Categories B-P, Item Number 15.10, for pressure retaining components, requires that a system leakage test be performed in accordance with the ASME Code, Section XI, IWB-5220. IWB-5222(b) permits the system leakage test to be conducted at or near the end of each inspection interval.

The NRC staff finds that the licensee performed an EOILT on the subject pipe segments and did not detect leakage in the third 10-year ISI interval in 2007.

The NRC staff determines that in accordance with the inspection requirements of the ASME Code, Section XI, Table IWB-2500-1, the licensee should have performed the required EOILT during the 2017 refueling outage. The 2017 refueling outage is the last opportunity that an EOILT could be performed prior to the end of fourth ISI interval which is scheduled to end on May 10, 2018. However, the licensee did not perform the EOILT on the subject pipe segments during the fourth 10-year ISI interval.

The next refueling outage is scheduled in March 2019, which would be part of the fifth ISI interval. The licensee plans to perform the EOILT on the subject pipe segments during the March 2019 refueling outage to take credit for the missing EOILT in the fourth ISI interval.

The NRC staff finds that although the licensee did not perform the EOILT on the subject piping segments in the 2017 refueling outage, the licensee did perform various other leakage-related tests on the subject piping segments during the fourth ISI interval that consists of the 2009, 2011, 2013, 2015, and 2017 refueling outages. As stated in the relief request, for the CS piping systems and subject pipe segments (A and B loops), the licensee performed check valve operability tests and RPV pressure tests. For the HPCI pipe segments, the licensee performed the Local Leak Rate test for the valves in accordance with the ASME Code, Section XI, Appendix J, Guide to Plant Maintenance Activities and Section XI Repair/Replacement Activities. For the SLC injection pipe segments, the licensee performed the ASME Code, Section XI test to inject demineralized water through a check valve at a test pressure of 50 psig to 94 psig.

In all of these tests, the licensee did not use the operating pressure to perform the tests. Therefore, these tests do not satisfy the requirements of the ASME Code, Section XI, IWB-5221, which requires that "...the system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power..."

Nevertheless, the NRC staff finds that the various tests of the subject pipe segments during the 2009, 2011, 2013, 2015, and 2017 refueling outages have provided reasonable assurance that the structural integrity and leak tightness of the subject pipe segments are adequate.

The NRC staff finds acceptable that the licensee will perform a system leakage test in accordance with IWB-5222(b) in the beginning of the fifth ISI interval during the 2019 refueling outage and an EOILT at the end of the fifth ISI interval.

The NRC staff finds that as the licensee stated, the subject pipe segments are not susceptible to thermal fatigue due to the piping being upstream of the first isolation valve from the reactor vessel. There are no known degradation mechanisms in each of the subject pipe systems which would challenge the structural integrity of the subject pipe segments.

With regard to hardship, the NRC staff finds that performance of the EOILT with associated VT-2 visual examination in accordance with the ASME Code, Section XI, IWB-5222(b) would cause difficulties. The plant would have to be shutdown to perform a mid-cycle system leakage test. This would lead to unnecessary cycling of the plant systems and components thereby causing transients that would add additional loads onto the systems and components. Therefore, the NRC staff finds that compliance with the ASME Code-specified requirements would result in hardship without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the proposed alternative provides reasonable assurance of structural integrity and leak tightness of the subject piping segments, and complying with the specified requirement 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, the NRC staff authorizes the use of relief request ISI-11 at Brunswick, Unit 2, for the remainder of the fourth 10-year ISI interval which is scheduled to end on May 10, 2018, up to and including the refueling outage B2R24 which is scheduled for March 2019 in the fifth 10-year ISI interval.

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

Principal Contributor: Ali Rezai, NRR

Date: May 7, 2018

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2 – RELIEF FROM THE REQUIREMENTS OF THE ASME CODE, SECTION XI, ISI-11 REGARDING SYSTEM LEAKAGE TEST OF CLASS 1 PIPING (EPID L-2018-LLR-0038) DATED MAY 7, 2018

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