

April 5, 2018

Serial: BSEP 18-0047

10 CFR 50.55a(z)(2)

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

Subject: Brunswick Steam Electric Plant, Unit No. 2  
Renewed Facility Operating License No. DPR-62  
Docket No. 50-324  
Supplement to Proposed Alternative In Accordance With 10 CFR 50.55a(z)(2) for  
End of Interval Leakage Test

Reference: Letter from Bryan B. Wooten (Duke Energy) to NRC Document Control Desk,  
*Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1) for End of Interval  
Leakage Test*, dated March 23, 2018, ADAMS Accession Number ML18082A037

Ladies and Gentlemen:

The referenced letter requested an alternative (i.e., ISI-11) to the requirements of paragraph IWB-5222(b) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2001 Edition through 2003 Addenda for the Brunswick Steam Electric Plant (BSEP), Unit No. 2. The original basis for ISI-11 was 10 CFR 50.55a(z)(1), which corresponds to a "proposed alternative provides an acceptable level of quality and safety." This submittal updates the basis for ISI-11 to be 10 CFR 50.55a(z)(2), which corresponds to "compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

This submittal also provides supplemental information for supporting the proposed alternative to the requirements of ASME Code, Section XI, paragraph IWB-5222(b). The supplement to ISI-11 is included in the Enclosure to this submittal. The changes and additional information are marked with revision bars in the body of the document.

The ASME Code, Section XI, paragraph IWB-5222(b), requires that the pressure retaining boundary system leakage test, conducted at or near the end of each inspection interval, be extended to all Class 1 pressure retaining components within the system boundary. The enclosed relief request is to allow the required Unit 2, fourth 10-year, end of interval leakage testing on portions of the Core Spray, High Pressure Coolant Injection, and Standby Liquid Control Systems to be completed no later than the end of refueling outage B2R24 (i.e., currently scheduled for March 2019). Approval of the proposed alternative is requested prior to the end of the fourth 10-year ISI interval, which is currently scheduled to end on May 10, 2018.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 832-2487.

Sincerely,



Bryan B. Wooten  
Director – Organizational Effectiveness  
Brunswick Steam Electric Plant

BBW/mkb

Enclosure: Supplement to 10 CFR 50.55a Request Number ISI-11

cc (with Enclosure):

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**Supplement to 10 CFR 50.55a Request Number ISI-11**

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2)

Unit 2 End of Fourth Interval Leakage Test

**1. ASME Code Components Affected**

Unit(s) Affected: Brunswick Steam Electric Plant (BSEP), Unit 2  
Code Class: ASME Code, Section XI, Class 1  
References: Subarticle IWB-5222(b)  
Examination Categories: B-P  
Item Number: 15.10, Pressure Retaining Components  
Component Numbers: Piping between 2-E21-F006A and 2-E21-F005A  
Piping between 2-E21-F006B and 2-E21-F005B  
Piping between 2-E41-V159 and 2-E41-F006  
Piping between 2-C41-F007 and 2-C41-F006  
Description: Pressure Testing

**2. Applicable Code Edition**

The Inservice Inspection Program for the fourth 10-year inservice inspection (ISI) interval is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2001 Edition with 2003 Addenda. The fourth 10-year ISI interval began on May 11, 2008, and is currently scheduled to end on May 10, 2018.

**3. Applicable 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.

**4. Reason for Request**

An End of Interval Leakage Test (EOILT) is required during the fourth 10-year ISI interval to satisfy the requirement of ASME Section XI paragraph IWB-5222(b), which states:

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.

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

Compliance with the ASME Section XI paragraph IWB-5222(b) requirements would result in an unplanned Unit 2 shutdown prior to May 10, 2018 (i.e., the end of the fourth 10-year ISI interval) to complete the pressure test on the applicable portions of piping. In lieu of completing the pressure test and in accordance with 10 CFR 50.55a(z)(2), relief is requested on the basis that compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

To comply with the requirements of IWB-5222(b) for the applicable portions of piping by the end of the fourth 10-year ISI interval, Unit 2 would be required to be placed in cold shutdown conditions in order to perform the pressure test on the applicable portions of piping. Once in

cold shutdown conditions, the plant systems would have to be realigned for performance of the test. Additional stresses and fatigue associated with shutdown and startup would be imposed on systems and components, and would require personnel to enter radiation fields to configure and prepare the piping for the pressure test, align the plant for the test, and perform the required VT-2 examinations during the test. The resulting dose accrual and plant risk associated with cycling Unit 2 into cold shutdown conditions and alignments for the pressure test would result in hardship without a compensating increase of quality or safety of the plant.

**5. Proposed Alternative and Basis for Use**

In accordance with 10 CFR 50.55a(z)(2), the proposed alternative is to allow the required Unit 2, fourth 10-year, EOILT to be completed no later than the end of the refueling outage B2R24 (i.e., currently scheduled for March 2019) during the Reactor Pressure Vessel Pressure Test. This test would include the piping which meets the criteria of IWB-5222(b), and is not exempt 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, Division 1*, (i.e., Reference 1), and the existing approved BSEP relief request PT-01 for BSEP's fourth interval (i.e., Reference 2). The portions of piping that will be included in the test are listed below. Referenced Boundary Sketches, with valve and line information, are provided at the end of this enclosure.

Line Function	First Isolation Valve	Affected Line	Line Size	Second Isolation Valve
Core Spray (CS) Injection (A Loop)	2-E21-F006A	2-E21-3-10-600	10"	2-E21-F005A
CS Injection (B Loop)	2-E21-F006B	2-E21-7-10-600	10"	2-E21-F005B
High Pressure Coolant Injection (HPCI) Injection	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

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 portions of piping that meet the IWB-5222(b) criteria and are not exempted by a code case will be pressurized to the RPV test pressure range of 1030 psig to 1070 psig. The test will be conducted 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 code case N-798.

The pressure test will be evaluated by qualified VT-2 examiners completing visual examinations of the test boundaries in accordance with the approved RPV pressure test procedure.

Approval of the proposed alternative is requested prior to the end of the fourth 10-year ISI interval, which is currently scheduled to end on May 10, 2018.

Basis for Use

BSEP is requesting an extension of the EOILT to be performed in the Unit 2 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 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 most recent performance of the EOILT on Unit 2 was April 8, 2007. This 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 relief request PT-01 (i.e., Reference 2) and was not tested during the 2007 test, but was visually examined.

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 each of the subject line systems which would cause degradation of the piping that would impact the structural integrity of the piping or piping welds.

The EOILT was last performed in 2007, however additional testing has been performed on the applicable portions of piping during each Unit 2 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 Unit 2 outage.

Operational and Pressure Testing

The following table provides a summary of Operational, ASME 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.

Line Function	Test	Boundary	Test Pressure	Year
Reactor Pressure Vessel and Class 1 Piping	OPT-80.1 (RPV Pressure Test) (Code Case N-498, Reference 3)	RPV and Class 1 Piping	1033 -1052.9 psig	2007
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	371 psig	2007
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	369 psig	2009
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	383 psig	2011

Line Function	Test	Boundary	Test Pressure	Year
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	376 psig	2013
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	377 psig	2015
CS Injection (A Loop)	OPT-07.1.1A (CS Injection Check Valve Operability Test)	Includes 2-E21-F006A to 2-E21-F005A	355 psig	2017
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2007
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2009
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2011
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2013
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2015
CS Injection (A Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006A to 2-E21-F005A	OPT-80.1 RPV Test Pressure (Note 2)	2017
CS Injection (B Loop)	OPT-07.1.1B (CS Injection Check Valve Operability Test)	Includes 2-E21-F006B to 2-E21-F005B	402 psig	2007
CS Injection	OPT-07.1.1B (CS Injection Check	Includes 2-E21-F006B to 2-E21-	391 psig	2009

Line Function	Test	Boundary	Test Pressure	Year
(B Loop)	Valve Operability Test)	F005B		
CS Injection (B Loop)	OPT-07.1.1B (CS Injection Check Valve Operability Test)	Includes 2-E21-F006B to 2-E21-F005B	399 psig	2011
CS Injection (B Loop)	OPT-07.1.1B (CS Injection Check Valve Operability Test)	Includes 2-E21-F006B to 2-E21-F005B	386 psig	2013
CS Injection (B Loop)	OPT-07.1.1B (CS Injection Check Valve Operability Test)	Includes 2-E21-F006B to 2-E21-F005B	388 psig	2015
CS Injection (B Loop)	OPT-07.1.1B (CS Injection Check Valve Operability Test)	Includes 2-E21-F006B to 2-E21-F005B	387 psig	2017
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2007
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2009
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2011
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2013
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2015
CS Injection (B Loop)	OPT-20.7B (PIV LRT) in conjunction with OPT-80.1 RPV Pressure Test	Includes 2-E21-F006B to 2-E21-F005B	OPT-80.1 RPV Test Pressure (Note 2)	2017

Line Function	Test	Boundary	Test Pressure	Year
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2007
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2009
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2011
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2013
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2015
HPCI Injection	OPT-20.3-B21 (App. J LLRT)	Includes 2-E41-F006 to 2-E41-V159	50 psig	2017
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	49.5 psig	2007
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	88.2 psig	2009 (Note 1)
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	90.5 psig	2009 (2 <sup>nd</sup> Occurrence) (Note 1)
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	91.5 psig	2011 (Note 1)
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	92 psig	2013 (Note 1)
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	93 psig	2015 (Note 1)
SLC Injection	OPT-20.14 (ASME Section XI PT)	Includes 2-C41-F006 to 2-C41-V5003	93.5 psig	2017 (Note 1)

Note 1 Indicates years that demineralized water was injected through the 1-C41-F007 Check Valve into the vessel however this portion of the test was not in the pressure boundary for the VT-2 Examination.



Note 2 OPT-20.7B is the Pressure Isolation Valve Leak Rate Test in Conjunction with the RPV Pressure Test. During this test the Core Spray Injection lines between the F006A/B and the F005A/B are pressurized at the RPV test pressure using mechanical jumpers through the F006 inboard and outboard drain lines.

#### Non Destructive Examinations

There have been no non-destructive examinations completed on the piping addressed in this relief request.

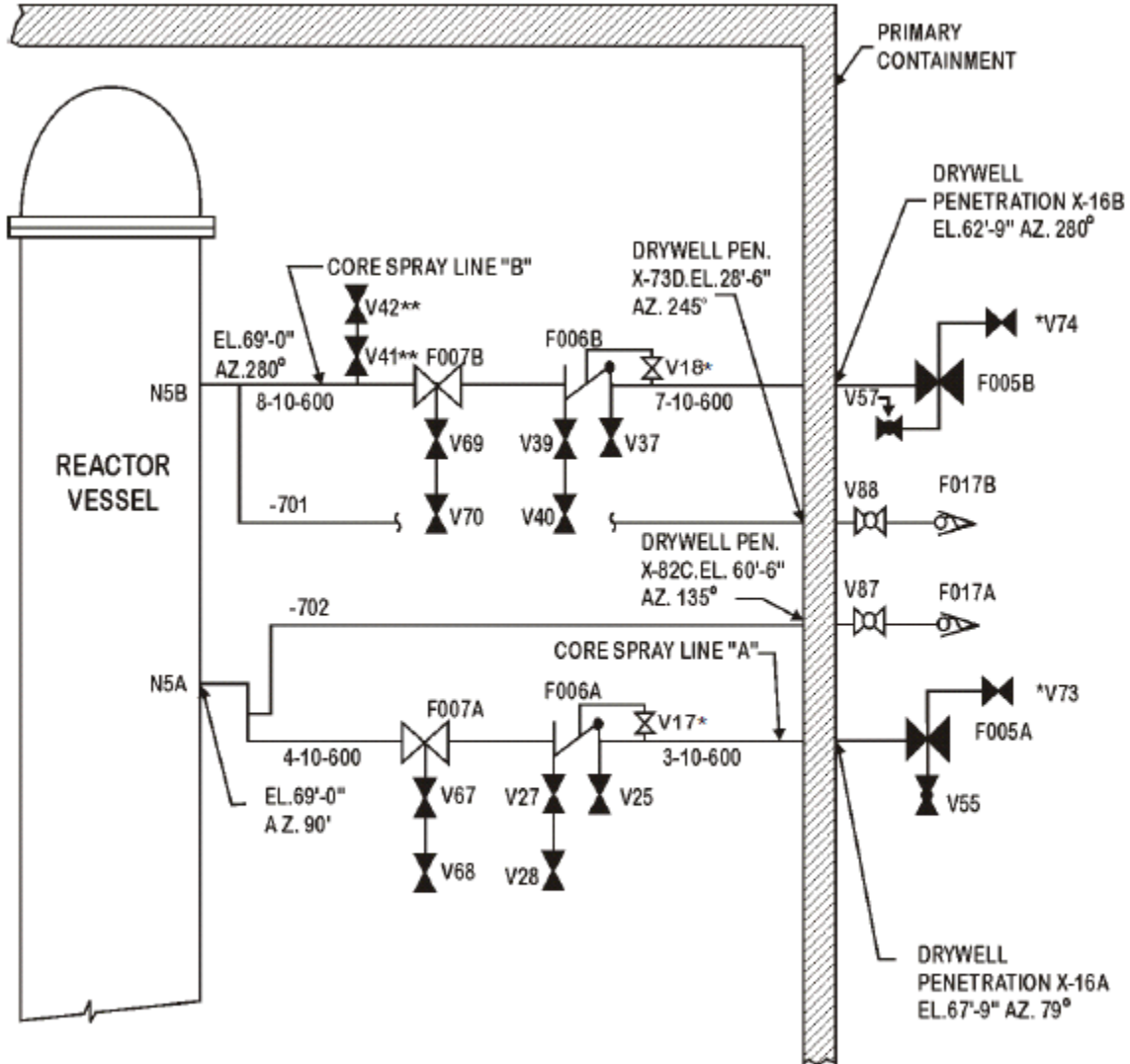
#### **6. Duration of the Proposed Alternative**

This proposed alternative is requested until the end of the refueling outage B2R24, currently scheduled for March 2019.

#### **7. References**

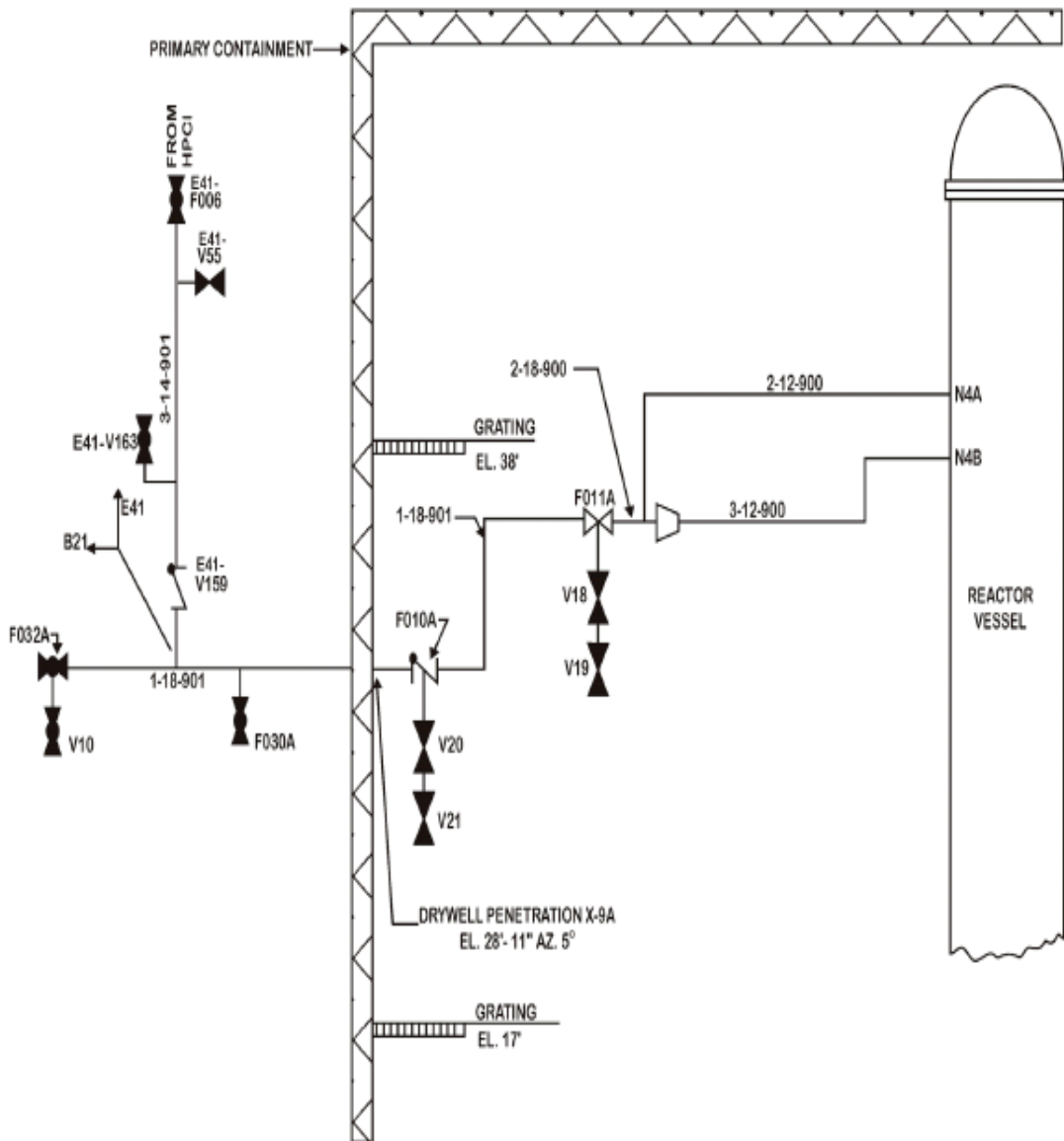
1. ASME Code Case N-798, *Alternative Pressure Testing Requirements for Class 1 Piping Between the First and Second Vent, Drain, and Test Isolation Devices, Section XI, Division 1*
2. Letter from Thomas H. Boyce (NRC) to Benjamin Waldrep (Carolina Power & Light Company), *Relief Request PT-01 for the Fourth 10-Year Inservice Inspection Interval on System Pressure Test Boundary*, dated November 6, 2008, ADAMS Accession No. ML082760533
3. ASME Code Case N-498, *Alternative Requirements for 10-Year System Hydrostatic Testing of Class 1, 2, and 3 Systems*

**OPT-80.1, Reactor Pressure Vessel ASME Section XI Pressure Test  
VT-2 Examination Boundary Drawing  
Core Spray A and B Loops Boundary**



\*Unit 1 only  
\*\* Unit 2 only

**OPT-80.1, Reactor Pressure Vessel ASME Section XI Pressure Test  
VT-2 Examination Boundary Drawing  
Feedwater A Loop  
(High Pressure Coolant Injection)**



**OPT-80.1, Reactor Pressure Vessel ASME Section XI Pressure Test  
VT-2 Examination Boundary Drawing  
Standby Liquid Control**

