Nebraska Public Power District
Always there when you need us

10 CFR 50.55a

NLS2015025
June 9, 2015

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: 10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval
Cooper Nuclear Station, Docket No. 50-298, License No. DPR-46

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District (NPPD) to request that the Nuclear Regulatory Commission (NRC) grant relief from, and authorize alternatives to, certain inservice inspection code requirements for the Cooper Nuclear Station (CNS) pursuant to 10 CFR 50.55a. The 10 CFR 50.55a requests pertain to both inservice examination and system pressure test requirements in Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The applicable ASME Code for the fifth ten-year interval is the 2007 Edition, 2008 Addenda. These requests are applicable to the fifth ten-year inservice inspection interval, which commences on March 1, 2016. In order to support planning for Refueling Outage 29, NPPD requests approval of these requests by March 1, 2016.

The Attachment contains the relief requests for the fifth ten-year interval. Note that Relief Request RR5-01 will only be used as a contingency in the unlikely event a flaw is discovered during Refueling Outage 29 in a control rod drive nozzle to cap weld resulting in the need for a full structural weld overlay. CNS currently has no weld overlays installed.

No formal licensee commitments are being made in this letter. Should you have any questions concerning this matter, please contact Jim Shaw, Licensing Manager, at (402) 825-2788.

Sincerely,

Oscar A. Limpias
Vice President - Nuclear and
Chief Nuclear Officer

/dv

A047
NRR

COOPER NUCLEAR STATION
P.O. Box 98 / Brownville, NE 68321-0098
Telephone: *(402) 825-3811 /* ***Fax:*** *(402) 825-5211*
www.nppd.com

Attachment: Cooper Nuclear Station Inservice Inspection Program Fifth Ten-Year Interval
10 CFR 50.55a Relief Requests

cc: Regional Administrator w/attachment
USNRC - Region IV

Senior Project Manager w/attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/attachment
USNRC - CNS

NPG Distribution w/o attachment

CNS Records w/attachment

Attachment

Cooper Nuclear Station Inservice Inspection Program
Fifth Ten-Year Interval 10 CFR 50.55a Relief Requests

RI5-01	Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05
RI5-02	Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2
RP5-01	Implementation of Code Case N-795
RC3-01	Alignment and Synchronization of the Containment Inservice Inspection Program Third Ten-Year Interval with the Inservice Inspection Program Fifth Ten-Year Interval
RR5-01	Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Acronyms

ART	Adjusted Reference Temperature
ASME	American Society of Mechanical Engineers
BWR	Boiling Water Reactor
BWRVIP	Boiling Water Reactor Vessel Internals Project
CE	Combustion Engineering
CNS	Cooper Nuclear Station
CFR	Code of Federal Regulation
CISI	Containment Inservice Inspection
CRD	Control Rod Drive
ΔP	Differential Pressure
EFPY	Effective Full Power Years
EPRI	Electric Power Research Institute
EVT-1	Enhanced Visual (VT-1) Testing
FN	Ferrite Number
FW	Feedwater
GE	General Electric
GTAW	Gas Tungsten Arc Weld
ID	Inner Diameter or Identification
IEB	Inspection and Enforcement Bulletin
IGSCC	Intergranular Stress Corrosion Cracking
ISI	Inservice Inspection
JP	Jet Pump
LLC	Limited Liability Corporation
LPCI	Low Pressure Coolant Injection
LRA	License Renewal Application
LTOP	Low Temperature Over Pressure
MUR	Measurement Uncertainty Recapture
NP	Non Proprietary
NPPD	Nebraska Public Power District
PDI	Performance Demonstration Initiative
PSI	Preservice Inspection
PSIG	Pounds per Square Inch
PWR	Pressurized Water Reactor
RG	Regulatory Guide
RICSIL	Rapid Information Communication Service Information Letter
RPV	Reactor Pressure Vessel
RT_{NDT}	Reference Temperature for Nil Ductility Transition
SCC	Stress Corrosion Cracking
SDC	Shut Down Cooling
SER	Safety Evaluation Report
SIL	Service Information Letter
SLC	Standby Liquid Control
TLAA	Time-Limited Aging Analyses
US NRC	United States Nuclear Regulatory Commission
UT	Ultrasonic Testing
VT	Visual Testing
VT-1	Detailed Inspection
VT-2	Leakage Inspection
VT-3	General Condition Inspection

10 CFR 50.55a Request No. RI5-01
Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Acceptable Level of Quality and Safety

ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class 1
Examination Category:	B-A
Item Number(s):	B1.11
Component Numbers:	RPV Circumferential Shell Welds (VCB-BB-1, VCB-BA-2, VCB-BB-3, VCB-BB-4)

Applicable Code Edition and Addenda

ASME Section XI, 2007 Edition through the 2008 Addenda

Applicable Code Requirement

Table IWB-2500-1, Examination Category B-A, Item No. B1.11, requires a volumetric examination of the circumferential shell welds each interval.

Reason for Request

During the staff's review of the CNS LRA, the staff concluded that CNS had demonstrated, in accordance with 10 CFR 54.21(c)(1)(ii), that for RPV circumferential weld examination relief, the analysis had been projected to the end of the period of extended operation. The staff also concluded that the Updated Safety Analysis Report Supplement contained an appropriate summary description of the TLAA evaluation in accordance with 10 CFR 54.21(d) and therefore, was acceptable.

As such, NPPD is requesting an alternative in accordance with 10 CFR 50.55a(z)(1) on the basis that this alternative provides an acceptable level of quality and safety. This request for alternative would provide relief from circumferential weld examinations required by the ASME Section XI Code for the extended period of operation.

CNS was previously granted this relief for the remainder of the original 40-year license term (TAC No. MD5260, ML080230288).

10 CFR 50.55a Request No. RI5-01 (continued)
Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05

Proposed Alternative and Basis for Use

Proposed Alternative

CNS requests the use of BWRVIP-05 with supporting information described herein as the bases for excluding the RPV shell circumferential welds from the examinations required by ASME Section XI, Examination Category B-A, Item No. B1.11 for the period of extended operation ending on January 18, 2034.

The axial weld seams (Examination Category B-A, Item No. B1.12) and their intersection with the associated circumferential weld seams will be examined in accordance with ASME Section XI except where specific relief is granted when essentially 100% (>90%) coverage cannot be obtained.

Basis for Use

The technical basis supporting the requested alternative is provided by BWRVIP-05, (EPRI TR-105697) "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations" as accepted in the staff's final safety evaluation report enclosed in a July 28, 1998, letter from Mr. G. C. Lainas, NRC, to Mr. C. Terry, the BWRVIP Chairman. In this letter, the staff concluded that because the failure frequency for circumferential welds in BWR plants is significantly below the criterion specified in RG 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors," and below the core damage frequency of any BWR plant, continued inspection would result in a negligible decrease in an already acceptably low RPV failure probability. Therefore elimination of the ISI requirements for RPV circumferential welds is justified.

The staff's letter indicated that BWR applicants may request relief from ASME Code Section XI requirements for volumetric examination of circumferential RPV welds by demonstrating that (1) the failure frequency for circumferential welds in BWR plants must be significantly below the criterion specified in RG 1.154 and below the core damage frequency of any BWR plant, therefore, the failure frequency for RPV circumferential welds is sufficiently low to justify elimination of ISI in accordance with the ASME Code Section XI; and (2) the applicants must implement operator training and operating procedures that limit the frequency of cold over-pressure events to the amount specified in the July 28, 1998, SER for the BWRVIP-05 report. The letter also indicated that the requirements for inspection of RPV circumferential welds during an additional 20-year license renewal period would need plant-specific reassessment as part of any BWR LRA. The applicant also must request relief from the ASME Code Section XI requirements for volumetric examination of circumferential welds for the extended license term in accordance with 10 CFR 50.55a(z).

10 CFR 50.55a Request No. RI5-01 (continued)
Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05

CNS LRA Section 4.2.5 provided a comparison of the plant-specific information with the generic analysis information in BWRVIP-05 SER to support the conclusion that the CNS RPV beltline circumferential weld parameters at 54 EFPY remained within the bounding parameters for CE RPVs at 64 EFPY from the BWRVIP-05 SER. Since the 54 EFPY mean ART value for CNS is less than the 64 EFPY value from the BWRVIP-05 SER (see Table 1 extracted from CNS LRA Table 4.2-6), the staff review concluded that the RPV conditional failure probability for CNS at 54 EFPY was bounded by the staff's generic analysis in the BWRVIP-05 SER. Therefore, the staff determined that CNS's RPV circumferential welds satisfy the limiting conditional failure probability for circumferential welds at the end of the period of extended operation (the first condition established in the BWRVIP-05 SER).

Table 1 (Table 4.2-6 in CNS LRA)
CNS Circumferential Weld Evaluation for 54 EFPY

Parameter Description	CE(VIP)(1) 32 EFPY Bounding Parameters	CNS 30 EFPY Bounding Weld (1-240)		CE(VIP)(1) 64 EFPY Bounding Parameters	CNS 54 EFPY Beltline Circumferential Weld (with MUR)
Initial reference temperature (RT_{NDT}), °F	0	-50		0	-50
Neutron fluence at the end of the requested relief period, n/cm^2	2.0E+18	1.57E+18		4.0E+18	1.48E+18
Weld copper content, %	0.13	0.20		0.13	0.183
Weld nickel content, %	0.71	0.69		0.71	0.704
Weld chemistry factor (CF)	151.7	175.30		151.7	172.22
RG 1.99 Position	N/A	C.1, surveillance data not available	C.2, surveillance data available	N/A	C.1
Increase in reference temperature (ΔRT_{NDT}), °F	86.4	87.65	137.61	113.2	86.1
Mean adjusted reference temperature (ART), °F (Initial RT_{NDT} + ΔRT_{NDT})	98.1	37.65	87.61	113.2	36.1

(1) Based on chemistry report by BWRVIP

For the second condition, the staff review of the original request for the 4th Interval concluded that the CNS implementation of operator training and establishment of procedures limiting the frequency of code over-pressure events to the frequency specified in BWRVIP-05 SER for the remaining initial licensed period of operation described in the letter dated January 15, 2008, was acceptable. In LRA Section 4.2.5, CNS stated that the same procedures and training will be used for the period of extended operation. Based on this the staff determined that continued

10 CFR 50.55a Request No. RI5-01 (continued)
Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05

implementation of operator training and establishment of procedures limiting the frequency of cold over-pressure events would be satisfied during the period of extended operation (the second criterion established in the BWRVIP-05 SER).

In addition to the above criterion, in the BWRVIP-05 SER, the staff concludes that the failure probability of the RPV circumferential shell welds is substantially less than that of the RPV axial shell welds. In the LRA Table 4.2-7 (Table 2 below), CNS summarized the effects of irradiation on the limiting axial weld at CNS and compared its properties to the NRC limiting plant-specific data used in the July 28, 1998, SER for BWRVIP-05. The higher copper content and chemistry factor for the CNS weld is offset by the CNS weld's lower initial RT_{NDT}. Consequently, the CNS axial welds are less susceptible to irradiation damage than the NRC limiting plant-specific case. During the staff's review of the LRA, a comparison of the mean ART values of CNS weld data in Table 4.2-6 (Table 1 above) and Table 4.2-7 (Table 2 below) concluded that the mean ART for the axial welds at CNS is higher than the mean ART for the circumferential weld, indicating that the axial welds are more susceptible to radiation embrittlement than the circumferential welds. Therefore, the continuation of ISI for axial welds provides additional assurance that the structural integrity of the circumferential welds is adequate.

Table 2 (Table 4.2-7 in CNS LRA) Effects of Irradiation on CNS RPV Axial Weld Properties		
Plant/Parameter Description	NRC Limiting Plant-Specific Data	CNS Data for Weld 2-233-B
EFPY	N/A	54
Initial (unirradiated) reference temperature (RT_{NDT}), °F	-2	-50
Neutron fluence, n/cm^2	1.50E+18	1.46E+18
Fluence factor (FF) (calculated per RG 1.99)	0.50	0.497
Weld copper content, %	0.219	0.27
Weld nickel content, %	0.996	1.035
Weld chemistry factor (CF) (calculated per RG 1.99)	231.7	254.43
Increase in reference temperature (ΔRT_{NDT}), °F (FF x CF)	116.0	126.5
Mean adjusted reference temperature (ART), °F ($RT_{NDT} + \Delta RT_{NDT}$)	114.0	76.5

To summarize, the additional analysis described in Section 4.2.5 of the LRA shows that the parameters projected to 54 EFPY for the CNS RPV are bounded by the staff's (64 EFPY) bounding parameters for a CE vessel in the BWRVIP-05 SER. Additionally, the CNS RPV axial welds are less susceptible to irradiation damage than the NRC limiting plant-specific case, but are more susceptible than the CNS circumferential welds. Therefore, continuation of ISI for axial welds provides additional assurance that the structural integrity of the circumferential welds is adequate.

10 CFR 50.55a Request No. RI5-01 (continued)
Reactor Pressure Vessel Circumferential Shell Welds using BWRVIP-05

The procedures and training used to limit low temperature over-pressure events will be the same as those in use when CNS requested approval of the BWRVIP-05 technical alternative for the current license term. The TLAA associated with reactor vessel circumferential weld inspection relief has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

Based on the information presented in this request and the referenced LRA with the corresponding NRC SER, the circumferential welds will continue to satisfy the limiting conditional failure probability for circumferential welds in the staff's July 28, 1998, safety evaluation.

Duration of Proposed Alternative

The duration of this request is for the period of extended operation ending on January 18, 2034.

Precedents

1. US NRC Letter to Exelon Generation Company, LLC, "Peach Bottom Atomic Power Station, Units 2 and 3 - Requests for Relief I4R-51 and I4R-52 (TAC Nos. ME5392, ME5393, ME5394 and ME5395)," dated January 24, 2012 (ML112770217).

10 CFR 50.55a Request No. RI5-02
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Acceptable Level of Quality and Safety

ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class 1
Examination Category:	B-N-1, B-N-2
Item Number(s):	B13.10, B13.20, B13.30, and B13.40
Component Numbers:	Various

Applicable Code Edition and Addenda

ASME Section XI, 2007 Edition through the 2008 Addenda

Applicable Code Requirements

Table IWB-2500-1, Examination Categories "B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessels," "B-N-3, Removable Core Support Structures" requires examinations based on the following Item Numbers:

B13.10 Examine accessible areas of the reactor vessel interior (B-N-1) each period by the VT-3, visual examination method; includes only those spaces above and below the core made accessible by removal of components during normal refueling outages.

B13.20 Examine accessible interior welded attachments within the beltline region each interval by the VT-1, visual examination method (B-N-2)

B13.30 Examine accessible interior welded attachments beyond the beltline region each interval by the VT-3, visual examination method (B-N-2)

B13.40 Examine the accessible surfaces of welded core support structures each interval by the VT-3, visual examination method (B-N-2)

These examinations are performed to assess the structural integrity of the reactor vessel interior, its welded attachments, and the welded core support structure within the boiling water reactor pressure vessel.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Reason for Request

In accordance with 10 CFR 50.55a(z)(1), NPPD is requesting NRC approval of a proposed alternative to the Code requirements provided above on the basis that the use of the BWRVIP guidelines discussed below provide an acceptable level of quality and safety.

The BWRVIP Inspection and Evaluation Guidelines recommend specific inspection by BWR owners to identify material degradation with BWR components. A wealth of inspection data has been gathered during these inspections across the BWR industry. The BWRVIP Inspection and Evaluation Guidelines focus on specific and susceptible components, specify appropriate inspection methods capable of identifying known or potential degradation mechanisms, and require re-examination at appropriate intervals. The scope of the BWRVIP Inspection and Evaluation Guidelines exceed that of ASME Section XI and in most instances include components that are not part of the ASME Section XI jurisdiction.

Use of this proposed alternative will maintain an adequate level of quality and safety and avoid duplicate or unnecessary inspections, while conserving radiological dose.

Proposed Alternative and Basis for Use

Proposed Alternative

NPPD requests authorization to utilize the alternative requirements of the BWRVIP Guidelines in lieu of the requirements of ASME Code Section XI.

NPPD will satisfy the Examination Category B-N-1 and B-N-2 requirements as described in Table 1 on page 15 in accordance with BWRVIP guideline requirements. This relief request proposes to utilize the identified BWRVIP guidelines in lieu of the associated Code requirements, including examination method, examination volume, frequency, training, successive and additional examinations, flaw evaluations, and reporting.

Not all of the components addressed by these guidelines are Code components. The proposed alternative includes:

For Examination Category B-N-1:

As an alternative to meeting ASME Section XI and performing a VT-3 examination of the RPV interior above and below the core made accessible by a normal refuel outage, NPPD will implement the BWRVIP Guidelines listed below and as outlined in Table 1 on page 15. By this request for alternative the BWRVIP Guidelines will be used as an alternative to the requirements of ASME Section XI.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

- BWRVIP-03, Revision 17, "Reactor Pressure Vessel and Internals Examination Guidelines"
- BWRVIP-18, Revision 1-A, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines"
- BWRVIP-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines"
- BWRVIP-26-A, "BWR Top Guide Inspection and Flaw Evaluation Guidelines"
- BWRVIP-27-A, "BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines"
- BWRVIP-41, Revision 3, "BWR Jet Pump Assembly Inspection and Evaluation Guidelines"
- BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines"
- BWRVIP-138 Revision 1-A, "Updated Jet Pump Beam Inspection and Flaw Evaluation Guidelines"

For Examination Category B-N-2:

As an alternative to meeting ASME Section XI and performing a VT-1 or VT-3, as required by ASME Section XI, examination of the RPV welded attachments and welded core support structures, NPPD will implement the BWRVIP Guidelines listed below and as outlined in Table 1 on page 15. By this request for alternative the BWRVIP Guidelines will be used as an alternative to the requirements of ASME Section XI.

- BWRVIP-03, Revision 17, "Reactor Pressure Vessel and Internals Examination Guidelines"
- BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines"
- BWRVIP-48-A, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines"
- BWRVIP-76, Revision 1-A, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines"
- BWRVIP-100-A, "Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds"

  Note: If flaw evaluations are required for BWRVIP-76, Revision 1-A, examinations, the fracture toughness values of BWRVIP-100-A will be utilized.

When a BWRVIP Guideline refers to ASME Section XI, the technical requirements of ASME Section XI as described by the BWRVIP Guideline will be met, but the examination is under the auspices of the BWRVIP program as defined by BWRVIP-94NP, Revision 2, "BWRVIP Vessel and Internals Project Program Implementation Guide".

The NPPD reactor vessel internals inspection programs have been developed and implemented to satisfy the requirements of BWRVIP-94NP, Revision 2. It is recognized that the BWRVIP executive committee periodically revises the BWRVIP guidelines to address industry operating experience, include enhancements to inspection techniques, and add or adjust flaw evaluation methodologies. BWRVIP-94NP, Revision 2, states that where guidance in existing BWRVIP

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

documents has been supplemented or revised by subsequent correspondence approved by the BWRVIP Executive Committee, the vessel and internals program shall be modified to reflect the new requirements and implement the guidance within two refueling outages, unless a different schedule is specified by the BWRVIP.

However, if new guidance approved by the Executive Committee includes changes to NRC approved BWRVIP guidance that are less conservative than those approved by the NRC, the less conservative guidance shall be implemented only after NRC approves the changes, which generally means publication of a "-A" document or equivalent. Therefore, where the revised version of a BWRVIP inspection guideline continues to also meet the requirements of the version of the BWRVIP inspection guideline approved by the NRC, it may be implemented. Otherwise, the revised guidelines will only be implemented after NRC approval of the revised BWRVIP guidelines or a plant-specific request for alternative has been approved. Table 1 below only represents the most current comparison.

Any deviations from the referenced BWRVIP Guidelines for the duration of the proposed alternative will be appropriately documented and communicated to the NRC, per the BWRVIP Deviation Disposition Process.

Note that other regulatory commitments (i.e., NUREG-0619) are still being implemented separately from the ASME Section XI Program or this request for alternative.

In the event that conditions are identified that require repair or replacement and the component is within the jurisdiction of ASME Section XI (welded attachments to the RPV or Core Support Structure), the repair or replacement activities will be performed in accordance with ASME Section XI, Article IWA-4000. Subsequent examinations will be in accordance with the applicable BWRVIP Guideline.

Basis for Use

As part of the BWRVIP initiative, the BWR reactor internals and attachments were subjected to a safety assessment to identify those components that provide a safety function and to determine if long-term actions were necessary to ensure continued safe operation. The safety functions considered are those associated with (1) maintaining a coolable geometry, (2) maintaining control rod insertion times, (3) maintaining reactivity control, (4) assuring core cooling and (5) assuring instrumentation availability. The results of the safety assessment are documented in BWRVIP-06, Revision 1-A, "BWR Vessel and Internals Project Safety Assessment of BWR Reactor Internals" which has been approved by the NRC. As a result of BWRVIP-06, Revision 1-A, component specific BWRVIP guidelines were developed providing appropriate examination and evaluation requirements to address the specific component safety function and potential degradation mechanism.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Along with the component specific guidelines, the BWRVIP has established a reporting protocol for examination results and deviations. The NRC has agreed with the BWRVIP approach in principal and has issued Safety Evaluations for many of these guidelines (see References).

As additional justification, page 17, "Comparison of ASME Code Section XI Examination Requirements to BWRVIP Examination Requirements," provides specific examples which compare the inspection requirements of ASME Code Section XI Table IWB-2500-1, Item Numbers B13.10, B13.20, B13.30 and B13.40 to the inspection requirements in the BWRVIP documents. Specific BWRVIP documents are provided as examples. This comparison also includes a discussion of the inspection methods.

Therefore, use of the BWRVIP guidelines as an alternative to ASME Section XI, as shown by the comparison provides an acceptable level of quality and safety.

Duration of Proposed Alternative

This proposed alternative will be used for the Fifth Ten-Year Interval of the Inservice Inspection Program for CNS.

Precedents

Similar Request for Alternatives has been previously approved for the following other licensees.

1. US NRC Letter to Entergy Operations, "Grand Gulf Nuclear Station, Unit 1 - Request for Relief GG-ISI-017, Alternative to Use Boiling Water Reactor Vessel and Internals Project Guidelines in Lieu of Specific ASME Code Requirements (TAC No. MF2357)", dated June 30, 2014 (ML14148A262).

2. US NRC Letter to Entergy Operations, "River Bend Station, Unit 1 - Request for Relief No. RBS-ISI-019, Alternative to Use Boiling Water Reactor Vessel and Internals Project Guidelines in Lieu of ASME Code, Section XI Requirements for the Fourth 10-Year Inservice Inspection Interval (TAC No. MF1867), dated May 30, 2014 (ML14127A327).

3. US NRC Letter to Exelon Generation Company, LLC, "Dresden Nuclear Power Station, Units 2 and 3 - Safety Evaluation in Support of Request for Relief Associated With the Fifth 10-Year Inservice Inspection Interval Program (TAC Nos. ME9682, ME9683, ME9684, ME9685, ME9686, ME9687, ME9688, ME9689, ME9690, ME9691, ME9692, ME9693, ME9694, ME9695, ME9696, and ME9697), dated September 30, 2013 (ML13260A585).

4. US NRC Letter to Exelon Generation Company, LLC, "Quad Cities Nuclear Power Station Units 1 and 2 - Safety Evaluation in Support of Request for Relief Associated With the Fifth 10 Year Interval Inservice Inspection Program (TAC Nos. ME9668, ME9669, ME9670,

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

ME9671, ME9672, ME9674, ME9675, ME9676, ME9677, ME9678, ME9679, ME9680, ME9681), dated September 30, 2013 (ML13267A097).

5. US NRC Letter to Exelon Nuclear, "Oyster Creek Nuclear Generating Station - Relief From the Requirements of the ASME Code, Relief Request No. I5R-01 (TAC No. ME9490), dated August 5, 2013 (ML13169A062).

References

1. US NRC Letter to BWRVIP, "Safety Evaluation by the Office of Nuclear Reactor Regulation Topical Report, BWRVIP-06-A: BWR (Boiling Water Reactor) Vessel and Internals Project (BWRVIP), Safety Assessment of BWR Reactor Internals, Revised Section 4.0: Consideration of Loose Parts" (TAC No. MC7448) dated July 29, 2008 (ML082030758).

2. Letter from NRC to BWRVIP, "Final Safety Evaluation for Electric Power Research Institute Boiling Water Reactor Vessel and Internals Project Technical Report 1016568, "BWRVIP-18, Revision 1: BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines (TAC No. ME2189)," dated January 30, 2012 (ML113620684).

3. US NRC Letter to BWRVIP, "Final Safety Evaluation of BWRVIP Vessel and Internals Project, BWR Vessel and Internals Project, BWR Core Plate Inspection and Flaw Evaluation Guidelines (BWRVIP-25)", EPRI Report TR-107284, December 1996 (TAC No. M97802)," dated December 19, 1999.

4. US NRC Letter to BWRVIP, "NRC Approval Letter of BWRVIP-26-A, BWR Vessel and Internals Project Boiling Water Reactor Top Guide Inspection and Flaw Evaluation Guidelines," dated August 29, 2005 (ML052490550).

5. US NRC Letter to BWRVIP, "Non-Proprietary Version of NRC Staff Review of BWRVIP-27-A, "BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines," dated June 9, 2004 (ML041700446).

6. US NRC Letter to BWRVIP, "Final Safety Evaluation of the "BWR Vessel and Internals Project, BWR Shroud Support Inspection and Flaw Evaluation Guidelines (BWRVIP-38)," EPRI Report TR-108823 (TAC No. M99638)," dated July 24, 2000 (ML003735498).

7. US NRC Letter to BWRVIP, "Final Safety Evaluation of the "BWR Vessel and Internals Project, BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (BWRVIP-41)," (TAC No. M99870)," dated February 4, 2001 (ML010460111).

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

8. US NRC Letter to BWRVIP, "NRC Approval Letter of BWRVIP-47-A, "BWR Vessel and Internals Project Boiling Water Reactor Lower Plenum Inspection and Flaw Evaluation Guidelines," dated September 1, 2005 (ML052490537).

9. US NRC Letter to BWRVIP, "NRC Approval Letter of BWRVIP-48-A, "BWR Vessel and Internals Project Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines," dated July 25, 2005 (ML052130284).

10. US NRC Letter to BWRVIP, "Final Safety Evaluations of the Boiling Water Reactor Vessel and Internals Project 76, Rev. 1 Topical Report, "Boiling Water Reactor Core Shroud Inspection and Flaw Evaluation Guidelines" (TAC No. ME8317)," dated November 12, 2014.

11. Letter from Chairman, BWR Vessel and Internals Project to NRC, "Project No. 704 - BWRVIP Program Implementation Guide (BWRVIP-94NP, Revision 2)," dated September 22, 2011 (ML11271A058).

12. US NRC Letter to BWRVIP, "NRC Approval Letter with Comment for BWRVIP-100-A, BWR Vessel and Internals Project, Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds," dated November 1, 2007 (ML073050135).

13. US NRC Letter to BWRVIP, "Electric Power Research Institute Final Safety Evaluation for Technical Report 1016574 "BWRVIP-138, Revision 1: BWR [Boiling Water Reactor] Vessel and Internals Project 'Updated Jet Pump Beam Inspection and Flaw Evaluation Guidelines' (TAC No. ME2191)," dated May 14, 2012 (ML1208A139).

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Table 1 Comparison of ASME Examination Category B-N-1 and B-N-2 Requirements with BWRVIP Guidance Requirements (Note 1)

ASME Item No. Table IWB-2500-1	Component	ASME Exam Scope	ASME Exam Type	ASME Frequency	Applicable BWRVIP Document	BWRVIP Exam Scope	BWRVIP Exam Type	BWRVIP Frequency
B13.10	Reactor Vessel Interior	Accessible Areas (Non-specific)	VT-3	Each Period	BWRVIP-18, 25, 26, 38, 41, 47, 48, 76, 138	Overview examinations of components during BWRVIP examinations are performed to satisfy Code VT-3 inspection requirements.		
B13.20	Interior Attachments within Beltline - Riser Braces	Accessible Welds	VT-1	Each 10-year Interval	BWRVIP-48 Table 3-2	Riser Brace Attachment	EVT-1	100% in first 12 years, 25% during each subsequent 6 years
	Lower Surveillance Specimen Holder Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	VT-1	Each 10-Year Interval
B13.30	Interior Attachments beyond Beltline - Steam Dryer Hold-down Brackets	Accessible Welds	VT-3	Each 10-year interval	BWRVIP-48, Table 3-2	Bracket Attachment	VT-3	Each 10-Year Interval
	Guide Rod Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	VT-3	Each 10-Year Interval
	Steam Dryer Support Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	EVT-1	Each 10-Year Interval
	Feedwater Sparger Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	EVT-1	Each 10-Year Interval
	Core Spray Piping Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	EVT-1	Every 4 Refueling Cycles
	Upper Surveillance Specimen Holder Brackets				BWRVIP-48, Table 3-2	Bracket Attachment	VT-3	Each 10-Year Interval

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Table 1 Comparison of ASME Examination Category B-N-1 and B-N-2 Requirements with BWRVIP Guidance Requirements (Note 1)

ASME Item No. Table IWB-2500-1	Component	ASME Exam Scope	ASME Exam Type	ASME Frequency	Applicable BWRVIP Document	BWRVIP Exam Scope	BWRVIP Exam Type	BWRVIP Frequency
	Shroud Support (Weld H9) including gussets				BWRVIP-38, 3.1.3.2, Figures 3-2 and 3-5	Weld H-9 including gussets	EVT-1 or UT	Maximum of 6 years for EVT-1, Maximum of 10 years for UT
B13.40	Integrally Welded Core Support Structure	Accessible Surfaces	VT-3	Each 10-year interval	BWRVIP-38, 3.1.3.2, Figures 3-2 and 3-5	Shroud support welds H8 and H9 including gussets	EVT-1 or UT	Based on as-found conditions, to a maximum 6 years for one side EVT-1, 10 years for UT where accessible
	Shroud Horizontal Welds				BWRVIP-76, 2.2	Welds H1-H7 as applicable	UT or EVT-1	Based on as-found conditions, to a maximum of 10 years for UT when inspected from both sides of the welds
	Shroud Vertical Welds				BWRVIP-76, 2.3	Vertical Welds as applicable	EVT-1 or UT	Maximum 10 years for UT based on inspection of horizontal welds

Note:

1. This Table provides only an overview of the requirements. For more details, refer to ASME Section XI, Table IWB-2500-1 and the appropriate BWRVIP document.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Comparison of ASME Code Section XI Examination Requirements to BWRVIP Examination Requirements

The following provides a comparison of the examination requirements provided in ASME Code Section XI Table IWB-2500-1, Examination Category B-N-1 and B-N-2, Item Numbers B13.10, B13.20, B13.30, and B13.40, to the examination requirements in the BWRVIP Guidelines. Specific BWRVIP Guidelines are provided as examples for comparisons. This comparison also includes a discussion of the examination methods.

Code Requirement - B13.10 - Reactor Vessel Interior Accessible Areas (B-N-1)

The ASME Section XI Code requires a VT-3 examination of reactor vessel accessible areas, which are defined as the spaces above and below the core made accessible during normal refueling outages. The frequency of these examinations is specified as the first refueling outage, and at intervals of approximately 3 years during the first inspection interval, and each period during each successive 10-year Inspection Interval. Typically, these examinations are performed every other refueling outage of the Inspection Interval. This examination requirement is a non-specific requirement that is a departure from the traditional Section XI examinations of welds and surfaces. As such, this requirement has been interpreted and satisfied differently across the licensees, and vendors of this inspection service. Based on the acceptance criteria specified in IWB-3520.2, the examination is to identify relevant conditions such as distortion or displacement of parts, loose, missing, or fractured fasteners, foreign material, corrosion, erosion, or accumulation of corrosion products, wear, and structural degradation.

Portions of the various examinations required by the applicable BWRVIP Guidelines require access to accessible areas of the reactor vessel during each refueling outage. Examination of Core Spray Piping and Spargers (BWRVIP-18-R1-A), Top Guide (BWRVIP-26-A), Jet Pump Welds and Components (BWRVIP-41-R3), Interior Attachments (BWRVIP-48-A), Core Shroud Welds (BWRVIP-76-R1-A), Shroud Support (BWRVIP-38), and Lower Plenum Components (BWRVIP-47-A) provides such access. Locating and examining specific welds and components within the reactor vessel areas above, below (if accessible), and surrounding the core (annulus area) entails access by remote camera systems that essentially perform equivalent VT-3 examination of these areas or spaces as the specific weld or component examinations are performed. This provides an equivalent method of visual examination on a more frequent basis than that required by the ASME Section XI Code. Evidence of wear, structural degradation, loose, missing, or displaced parts, foreign materials, and corrosion product buildup can be, and has been observed during the course of implementing these BWRVIP examination requirements. Therefore, the requirements specified by the BWRVIP Guidelines meet or exceed the subject Code requirements for examination method and frequency of the interior of the reactor vessel. Accordingly, these BWRVIP examination requirements provide an acceptable level of quality and safety as compared to the subject Code requirements.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Code Requirement - B13.20 - Interior Attachments within the Beltline (B-N-2)

The ASME Section XI Code requires a VT-1 examination of accessible reactor interior surface attachment welds within the beltline each 10-year interval. In the BWR, this includes the Jet Pump Riser Brace Weld-to-Vessel Wall and the Lower Surveillance Specimen Support Bracket Welds-to-Vessel Wall. In comparison, the BWRVIP requires the same examination method and frequency for the Lower Surveillance Specimen Support Bracket Welds, and requires an EVT-1 examination on the remaining attachment welds in the beltline region in the first 12 years, and then 25% during each subsequent 6 years.

The Jet Pump Riser Brace examination requirements are provided below to show a comparison between the Code and the BWRVIP examination requirements.

<u>Comparison to BWRVIP Requirements - Jet Pump Riser Braces (BWRVIP-41-R3 and BWRVIP-48-A)</u>

- The ASME Code requires a 100% VT-1 examination of the Jet Pump Riser Brace-to-Reactor Vessel Wall Pad welds each 10-year Interval.
- The BWRVIP requires an EVT-1 baseline examination of 100% of the Jet Pump Riser Brace-to-Reactor Vessel Wall Pad welds in the first 12 years with at least 50% being inspected in the first 6 years. Reinspection consists of 25% during each subsequent 6 year period.
- BWRVIP-48-A specifically defines the susceptible regions of the attachment that are to be examined.

The Code VT-1 examination is conducted to detect discontinuities and imperfections on the surfaces of components, including such conditions as cracks, wear, corrosion, or erosion. The BWRVIP EVT-1 is conducted to detect discontinuities and imperfections on the surface of components and is additionally specified to detect potentially very tight cracks characteristic of fatigue and IGSCC, the relevant degradation mechanisms for these components. General wear, corrosion, or erosion although generally not a concern for inherently tough, corrosion resistant stainless steel material, would also be detected during the process of performing a BWRVIP EVT-1 examination.

The ASME Code visual examination method requires (depending on applicable ASME Edition) that a letter character with a height of 0.044 inches can be read. The BWRVIP EVT-1 visual examination method requires the same 0.044 inch resolution on the examination surface and additionally the performance of a cleaning assessment and cleaning as necessary. While the Jet Pump Riser Brace configuration varies depending on the vessel manufacturer, BWRVIP-48-A includes diagrams for each configuration and prescribes examination for each configuration.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

The calibration standards used for BWRVIP EVT-1 examinations utilize the same Code characters, thus assuring at least equivalent resolution compared to the Code. Although the BWRVIP examination may be less frequent, it is a more comprehensive method. Therefore, the BWRVIP guidance provides an acceptable level of quality and safety to that provided by the ASME Code.

Code Requirement - B13.30 - Interior Attachment Beyond the Beltline Region (B-N-2)

The ASME Section XI Code requires a VT-3 examination of accessible Reactor Interior Surface Attachment Welds beyond the beltline each 10-year Interval. In the Boiling Water Reactor, this includes the Core Spray Piping Primary, the Upper Surveillance Specimen Support Bracket Welds-to-Vessel Wall, the Feedwater Sparger Support Bracket Welds-to-Reactor Vessel Wall, the Steam Dryer Support and Hold-Down Bracket Welds-to-Reactor Vessel Wall, the Guide Rod Support Bracket Weld-to-Reactor Vessel Wall, the Shroud Support Plate-to-Vessel Welds, and Shroud Support Gussets. BWRVIP-48-A requires as a minimum the same VT-3 examination method as the Code for some of the interior attachment welds beyond the beltline region, and in some cases specifies an enhanced visual examination technique EVT-1 for these welds. For those interior attachment welds that have the same VT-3 method of examination, the same scope of examination (accessible welds), the same examination frequency (each 10 year interval) and ASME Section XI flaw evaluation criteria, the level of quality and safety provided by the BWRVIP requirements are equivalent to that provided by the ASME Code.

The Core Spray Piping Bracket-to-Vessel Attachment Weld is used as an example for comparison between the Code and BWRVIP examination requirements as discussed below:

<u>Comparison to BWRVIP Requirements - Core Spray Piping Bracket Welds relative to BWRVIP-48-A</u>

- The Code examination requirement is a VT-3 examination of each weld every 10 years.
- The BWRVIP examination requirement is an EVT-1 for the Core Spray Piping Bracket Attachment Welds with each weld examined every four cycles (8 years for units with a 2 year fuel cycle)

The BWRVIP examination method EVT-1 has superior flaw detection and sizing capability than the Code VT-3, the examination frequency is greater than the Code requirements, and the same flaw evaluation criteria are used.

The Code VT-3 examination is conducted to detect component structural integrity by ensuring the component's general condition is acceptable. An enhanced EVT-1 is conducted to detect discontinuities and imperfections on the examination surfaces, including such conditions as tight cracks caused by IGSCC or fatigue, the relevant degradation mechanisms for BWR internal attachments. Additionally, BWRVIP-48-A guidance requires indications detected by an EVT-1

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

to be examined by ultrasonics to determine if the indication has propagated into the reactor vessel base material.

Therefore, with the EVT-1 examination method, the same examination scope (accessible welds), an increased examination frequency (8 years instead of 10 years) in some cases, and the same flaw evaluation criteria (ASME Code Section XI), the level of quality and safety provided by the BWRVIP criteria is superior to that provided by the ASME Code.

Code Requirement - B13.40 - Integrally Welded Core Support Structures (B-N-2)

The ASME Code requires a VT-3 examination of accessible surfaces of the welded core support structure each 10-year interval. In the boiling water reactor, the welded core support structure has primarily been considered the shroud support structure, including the shroud support plate (annulus floor), the shroud support ring, the shroud support welds, and the shroud support gussets. In later designs, the shroud itself is considered part of the welded core support structure. Historically, this requirement has been interpreted and satisfied differently across the industry. The proposed alternate examination replaces this ASME requirement with specific BWRVIP guidelines that examine susceptible locations for known relevant degradation mechanisms.

- The Code requires a VT-3 of accessible surfaces each 10-year interval.
- The BWRVIP requires as a minimum the same examination method (VT-3) as the Code for integrally welded Core Support Structures, and for specific areas, requires either an enhanced visual examination technique (EVT-1) or volumetric examination (UT).

BWRVIP recommended examinations of integrally welded core support structures are focused on the known susceptible areas of this structure, including the welds and associated weld heat affected zones. As a minimum, the same or superior visual examination technique is required for examination at the same frequency as the Code examination requirements. In many locations, the BWRVIP guidelines require a volumetric examination of the susceptible welds at a frequency identical to the Code requirement. For other integrally welded core support structure components, the BWRVIP requires an EVT-1 or UT of core support structures. The core shroud is used as an example for comparison between the Code and BWRVIP examination requirements as shown below.

<u>Comparison to BWRVIP Requirements - BWR Core Shroud Examination and Flaw Evaluation Guideline (BWRVIP-76)</u>

- The Code requires a VT-3 examination of accessible surfaces every 10 years.
- The BWRVIP requires an EVT-1 examination from the inside and outside surface where accessible or ultrasonic examination of each core shroud circumferential weld that has not been structurally replaced with a shroud repair at a calculated "end of interval" that will vary depending upon the amount of flaws present, but not to exceed ten years.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

The BWRVIP recommended examinations specify locations that are known to be vulnerable to BWR relevant degradation mechanisms rather than "all surfaces." The BWRVIP examination methods (EVT-1 or UT) are superior to the Code required VT-3 for flaw detection and characterization. The BWRVIP examination frequency is equivalent to or more frequent than the examination frequency required by the Code. The superior flaw detection and characterization capability, with an equivalent or more frequent examination frequency and the comparable flaw evaluation criteria, results in the BWRVIP criteria providing a level of quality and safety equivalent to or superior to that provided by the Code requirements.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Reactor Internals Inspection History

Cooper Nuclear Station - Reactor Internals Inspection History through RE28

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
Core Shroud	Fall 1995 (RE15)	UT	Baseline UT performed on welds H1 through H7 per BWRVIP guidelines. Indications identified in 4 circumferential welds. No examinations on vertical welds. No repair required.
	Spring 2005 (RE22)	UT	UT examinations were performed on welds H-1 through H-4 including a portion of vertical weld V16. Examination of welds H5-H7 was deferred to fall 2006. Single sided UT examinations were performed on welds H-1 through H-3 with welds H-4 and vertical weld (V-16) receiving dual sided examinations. Percentage of welds examined: H1 (54.9%), H2 (55.7%), H3 (63.9%), H4 (58.4%). The previously identified eight (8) flaws in H1 showed a net decrease in length. No new flaws in H2 were identified. The eight (8) flaws in H3 were reexamined with one (1) new flaw identified for a total increased change in flaw length relative to total weld length of 7.5 %. Two (2) new minor flaws were discovered in the HAZ of H4. In addition, a total of eleven (11) minor indications were identified in the base metal adjacent to H4. Six (6) of the indications exhibited characteristics associated with Stress Corrosion Cracking (SCC) in areas subjected to cold working during the shroud fabrication/installation process. The remaining five (5) indications did not exhibit characteristics of SCC but appeared to exhibit characteristics commonly observed from localized attachment removal sites. The indications were determined to be acceptable by analysis. No indications were observed in the vertical weld.
	Fall 2006 (RE23)	UT	UT examinations were performed on welds H5, H6a, H6b, and H7 using phased array. Two- (2) sided examinations were performed on all welds except H7 that received a one-sided UT examination. Coverage was estimated at greater than 72% for welds H5, H6a, and H6b. H7 received greater than 53% coverage. A previously identified indication in H5 was re-examined with no apparent change. A previously identified indication in H6a was re-examined with no apparent change. A new minor indication was

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			discovered in weld H6b in an area previously scanned in RE16 (1995). Two (2) new minor indications were discovered in weld H7, one in a previously scanned location and the other in an area not previously scanned.
		VT-3	VT-3 examination of shroud per ASME Section XI, B-N-2 requirements. Discovered an indication approximately ten (10) inches long behind JP-19. Analyzed as acceptable.
	Spring 2008 (RE24)	VT-3	Performed first ASME B-N-2 VT-3 successive examination of flaw discovered in base metal behind JP-19. No changes in the indication.
	Spring 2011 (RE26)	VT-3	Performed second ASME B-N-2 VT-3 successive examination of flaw discovered in base metal behind JP-19. No changes in the indication.
	Fall 2014 (RE28)	UT	UT exams were performed on the H1 thru H7 welds along with the V16 and base material flaw behind JP19. The previously identified indications showed no apparent changes in growth and none were through wall.
			VT-3 examination of shroud per ASME Section XI, B-N-2 requirements. Also performed third ASME B-N-2 VT-3 successive examination of flaw discovered in base metal behind JP-19. No changes in the indication.
Shroud Support/ Access Hole Covers	1993-1995	VT-3 and UT	VT-3 examinations of welds on 50% of core plate each outage. No indications. UT of access hole covers (AHC) in 1993. No indications.
	Spring 1997 (RE17)	VT-3	VT-3 examinations on 50% of the core shroud support plate. No indications.
		VT-1	VT-1 examinations of AHC in accordance with GE SIL 462. No indications.
	Fall 1998 (RE18)	VT-3	VT-3 examinations on 50% of the core shroud support plate. No indications.
		VT-1	VT-1 of AHC's in accordance with GE SIL 462. No indications. VT-1 of gusset plate welds between 0-180° to B-N-2.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Spring 2000 (RE19)	VT-3	VT-3 examinations on 50% of the core shroud support plate. No indications.
		VT-1	VT-1 examinations of AHCs in accordance with GE SIL 462. No indications.
	Fall 2001 (RE20)	EVT-1	EVT-1 examinations on 17% of the H8 and H9 welds. EVT-1 examinations on 6 gusset welds and AHCs. No indications.
		UT	UT examination of AHCs. No indications.
	Spring 2003 (RE21)	EVT-1	EVT-1 examinations on four (4) gusset welds. No indications.
	Spring 2005 (RE22)	UT	UT examinations on 11.7% of the H9 weld length. No indications.
	Fall 2006 (RE23)	EVT-1	EVT-1 examinations performed on approximately 16% of H8 weld length with no relevant indications. EVT-1 examinations of AHC per SIL 462. No indications.
	Spring 2008 (RE24)	EVT-1	EVT-1 examinations performed on accessible lengths of welds on seven (7) gussets. No indications.
	Fall 2012 (RE27)	EVT-1	EVT-1 examinations on 16.7% of the H8 weld. EVT-1 examinations on accessible lengths of welds on two (2) gussets @ 195° and 315°. No indications.
	Fall 2014 (RE28)	UT/EVT-1	UT performed on H9 with 13.4% coverage. EVT-1 performed on both AHC's. No indications.
Core Spray Piping	1980's to 1995	VT-1/VT-3	IEB 80-13 examinations of piping and welds in annulus. Three (3) indications identified in Fall 1995 outage by EVT-1. No repair required.
	Spring 1997 (RE17)	UT	UT examination of CS P8a and P8b welds. Indications on one P8a and one P8b weld (first discovery). Evaluated as acceptable.
		EVT-1	EVT-1 examinations on balance of piping.
	Fall 1998 (RE18)	UT	UT examinations on the P8a and P8b indications were re-examined.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
		EVT-1	Balance examined by EVT-1. No visual indications.
	Spring 2000 (RE19)	UT	UT examinations on P8a and P8b welds with indications. No repair required.
		EVT-1	EVT-1 of P3, P4, P5, P6, and P7 welds. No visual indications.
	Fall 2001 (RE20)	UT	UT examinations on P3's, three (3) P4's, P5's, P6's, P7's, P8a's and P8b's. EVT examinations of thirty-one of the CS piping welds.
		EVT-1	EVT-1 examinations on fifteen (15) welds. Indications re-examined on P8a weld and P8b welds.
	Spring 2003 (RE21)	UT	UT examinations on all P8a and P8b welds. Identified three (3) flaw indications on one P8b weld and one (1) flaw indication on one P8a weld. No change in length.
		EVT-1	EVT-1 examinations on both junction box covers and accessible portions of both P1's, 2 - P2's, 4 - P3's, 1-P4a , 1-P4b, 1-P4c, 1-P4d. EVT-1 all P8a and P8b welds. No indications.
	Spring 2005 (RE22)	EVT-1	EVT-1 examinations of both P1's . The examination revealed that the P1 weld is not a creviced weld based on the presence of an external weld on the tee box near the nozzle thermal sleeve. EVT-1 examinations were performed on both P2 welds, the four (4) P3 welds, the 4a – 4d welds at 190°, the P5's, P6's, and P7's, the four (4) P8a's, and four (4) P8b's.
	Fall 2006 (RE23)	UT	UT examinations of P8b welds. Previous indications showed no change in size.
		EVT-1	EVT-1 examinations of piping welds and bracket attachment welds. No new relevant indications observed.
	Spring 2008 (RE24)	EVT-1	EVT-1 of indication near P1 at 90°. No change. EVT-1 of P1 at 270°. EVT-1 of P2's and P3's at 90° and 270°. EVT-1 of P4a, -b, -c, and -d at 170° EVT-1 of P5's, P6's, and P7's at 10°, 170°, 190°, and 350°.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Fall 2009 (RE25)	EVT-1	EVT-1 examinations near P1welds at 90° and 270°. No change with the indication near the P1 at 90° (Loop A). EVT-1 examinations of the four (4) P3, P5, P6 and P7 welds, EVT-1 examinations of downcomer welds P4a, P4b, P4c, and P4d at 10°. EVT-1 examinations of four (4) P8a and P8b welds. No change with visual indication of P8b at 10°.
		UT	UT performed on all four (4) P8a and P8b welds. Previously identified indications on the P8a at 190° (Loop B) and the P8b at 10° (Loop A) did not show any change.
	Spring 2011 (RE26)	EVT-1	EVT-1 of area and indication adjacent to P1weld at 90° (Loop A). No change to the indication. EVT-1 of area adjacent to P1 weld at 270°. No indications. EVT-1 of the P2 welds at 90° and 270°. EVT-1 of the four (4) P3, P5, P6, and P7 welds. EVT-1 of downcomer welds P4a, P4b, P4c, and P4d at 190°. No indications.
	Fall 2012 (RE27)	EVT-1	EVT-1 of area and indication adjacent to P1weld at 90° on A Loop. No change to the indication. EVT-1 of the P2, P3a, & P3b @ 90°. EVT-1 of P5, P6, & P7 @ 10° & 170°. No indications. EVT-1 of area adjacent to P1 weld at 270° on B Loop. No indications. EVT-1 of the P2, P3a, & P3b welds at 270°. EVT-1 of P5, P6, and P7 welds @ 190° & 350°. EVT-1 of downcomer welds P4a, P4b, P4c, and P4d @ 350°. No indications. Loops A & B, EVT-1 of the bracket attachment welds PB @ 30°, 150°, 210°, and 330°. No indications.
		UT	UT performed on all four (4) P8a and P8b welds. Previously identified indications on the P8a at 190° (Loop B) and the P8b at 10° (Loop A) did not show any change.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Fall 2014 (RE28)	EVT-1	Loop A EVT-1 of area and indication adjacent to P1weld at 90° on A Loop. No change to the indication. EVT-1 of the P2, P3a & P3b welds @ 90°. EVT-1 of P5, P6, & P7 @ 10° & 170°. EVT-1 of downcomer welds P4a, P4b, P4c, and P4d @ 170°. No indications observed. Loop B EVT-1 of area adjacent to P1 weld at 270°. EVT-1 of the P2, P3a, & P3b welds at 270°. EVT-1 of P5, P6, and P7 welds @ 190° & 350°. No indications observed.
Core Spray Sparger	1980's to 1995	VT-1/UT	IEB 80-13 of welds on sparger. No indications.
	Spring 1997 (RE17)	EVT-1	EVT-1 examinations of sparger welds and brackets per BWRVIP-18. Debris (wire) in C-sparger Nozzle 15C identified. No other indications.
	Fall 1998 (RE18)	EVT-1	EVT-1 examinations of sparger welds and brackets inspected in accordance with BWRVIP-18. Debris (wire) in C-sparger Nozzle 15C was reconfirmed. No other indications.
	Spring 2000 (RE19)	EVT-1	EVT-1 examinations of sparger and brackets. Five (5) indications evaluated as acceptable.
	Fall 2001 (RE20)	VT-1	VT-1 of 25% of S3a, S3b, and S3c welds. No indications.
		EVT-1	EVT-1 examinations of all S1, S2, and S4 welds examined with no indications.
	Spring 2003 (RE21)	VT-1	VT-1 of 25% of S3a & S3b's and all bracket welds. No indications.
		EVT-1	EVT-1 examinations of two S1's, two S2',s, both XTRW welds near t-boxes, and four (4) S4 welds. No indications.
	Spring 2005 (RE22)	N/A	Sparger examinations deferred to fall 2006. (RE23).
	Fall 2006 (RE23)	VT-1	VT-1 on 50% of the S3a, S3b, and S3c welds and 100% on sparger brackets. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
		EVT-1	EVT-1 on 100% of S1's and S2's and S4's. No indications.
	Spring 2008 (RE24)	VT-1	VT-1 on 25% of the S3a, S3b, and S3c welds. VT-1 of SB's at 90°, 92°, 119°, 149°, 210°, 241° and 268°.
		EVT-1	EVT-1 examinations of S1's and S2's at 170° and 190°. EVT-1 examinations of S3a, S3b at 92° to 269°. EVT-1 examinations of S3c at 99°. EVT-1 examinations of S4's at 91° and 269°.
	Fall 2009 (RE25)	VT-1	VT-1 on 25% of the S3a, S3b, and S3c welds. VT-1 of SB's at 272°, 299°, 30°, 329°, 61°, 88° and 270°.
		EVT-1	EVT-1 examinations of S1 and S2 and at 10° and 350°. EVT-1 examinations of two (2) additional welds near the 350° tee-box S2 welds.
	Spring 2011 (RE26)	VT-1	VT-1 on 25% of the S3a, S3b, and S3c welds. VT-1 of sparger brackets at 90°, 92°, 119°, 149.5°, 210.5°, 241° and 268°. No indications.
		EVT-1	EVT-1 on C Sparger, S1 @ 170°, S2 @ 168° & 172°, S4 @ 91° & 269°. No indications. EVT-1 on D Sparger, S1 @ 190°, S2 @ 188° & 192°, S4 @ 91° & 269°. No indications.
	Fall 2012 (RE27)	EVT-1	EVT-1 on A sparger, S1 @ 10, S2 @ 8° & 12°, and S4 @ 89° & 271°. No indications. EVT-1 on B sparger, S1 @ 350°, S2 @ 348° & 352°, XTRW welds near T-box @ 346° & 354°, and S4 @ 89° & 271°. No indications.
		VT-1	VT-1 on the B sparger, S3a & S3b @ 271°-89° and S3c @ 279°. No indications. VT-1 of the sparger brackets at 30.5°, 61°, 88°, 270°, 272°, 299°, and 329.5°. No indications.
	Fall 2014 (RE28)	EVT-1	EVT-1 on C Sparger, S1 @ 170°, S2 @ 168° & 172°, S4 @ 91° & 269°. No indications observed.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			EVT-1 on D Sparger, S1 @ 190°, S2 @ 188° & 192°, S4's @ 91° & 269°. No indications observed.
		VT-1	VT-1 on 25% of the S3a, S3b, and S3c welds. VT-1 of sparger brackets (SB) at 90°, 92°, 119°, 149.5°, 210.5°, 241° and 268°. No indications observed.
Top Guide (Rim, etc.)	1991-1995	VT	VT of top guide beams of fifty (50) cells was performed in 1991 per RICSIL 059. No indications. VT exams of the members in the load path between the top guide and core shroud in 1995 per SIL 588. One (1) indication on the 90° aligner pin keeper was observed and evaluated as acceptable (indication not on load bearing portion of assembly).
	Spring 1997 (RE17)	VT -1	VT-1 re-examination of Top Guide Aligner Pin located at 90° in accordance with SIL 588, R1. Indication on aligner pin keeper did not appear to change in size.
	Spring 2000 (RE19)	VT -1	VT-1 of two (2) hold down assemblies. No indications.
	Fall 2001 (RE20)	VT -1	VT-1 of two (2) horizontal aligner pins with no new indications. VT-1 of four (4) hold down assemblies.
		EVT-1	EVT-1 examinations of accessible areas of the Rim weld.
	Fall 2006 (RE23)	VT-1	VT-1 on two (2) hold down assemblies and aligner pin assemblies at 90° and 270°. A previous indication identified on the non-load bearing keeper of the aligner pin assembly at the 90° location was observed with no apparent change. However, two (2) new but similar type indications were also observed on the same keeper. Three (3) new indications were observed on the non-load bearing aligner pin keeper at the 270° location. Indications were evaluated as acceptable.
		VT-3	VT-3 examinations performed on accessible areas of top guide per B-N-2. No indications.
	Spring 2008 (RE24)	VT-1	VT-1 examinations performed on hold down and aligner assemblies at 0 and 180°. One (1) new

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			indication identified on non-structural keeper at 180°. Similar to indications in keepers seen at 90° and 270°. Evaluated as acceptable.
		EVT-1	EVT-1 examinations of accessible areas of rim weld.
		VT-3	VT-3 examinations performed of accessible top guide hold down assemblies, rim pins per B-N-2.
	Fall 2009 (RE25)	VT-1	VT-1 examinations performed on hold down and aligner assemblies at 90°. No change in the indication at the 90° aligner pin keeper.
		EVT-1	EVT-1 examinations of 10% or fourteen (14) of top guide grid beams per BWRVIP-183. No indications. However, only eight (8) were credited as quality examinations.
		VT-3	VT-3 examinations of accessible areas of top guide per B-N-2.
	Spring 2011 (RE26)	VT-3	VT-3 of accessible areas of Top Guide per B-N-2. No indications.
		VT-1	VT-1 for BWRVIP-26 credit was performed on the Hold Down assemblies and Aligner Pin assemblies at 270°. An indication not previously reported was observed adjacent to the attachment weld adjoining the Aligner Block to the Top Guide. Indication appears to be a manufacturing remnant that was not completely removed during construction. Previously identified indications were also observed with no changes. Scope was expanded to include the remaining other three (3) Aligner Pin assemblies located at 0°, 90°, and 180°. VT-3 for Sect XI B-N-2 and VT-1 for BWRVIP-26 credit was performed. Aligner Pin assembly at 0° was found to have seven (7) previously unidentified indications, with four (4) identified in the Aligner Pin Keeper and three (3) identified in the Aligner Block. Review of previous inspection video showed faint presence of indications. Evaluated as acceptable. Aligner Pin assembly at 90° was found to have one (1) previously unidentified indication located on

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			the Aligner Pin Keeper. Review of previous inspection video showed a faint presence of the indication. Three (3) previously identified indications were also observed with no changes. Evaluated as acceptable. Aligner Pin assembly at 180° was found to have two (2) previously unidentified indications located on the Aligner Pin Keeper. Review of previous inspection video shows presence of indications. Three (3) previously identified indications were also observed with no changes. Evaluated as acceptable.
		EVT-1	EVT-1 examinations of accessible areas of the Rim weld. EVT-1 of two (2) top guide cell locations per BWRVIP-183. No indications.
	Fall 2012 (RE27)	VT-1	VT-1 examinations performed on hold down assembly at 180°. No indications.
		VT-1	VT-1 of the aligner pin assembly at 0° was performed to confirm seven (7) flaws identified in RE26. Four (4) of the flaws on the keeper were confirmed and verified to have no changes. One (1) flaw on the aligner pin block was confirmed and verified to have no changes. The two (2) other previously identified flaws on the block were determined to be non-relevant surface scratches. VT-1 of the aligner pin assembly at 90° was performed to confirm seven (7) flaws identified on the keeper in RE26. 4 of the flaws were confirmed and verified to have no changes. One (1) additional flaw on the keeper was also reported. This flaw is similar to flaws seen on the other aligner pin keepers, but could not be verified in previous video due to camera positioning. VT-1 of the aligner pin assembly at 180° was performed to confirm three (3) flaws identified in RE26. All of the flaws on the keeper were confirmed and verified to have no changes. VT-1 of the aligner pin assembly at 270° was performed to confirm four (4) flaws identified in

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			RE26. Three (3) of the flaws on the keeper were confirmed and verified to have no changes. One (1) previously reported flaw adjacent the aligner block to top guide weld was examined using an improved camera and delivery mechanism and determined to be a non-relevant surface scratch.
	Fall 2014 (RE28)	EVT-1	EVT-1 examinations of accessible areas of Rim weld. No indications.
		VT-1	VT-1 examinations performed on accessible top portion of the top guide hold down assembly at 0°. No indications. VT-1 of the aligner pin assembly at 0° was performed to confirm five (5) previously identified flaws. Four (4) flaws on the keeper were confirmed to have no changes. The identified flaw on the aligner pin block showed slight increase in length. VT-1 of the aligner pin assembly at 90° was performed to confirm five (5) previously identified flaws. The 5 flaws on the keeper were confirmed to have no changes. Five (5) unreported flaws on the aligner block were detected. VT-1 of the aligner pin assembly at 180° was performed to confirm three (3) previously identified flaws. The three flaws on the Keeper were confirmed to have no change. Five (5) unreported flaws on the aligner block and two (2) on the top guide were detected. VT-1 of the aligner pin assembly at 270° was performed to confirm three (3) previously identified flaws. The three (3) flaws on the keeper were confirmed and verified to have no changes. One (1) unreported flaw on the aligner block and one (1) on the top guide were detected. EVT-1 of beams near impact site of dropped control rod blade. (Ref OE 313327). No crack indications identified.
Core Plate (Rim, etc.)	Fall 1995	VT-3	VT-3 examinations of Hold down bolts examined in 1995 per SIL 588. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Spring 2000 (RE19)	VT -3*	VT-3 examinations of 48 bolts examined from top side. *(Bolts are not accessible for EVT-1)
	Fall 2001 to Fall 2009 (RE20 – RE26)	VT-3	VT-3 examinations performed on accessible areas per B-N-2. No indications.
	Fall 2012 (RE27)	VT-3	VT-3 examination of three (3) hold down bolt locations (70, 71, and 72) from the top side. No indications.
	Fall 2014	VT-3	VT-3 exam of 36 (50%) hold down bolt locations from the top side. No indications.
SLC	1986-2001	VT-2	VT-2 examinations of SLC penetration during Class 1 RPV pressure test each outage.
	Spring 2003 (RE23)	EVT-2	Enhanced VT-2 examinations during Class 1 pressure test. No indications.
	Spring 2005 (RE22)	EVT-2/UT	Enhanced VT-2 performed of safe-end and penetration in conjunction with ASME Section XI Class I pressure test. Manual UT to Appendix VIII performed on nozzle to safe-end weld. No indications.
	Fall 2006 (RE23)	EVT-2	Enhanced VT-2 examinations of safe-end and penetration performed in conjunction with ASME Section XI Class I system leakage test. No indications.
	Spring 2008 (RE24)	EVT-2	Enhanced VT-2 examinations performed of safe-end and penetration in conjunction with ASME Section XI Class I system leakage test. No indications.
	Fall 2009 (RE25)	EVT-2	Enhanced VT-2 examinations of safe-end and penetration performed in conjunction with ASME Section XI Class I system leakage test. No indications.
	Spring 2011 (RE26)	EVT-2	Enhanced VT-2 examinations of safe-end and penetration performed in conjunction with ASME Section XI Class I system leakage test. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Fall 2012 (RE27)	UT	UT examination of N10 SLC nozzle to safe-end per Risk-Informed ISI Program and Appendix VIII. No indications.
		EVT-2	Enhanced VT-2 examinations of safe-end and penetration performed in conjunction with ASME Section XI Class I system leakage test. No indications.
	Fall 2014 (RE28)	EVT-2	Enhanced VT-2 examinations of safe-end and penetration performed in conjunction with ASME Section XI Class I system leakage test. No indications.
Jet Pump Assembly	1986-1995	VT-1/VT-3/ UT	VT examinations on ten (10) Jet Pumps each outage. Exam includes applicable GE SILS. Jet pump beams replaced in 1985. Jet pump beam UT first performed in 1993.
	Spring 1997 (RE17)	VT-1/VT-3	Ten (10) jet pumps VT examined. Exam includes applicable GE SILs. No indications.
	Fall 1998 (RE18)	VT -1/VT-3	Ten (10) jet pumps VT examined. Exam includes applicable GE SILs. No indications.
	Spring 2000 (RE19)	N/A	Examinations deferred to Fall 2001.
	Fall 2001 (RE20)	VT-3	VT-3 examinations on all 20 jet pump nozzle inlets per SIL 465. No indications.
		VT-1	VT-1 examinations on all WD-1's. No indications.
		EVT-1	EVT-1 examinations on BB-1 and BB-2 on JP's 1-10. EVT-1 on MX-2's on JP's 1 – 10. EVT-1 on RB-1's and RB-2's on JP's 1/2, 3/4, and 5/6. No indications. EVT-1 on RS-1's, RS-2's, and RS-3's on JP's 1 – 10. EVT-1 on RS-6's on JP's 1, 3, and 5. EVT-1 on RS-7's on JP's 2, 4, and 6. EVT-1 on RS-8's and RS-9's on JP's 1/2, 3/4, and 5/6. No indications.
	Spring 2003 (RE21)	VT-3	VT-3 examinations on the JP nozzle inlet mixers on JP's 11 - 20 per SIL 465. VT-3 examinations of set screws, gaps, and tack welds on JP's 1 - 20 per SIL 574. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
		EVT-1	EVT-1 examinations on the IN-4 on JP's 5, 6, 11, 12, 13, and 14. EVT-1 examinations on the MX-2 on JP's 11, 12, 13, and 14. EVT-1 examinations on the RB-1's and RB-2's, on JP's 11/12 and 13/14. EVT-1 examinations on RS-1 and RS-2 on JP's 11/12, 13/14, 15/16, and 17/18; RS-6 on JP's 11 and 13; RS-7's on JP's 12 and 14; RS-8's and RS-9's on JP's 11/12 13/14. No indications.
		UT	UT examinations on the BB-1's and BB-2's for JP's 1 – 20. No indications.
	Spring 2005 (RE22	VT-3	VT-3 on the JP nozzle inlet mixers on JP s 1 - 10 per SIL 465. No indications.
		VT-1	VT-1 examinations on JP set screws, gaps and tack welds on JP's 1, 2, 15, and 16 per SIL 574. No indications.
		EVT-1	EVT-1 examinations on RS-1, RS-2, and RS-3 welds on JP's 1 and 2 and the IN-4 welds on JP's 7, 8, 9, and 10. No indications.
	Fall 2006 (RE23)	VT-1	VT-1 per SIL 574 of adjustment screw and gap and tack welds on JPs 9 10. VT-1 of WD-1 at JP's 9 10. No indications.
		EVT-1	EVT-1 of RS-1 and RS-2 on JP's 15/16 and 19/20.
	Spring 2008 (RE24)	EVT-1	EVT-1 examinations of IN-4's at JP's 19 and 20. EVT-1 examinations of RB-1a's, -1b's, -1c's, and -1d's between JP's 9/10 and 19/20. EVT-1 examinations of RB-2a's, -2b's, -2c's, and -2d's between JP's 9/10 and 19/20. EVT-1 examination of RS-3 between JP's 19/20. EVT-1 examinations of RS-6 at JP's 9 and 19. EVT-1 examination of RS-7 at JP's 10 and 20. EVT-1 examinations of RS-8 and RS-9 at JP's 19/20 and 9/10. No indications.
		UT	UT of BB-1, -2 and -3 on all 20 JP beams. No indications. UT of MX-2 (and AD-1, AD-2, DF-1, DF-2, DF-3 note in Diffuser Section) on all 20 jet pumps.
	Fall 2009 (RE25)	VT-3	VT-3 of JP nozzle inlets per SIL 465 on JP's 15, 16, 17 and 18. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
		VT-1	VT-1 per SIL 574 of adjustment screw and gap and tack welds on JPs 10, 15, 16, 19, and 20. VT-1 of WD-1 at JP's 17 and 18. No indications.
		EVT-1	EVT-1 examinations of IN-4 on JP's 15, 16, 17, and 18. EVT-1 examinations of RB-1's and RB-2's on JP's 7/8, 15/16, and 17/18. EVT-1 examinations on RS-1's and RS-2's on JP's 11/12 and 17/18. EVT-1 examinations on RS-3's on JP's 11/12, 15/16, and 17/18. EVT-1 examinations on RS-6's on JP's 7, 15, and 17 and RS-7's on JP's 8, 16, and 18. EVT-1 examinations on RS-8's and RS-9's on JP's 7/8, 15/16, and 17/18. No indications.
	Spring 2011 (RE26)	VT-3	VT-3 of JP nozzle inlets on JP 9 and 10. No indications.
		VT-1	VT-1 of the JP Restrainer Wedge (WD-1) at JP-1 thru JP-20. No indications of movement or wear observed.
		EVT-1	EVT-1 of RS-8 and RS-9 on JP-1 thru JP-14, JP-19, and JP-20. No indications. EVT-1 of JP-9 and JP-10's IN-4, RB-1a, RB-1b, RB-1c, RB-1d, RB-2a, RB-2b, RB-2c, RB-2d, RS-3, RS-1 RS-2. EVT-1 of JP-9's RS-6 and JP-10's RS-7. No indications. EVT-1 of JP-7 and JP-8's RS-3. No indications.
	Fall 2012 (RE27)	EVT-1	EVT-1 of JP-13 and JP-14's IN-4, RB-1a, RB-1b, RB-1c, RB-1d, RB-2a, RB-2b, RB-2c, RB-2d, RS-1, RS-2, & RS-3. EVT-1 of RS-6 on JP-13 and RS-7 on JP-14. No indications. EVT-1 of JP-7 and JP-8's RS-3. No indications. EVT-1 of JP-15 and 16's RS-3. No indications.
		VT-1	VT-1 of the JP Restrainer Wedge (WD-1) at JP-1, 2, 9, 10, 13, 14, 15, 16, 19, & 20. No indications of movement or wear observed. VT-1 of the JP-15 set screw gaps and slip joint. Previously identified shroud side gap was found to

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			have an increase of 0.003" with no signs of movement. Vessel side set screw confirmed to have partial contact. No indications on slip joint. VT-1 of the JP-20 set screw gaps and slip joint. Previously identified shroud side gap was found to have an increase of .004" with no signs of movement. Newly reported Vessel side set screw gap measured to be .013". No indications on slip joint.
		VT-3	VT-3 of JP nozzle inlets on JP-13 and 14. No indications.
	Fall 2014 (RE28)	EVT-1	EVT-1 of MX-2 on Jet Pumps 1, 2, 8, 9, & 10. No Indications.
			EVT-1 of JP-1 and JP-2's IN-4, RB-1a, RB-1b, RB-1c, RB-1d, RB-2a, RB-2b, RB-2c, RB-2d, RS-1, RS-2, RS-3, RS-6 on JP-1 and RS-7 on JP-2. No indications.
		VT-1	VT-1 of the JP Restrainer Wedge (WD-1) at JP-1 thru JP-20. No indications of movement or wear observed.
			VT-1 of the set screws and auxiliary wedges on Jet Pump 1, 2, 9, &10. JP10 had a previously identified shroud side gap that was found to be 0.011" with no signs of movement. JPs 1, 2, and 9 set screws and aux wedges were found to be in full contact with no signs of wear.
		VT-3	VT-3 of JP nozzle inlets on JP-1 and 2. No indications.
Jet Pump Diffuser	1986-1998	VT-3	10 Jet Pumps VT-3 examined each outage. No indications. No indications.
	Spring 1997 (RE17)	VT-1/VT-3	Ten jet pumps VT examined. Exam includes applicable GE SILs. No indications.
	Fall 1998 (RE18)	VT-1/VT-3	VT examinations on ten (10) jet pumps. Exam includes applicable GE SILs. No indications.
	Spring 2000 (RE19)	N/A	Exams deferred to Fall 2001.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Fall 2001 (RE20)	EVT-1	EVT-1 examinations on ten (10) jet pumps (5 assemblies). Identified an indication thought to be a broken jet pump sensing line upper bracket retaining weld. Evaluated as acceptable.
	Spring 2003 (RE21)	VT-3	VT-3 on JP sensing lines for all jet pumps per SIL 420. No indications.
		VT-1	VT-1 on sensing line brackets for all jet pumps per SIL 420. Previously reported cracked bracket weld was determined not to be cracked. No indications.
		EVT-1	EVT-1 examinations of AD-1, AD-2, AD-3a, AD-3b welds on JP's 11 through 20. No indications.
	Spring 2005 (RE22)	VT-3	VT-3 on JP sensing lines for JP's 1 - 11 and 14 per SIL 420. No indications.
		VT-1	VT-1 on JP sensing line brackets for JP's 1- 11 and 14. No indications.
	Fall 2006 (RE23)	EVT-1	EVT- 1 on AD-1 on JP's 1, 2, and 5. EVT-1 examinations on AD-2, AD-3a, AD-3b, DF-1 on JP-15, 16, 17, 18, 19, and 20 and DF-2 on JP's 15, 16, 19, and 20. No indications.
	Spring 2008 (RE24)	UT	UT on AD-1, AD-2, DF-1, DF-2, and DF-3 (and MX-2). One (1) indication on DF-1 at JP-14.
		EVT-1	EVT-1 examinations on DF-1 at JP-14 in addition to UT. Appeared to be a defect from original construction.
	Fall 2009 (RE25)	EVT-1	EVT-1 examinations of indication to DF-1 on JP-14 identified during the previous outage. No change.
	Spring 2011 (RE26)	EVT-1	EVT-1 re-examination of indication located on the inside surface of JP-14 at the DF-1 weld. Indication was found to have no changes.
	Fall 2012 (RE27)	EVT-1	EVT-1 re-examination of indication located on the inside surface of JP-14 at the DF-1 weld. Indication did not change.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Fall 2014 (RE28)	EVT-1	EVT-1 of AD-1, AD-2, AD-3a, AD-3b, DF-1, DF-2 on Jet Pumps 1, 2, 8, 9, & 10. No Indications. EVT-1 re-examination of indication located on the inside surface of JP-14 at the DF-1 weld. Indication did not change.
CRD Guide Tube	Fall 1995	VT -3	VT-3 exams of accessible guide tubes. No indications.
	Spring 1997 (RE17)	VT -3	VT-3 exams of accessible guide tubes. No indications.
	Fall 1998 (RE18)	VT -3	VT-3 exams of accessible guide tubes. No indications.
	Spring 2000 (RE19)	VT-3	VT-3 examinations of eighteen (18) anti-rotation pins and eleven (11) CRGT-1 welds. No indications.
		EVT-1	EVT-1 examinations of four (4) CRGT-2 and CRGT-3 welds. No indications.
	Fall 2001 (RE20)	VT-3	VT-3 examinations of thirteen (13) anti-rotation pins and thirteen (13) CRGT-1 welds. No indications.
		EVT -1	EVT-1 examinations of five (5) CRGT-2 and CRGT-3 welds. No indications.
	Spring 2005 (RE22)	EVT-1	EVT-1 examinations of one (1) CRGT-2 weld and one (1) CRGT-3 weld. No indications.
	Fall 2006 (RE23)	EVT-1	EVT-1 examinations of one (1) CRGT-2 weld and one (1) CRGT-3 weld. No indications.
	Spring 2008 (RE24)	EVT-1	EVT-1 examinations of two (2) CRGT-2 welds and three (3) CRGT-3 welds. No indications.
	Fall 2009 (RE25)	EVT-1	EVT-1 examinations on one (1) CRGT-2 weld and two (2) CRGT-3 welds. No indications.
CRD Stub Tube	N/A	N/A	No record of examination.
In-core Housing	NA	NA	No record of examination back to 1996.
Dry Tube	1989-1991	VT	VT exam in 1989, 1990, and 1991 per SIL 409R1. All dry tubes replaced in 1993.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Spring 2005 (RE22)	VT	Replaced one (1) dry tube.
	Fall 2012 (RE27)	VT-1	VT-1 was performed on dry tube locations at 12-09 and 28-25. No indications.
	Fall 2014 (RE28)	VT-1	VT-1 performed on IRM dry tube locations at 20-25 and 36-41. No indication observed. Replaced IRM dry tube at 12-41.
Instrument Penetrations	1986-2000	VT-2	VT-2 examination performed during RPV system leakage test each outage for all six (6) instrument nozzle penetrations. No indications.
	Spring 2000 (RE19)	PT	PT examination of N16A instrument penetration nozzle to safe-end weld.
	Fall 2001 (RE20)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Spring 2003 (RE21)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Spring 2005 (RE22)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
		UT	UT examination of N16B nozzle to safe-end per Risk-Informed ISI Program and Appendix VIII. No indications.
	Fall 2006 (RE23)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Spring 2008 (RE24)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Fall 2009 (RE25)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Spring 2011 (RE26)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Fall 2012 (RE27)	VT-2	VT-2 examination performed during RPV system leakage test. No indications.
	Fall 2014 (RE28)	UT	UT examination of N16B nozzle to safe-end per Risk-Informed ISI Program and Appendix VIII. No indications.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
		VT-2	VT-2 examination performed during RPV system leakage test. No indications.
Vessel ID Brackets	1986-1995	VT-1/VT-3	ASME XI VT-3 (non-beltline) and VT-1 (beltline examinations) of jet pump riser brace, dryer, FW Sparger, Core Spray, guide rod, and surveillance capsule holder brackets performed once per interval. No indications.
	Spring 1997 (RE17)	VT-1/VT-3	VT-1/VT-3 ASME Section XI examinations on five (5) jet pump riser brackets, FW brackets and welds examined. No indications.
	Fall 1998 (RE18)	VT-1/VT-3	VT-1/VT-3 ASME Section XI examinations on five (5) jet pump riser brackets, FW brackets and welds examined. No indications.
		EVT-1	EVT-1 examinations on four (4) CS bracket attachment welds. No indications.
	Spring 2000 (RE19)	VT-3	VT-3 examinations of guide rod attachment welds. No indications.
		VT-1	VT-1 on FW sparger brackets. No indications.
		EVT-1	EVT-1 examinations on CS bracket attachment welds. No indications.
	Fall 2001 (RE20)	EVT-1	EVT-1 examinations on all FW sparger bracket attachment welds and all dryer support attachment welds. No indications.
	Spring 2003 (RE21)	EVT-1	EVT-1 examination of on JP riser brace pad attachment weld at 150°. No indications.
	Spring 2005 (RE22)	VT-3	VT-3 examination of steam dryer hold down brackets.
	Fall 2006 (RE23)	EVT-1	EVT-1 of eight (8) FW sparger brackets and four (4) CS piping bracket attachment welds. No indications.
	Spring 2008 (RE24)	VT-3	VT-3 of guide rod attachment welds. No indications.
		EVT-1	EVT-1 examinations of JP riser brace pad attachment welds at 30°, 150°, 210°, 270°, and 330°. EVT-1 examinations of steam dryer support

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
			bracket attachment welds at 215° and 325°. No indications.
	Fall 2009 (RE25)	EVT-1	EVT-1 examinations of JP riser brace pad attachment welds at 60°, 90°, and 120°. No indications.
	Spring 2011 (RE26)	EVT-1	EVT-1 of the JP riser brace pad attachment welds, JP-RBPAD-ATTWLDS @ 30°. No Indications.
	Fall 2012 (RE27)	EVT-1	EVT-1 of four (4) CS piping bracket attachment welds at 30°, 150°, 210°, and 330°. No indications.
			EVT-1/VT-1 of JP riser brace pad attachment welds at 270°. No indications.
			EVT-1/VT-3 of steam dryer support bracket attachment welds at 215° and 325°. No indications.
		VT-1	VT-1 of surveillance capsule holder brackets at 300°. No indications.
		VT-3	VT-3 (direct) examination of steam dryer hold down brackets @ 35°, 145°, 215°, and 325°. No indications.
	Fall 2014 (RE28)	EVT-1	EVT-1 of Riser Brace attachment welds on JP-1 & 2 at 150°. No indications.
		EVT-1/VT-3	EVT-1/VT-3 of steam dryer support bracket attachment welds at 145° and 35°. No indications.
		VT-1	VT-1 of surveillance capsule holder brackets at 30° & 120°. No indications.
		VT-3	VT-3 (direct) examination of steam dryer hold down brackets @ 35°, 145°, 215°, and 325°. No indications.
LPCI Coupling	N/A	N/A	Not applicable to this plant.
Steam Dryer	Fall 2001 (RE20)	VT-1	VT-1 of twenty four (24) drain channel welds per SIL 474.
	Spring 2003 (RE21)	EVT-1	EVT-1 of twenty four (24) drain channel welds per SIL 474.

10 CFR 50.55a Request No. RI5-02 (continued)
Implementation of BWRVIP Documents in Lieu of B-N-1 and B-N-2

Component in BWRVIP Scope	Date of Frequency of Inspection	Inspection Method Used	Summarize the Following Information: Inspection Results, Repairs, Replacements, Re-inspections
	Spring 2005 (RE22)	VT-1	VT-1 of leveling screws per OE 16110.
	Fall 2006 (RE23)	VT-1 w/Character Card	Performed baseline VT-1 examinations to BWRVIP-139 and SIL 644, Rev 2. Re-examined five (5) minor indications previously identified per SIL 474 adjacent to several drain channels. Two (2) new indications were observed in a weld adjacent to a drain channel and both tack welds on one (1) lifting lug were observed. The indications were evaluated as acceptable.
	Fall 2009 (RE25)		VT-1 examinations on seven (7) previously identified indications on dryer. With additional cleaning, six (6) of the indications disappeared with only one (1) remaining (i.e., the cracked tack welds on one (1) lifting lug - no change in the lifting lug).
Dissimilar metal welds	Spring 2008 (RE24)	UT	Automated UT performed on four (4) CAT A welds per Appendix VIII. Manual UT performed on two (2) CAT A welds. All welds included in Risk-Informed ISI Program. No indications.
	Spring 2011 (RE26)	UT	Manual UT inspection performed on one (1) CAT D nozzle to cap weld (CRD Return) per Appendix VIII and Risk-Informed ISI Program. No indications.
	Fall 2014 (RE28)	UT	Manual UT inspection performed on three (3). CAT A welds per Appendix VIII. All welds included in Risk-Informed ISI Program. No indications.

10 CFR 50.55a Request No. RP5-01
Implementation of Code Case N-795

Propose Alternative in Accordance with 10 CFR 50.55a(z)(2)
Hardship without a Compensating Increase in Quality and Safety

ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class 1
Examination Category:	Not Applicable
Item Number(s):	Not Applicable
Component Numbers:	Not Applicable

Applicable Code Edition and Addenda

ASME Section XI, 2007 Edition through the 2008 Addenda

Applicable Code Requirement

10 CFR 50.55a(b)(2)(xxvi) requires the use of the 1998 Edition, IWA-4540(c) for pressure testing of Class 1, 2, and 3 mechanical joints.

The 1998 Edition of ASME Section XI, IWA-4540(c) states: "Mechanical joints made in installation of pressure retaining items shall be pressure tested in accordance with IWA-5211(a). Mechanical joints for component connections, piping, tubing (except heat exchanger tubing), valves, and fittings, NPS-1 and smaller, are exempt from the pressure test." NPPD understands that this means a pressure test is required for a mechanical joint when a new valve or flange greater than NPS-1 is installed as part of the repair/replacement activity, and does not include those items covered by IWA-4132 "Items Rotated From Stock."

Note that the 1998 Edition, IWA-5211(a) states "a system leakage test conducted during operation at nominal operating pressure, or when pressurized to nominal operating pressure and temperature." NPPD has defined this to be a minimum of 1005 psig for components within the Reactor Coolant Pressure Boundary.

The applicability for Code Case N-795 begins with the 1998 Edition with the 1999 Addenda and includes applicability to the 2007 Edition with the 2008 Addenda; although the 1998 Edition specified in 10 CFR 50.55a(b)(2)(xxvi) is not included in the published applicability, NPPD believes that the comparison of IWB-5211(a) from the 1998 Edition and IWB-5221(a) of the 2007 Edition with the 2008 Addenda is compatible when the pressure has been defined specifically as described above. Therefore, NPPD concludes that Code Case N-795 may be used for the 1998 Edition specified by the NRC condition found in 10 CFR 50.55a.

10 CFR 50.55a Request No. RP5-01 (continued)
Implementation of Code Case N-795

Welded or Brazed Joints

ASME Section XI, 2007 Edition with the 2008 Addenda

IWA-4540(a) states: "Unless exempted by IWA-4540(b), repair/replacement activities performed by welding or brazing on pressure-retaining boundary shall include a hydrostatic or system leakage test in accordance with IWA-5000, prior to, or as part of, returning to service. Only brazed joints and welds made in the course of a repair/replacement activity require pressurization and VT-2 visual examination during the test."

Pressure Testing Requirements

ASME Section XI, 2007 Edition with the 2008 Addenda

IWB-5221(a) states: "The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power."

Reason for Request

At CNS, Class 1 pressure tests for repair/replacement activities in accordance with IWA-4540 at pressure corresponding to 100% rated reactor power when performed after Table IWB-2500-1, Category B-P testing has been completed, requires abnormal plant conditions/alignments. Testing at these abnormal plant conditions/alignments results in additional risks and delays while providing little added benefit beyond tests which could be performed at slightly reduced pressures under normal plant conditions.

Code Case N-795 is intended to provide alternative test pressure for certain Class 1 pressure tests. The code case would be used following repair/replacement activities (excluding those on the reactor vessel) which occur subsequent to the periodic Class 1 pressure test required by Table IWB-2500-1, Category B-P and prior to the next refueling outage on those components that cannot be isolated. Components which can be isolated will be pressure tested at a pressure in accordance with IWB-5221(a).

Performance of the Category B-P pressure test each refueling outage places CNS in a position of significantly reduced margin, approaching the fracture toughness limits defined in the Technical Specification Pressure Temperature Curves. To violate these curves would place the vessel in a LTOP condition. With strict operational control procedures, specific component alignment and operations staff training regarding LTOP this may be considered acceptable to be at this reduced margin condition for the purpose of verifying the leakage status/integrity of the primary system in order to meet the ASME Section XI, Category B-P requirements prior to startup from a

10 CFR 50.55a Request No. RP5-01 (continued)
Implementation of Code Case N-795

refueling outage, however to perform this evolution more frequently would increase the overall risks to the plant.

Proposed Alternative and Basis for Use

Proposed Alternative

Pursuant to 10 CFR 50.55a(z)(2), relief is requested on the basis that the proposed alternative provides an acceptable level of quality and safety.

NPPD proposes to perform the system leakage testing and associated VT-2 examination following repair/replacement activities on those components that cannot be isolated in accordance with Code Case N-795, however using a longer hold time than specified in the code case. The system leakage test will be performed during the normal operational start-up sequence at a minimum of 900 psig (~90% of the pressure required by IWB-5221(a)) following a one hour hold time (for uninsulated components) and an eight hour hold time (for insulated components) in lieu of the nominal operating pressure associated with 100% reactor power of approximately 1005 psig. Note that this code case is not applicable to Class 1 pressure tests performed to satisfy the periodic requirement of Table IWB-2500-1, Category B-P and is not applicable to pressure tests required following repair/replacement activities on the reactor vessel. NPPD will continue to conduct the periodic system leakage tests required by IWB-2500-1, Category B-P at the end of each refueling outage at a pressure corresponding to 100% rated reactor power.

Basis for Use

By the end of a normal refueling outage the core decay heat has had time to decrease and some spent fuel has been removed and some new fuel has been added. The result is a much lower decay heat load and much lower heatup rates. At the end of a normal refueling outage, the rate of temperature increase is able to be tolerated during the system leakage test. During normal performance of this system leakage test, the pressurization phase of the test is taken at a slow and very controlled pace. The pressurization phase normally takes several hours to reach test conditions.

However, following a maintenance or forced outage, there is a much larger decay heat load from the reactor core. That heat load is difficult to control once SDC has been removed from service. Once SDC is removed from service, heatup starts immediately. During a short term mid-cycle shutdown, the projected heatup rate could be in the order of 0.4°F per minute depending on how quickly SDC is secured. Under those conditions, the time available to pressurize up to test conditions, perform the VT-2 exam and return to SDC will be greatly reduced. The hurried time frames may create a more error-likely environment.

10 CFR 50.55a Request No. RP5-01 (continued)
Implementation of Code Case N-795

During short mid-cycle outages, the core does have a larger decay heat load. Considering only the actions of isolating SDC from the vessel under high decay heat loads, there is some inherent risk. There would be some probability that once isolated, mechanical, control or operational problems could occur which could delay return to SDC.

The required VT-2 examinations performed following repair/replacement activities are limited to the areas affected by the work thereby allowing for a focused exam. The VT-2 exams, therefore, have a much smaller examination boundary than the periodic test. Entry by personnel into containment at power levels associated with 100% rated reactor power versus 900 psig as requested by this Relief Request would expose personnel to excessive radiation levels, including significant exposure to neutron radiation field, which is contrary to Station ALARA (As Low as Reasonably Achievable) practices.

Indication of leakage identified through the VT-2 examinations during a test at a pressure correlating to either the 100% rated reactor power level or at ~90% of that value will not be significantly different between the two tests. Higher pressure under the otherwise same conditions will produce a higher flow rate but the difference is not significant. Code Case N-795 proposes increased hold times, as compared to a test performed at normal operating pressure, to allow for more leakage from the pressure boundary if a through-wall or mechanical joint leakage condition exists. Further, NPPD proposes to implement longer hold times than specified by the Code Case. NPPD believes these longer hold times are justified to allow for additional leakage to accumulate at the area of interest so as to be more evident during the VT-2 examination, should a through-wall or mechanical joint leakage condition exist. This alternate test pressure, when combined with longer hold times, is still adequate to provide evidence of leakage, should a leak exist.

With respect to using the alternative requirements of Code Case N-795 to welded repair/replacement activities, the ASME concluded during the original development of Code Case N-416, "Alternative Pressure Test Requirements for Welded or Brazed Repairs, Fabrication Welds or Brazed Joints for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding or Brazing, Classes 1, 2, and 3" and Code Case N-498, "Alternative Requirements for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems", that the hydrostatic test (a test using pressure higher than a system leakage test) was not a structural integrity test, but a leakage test. The fact that the hydrostatic test does not verify structural integrity served as the basis for replacing it with a system leakage test. Both code cases are approved by the NRC in RG 1.147 (i.e., N-416-4 and N-498-4). It is the requirements of the construction code, including the construction code nondestructive examinations used for the repair/replacement activity, that ensures structural integrity of the pressure boundary and its welded or brazed connections. Based on research performed by ASME, the effect of testing at a pressure that corresponds with 90% of rated power verses 100% of rated power is not reduced validation of structural integrity, but a potential in leakage rate reduction. Therefore, NPPD

10 CFR 50.55a Request No. RP5-01 (continued)
Implementation of Code Case N-795

believes that the alternative requirements of Code Case N-795 on welded or brazed repair/replacement activities are acceptable.

Research described in the White Paper performed by Argonne National Laboratory, as commissioned by the NRC, indicates that the relationship of leakage and pressure is relatively linear. Therefore, leakage rates associated with pressure at 90% of normal operating pressure would be approximately 10% less than a leakage rate at 100% of normal operating pressure. However, any reduction in leakage rate is more than compensated for by the increase in hold time (600% for noninsulated and 200% for insulated). Other research cited in the White Paper supports the conclusions of Argonne National Laboratory.

While NPPD does not expect that leakage will occur, any leakage will be related to the differential pressure at the point of leakage, or across the connection. A 10% reduction in the test pressure is not expected to result in the arrest of a leak that would occur at nominal operating pressure. In the unlikely event that leakage would occur subsequent to the VT-2 examination, at higher pressures associated with 100% rated reactor power, leakage would be detected by the drywell monitoring systems, which include drywell pressure monitoring, the containment atmosphere monitoring system, and the drywell floor drain sumps. Leakage monitoring is required by Technical Specifications.

Code Case N-795 and the NPPD proposed hold times allows for an adequate pressure test to be performed; ensuring the safety margin is not reduced due to VT-2 examination being performed at the slightly reduced pressure. There is no physical benefit withheld by testing at the slightly reduced pressure. The affected pressure boundary will be tested and will be otherwise fully capable of performing its intended safety function as part of the Reactor Coolant Pressure Boundary.

The use of Code Case N-795 will only be applied if the System Leakage Test required by IWB-2500-1, Category B-P has been completed for the cycle on components that cannot be isolated and will not be implemented for any repair/replacement activity performed on the reactor pressure vessel.

In summary, the proposed alternative is to perform the system leakage test and VT-2 examination in accordance with Code Case N-795 at 900 psig with a minimum hold time of one hour for uninsulated components and an eight hour hold time for insulated components during maintenance, forced outages, or following the performance of the periodic pressure test required by Table IWB-2500-1, Category B-P during refueling outages. The provisions of this alternative are not applicable to the Examination Category B-P pressure test performed during refueling outages or to pressure tests of repair/replacement activities of the reactor pressure vessel or components that can be isolated. Considering the discussion above, NPPD believes that this alternative will provide an acceptable verification of the leak integrity of the locations having repair/replacement activities performed without putting the plant in a non-conservative

10 CFR 50.55a Request No. RP5-01 (continued)
Implementation of Code Case N-795

operational condition and without unnecessary radiation exposure and safety challenges to personnel.

Duration of Proposed Alternative

This proposed alternative will be used for the entire Fifth Ten-Year Interval of the Inservice Inspection Program for CNS.

Precedents

1. US NRC Letter to PPL Susquehanna, LLC, "Susquehanna Steam Electric Station, Units - 1 and 2 Relief Request for the Fourth 10-Year Inservice Inspection Interval (TAC Nos. MF2705 through MF2714)," dated June 9, 2014 (ML14141A073).

2. US NRC Letter to Energy Northwest, "Columbia Generating Station - Relief Request 3ISI-12, Proposed Alternative Using Code Case N-795 (TAC No. MF0319)," dated August 9, 2013 (ML13191A054).

3. US NRC Letter to Northern States Power Company - Minnesota, "Monticello Nuclear Generating Plant - Relief from the Requirements of the American Society of Mechanical Engineers Code for the Fifth 10-Year Inservice Inspection Program Interval (TAC Nos. ME8068, ME8070, and ME8071)," dated February 26, 2013 (ML13035A158).

4. US NRC Letter to Nuclear Management Company, LLC, "Monticello Nuclear Generating Plant - One Time Inservice Inspection Program Plan Relief Request No. 8 for Leak Testing the "B" and "G" Main Steam Safety Relief Valves (TAC No. MB9538)," dated June 13, 2003 (ML031640464).

10 CFR 50.55a Request Number RC3-01
Alignment and Synchronization of the Containment Inservice Inspection Program Third Ten-Year Interval with the Inservice Inspection Program Fifth Ten-Year Interval

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Acceptable Level of Quality and Safety

ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class MC
Examination Categories:	E-A, E-C and E-G
Item Numbers:	Various
Component Numbers:	All Class MC Components
Reference:	IWA-2430 Inspection Intervals

Applicable Code Edition and Addenda

The ASME Code of Record for the CISI Program Third Ten-Year Interval and the ISI Program Fifth Ten-Year Interval will be ASME Code, Section XI, 2007 Edition, 2008 Addenda.

Applicable Code Requirements

The following Code requirements for inspection intervals are from Subarticle IWA-2430, Inspection Intervals of the ASME Code, Section XI, 2001 Edition, 2003 Addenda as applied to the current CISI Program Second Ten-Year Interval and the corresponding requirements of the ASME Code, Section XI, 2007 Edition, 2008 Addenda for the proposed CISI Third Ten-Year Interval describing the requirements for a 10 year inspection interval. The requirements in 10 CFR 50.55a use a 120-month interval and it is the same as the 10 year interval used in the ASME Code. For purposes of this request the term Ten-Year Interval is used.

Paragraph IWA-2430(b) - The inspection interval shall be determined by calendar years following placement of the plant into commercial service. (2001 Edition, 2003 Addenda and 2007 Edition, 2008 Addenda)

Subarticle IWA-2432 (2001 Edition, 2003 Addenda and IWA-2431 2007 Edition, 2008 Addenda) - The inspection intervals shall comply with the following, except as modified by IWA-2430(d) - (2001 Edition, 2003 Addenda) - IWA-2430(c) - (2007 Edition, 2008 Addenda):

1st Inspection Interval - 10 years following initial start of plant commercial service
Successive Inspection Intervals - 10 years following the previous inspection interval

**10 CFR 50.55a Request Number RC3-01 (continued)
Alignment and Synchronization of the Containment Inservice Inspection Program Third Ten-Year Interval with the Inservice Inspection Program Fifth Ten-Year Interval**

Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), an alternative is requested to allow the CISI Program Third Ten-Year Interval start date to be aligned with the ISI Program Fifth Ten-Year Interval and to synchronize the ASME Code, Section XI, 2007 Edition, 2008 Addenda requirements of these programs on the basis that the proposed alternative would provide an acceptable level of quality and safety.

Specifically, this is an administrative type of request that is being sought to complete the CISI Program Second Ten-Year Interval early on February 29, 2016, in lieu of the currently scheduled end date of May 8, 2018, and to begin the CISI Program Third Ten-year Interval on March 1, 2016 aligning it with the start of the ISI Program Fifth Ten-Year Interval. Additionally, synchronization of the 10 CFR 50.55a requirements to use the same ASME Code, Section XI, 2007 Edition, 2008 Addenda for both programs will also begin on March 1, 2016, and this alignment and synchronization will continue for successive CISI and ISI Ten-Year Intervals to the end of the extended license period for CNS. The net effect of this request is to establish one common Ten-Year Interval for both the CISI and ISI Programs at the CNS.

This request for alignment and synchronization of these programs will allow NPPD as the licensee for CNS a burden reduction in procedure development and maintenance and to reduce possible errors associated with applying two different ASME Code, Section XI, Editions and Addenda requirements at the same time.

Currently, the CISI Program Second Ten-Year Interval is using the ASME Code, Section XI, 2001 Edition, 2003 Addenda. If this request is not authorized, procedures will have to remain in place to support the related Code requirements of the CISI Program using Subsection IWE of the ASME Code, Section XI, 2001 Edition, 2003 Addenda and related requirements in IWA-1000, IWA-2000 and IWA-4000. This means that for the ISI Program Fifth Ten Year Interval that will use ASME Code, Section XI, 2007 Edition, 2008 Addenda and begins March 1, 2016, these same types of procedures will have to be revised to include both sets of Code requirements or separate procedures written for each set of Code requirements. Then again in 2018, because of the current CISI Program Second Ten-Year Interval end date, a later ASME Code, Section XI, Edition or Addenda could be required and more changes would have to be made and CNS is trying to alleviate this situation from occurring with this request.

The current ASME Code requirement in IWA 2430 described above was not used in the implementation of the CISI Program. In the Final Rule change to 10 CFR 50.55a that required the implementation of ASME Code, Subsection IWE requirements that was published in the Federal Register (61 FR 41303) dated August 8, 1996, the NRC amended its regulations (Rule) to incorporate by reference the 1992 Edition and 1992 Addenda of Subsections IWE and IWL of Section XI of the ASME Code. Only Subsection IWE for Metal Containments applied to CNS

10 CFR 50.55a Request Number RC3-01 (continued)
Alignment and Synchronization of the Containment Inservice Inspection Program Third Ten-Year Interval with the Inservice Inspection Program Fifth Ten-Year Interval

because it is a BWR with a Mark I Containment. The amended rule became effective on September 9, 1996; it required the licensees to incorporate the new requirements into their ISI plans and to complete the first period containment inspections within five years (i.e., no later than September 9, 2001).

CNS proceeded to develop their CISI Program and to complete the first period examinations by September 9, 2001. Thus, the CISI Program First Ten-Year Interval began on September 9, 1996, and ended on May 8, 2008. This is actually about a 12 year interval and was due to the 5 years allowed to complete the first period examinations. This CISI Program First Ten-Year Interval set the start date of May 9, 2008, to the end date of May 8, 2018, for the current CISI Program Second Ten-Year Interval.

In the Federal Register (67 FR 60520) dated September 26, 2002, another Final Rule change to 10 CFR 50.55a was published and in the Supplementary Information in Section 2.2 Section XI, Pages 60521 and 60522, it contains statements supporting the proposed alternative for modifying the CISI Interval. Specifically, the information pointed out that 10 CFR 50.55a(g)(4)(ii) does not prohibit licensees from updating to a later Edition and Addenda of the ASME Code midway through a Ten-Year IWE and IWL examination interval. Additionally, the information advised that licensees wishing to synchronize their 120-month intervals may submit a request in accordance with Section 50.55a(a)(3), which is currently reflected in a new Section 50.55a(z).

A common interval date for both the CISI Program Third Ten-Year Interval and the ISI Program Fifth Ten-Year Interval is based on the current requirement to update the ISI Program Fifth Ten-Year Interval on March 1, 2016. The Code of record for that interval, which was set on February 28, 2015 [i.e., 12 months prior to the start of the successive interval in accordance with 10 CFR 50.55a(g)(4)(ii)] currently is ASME Code, Section XI, 2007 Edition, 2008 Addenda. Thus, with authorization of this request CNS intends to use the same start and end dates for the CISI Program Third Ten-Year Interval and the ISI Program Fifth Ten-Year Interval along with the same ASME Code, Section XI, 2007 Edition with the 2008 Addenda requirements.

In conclusion, NPPD has determined that authorizing the proposed alternative as described herein provides and acceptable level of quality and safety and does not adversely impact the health and safety of the public.

Proposed Alternative and Basis for Use

As an alternative to the full CISI Program Second Ten-Year Interval duration requirements of IWA-2430(b) and IWA-2432 of the ASME Code, Section XI, 2001 Edition, 2003 Addenda, CNS proposes to start the new CISI Program Third Ten-Year Interval on March 1, 2016 instead of the current start date which would be May 9, 2018. This will permit the subsequent ISI and CISI Programs to share a common inspection interval and to implement a common ASME Code,

10 CFR 50.55a Request Number RC3-01 (continued)
Alignment and Synchronization of the Containment Inservice Inspection Program Third Ten-Year Interval with the Inservice Inspection Program Fifth Ten-Year Interval

Section XI Edition and Addenda. The common Code of record for both the CISI Program Third Ten-Year Interval and the ISI Program Fifth Ten-Year Interval will be the ASME Code, Section XI, 2007 Edition, 2008 Addenda.

Since this alternative will shorten the current CISI Program Second Ten-Year Interval by approximately two years CNS has completed all the required CISI examinations for the CISI Second Ten-Year Interval during the last refueling outage, RE28, in October 2014 in preparation for the submittal of this request. Examinations performed to date have satisfied the acceptance standards contained in Article IWE-3000. Based on these completed examinations and the regulatory information that has been described above, it is concluded that this request has the necessary information to support authorization for its use.

Duration of Proposed Alternative

When authorized, this proposed alternative will be used at the start of the CISI Program Third Ten-Year Interval and will continue until the end of the extended license period for CNS.

Precedents

1. US NRC Letter to Exelon Nuclear, "Limerick Generating Station, Units 1 and 2 - Relief Requests I3R-01 for Alignment of Inservice Inspection and Containment Inservice Inspection (TAC Nos. MD2727 and MD2728)," dated January 24, 2007 (ML063390103).

10 CFR 50.55a Request No. RR5-01
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Acceptable Level of Quality and Safety

ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class 1
Examination Categories:	B-F
Item Number:	B5.10
Component Numbers:	RCA-BF-1, 5 inch Control Rod Drive Return Cap to Nozzle N9 Weld

Applicable Code Edition and Addenda

ASME, Section XI, 2007 Edition through the 2008 Addenda.

Applicable Code Requirement

ASME Section XI, IWA-4411 requires repair/replacement activities to be performed in accordance with the Owner's Requirements and the original Construction Code of the component or item. Alternatively, IWA-4411 (a) and (b) allows use of later Editions/Addenda of the Construction Code either in its entirety or portions thereof, Code Cases, and revised Owner Requirements.

IWA-4190(a) requires Code Cases used for repair/replacement activities to be applicable to the Edition and Addenda of Section XI specified for the activity.

IWA-4411(e) permits the use of IWA-4600(b) when welding is to be performed without postweld heat treatment required by the Construction Code. IWA-4600(b) provides temper bead welding requirements as an alternative to the welding and postweld heat treatment requirements of the Construction Code. Also as an alternative to IWA-4600(b), the requirements of Code Case N-638-4, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique", as approved by the NRC, may be used.

IWA-4411(h) permits the use of Nonmandatory Appendix Q for the installation of welded overlays for the repair of SCC in Class 1, 2 or 3 austenitic stainless steel pipe weldments.

Mandatory Appendix VIII, Supplement 11 provides procedure and personnel qualification requirements for examination of full structural overlaid wrought austenitic piping welds and is required by Nonmandatory Appendix Q.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Reason for Request

The control rod drive return line cap to nozzle weld is considered susceptible to stress corrosion cracking and is classified as Category D in BWRVIP-75A. Previous ultrasonic examinations of this nozzle weld have not identified any relevant indications. In the event an examination identifies conditions requiring repair, the methods currently available within ASME Section XI do not provide techniques to support a repair without draining the reactor vessel. Note that Relief Request RR5-01 will only be used as a contingency in the unlikely event a flaw is discovered during Refueling Outage 29 in a control rod drive nozzle to cap weld resulting in the need for a full structural weld overlay. CNS currently has no weld overlays installed.

Because ASME Section XI, Nonmandatory Appendix Q does not specifically apply to the overlay of dissimilar metal welds and the requirements of IWA-4600(b) or Code Case N-638-4 do not specifically apply to the welding of overlays, an alternative is required to combine the requirements of Nonmandatory Appendix Q and Code Case N-638-4 to provide a complete set of requirements for a full structural weld overlay of the control rod drive return line cap to nozzle weld.

Pursuant to 10 CFR 50.55a, "Codes and Standards," Paragraph (z)(1), relief is requested from the requirements of ASME Code Section XI as described below:

Nonmandatory Appendix Q

Historically, similar requests for relief have been based, in part, on Code Case N-504 (various revisions). However, Code Case N-504 was incorporated into ASME Section XI as Nonmandatory Appendix Q in the 2004 Edition with the 2005 Addenda. Nonmandatory Appendix Q, as part of ASME Section XI, is approved by the NRC, by reference, without condition in 10 CFR 50.55a(b)(2).

Like Code Case N-504, Nonmandatory Appendix Q is applicable to weld overlay of austenitic stainless steel material. However an alternative is required because the configuration subject to this request includes the overlay of an SA 508 Class 2 nozzle, Alloy 82 and 182 weld materials, and an SB-166 cap.

Nonmandatory Appendix Q, paragraph Q-2000(a), requires the reinforcement weld metal to be low carbon (0.035 percent maximum) austenitic stainless steel. An alternative is required since a nickel-based weld material (Alloy 52M) will be used.

Nonmandatory Appendix Q, paragraph Q-2000(d), requires the first two layers of the weld overlay to have a ferrite content of at least 7.5 FN. An alternative is required because the overlay weld material is a nickel based alloy (Alloy 52M) which is fully austenitic.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Nonmandatory Appendix Q, Article Q-4000, requires UT personnel and procedures to be qualified in accordance with Mandatory Appendix VIII. Mandatory Appendix VIII, Supplement 11 provides requirements for the qualification of procedures and personnel for examination of full structural overlaid wrought austenitic piping welds. The overlay configuration subject to this request is a dissimilar metal weld and not within the scope of Supplement 11. An alternative is required to accept the use of personnel and procedures qualified by the EPRI PDI which is based on Code Case N-653-1 with modifications.

Code Case N-638-4

As an alternative to IWA-4600(b), Code Case N-638-4, will be used.

Code Case N-638-4 is listed in RG 1.147, Revision 17, Table 2 as approved by the NRC with two conditions:

1. Demonstration for ultrasonic examination of the repaired volume is required using representative samples which contain construction type flaws.

2. The provisions of 3(e)(2) or 3(e)(3) may only be used when it is impractical to use the interpass temperature measurement methods described in 3(e)(1), such as in situations where the weldment area is inaccessible (e.g., internal bore welding) or when there are extenuating radiological conditions.

ASME Section XI, IWA-4190(a) requires Code Cases used for repair/replacement activities to be applicable to the Edition and Addenda specified for the repair/replacement activity. The applicability of Code Case N-638-4 (latest approved by the NRC) is limited to the 2004 Edition of ASME Section XI and the ASME Section XI that is specified for this repair/replacement activity is the 2007 Edition with the 2008 Addenda. An alternative to IWA-4190(a) is required to permit use of Code Case N-638-4 with the 2007 Edition through the 2008 Addenda of ASME Section XI as described in this request.

Code Case N-638-4, paragraphs 4(a), and 4(a)(4) state that all welds (including repair welds) shall be volumetrically examined in accordance with the requirements and acceptance criteria of the Construction Code or ASME Section III. An alternative is required to use the examination requirements of paragraph Q-4100 of ASME Section XI, Nonmandatory Appendix Q.

Proposed Alternative and Basis for Use

Proposed Alternative

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

The component subject to repair using the requirements described in the request for alternative is described in Table 1. The repair would consist of a full structural welded overlay to replace the original pressure boundary of the dissimilar metal weld identified in Table 1.

Table 1

Component Identification	Component Description	Material 1	Material 2	Maximum Surface Area of Weld Overlay (Ferritic side, in^2)
RCA-BF-1	5 inch Control Rod Drive Return Cap to Nozzle N9 Weld	Nozzle: A-508 Class 2	SB-166	260

Nonmandatory Appendix Q applies specifically to austenitic stainless steel piping and weldments. As an alternative CNS proposes the use of Code Case N-638-4 and Nonmandatory Appendix Q to install a weld overlay on a configuration that consists of an A-508, Class 2 low alloy steel nozzle, Alloy 182/82 weld materials, and an SB-166, Alloy 600 nickel alloy cap using ERNiCrFe-7A (Alloy 52M) filler metal.

Appendix Q, paragraph Q-2000(a) requires weld metal used to fabricate weld overlays be low carbon steel (0.035%) austenitic stainless steel. As an alternative, NPPD proposes to perform the weld overlay using ERNiCrFe-7A (Alloy 52M). Therefore, this requirement does not apply.

Appendix Q, paragraph Q-2000(d) requires the weld overlay to consist of at least two austenitic stainless steel weld layers, each layer having an as-deposited delta ferrite content of at least 7.5 FN or 5 FN under certain conditions. As an alternative, NPPD proposes to perform the weld overlay using ERNiCrFe-7A (Alloy 52M) which is purely austenitic. Therefore, the delta ferrite requirement does not apply.

Code Case N-638-4 is included in the latest Revision of RG 1.147, Revision 17, with the following conditions:

1. Demonstration for ultrasonic examination of the repaired volume is required using representative samples which contain construction type flaws.

    - CNS will implement this condition.

2. The provisions of 3(e)(2) and 3(e)(3) may only be used when it is impractical to use the interpass temperature measurement methods described in 3(e)(1), such as in situations where the weldment area is inaccessible (e.g., internal bore welding) or when there are extenuating radiological conditions.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

- CNS is not using the provisions of 3(e)(2) or 3(e)(3). In monitoring preheat and interpass temperatures during the application of the overlay, CNS will comply with 3(e)(1) of the code case as described below:

  Preheat and interpass temperatures will be measured using a contact pyrometer. In the first three layers, the interpass temperature will be measured every three to five passes. After the first three layers, interpass temperature measurements will be taken every six to ten passes for the subsequent layers. Contact pyrometers will be calibrated in accordance with approved calibration and control program documents.

The reason N-638-4 is not applicable to the 2007 Edition through the 2008 Addenda is due to a change in ASME Section XI references that occurred in the 2005 Addenda. To remedy this situation, the ASME Section XI committees created a "Guideline for Cross-Referencing Section XI Cases" which includes "Cross Reference List for Section XI Cases." This was added in the front of the Nuclear Code Case Book. Code Case N-638 has been added to this table showing the correct references for using the Code Case with Editions/Addenda of Section XI later than the 2004 Edition. Using the corrected references in Table 2 ensures N-638-4 is correctly used with the 2007 Edition through the 2008 Addenda of ASME Section XI.

Table 2
References for Alternative Editions and Addenda for Section XI[1]

2008 Addenda	*2007 Edition*	*2006 Addenda*	*2005 Addenda*	1989 Edition with 1991 Addenda through 2004 Edition	1986 Edition with 1998 Addenda through 1989 Edition with 1990 Addenda	1983 Edition with 1983 Addenda through 1986 Edition with the 1987 Addenda	1980 Edition with 1981 Winter Addenda through 1983 Edition with 1983 Summer Addenda
IWA-2200	*IWA-2200*	*IWA-2200*	*IWA-2200*	IWA-2210 Visual Examinations	IWA-2210	IWA-2210	IWA-2210
IWA-2300	*IWA-2300*	*IWA-2300*	*IWA-2300*	IWA-2300 Personnel Qualifications	IWA-2300	IWA-2300	IWA-2300

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

IWA-4000	*IWA-4000*	*IWA-4000*	*IWA-4000*	IWA-4000 Repair/Replacement Activities	IWA-4000 & IWA-7000	IWA-4000 & IWA-7000	IWA-4000 & IWA-7000
IWA-4410 IWA-4411 IWA-4420 IWA-4440	*IWA-4410 IWA-4411 IWA-4420 IWA-4440*	*IWA-4410 IWA-4411 IWA-4420 IWA-4440*	*IWA-4410 IWA-4411 IWA-4420 IWA-4440*	IWA-4400 Welding, Brazing, Metal Removal and Installation	IWA-4400	IWA-4300	IWA-4300

[1] The *italicized* text has been added to the existing Table 1 from Code Case N-638-4.

This shows that the applicability of Code Case N-638-4 can be extended to the 2007 Edition through the 2008 Addenda with the corrected references.

This proposed alternative provides an acceptable methodology for installing and examining a full structural overlay that will provide structural integrity for the life of the plant.

The full structural weld overlay will be designed consistent with the requirements of the following:

1. Nonmandatory Appendix Q "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments", and

2. IWB-3640, ASME Section XI 2007 through the 2008 Addenda as referenced by Nonmandatory Appendix Q.

The use of an overlay filler material that provides excellent resistance to SCC creates an effective barrier to flaw extension. Also, temper bead welding techniques produce excellent toughness and ductility in the weld heat-affected zone of low alloy steel materials and in this case results in compressive residual stresses on the inside surface that help to inhibit further SCC of the original weldment. The design of the overlay for the nozzle to end cap weldment uses methods that are standard in the industry. There are no new or different approaches in this overlay design which would be considered either a first-of-a-kind or inconsistent with previous approaches.

The overlay will be designed as a full structural weld overlay in accordance with Nonmandatory Appendix Q. The temper bead welding technique to be implemented in accordance with Code Case N-638-4 will produce a tough, ductile, corrosion-resistant overlay.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Welder Qualification and Welding Procedures - Use of Alloy 52M

All welders, welding operators, and weld procedures will be qualified in accordance with ASME Section IX and any special requirements of Nonmandatory Appendix Q or Code Case N-638-4. Qualified personnel under the vendor's welding program will perform the weld overlay repair.

A welding procedure specification utilizing machine GTAW (with cold wire feed) for welding SFA-5.14, ERNiCrFe-7A, UNS N06054, F-No. 43 (commercially known as Alloy 52M) will be used. This alloy has nominally 30% chromium, which is significantly greater than Inconel 82 (which nominally contains 20% chromium), and has been accepted by the NRC in NUREG-0313, Revision 2, as a resistant material against IGSCC in the BWR.

If repairs to the overlay are required, manual GTAW for welding SFA-5.14, ERNiCrFe-7A, UNS N06054, F-No. 43 (commercially known as Alloy 52M) will be used. In the unlikely event of a through-wall defect, UNS W86152, F-No. 43 manual shield metal arc weld rod (commercially known as Alloy 152) will be used to seal any defect if it is greater than 0.125 inch from the P-3 nozzle material before beginning the structural weld overlay using GTAW.

Welding Wire and Electrodes

A consumable nickel-based welding wire, highly resistant to SCC, is selected as the weld overlay material. This material is Alloy 52M, contains a nominal 30% Cr level that imparts excellent resistance to SCC. Where localized repairs are required, Alloy 52M will also be used.

Weld Overlay Design

The weld overlay will extend around the full circumference of the end cap to nozzle weldment location in accordance with Nonmandatory Appendix Q. The overlay length will extend across the projected flaw intersection with the outer surface beyond the extreme axial boundaries of the flaw. The design thickness and length will be determined in accordance with the guidance provided in Nonmandatory Appendix Q (paragraph Q-3000(a)) and ASME Section XI, paragraph IWB-3640, 2007 Edition through the 2008 Addenda for the evaluation methodology for flawed pipe. The overlay will completely cover the area of the flaw and other Alloy 182 or susceptible austenitic stainless steel material with the highly resistant Alloy 52M weld filler material. The overlay length will conform to Nonmandatory Appendix Q, paragraph Q-3000(a), which satisfies the stress and load transfer requirements.

In order to apply the necessary weld overlay geometry, it will be necessary to weld on the low alloy steel nozzle base material. A temper bead welding approach will be used for this purpose following ASME Section XI Code Case N-638-4 as described herein. This code case provides for fabricating machine GTAW temper bead weld repairs to P-No. 3 Group No. 3 nozzle base

**10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining
Nozzle to Control Rod Drive End Cap**

materials at ambient temperature. The temper bead approach was selected because temper bead welding is an acceptable alternative to the requirement for post-weld heat treat of the heat-affected zone in welds on low alloy steel material. Also, the temper bead welding technique produces excellent toughness and ductility as demonstrated by welding procedure qualification in the heat-affected zone of welds on low alloy steel materials and, in this case, results in compressive residual stresses on the inside surface, which assists in inhibiting SCC. This approach provides a comprehensive weld overlay repair and increases the volume under the overlay that can be examined.

<u>Pressure Testing</u>

The completed repair shall be pressure tested in accordance with ASME Section XI Nonmandatory Appendix Q, Q-4400.

Basis for Use

Code Case N-638-4 is approved (with two conditions) for generic use in RG 1.147, Revision 17, and was developed for both similar and dissimilar metal welding using ambient temperature machine GTAW temper bead technique. The welding methodology of Code Case N-638-4 will be followed for the overlay, whenever welding within the 0.125-minimum distance from the low alloy steel nozzle base material.

Nonmandatory Appendix Q is approved in 10 CFR 50.55a with no conditions and was developed for welding on and using austenitic stainless steel material. An alternative application for nickel-based and low alloy steel materials is proposed due to the specific configuration of this weldment. The weld overlay proposed is austenitic material having a mechanical behavior similar to austenitic stainless steel. It is also compatible with the existing weld and base materials. The methodology of Nonmandatory Appendix Q will be followed with the following exceptions:

<u>Alternative to Appendix Q, Requirement Q-2000(a)</u>

Q-2000(a) requires the weld overlay to be low carbon (0.035% maximum) austenitic stainless steel. A consumable welding wire highly resistant to SCC was selected for the overlay material. This material, designated as UNS N06054, FN 43, is a nickel-based alloy weld filler material, commonly referred to as Alloy 52M, and will be deposited using the machine GTAW process with cold wire feed. Alloy 52M contains about 30% chromium, which imparts excellent corrosion resistance to the material. By comparison, Inconel 82 is identified as an SCC resistant material in NUREG-0313, Revision 2, and contains nominally 20% chromium, while Alloy 182 has a nominal chromium content of 15%. With its significantly higher chromium content than Inconel 82, Alloy 52M provides an even a higher level of resistance to SCC consistent with the

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

requirements of the code case. Therefore, this alternative provides an acceptable level of quality and safety.

Alternative to Appendix Q, Requirement Q-2000(d)

Q-2000(d) requires the first two layers of the weld overlay to have a ferrite content of at least 7.5 FN. The composition of nickel-based Alloy 52M is such that delta ferrite does not form during welding, because Alloy 52M welds are 100% austenitic and contain no delta ferrite due to the high nickel composition (approximately 60% nickel). Consequently, delta ferrite measurements will not be performed for this overlay. Therefore, this alternative provides an acceptable level of quality and safety.

Alternative to Code Case N-638-4, Paragraph 4(a) and 4(a)(4)

Code Case N-638-4, Paragraph 4(a) and 4(a)(4), state that all welds (including repair welds) shall be examined in accordance with the requirements and acceptance criteria of the Construction Code or ASME Section III. As an alternative, CNS proposes to examine the weld overlay in accordance with the requirements and acceptance criteria of Nonmandatory Appendix Q, Article Q-4000 of ASME Section XI. The examination requirements and acceptance standards in Nonmandatory Appendix Q, paragraph Q-4100 were developed specifically for weld overlays unlike those in Code Case N-638-4. However, the examinations required by Nonmandatory Appendix Q will not be performed until after the three tempering layers have been in place for at least 48 hours as required by 4(a)(2) of Code Case N-638-4.

Nonmandatory Appendix Q, Article Q-4000, requires UT examination procedures and personnel to be qualified in accordance with Appendix VIII of ASME Section XI. Supplement 11 of Appendix VIII addresses qualification requirements for weld overlays, but is limited to full structural overlaid wrought austenitic piping welds.

Alternative to 2007 Edition with 2008 Addenda of ASME Section XI, Appendix VIII, Supplement 11

The PDI qualification program for structural overlays does not implement Mandatory Appendix VIII, Supplement 11, but is based on Code Case N-653-1 with modifications. The attached Table 1 provides a comparison of Supplement 11 requirements and the alternate requirements contained within EPRI PDI guidance documents, written in accordance with Code Case N-653-1. Based on the attached Table and as described below, use of the EPRI PDI qualification program for qualification of procedures and personnel as an alternative to ASME Section XI, Mandatory Appendix VIII, Supplement 11 will provide an acceptable level of quality and safety.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

- The scope was changed to broaden the applicability of Supplement 11.

    - The title of ASME Section XI, Supplement 11 in the 2007 Edition with Addenda through 2008 is "Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds." When originally written, this was accurate for the extent of usage of weld overlay repairs. However, the use of weld overlays has broadened. Weld overlays are now being designed that are not intended as full-structural replacements to the original weld and base material. In addition, weld overlays are now being applied over cast austenitic stainless steel piping welds, as well as wrought. Therefore, the alternatives proposed within this relief request are required to broaden the applicability of Supplement 11 as written in the 2007 Edition with Addenda through 2008 of the ASME Section XI Code.

- The names of the grading units were changed from base metal and overlay fabrication to inservice and preservice respectively.

    - Originally, Supplement 11 was written to cover the examination of weld overlay repairs of BWR recirculation piping welds, which were applied due to SCC. At the time, SCC was only occurring in the base metal adjacent to the weld (in the heat affected zone). Therefore, for qualification purposes, it was appropriate to refer to the grading units intended to contain cracking in the original pipe as "base metal" grading units. Subsequently, mechanisms have been discovered that cause cracking not only in the base metal, but also in the weld and buttering of these types of welds. Overlays are being applied to welds in PWRs, as well, where the cracking is primarily found in the weld and buttering material. Therefore, it is now more appropriate to call the grading unit for the original piping an "inservice" grading unit, which is a broad enough term to encompass flaws in the base material or weld material. Since the term for grading units in the original piping was being changed to "inservice", it seemed appropriate to change the term for grading units intended to contain fabrication related discontinuities in the weld overlay (i.e. bonding and weld cleanliness) to "preservice". It is during the preservice inspection that these indications are expected to be discovered.

    - The term base metal flaws was changed to service-induced flaws and the term overlay fabrication flaws was changed to fabrication-induced flaws in this revision.

    - This relief request proposes using "service-induced flaws" as an alternative to the term "base metal flaws" and "fabrication-induced flaws" as an alternative to "overlay fabrication flaws" to describe the flaw types to make them broad enough to encompass all currently recognized degradation mechanisms.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

- Provisions have been added for qualification of "optimized" weld overlays.
  - The qualification requirements provided in ASME Section Xl, Appendix VIII, Supplement 11 were written strictly for weld overlay repairs designed as full structural replacements for the original weld and base material beneath them. The volumetric examination coverage required for full structural weld overlays was the thickness of the overlay, plus the outer 25% of the original weld and base material. Since that time, the industry has begun to use overlay repairs on larger piping systems, for which full structural overlays are not practical, due to the weight they would add to the piping system and the time it would take to install them. These new "optimized" weld overlays are thinner and are designed as a partial structural replacement to the original piping. They are only designed as a repair for up to a 75% through-wall circumferential crack, instead of a 100% through-wall crack. Because of this, the volumetric examination requirements can be increased to greater than the outer 25% of the original base material. The proposed alternatives contain provisions to allow for qualification of this extended examination volume.
- Qualification for width sizing of laminar flaws is now addressed.
  - The acceptance criteria for laminar flaws in a weld overlay repair are based upon, among other things, the total area of the flaw. However, Supplement 11 only contains provisions for length sizing and is silent on qualification for width sizing. The common technique for both length sizing and width sizing of laminar flaws is to map the edges of the flaw using a 0° (straight beam) transducer. There is virtually no difference in these measurements in terms of axial versus circumferential directions. Therefore, this relief request includes a clarifying sentence for the qualification for both length and width sizing of laminar flaws.

<u>Additional NDE Information</u>

The length, surface finish, and flatness of the weld overlay will comply with Q-4100(a) to facilitate examination in accordance with ASME Section XI, Appendix Q. Figure Q-4100-1 describes the examination volume for acceptance examination while Figure Q-4300-1 does the same for preservice and inservice examinations. Preservice and inservice examination requirements are specified in Q-4200 and Q-4300 of Appendix Q. The examinations required by Nonmandatory Appendix Q as described by this request for alternative will provide adequate assurance that the integrity of the proposed weld overlay is consistent with the structural integrity assumptions of the design.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

Duration of Proposed Alternative

This proposed alternative will be used for the Fifth Ten-Year Interval of the Inservice Inspection Program for CNS.

Precedents

Similar Request for Alternatives previously approved by the NRC.

1. US NRC Letter to Nebraska Public Power District, "Cooper Nuclear Station - Request for Relief No. RI-35 for Fourth 10-Year Inservice Inspection Interval Regarding Weld Overlay Repair (TAC No. MD8025)," dated August 15, 2008 (ML082130483).

2. US NRC Letter to Entergy Nuclear Operations, Inc., "Palisades Nuclear Plant - Relief Request Number RR-4-19, Proposed Alternative to the Requirements of ASME Code Case N-638-4, (TAC No. MF3517)," dated August 13, 2014 (ML14199A557).

3. US NRC Letter to Dominion Nuclear Connecticut, Inc., "Request for Approval to Use IR-2-47 for Dissimilar Metal Weld Overlays as an Alternative Repair Technique (TAC No. MD3379)," dated May 3, 2007 (ML071210024).

Attachment to this Relief Request

The following is a two column Table providing the ASME Section XI, Appendix VIII, Supplement 11, 2007 Edition with 2008 Addenda requirements as compared with requirements contained within EPRI PDI Supplement 11 demonstration documents, written in accordance with Code Case N-653-1.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
None	**SCOPE** This Case provides qualification requirements for detection and length and depth sizing for both service-induced and fabrication-induced flaws. It is applicable for wrought austenitic, ferritic, or dissimilar metal welds, overlaid with austenitic weld material.
1.0 SPECIMEN REQUIREMENTS	**SPECIMEN REQUIREMENTS**
Qualification test specimens shall meet the requirements listed herein, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.	Qualification test specimens shall meet the requirements listed in this document, unless a set of specimens is designed to accommodate specific limitations stated in the scope of the examination procedure (e.g., pipe size, weld joint configuration, access limitations). The same specimens may be used to demonstrate both detection and sizing qualification.
1.1 General. The specimen set shall conform to the following requirements. (a) Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.	General - The specimen set shall conform to the following requirements. Specimens shall have sufficient volume to minimize spurious reflections that may interfere with the interpretation process.
(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. (600 mm) or larger, the specimen set must include at least one specimen 24 in. (600 mm) or larger but need not include the maximum diameter. The specimen set shall include at least one specimen with overlay not thicker than 0.1 in. (2.5 mm) more than the minimum thickness, and at least one specimen with overlay not thinner than 0.25 in. (6 mm) less than the maximum for which the examination procedure is applicable.	The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times the nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. (610 mm) or larger, the specimen set must include at least one specimen 24 in. (610 mm) or larger but need not include the maximum diameter. The specimen set must include specimens with overlay not thicker than 0.1 in. (2.5 mm) more than the minimum thickness, and at least one specimen with overlay not thinner than 0.25 in. (6 mm) less than the maximum thickness for which the examination procedure is applicable.
(c) The surface condition of at least two specimens shall approximate the roughest surface condition for which the examination procedure is applicable.	The surface condition of at least two specimens shall approximate the roughest surface condition for which the examination procedure is applicable."
(d) Flaw Conditions (1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws. At least 70% of the flaws in the detection and sizing tests shall be actual cracks. Specimens containing IGSCC shall be used if they are	Service-induced Flaws Service-induced flaws shall be in or near the butt weld heat-affected zone, open to the inside surface. The examination procedure shall specify the examination volume. If the examination procedure specifies an examination volume greater than the outer 25% of the base metal wall thickness, the detection and sizing test sets shall include at least five representative flaws suitable to demonstrate the procedure capability in

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
available. If implantation of actual cracks produces spurious reflectors that are not characteristic of actual flaws, alternative flaws may be used but shall comprise not more than 30% of the total of base material flaws. Alternative flaws, if used, shall provide crack-like reflective characteristics and shall be semielliptical. The tip width of the alternative flaws shall not exceed 0.002 in.	this extended volume. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws. Specimens containing IGSCC shall be used when available. At least 70% of the flaws in the detection and sizing tests shall be actual cracks. If implantation of actual cracks produces spurious reflectors that are not characteristic of actual flaws; alternative flaws may be used but shall comprise not more than 30% of the total of base material flaws. Alternative flaws, if used, shall provide crack-like reflective characteristics. The shape of the alternative flaw is intended to simulate the growth pattern of actual flaws and may be semielliptical. The tip width of the alternative flaws shall not exceed 0.002 inches.
(2) Overlay fabrication flaws. At least 40% of the flaws shall be noncrack fabrication flaws (e.g., sidewall lack of fusion or laminar lack of bond) in the overlay or the pipe-to-overlay interface. At least 20% of the flaws shall be cracks. The balance of the flaws shall be of either type.	Fabrication-induced Flaws At least 40% of the flaws shall be non-crack fabrication flaws (e.g., sidewall lack of fusion or laminar lack of bond) in the overlay or the pipe-to-overlay interface. At least 20% of the flaws shall be cracks wholly contained in the overlay. The balance of the flaws shall be of either type.
(e) Detection Specimens (1) At least 20% but less than 40% of the base metal flaws shall be oriented within ±20 deg of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.	Detection Specimens (a) At least 20% but less than 40% of the base metal flaws shall be oriented within +20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.
(2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.	Specimens shall be divided into base metal (ISI) and overlay fabrication (PSI) grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws. ISI Grading Unit. A grading unit designed to include a portion of the original weld and base material and the weld overlay material above it and designed to contain service-induced flaws (cracks) PSI Grading Unit. A grading unit designed to include a portion of the weld overlay, including the interface between the weld overlay and the original weld and base material, and designed to contain fabrication-induced flaw types (e.g. interbead lack of fusion, laminar lack of bond, cracks). Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws.
(a)(1) A base metal grading unit includes the overlay material and the outer 25% of the original overlaid weld. The base metal grading unit shall	ISI grading units include the overlay material and the examination volume specified in the examination procedure. ISI grading units shall extend

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
extend circumferentially for at least 1 in. (25 mm) and shall start at the weld centerline and be wide enough in the axial direction to encompass one half of the original weld crown and at least 1/2 in. (13 mm) of the adjacent base material. For axially-oriented discontinuities, the axial dimension of the base metal grading unit may encompass the original weld crown and at least 1/2 in. (13 mm) of the adjacent base materials.	circumferentially for at least 1 inch (25 mm) and shall start at the weld centerline and shall be wide enough in the axial direction to encompass 1/2 of the original weld crown and at least 1/2 inch (13 mm) of the adjacent base material. The grading units shall be of various sizes. For an axially oriented discontinuity, the axial dimension of the base metal grading unit may encompass the original weld crown and at least 1/2inch (13 mm) of both adjacent base materials. The base metal grading unit shall not include the inner 75% of the overlaid weld and base metal, or base metal-to-overlay interface. For axially-oriented discontinuities, the axial dimension of the base metal grading unit may encompass the original weld crown and at least 1/2 in. (13 mm) of the adjacent base metal.
(2) When base metal flaws penetrate into the overlay material, the base metal grading unit shall not be used as part of any overlay grading unit.	If service-induced flaws penetrate into the overlay material, the base metal grading unit (ISI) shall not be used as part of any (PSI) grading unit.
(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.	Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws.
(b)(1) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 in. (25 mm).	PSI grading unit shall include the overlay material and the overlay-to-component interface for a length of at least 1 inch (25 mm).
(2) Overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. (25 mm) at both ends. Sufficient unflawed overlaid weld and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen.	PSI grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed overlay-to-component interface for at least 1 inch (25 mm) at both ends. Sufficient unflawed overlaid weld and base metal shall exist on both sides of the PSI grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one PSI grading unit shall not be used in another overlay (PSI) fabrication grading unit. PSI grading units need not be spaced uniformly about the specimen.
(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.	Detection sets shall be selected from Table VIII-S2-1. The detection sample sets shall contain at least ten flawed ISI grading units and five flawed PSI grading units. Additionally, for each type of grading unit, the sets shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
(f) Sizing Specimen [1.1] (1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be open to the inside surface. To assess sizing capabilities, sizing sets shall contain a representative distribution of flaw dimensions. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.	Sizing Specimens Sizing sample sets shall contain at least ten flaws. At least 30% of the flaws shall be overlay fabrication-induced flaws. At least 40% of the flaws shall be service-induced flaws and shall be open to the inside surface. Sizing sets shall contain a representative distribution of flaw dimensions that cover the examination volume specified in the examination procedure. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.
(2) At least 20% but less than 40% of the flaws shall be oriented axially. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.	At least 20% but less than 40% of the flaws shall be oriented axially. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access.
(3) Base metal flaws used for length sizing demonstrations shall be oriented circumferentially.	Service-induced flaws used for length sizing demonstrations shall be oriented circumferentially.
(4) Depth sizing specimen sets shall include at least two distinct locations where a base metal flaw extends into the overlay material by at least 0.1 in. (2.5 mm) in the through-wall direction.	Depth sizing specimen sets shall include at least two distinct locations where a service-induced flaw extends into the overlay material by at least 0.1 inches (2.5 mm) in the through-wall direction.
2.0 CONDUCT OF PERFORMANCE DEMONSTRATIONS	**PERFORMANCE DEMONSTRATION**
The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited. The overlay fabrication flaw test and the base metal flaw test may be performed separately.	The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited. The PSI test and the ISI test may be performed separately.
2.1 Detection Test. Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base or overlay fabrication) that are present for each specimen.	Detection Test Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (ISI or PSI) that are present for each specimen.
2.2 Length Sizing Test (a) The length sizing test may be conducted separately or in conjunction with the detection test.	Length Sizing Test The length sizing tests may be conducted separately or in conjunction with the detection test.
(b) If the length sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions	If the length sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements for the sizing specimens detailed above, additional specimens shall be provided to the

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.
(c) For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.	For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region.
(d) For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base metal wall thickness.	For flaws in ISI grading units, the candidate shall estimate the length of that part of the flaw that part of the flaw that is in the examination volume specified in the examination procedure.
2.3 Depth Sizing Test (a) Depth sizing consists of measuring the metal thickness above the flaw (i.e., remaining ligament), and may be conducted separately or in conjunction with the detection test.	Depth Sizing Test Depth sizing consists of measuring the metal thickness above the flaw (i.e., remaining ligament) and may be conducted separately or in conjunction with the detection test.
(b) If the depth sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	If the depth sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements for the sizing specimens above, additional specimens shall be provided to the candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.
(c) For a separate depth sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	For a separate depth sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.
3.0 ACCEPTANCE CRITERIA	**ACCEPTANCE CRITERIA**
3.1 Detection Acceptance Criteria. (a) Examination procedures shall be qualified as follows: (1) All flaws within the scope of the procedure shall be detected, and the results of the performance demonstration shall satisfy the acceptance criteria of Table VIII-S2-1 for false calls. (2) At least one successful personnel demonstration shall be performed meeting the acceptance criteria defined in 3.1(b).	Procedure Qualification In addition to the specimen and performance demonstration requirements, procedure qualification shall satisfy the following: (a) The specimen set shall include the equivalent of at least three personnel performance demonstration test sets. Successful personnel demonstrations may be combined to satisfy these requirements. (b) Detectability of all flaws in the procedure qualification test set within the scope of the procedure shall be demonstrated. Length and depth sizing shall meet the requirements of the below paragraphs. (c) At least one successful personnel demonstration shall be performed.

10 CFR 50.55a Request No. RR5-01 (continued)
Alternative Weld Overlay Repair for a Dissimilar Metal Weld Joining Nozzle to Control Rod Drive End Cap

SECTION XI, 2007 EDITION with 2008 Addendum, APPENDIX VIII, SUPPLEMENT 11 REQUIREMENTS VS. PDI PROGRAM REQUIREMENTS USED TO MEET CODE CASE N-653-1	
2007 Edition with 2008 Addendum ASME, Section XI, Appendix VIII, Supplement 11	**PDI Program Requirements**
(b) Examination equipment and personnel shall be considered qualified for detection if the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls.	Examination equipment and personnel shall be considered qualified for detection if the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. If the procedure is intended to be used to examine greater than the upper 25% of the original pipe volume, a candidate for personnel qualification shall not fail to detect more than one of the flaws located in the extended volume.
(c) The criteria in 3.1(a) and 3.1(b) shall be satisfied separately by the demonstration results for base metal grading units and by those for overlay fabrication grading units.	The detection test, length sizing test, and depth sizing test criteria shall be satisfied separately by the demonstration results for ISI grading units and by those for PSI grading units.
3.2 Sizing Acceptance Criteria. Examination procedures, equipment, and personnel are qualified for sizing when the results of the performance demonstration satisfy the following criteria. (a) The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 in. (19 mm). The length of a base metal flaw is measured at the 75% through-base-metal position.	Examination procedures, equipment, and personnel are qualified for length sizing. If the RMS error of the circumferential flaw length measurements, compared to the true circumferential flaw lengths, is not more than 0.75 in. (19mm). The length of a service-induced flaw is measured in accordance with the length sizing test requirements. Examination procedures, equipment, and personnel qualified for length sizing in accordance with the criteria above are considered qualified for both length and width sizing of laminar flaws.
(b) The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in. (3.2 mm).	Examination procedures, equipment and personnel are qualified for depth sizing if the RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 in (3.2 mm).