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BVY 09-066

December 14, 2009

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

SUBJECT: 10CFR50.55a(a)(3)(i) Inservice Inspection Program Request VY-ISI-014
Vermont Yankee Nuclear Power Station
Docket No. 50-271
License No. DPR-28

Dear Sir or Madam:

Section 50.55a of Title 10 of the Code of Federal Regulations requires that Inservice Inspection (ISI) of American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 piping be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. Pursuant to 10 CFR 50.55a(a)(3)(i) Entergy Nuclear Operations, Inc. (ENO) hereby requests NRC approval of the alternative to ASME Section XI, Sub Article IWB-2500 to allow reduced percentage requirements for nozzle to vessel weld and inner radius examinations. This alternative is requested for the fourth ten-year interval ISI program at Vermont Yankee Nuclear Power Station (VY), which began on September 1, 2003.

Approval of request VY-ISI-014 would allow reduced examination requirements through application of ASME Code Case N-702. The NRC has provided a Safety Evaluation approving the generic technical basis and acceptability criteria for application of Code Case N-702, which ENO has followed as detailed in the attached request. ENO requests approval of this request by November 30, 2010. Attachment 1 contains the description and basis for the request and Attachment 2 lists the affected nozzle assemblies.

There are no new regulatory commitments being made in this submittal.

Should you have any questions concerning this submittal, please contact Mr. David Mannai at 802-451-3304.

Sincerely,

A handwritten signature in black ink, appearing to read "MJC/PLC".

MJC/PLC

A047
MJC

Attachments: 1. 10CFR50.55a(a)(3)(i) Inservice Inspection Program Request VY-ISI-014
2. Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii Component Tables

cc: Mr. Samuel J. Collins
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Attachment 1

Vermont Yankee Nuclear Power Station

10CFR50.55a(a)(3)(i) Inservice Inspection Program Request VY-ISI-014

**Entergy Nuclear Operations, Inc
Vermont Yankee Nuclear Power Station
Request for Alternative In Accordance with 10 CFR 50.55a(a)(3)(i)
VY-ISI-014**

1. ASME Code Component(s) Affected

Code Class:	1
Component Numbers:	N1, N2, N3, N5, N6, N7, N8, N9, N10 (See Attachment 1 for detailed list of components)
Code References:	(1) ASME Section XI, 1998 Edition with 2000 Addenda (2) Code Case N-702
Examination Category:	B-D (Inspection Program B)
Item Number:	B3.90 and B3.100
Unit/Inspection Interval	Vermont Yankee / Fourth (4 th) 10-year interval September
Applicability:	2003 - August 2013

2. Applicable Code Requirement

ASME Section XI, 1998 Edition with 2000 Addenda Table IWB-2500-1, Examination Category B-D, Full Penetration Welds of Nozzles in Vessels – Inspection Program B requires a volumetric examination of all nozzles with full penetration welds to the vessel shell (or head) and integrally cast nozzles each 10-year interval. The subject components for this request for alternative consideration are the Reactor Vessel Nozzle-to-Vessel Welds (Item B3.90) and the Reactor Vessel Nozzle Inside Radii (Item B3.100).

3. Reason for Request

The twenty-five percent sampling level stated in Code Case N-702 (Reference 3) provides a significant reduction in worker dose exposure. Vermont Yankee Nuclear Power Station (VY) has estimated that the proposed reduction of inspection requirements would result in a reduction in worker dose exposure of approximately 8,000 mRem over the remainder of the current interval.

4. Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), an alternative is requested from performing the required examinations on 100% of the identified nozzle assemblies in Attachment 2. As an alternative, incorporation of Code Case N-702 (Reference 3) would require examination of a minimum of 25% of the nozzle-to-vessel welds and inner radius sections, including at least one nozzle from each system and nominal pipe size. For each of the identified nozzle assemblies in Table 1, both the inner radius and the nozzle-to-shell weld would be examined. Six (6) nozzle assemblies remain to be inspected for the remainder of the interval. Table 1 summarizes the affected nozzle assemblies listed in Attachment 2.

Table 1			
Group	Total Number	Minimum Number to be Examined	Comments
Recirculation Outlet (N1)	2	1	One to be examined in Period 3
Recirculation Inlet (N2)	10	3	Five completed in Period 1
Main Steam (N3)	4	1	Four completed in Period 2
Feedwater (N4)	4	4	Four completed in Period 2. Code Case excludes these nozzle examinations
Core Spray (N5)	2	1	One completed in Period 2
Instrument (N6)	2	1	One to be examined in Period 2
Head Vent (N7)	1	1	To be examined in Period 3
Jet Pump Instrument (N8)	2	1	One to be examined in Period 3
CRD Return Line (N9)	1	1	To be examined in Period 3. Code Case excludes this nozzle VY CRD Line is capped and as such is no longer the return for CRD. Because N9 is a unique nozzle, it will be examined and an alternative is not being sought for this nozzle.
SBLC & Core DP (N10)	1	1	To be examined in Period 3

The examination schedule proposed in this alternative request will result in the Interval 4 examination percentages shown below, thus satisfying the requirements of Table IWB-2412-1.

	Period 1	Period 2	Period 3
ASME Cat. B-D Examinations	10	20	10
Period Cumulative Percentage	25%	75%	100%

Code Case N-702 stipulates that VT-1 examination may be used in lieu of the volumetric examination for the inner radii (Item No. B3.100). Note that VY is not currently using Code Case N-648-1 on enhanced magnification visual examination and currently has no plans of using Code Case N-648-1 in the future. All examinations on Item 3.100, inner radius sections, will be volumetric examinations.

5. Basis for Proposed Alternative

Electric Power Research Institute (EPRI) Technical Report 1003557, "BWR Vessel and Internals Project (BWRVIP), Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," (References 1 and 2) provides the basis for Code Case N-702. The evaluation found that failure probabilities

due to a Low Temperature Overpressure event at the nozzle blend radius region and nozzle-to-vessel shell weld are very low (i.e. $< 1 \times 10^{-6}$ for 40 years) with or without inservice inspection. The report concludes that inspection of 25% of each nozzle type is technically justified. BWRVIP-108 was originally submitted to the NRC for review and approval by the BWRVIP via BWRVIP letter 2002-323 on November 25, 2002 and supplemented by Tennessee Valley Authority (TVA) letter dated November 15, 2004, and BWRVIP letters dated July 25, 2006, and September 13, 2007.

On December 19, 2007, the NRC issued a Safety Evaluation (SE) (Reference 4) approving the use of BWRVIP-108. Within Section 5 of the SE, it states that each licensee should demonstrate the plant-specific applicability of the BWRVIP-108 report to their units in the request for alternative by meeting the criteria discussed in Section 5 of the SE.

The applicability of the BWRVIP-108 report to VY is demonstrated by showing the criteria within Section 5 of the SE are met.

- The general terms used in the SE Section 5 applicability evaluations are:

C_{i-RPV} = recirculation inlet nozzles (from BWRVIP-108 model) = 19332 psi

$C_{i-NOZZLE}$ = recirculation inlet nozzles (from BWRVIP-108 model) = 1637 psi

C_{o-RPV} = recirculation outlet nozzles (from BWRVIP-108 model) = 16171 psi

$C_{o-NOZZLE}$ = recirculation outlet nozzles (from BWRVIP-108 model) = 1977 psi

- The VY nozzle-specific terms to be used in the SER Section 5 applicability evaluations are as follows:

Heatup/ Cooldown rate = 100°F/hr

p = Reactor Pressure Vessel (RPV) normal operating pressure, $p = 1010$ psi

r = RPV inner radius, $r = 103$ "

t = RPV wall thickness, $t = 5.625$ "

r_{iN2} = inner radius for Recirculation Inlet N2 nozzles, $r_{iN2} = 6.875$ "

r_{oN2} = outer radius for Recirculation Inlet N2 nozzles, $r_{oN2} = 14.125$ "

r_{iN1} = inner radius for Recirculation Outlet N1 nozzles, $r_{iN1} = 12.875$ "

r_{oN1} = outer radius for Recirculation Outlet N1 nozzles, $r_{oN1} = 24.375$ "

Given the general and plant-specific terms, VY's conformance with the five (5) criteria is demonstrated as follows:

(1) Max RPV Heatup/Cooldown Rate

Criterion – the maximum RPV heatup/cooldown rate is limited to $< 115^\circ\text{F/hr}$

In accordance with Technical Specification 3.6.A.2 Reactor Coolant System heatup and cooldown rates are limited to a maximum of 100°F when averaged over any one hour period and thus meets the requirement of criterion (1).

VY operating procedures limit the heatup rate to $\leq 90^\circ\text{F/hr}$ and cooldown rate to between 50°F/hr and 90°F/hr . This procedural guidance has satisfactorily maintained heatup/cooldown rates within the Technical Specification limits.

(2) Recirculation Inlet (N2) Nozzles

Equation to meet criterion: $(pr/t) / C_{i-RPV} < 1.15$

$$[(1010 \text{ psig})(103'')/5.625'']/19332 = 0.96 < 1.15$$

The VY result is 0.96 and thus meets the requirement of criterion (2) to be < 1.15.

(3) Recirculation Inlet (N2) Nozzles

Equation to meet criterion: $[p(r_{oN2}^2 + r_{iN2}^2) \div (r_{oN2}^2 - r_{iN2}^2)] \div C_{i-NOZZLE} < 1.15$

$$[1010 \text{ psig } ((14.13'')^2 + (6.88'')^2) / ((14.13'')^2 - (6.88'')^2)] / 1637 = 1.00 < 1.15$$

The VY result is 1.00 and thus meets the requirement of criterion (3) to be < 1.15.

(4) Recirculation Outlet (N1) Nozzles

Equation to meet criterion: $(pr/t) / C_{o-RPV} < 1.15$

$$[(1010 \text{ psig})(103'')/5.625'']/16171 = 1.144 < 1.15$$

The VY result is 1.144 and thus meets the requirement of criterion (4) to be < 1.15.

(5) Recirculation Outlet (N1) Nozzles

Equation to meet criterion: $[p(r_{oN1}^2 + r_{iN1}^2) \div (r_{oN1}^2 - r_{iN1}^2)] \div C_{o-NOZZLE} < 1.15$

$$[1010 \text{ psig } ((24.38'')^2 + (12.88'')^2) / ((24.38'')^2 - (12.88'')^2)] / 1977 = 0.906 < 1.15$$

The VY result is 0.906 and thus meets the requirement of criterion (5) to be < 1.15

The results of the above equations demonstrate the applicability of the BWRVIP-108 report to VY by showing the criteria within Section 5 of the NRC SE are met. Therefore, the basis for using Code Case N-702 is demonstrated for VY.

6. Conclusion

Use of ASME Code Case N-702 provides an acceptable level of quality and safety in accordance with 10 CFR 50.55a(a)(3)(i) for all applicable RPV nozzle-to vessel shell full penetration welds and nozzle inner radii sections identified in Attachment 1, Tables 1 and 2.

7. Duration of Proposed Alternative

Upon approval by the NRC staff, this request for alternative will be utilized through the remainder of the VY Fourth Inspection Interval (September 1, 2003- August 31, 2013) for the nozzle assemblies listed in Attachment 1. The resubmittal of this request will occur as a part of an operating license renewal and new inspection interval. The use of Code Case N-702 is requested until such time as the ASME Code Case is published in a future revision of RG 1.147.

8. Precedents

The NRC Staff has approved similar Requests for Alternative for the following plants:

1. Duane Arnold Energy Center, Docket No. 50-331, TAC No. MD8193/August 29, 2008

2. Perry Nuclear Power Plant, Docket No. 50-440, TAC No. MD8458/December 29, 2008
3. Columbia Generating Station, Docket No. 50-397, TAC No. MD9850/April 8, 2009

9. References

1. EPRI Technical Report 1003557, "BWRVIP-108: BWR Vessel and Internals Project Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," dated October 2002
2. BWRVIP letter 2002-323, Carl Terry, BWRVIP Chairman, to NRC Document Control Desk, "Project No. 704- BWRVIP-108: BWR Vessel and Internals Project, Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," November 25, 2002
3. ASME Boiler and Pressure Vessel Code, Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1," dated February 20, 2004
4. Letter from Matthew A. Mitchell (NRR), to Rick Libra, BWRVIP Chairman, Safety Evaluation of Proprietary EPRI Report, 'BWR Vessel and Internals Project, Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Inner Radius (BWRVIP- 108),' dated December 19, 2007

Attachment 2

Vermont Yankee Nuclear Power Station

Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii Component Tables

Table 1 contains the nozzle assemblies that require nozzle-to-vessel weld examinations affected by this request. Table 2 contains the nozzle assemblies that require nozzle inner radius examinations affected by this request.

Table 1 Nozzle-to-Vessel Weld Examinations			
ASME Item	Comp ID	Item Description	Status
B3.90	N1A	28" Recirc Outlet	Will be examined Period 3
B3.90	N1B	28" Recirc Outlet	Requesting alternative to exam requirements
B3.90	N2A	12" Recirc Inlet	Examination complete Period 1
B3.90	N2B	12" Recirc Inlet	Examination complete Period 1
B3.90	N2C	12" Recirc Inlet	Examination complete Period 1
B3.90	N2D	12" Recirc Inlet	Examination complete Period 1
B3.90	N2E	12" Recirc Inlet	Examination complete Period 1
B3.90	N2F	12" Recirc Inlet	Requesting alternative to exam requirements
B3.90	N2G	12" Recirc Inlet	Requesting alternative to exam requirements
B3.90	N2H	12" Recirc Inlet	Requesting alternative to exam requirements
B3.90	N2J	12" Recirc Inlet	Requesting alternative to exam requirements
B3.90	N2K	12" Recirc Inlet	Requesting alternative to exam requirements
B3.90	N3A	18" Main Steam	Examination complete Period 2
B3.90	N3B	18" Main Steam	Examination complete Period 2
B3.90	N3C	18" Main Steam	Examination complete Period 2
B3.90	N3D	18" Main Steam	Examination complete Period 2
B3.90	N4A	10" Feedwater	Examination complete Period 2 - Augmented
B3.90	N4B	10" Feedwater	Examination complete Period 2 - Augmented
B3.90	N4C	10" Feedwater	Examination complete Period 2 - Augmented
B3.90	N4D	10" Feedwater	Examination complete Period 2 - Augmented
B3.90	N5A	8" Core Spray	Examination complete Period 2
B3.90	N5B	8" Core Spray	Requesting alternative to exam requirements
B3.90	N6A	6" Instrument	Will be examined Period 2
B3.90	N6B	6" Instrument	Requesting alternative to exam requirements
B3.90	N7	4" Head Vent	Will be examined Period 3
B3.90	N8A	4" Jet Pump Instrument	Will be examined Period 3
B3.90	N8B	4" Jet Pump Instrument	Requesting alternative to exam requirements
B3.90	N9	3" CRD Return Line	Will be examined Period 3 VY CRD Line is capped and as such is no longer the return for CRD. Because N9 is a unique nozzle, it will be examined and an alternative is not being sought for this nozzle.
B3.90	N10	2" SBLC & Core DP	Will be examined Period 3

Table 2
Nozzle Inner Radius Examinations

ASME Item	Comp ID	Item Description	Status
B3.100	N1A-IR	28" Recirc Outlet	Will be examined Period 3
B3.100	N1B-IR	28" Recirc Outlet	Requesting alternative to exam requirements
B3.100	N2A-IR	12" Recirc Inlet	Examination complete Period 1
B3.100	N2B-IR	12" Recirc Inlet	Examination complete Period 1
B3.100	N2C-IR	12" Recirc Inlet	Examination complete Period 1
B3.100	N2D-IR	12" Recirc Inlet	Examination complete Period 1
B3.100	N2E-IR	12" Recirc Inlet	Examination complete Period 1
B3.100	N2F-IR	12" Recirc Inlet	Requesting alternative to exam requirements
B3.100	N2G-IR	12" Recirc Inlet	Requesting alternative to exam requirements
B3.100	N2H-IR	12" Recirc Inlet	Requesting alternative to exam requirements
B3.100	N2J-IR	12" Recirc Inlet	Requesting alternative to exam requirements
B3.100	N2K-IR	12" Recirc Inlet	Requesting alternative to exam requirements
B3.100	N3A-IR	18" Main Steam	Examination complete Period 2
B3.100	N3B-IR	18" Main Steam	Examination complete Period 2
B3.100	N3C-IR	18" Main Steam	Examination complete Period 2
B3.100	N3D-IR	18" Main Steam	Examination complete Period 2
B3.100	N4A-IR	10" Feedwater	Examination complete Period 2 - Augmented
B3.100	N4B-IR	10" Feedwater	Examination complete Period 2 - Augmented
B3.100	N4C-IR	10" Feedwater	Examination complete Period 2 - Augmented
B3.100	N4D-IR	10" Feedwater	Examination complete Period 2 - Augmented
B3.100	N5A-IR	8" Core Spray	Examination complete Period 2
B3.100	N5B-IR	8" Core Spray	Requesting alternative to exam requirements
B3.100	N6A-IR	6" Instrument	Will be examined Period 2
B3.100	N6B-IR	6" Instrument	Requesting alternative to exam requirements
B3.100	N7-IR	4" Head Vent	Will be examined Period 3
B3.100	N8A-IR	4" Jet Pump Instrument	Will be examined Period 3
B3.100	N8B-IR	4" Jet Pump Instrument	Requesting alternative to exam requirements
B3.100	N9-IR	3" CRD Return Line	Will be examined Period 3 VY CRD Line is capped and as such is no longer the return for CRD. Because N9 is a unique nozzle, it will be examined and an alternative is not being sought for this nozzle.
B3.100	N10-IR	2" SBLC & Core DP	Will be examined Period 3