

**From:** Guzman, Richard  
**Sent:** Wednesday, July 24, 2013 10:56 AM  
**To:** Couture III, Philip  
**Subject:** RE: [FOLLOW-UP] Request for Additional Information - Relief Requests  
ISI-01 and ISI-03 dated March 27, 2013 - BVY 13-018 (TAC Nos.  
MF1196/1198)

Phil,

The NRC staff has reviewed the information provided in the Entergy RAI response letter dated June 27, 2013 (ADAMS Accession No. ML13183A065) regarding the subject Vermont Yankee relief request dated March 27, 2013 (ADAMS Accession No. ML13092A204), and has determined that follow-up additional information is needed to complete its review. See below supplemental RAI question RAI-4A. To support the staff's timely review, we request that you provide a formal response by August 30, 2013. Please let me know if you'd like to have a teleconference with the technical staff to discuss any clarifications necessary to address the question.

Thanks,

**Rich Guzman**  
**Sr. Project Manager**  
**NRR/DORL**  
**US NRC**  
**301-415-1030**  
[Richard.Guzman@nrc.gov](mailto:Richard.Guzman@nrc.gov)

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REQUEST FOR ADDITIONAL INFORMATION  
PROPOSED ALTERNATIVE REQUESTS FOR RELIEF NO ISI-03  
FIFTH TEN-YEAR INSPECTION INTERVAL  
NOZZLE-TO-VESSEL WELD, AND NOZZLE INNER RADIUS INSPECTIONS  
ENTERGY NUCLEAR OPERATIONS, INC.  
VERMONT YANKEE NUCLEAR POWER STATION  
DOCKET NOS. 50-271  
(TAC NO. MF1196)

RAI-4A

In response to RAI-4, by letter dated June 27, 2013 (ADAMS Accession No. ML13183A065), the licensee listed a number of nozzle-to-vessel welds and nozzle inner radii in which indications have been detected in previous inservice inspections (ISIs). The table in the attachment to the revised Relief Request ISI-03 provided in the letter dated June 27, 2013, provides the results of American Society of Mechanical Engineers Boiler and Pressure Vessel

Code (ASME Code), Section XI examinations of Vermont Yankee Nuclear Power Station (VYNPS) nozzle-to-vessel and nozzle inner radii from the Fourth Ten-Year ISI interval. In this table a number of nozzles have "Accept" in the results column. The NRC staff interprets "Accept" as implying that indications were detected but were acceptable under Section XI. A number of the nozzles having "Accept" in the results column are not nozzles mentioned in the response to RAI 4 as nozzles having previous indications. These are the N3A, N3B, N3D, N4A, N4B, N4C, and N4D nozzle-to-vessel welds, and N3A, N3B, N3C, and N3D inner radii. The RAI-4 response noted indications were detected during the Third Ten-Year ISI interval for the N4A and N4B nozzles but did not specify whether the indications were in the nozzle-to-vessel or nozzle inner radius. Therefore, it is not clear whether some of the nozzles with the result "Accept" have indications that have first been detected during the Fourth Ten-Year ISI interval. The staff notes that if any indications were accepted by analytical evaluation in accordance with the ASME Code, Section XI, IWB-3142.4, these indications must be subsequently examined in accordance with IWB-2420 (b) and (c).

Requested Information:

1. Clarify the meaning of "Accept" in the results column of the table.
2. Reconcile the difference in the nozzle-to-vessel weld and nozzle inner radii examinations with the result "Accept" for the Fourth Ten-Year ISI interval examinations with those nozzle-to-vessel welds and nozzle inner radii listed in the RAI 4 response as having previous indications.
3. Identify any nozzle-to-vessel welds and nozzle inner radii which had new indications detected during the Fourth Ten-Year ISI interval, and whether subsequent examinations in accordance with IWB-2420 (b) and (c) are required for any of these nozzles.

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**From:** Couture III, Philip [<mailto:pcoutur@entergy.com>]  
**Sent:** Thursday, June 27, 2013 4:11 PM  
**To:** Guzman, Richard  
**Subject:** RE: Request for Additional Information - Relief Requests ISI-01 and ISI-03 dated March 27, 2013 - BNY 13-018 (TAC Nos. MF1196/1198)

Rich,

Attached is an advance copy of the RAI response.

Phil Couture  
Vermont Yankee Licensing  
802-451-3193

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**From:** Guzman, Richard [<mailto:Richard.Guzman@nrc.gov>]  
**Sent:** Wednesday, May 08, 2013 1:39 PM  
**To:** Couture III, Philip

**Subject:** Request for Additional Information - Relief Requests ISI-01 and ISI-03 dated March 27, 2013 - BVY 13-018 (TAC Nos. MF1196/1198)

Phil,

The NRC staff has reviewed the information provided in the subject relief request letter dated March 27, 2013 (Agencywide Documents Access and Management System Accession No. ML13092A204), and has determined that additional information is needed to complete its review. Shown below is the NRC staff's request for additional information (RAI) questions. To support the staff's timely review, we request that you provide a formal response by June 28, 2013. Please contact me if you have any questions.

Thanks,

**Rich Guzman**  
**Sr. Project Manager**  
**NRR/DORL/LPL1-1**  
**US NRC**  
**301-415-1030**

REQUEST FOR ADDITIONAL INFORMATION  
PROPOSED ALTERNATIVE REQUESTS FOR RELIEF NOS. ISI-01 AND ISI-03  
FIFTH TEN-YEAR INSPECTION INTERVAL  
REACTOR PRESSURE VESSEL CIRCUMFERENTIAL WELD, NOZZLE-TO-VESSEL WELD, AND  
NOZZLE INNER RADIUS INSPECTIONS  
ENTERGY NUCLEAR OPERATIONS, INC.  
VERMONT YANKEE NUCLEAR POWER STATION  
DOCKET NOS. 50-271  
(TAC NOS. MF1196 AND MF1198)

By letter dated March 27, 2013 (ADAMS Accession No. ML13092A204), Entergy Nuclear Operations, Inc. (Entergy), the licensee for Vermont Yankee Nuclear Power Station (VYNPS), submitted requests for relief from American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI.

The alternative proposed in Relief Request RR-01 would eliminate the requirement to inspect the circumferential welds except for the areas of intersection with the axial welds consistent with the guidance provided in Generic Letter 98-05, "Boiling Water Reactor Licensee Use of the BWRVIP-05 Report to Request Relief from Augmented Examination Requirements on Reactor Pressure Vessel Circumferential Welds," dated November 10, 1998 (Ref. 1) and the NRC staff's safety evaluation (SE) for the report issued on July 28, 1998 (Ref.2).

The alternative proposed in Relief Request ISI-03 would allow a reduction in the percentage of nozzle-to-vessel welds and nozzle inner radii inspected during each ten-year inspection interval from 100% to 25%, in accordance with ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds." The technical basis for ASME Code Case N-702 was documented in an Electric Power Research Institute (EPRI) report for the Boiling-Water Reactor Vessel and Internals Project (BWRVIP); 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) (Ref. 3), which was approved by the NRC in a safety evaluation (SE) dated December 19, 2007 (Ref. 4). The staff's SE in Reference 4 specified plant-specific requirements which must be met by applicants proposing to use this alternative.

RAI 1

In Relief Request ISI-01, the licensee provided Table 4.2-5 reproduced from the VYNPS License Renewal Application (Ref. 5). The table provides the supporting data for the evaluation of the mean reference temperature ( $RT_{NDT}$ ), for the VYNPS limiting circumferential weld at 32 and 54 effective full power years (EFPY), and the limiting generic circumferential weld for a reactor pressure vessel (RPV) fabricated by Chicago Bridge & Iron Company (CB&I) at 32 EFPY and 64 EFPY. The generic CB&I mean  $RT_{NDT}$  values are from Table 2.6-4 and 2.6-5 of the staff's SE of BWRVIP-05 (Ref. 2). Note that the VYNPS 54 EFPY value is compared to the generic 64 EFPY value for additional conservatism. The licensee provided an "implied margin" value of 25.5 °F for the limiting CB&I weld at 64 EFPY and 16.5 °F for the limiting VYNPS circumferential weld at 54 EFPY. Note that for the analysis of limiting circumferential weld  $RT_{NDT}$  to support relief from inspection of the circumferential welds in accordance with Generic Letter 98-05, the mean  $RT_{NDT}$  is used rather than the upper bound  $RT_{NDT}$ , which is typically used in other RPV integrity evaluations. As clarified in Reference 6, mean  $RT_{NDT}$  means that the end-of-life  $RT_{NDT}$  is based on the initial (unirradiated)  $RT_{NDT}$  plus the shift in  $RT_{NDT}$  due to irradiation, calculated as the product of the chemistry factor and fluence factor as defined in Regulatory Guide 1.99, Revision 2, without a margin term. Reference 6 also corrected Table 2.6-4 from the staff's SE of BWRVIP-05, to revise the chemistry factor for the limiting CB&I circumferential weld from the original value in Reference 1 of 109.5 °F to 134.9 °F.

The NRC staff requests that the licensee review References 5 and 6 and revise Table 4.2-5 accordingly. If the replied margin term is to be retained, please provide the basis for calculating the implied margin term and why it is necessary.

### RAI 2

Relief Request ISI-03 provides the calculations for the VYNPS values of the parameters for plant-specific applicability criteria 2, 3, 4, and 5 from the staff's final SE of BWRVIP-108. The staff checked the licensee's calculations of the parameters related to criteria 2, 3, 4, and 5. The staff independently verified the geometric parameters to the extent possible. The Updated Final Safety Evaluation Report (UFSAR) for VYNPS, Revision 25, Table 1.7-6, provided a RPV inside diameter of 17 feet 2 inches (206 inches), resulting in a RPV inner radius (r) of 103 inches, consistent with the licensee's value. UFSAR Table 1.7-6 provides a RPV wall thickness of 5.187 inches which includes 1/8 inch (0.125 inch) cladding. Subtracting the cladding thickness yields an RPV wall thickness (t) of 5.062 inches, which is inconsistent with the licensee's value of 5.625 inches. The staff recalculated the parameters for Criterion 2 and Criterion 4, which both have "t" as an input. Using t = 5.062 inches results in Criterion 4 not being met, while Criterion 2 is still met.

For the Recirculation Inlet Nozzles (N2):

(Criteria 2)  $(pr/t) / C_{RPV} < 1.15$

$[(1010 \times 103) / 5.062] / 19332 = 1.063 < 1.15$

For Recirculation Outlet Nozzles (N1):

(Criteria 4)  $(pr/t) / CRPV < 1.15$

$[(1010 \times 103) / 5.062] / 16171 = 1.27 > 1.15$

The NRC staff therefore requests the licensee to provide a basis for use of a wall thickness of 5.625 inches for the Criterion 2 and Criterion 4 calculations, or revise the calculations to use a wall thickness consistent with that listed in the UFSAR.

### RAI 3

Clarify whether the attachment to Relief Request ISI-03 contains only examinations conducted during the most recent ISI ten-year interval. Have all nozzle-to-vessel welds and nozzle inner radii been inspected at least once? If not, explain why some nozzles have had no prior inspections.

### RAI 4

- a. For those nozzle-to-vessel welds and nozzle inner radii that had indications detected in previous ISI inspections, discuss whether these indications were determined to be fabrication defects or service-induced defects.
  
- b. Was any change in size of these indications noted in subsequent ISI examinations? If so, how was the change in size explained?

#### RAI 5

Provide the results of the 2010 Appendix VIII examination of the N5B nozzle-to-vessel weld, which is missing from the attachment.

#### References

1. EPRI TR-105697, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations," Sept. 1995 (BWRVIP-05) (ADAMS Accession No. ML032200246)
  
2. "Evaluation by the Office of Nuclear Reactor Regulation Related to Review of the Topical Report by the Boiling Water Reactor Vessel and Internals Project: BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)," Enclosure to Letter from Gus. C. Lainas to Carl Terry dated July 28, 1998, Subject: Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report (TAC No. M93925); (ADAMS Accession No. 9808040037)
  
3. 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, EPRI Technical Report 1003557, Final Report dated October 2002 (ADAMS Accession Nos. ML023360232 (Part 1) and ML023360234 (Part 2))
  
4. "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)" transmitted via letter from Matthew A. Mitchell to Rick Libra dated December 19, 2007 (ADAMS Accession No. ML073600374)
  
5. 2006/01/25-Vermont Yankee Nuclear Power Station License Renewal Application, January 25, 2006, (ADAMS Accession No. ML060300085)

6. Supplement to Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report dated March 7, 2000 (ADAMS Accession No. ML003690281)
  
7. Letter from R. J. Pascarelli to T.J. O'Connor dated February 8, 2011, Transmitting Staff Safety Evaluation for Monticello, Request for Relief No. 17 Regarding Examination of Reactor Pressure Vessel Shell Circumferential Welds, (ADAMS Accession No. ML110200700)
  
8. Letter from M. Khanna to M. J. Pacilio dated January 24, 2012, Transmitting Staff Safety Evaluation for Peach Bottom Atomic Power Station, Units 2 and 3 - Requests for Relief I4R-51 and I4R-52 (TAC Nos. ME5392, ME5393, ME5394 and ME5395). (ADAMS Accession No. ML112770217)