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JAFP-11-0112
October 3, 2011

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

SUBJECT: Relief Request (RR-8), Alternative Examination Requirements for Nozzle-to-Vessel Shell Welds and Nozzle Inner Radius Sections Using American Society of Mechanical Engineers Code Case N-702 and BWRVIP-108NP.
James A. FitzPatrick Nuclear Power Plant (JAF)
Docket No. 50-333
License No. DPR-59

REFERENCES:

1) ASME Code Case N-702: "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1", February 20, 2004.

2) BWRVIP-108NP: 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 1016123, November 2007.

Dear Sir or Madam,

Pursuant to 10CFR 50.55a(a)(3)(i), Entergy Nuclear Operations, Inc. (Entergy) requests NRC approval of Relief Request (RR-8), Alternative Examination Requirements for JAF Nozzle-to-Vessel Shell Welds and Nozzle Inner Radius Sections using the requirements of ASME Code Case N-702 and BWRVIP-108NP provisions (References 1 and 2).

ASME Section XI, Table IWB-2500-1 requires 100% examination of nozzle-to-vessel shell welds and nozzle inside-radius sections during the current Inservice Inspection (ISI) interval. JAF is in the 4th ISI interval, which began on March 1, 2007, and will end December 31, 2016. The Code of Record for JAF is ASME Section XI, 2001 Edition with the 2003 Addenda. The proposed alternative follows ASME Code Case N-702, which requires an examination of a minimum of 25% of the nozzle-to-vessel welds and nozzle inside radius sections. In addition, the code case requires at least one nozzle from each system and nominal pipe size. BWRVIP-108NP provides the technical basis for the reduction of examination requirements for BWR Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii.

The proposed alternative provides an acceptable level of quality and safety because it follows the requirements of ASME Code Case N-702 and the NRC approved technical basis (BWRVIP-108NP) for the alternative examinations presented in the enclosed Relief Request (RR-8).

The NRC has previously approved the proposed alternative examination requirements based on the above justification for the following plants:

1) Pilgrim Nuclear Power Station, Docket No. 50-293, TAC No. ME3290 / August 25, 2010
2) Duane Arnold Energy Center, Docket No. 50-331, TAC No. MD8193 / August 29, 2008
3) Perry Nuclear Power Plant, Docket No. 50-440, TAC No. MD8458 / December 29, 2008
4) Columbia Generating Station, Docket No. 50-397, TAC No. MD9850 / April 8, 2009
5) Clinton Power Station, Docket No. 50-461, TAC No. ME0218 / August 24, 2009
6) Dresden Nuclear Power Station, Docket Nos. 50-237 & 50-249, TAC Nos ME0882 & ME0883 / November 3, 2009

Entergy requests NRC approval of the proposed alternative pursuant to 10CFR 50.55a(a)(3)(i) by October 2012 with a 30 day implementation period.

There are no commitments made in this submittal.

If you have any questions or require additional information, please contact Mr. Joseph Pechacek, Licensing Manager, at 315-349-6766.

Sincerely

Joseph Pechacek
Licensing Manager

Enclosure: Fourth Interval ISI Program JAF Relief Request No. RR-8

cc: Regional Administrator, Region 1
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Enclosure to

Entergy Letter Number JAFP-11-0112

James A. FitzPatrick

Fourth Interval ISI Program, Relief Request No. RR-8

(9 pages including cover page)

1. ASME Code Component(s) Affected

Code Class:	1
Component Numbers:	N1, N3, N5, N8, CH Inst., CH Vent (See Attachment 1 for detailed list of components)
Code References:	ASME Section XI, 2001 Edition with 2003 Addenda
	ASME Code Case N-702: "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1."
	BWRVIP-108NP: 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."
Examination Category:	B-D (Inspection Program B)
Item Numbers:	B3.90 and B3.100
Description:	Alternative to ASME Section XI, Table IWB-2500-1
Unit/Inspection Interval:	James A. FitzPatrick (JAF) / Fourth (4th) 10-year interval starting March 1, 2007, ending December 31, 2016

2. Applicable Code Requirement

ASME Section XI, 2001 Edition with the 2003 Addenda (Reference 1), Table IWB-2500-1, Examination Category B-D, Full Penetration Welded 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. Additionally, for ultrasonic examinations, ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," is implemented; as required and modified by 10CFR 50.55a(b)(2)(xv). The subject components for this request for alternative examination requirements are the Reactor Pressure Vessel (RPV) nozzle-to-vessel welds (Item B3.90) and the RPV nozzle inside radius section (Item B3.100).

3. Reason for Request

The twenty-five percent sampling level stated in Code Case N-702 (Reference 2) provides a significant cost savings and reduction in worker dose. JAF has estimated that the proposed reduction of inspection requirements would result in an approximate cost savings of $22,444 and reduction in worker dose of 6.558 Rem over the remainder of the current interval.

4. Proposed Alternative

Pursuant to 10CFR 50.55a(a)(3)(i), an alternative is requested from performing the required examinations on 100% of the identified nozzle assemblies listed in Attachment 1. As an alternative, incorporation of Code Case N-702 would require examination of a minimum, 25% of the nozzle-to-vessel welds and nozzle inner radius sections, including at least one nozzle from each system and nominal pipe size as shown in Table 4-1. For each of the identified nozzle assemblies in Table 4-1, both the inner radius region and the nozzle-to-shell weld either have already been examined or will be examined during the 4th interval.

Table 4-1

JAF Summary - Affected Components

Group	Nozzle Description	Total Number	Minimum Number to be Examined	Comments
N1	Recirculation Outlet	2	1	1 scheduled 2nd period
N2	Recirculation Inlet	10	10	Attachment 2 applicability criteria not met.
N3	Main Steam	4	1	1 completed 1st period
N5	Core Spray	2	1	1 completed 1st period
N8	Jet Pump Instrumentation	2	1	1 completed 1st period
CH Inst.	Closure Head Instrumentation Nozzle	2	1	1 completed 1st period
CH Vent	Closure Head Vent Nozzle	1	1	1 scheduled 3rd period

Note: Feedwater (N4) nozzles and CRD Return (N9) nozzle are outside the scope of Code Case N-702 and are excluded from this application.

Code Case N-702 stipulates that the VT-1 examination method may be used in lieu of the volumetric examination method for the inner radius sections (Item No. B3.100). JAF has adopted ASME Code Case N-648-1 “Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles” (Reference 3), with the provisions stipulated in Regulatory Guide 1.147, in the JAF Fourth Interval ISI Program Plan. Therefore, JAF may perform examinations on inner radius sections with either the VT-1 or the volumetric examination method.

5. Basis for Proposed Alternative

Electric Power Research Institute (EPRI) Technical Report 1016123, "BWRVIP-108NP: 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" (Reference 4) provides the technical basis for use of Code Case N-702. The BWRVIP 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. < $1X\ 10^{-6}$ for 40 years) with or without inservice inspection. The report concludes that inspection of 25% of each nozzle type is technically justified.

BWRVIP-108 (Reference 5) was originally submitted to the NRC for review and approval via BWRVIP Letter 2002-323 (Reference 6) on November 25, 2002. This report was supplemented by Tennessee Valley Authority (TVA) letter dated November 15, 2004, and BWRVIP letters dated July 25, 2006, and September 13, 2007.

BWRVIP-108NP was originally submitted to the NRC for review and approval via BWRVIP Letter 2007-349 (Reference 7) on November 21, 2007. The non-proprietary report BWRVIP-108NP superseded the proprietary version previously transmitted to the NRC as BWRVIP-108. The content of the BWRVIP-108NP report is identical to that of the proprietary version. The BWRVIP is providing this non-proprietary version to facilitate use of the information in the report in public forums by the NRC and other organizations such as ASME.

On December 19, 2007, the NRC issued a Safety Evaluation (SE) (Reference 8) approving the use of BWRVIP-108. Section 5.0 of the SE identifies that each licensee should demonstrate the plant-specific applicability of the BWRVIP-108 report in their relief request.

The applicability of the BWRVIP-108NP report to JAF is demonstrated by showing that all the general and nozzle-specific criteria within Section 5.0 of the NRC Safety Evaluation are met. The criteria are evaluated in attachment 2.

- The general terms used in the SE Section 5.0 applicability evaluations are:

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

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

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

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

- The James A. FitzPatrick nozzle-specific terms to be used in the SE Section 5 applicability evaluations are as follows:

  Heatup / Cooldown rate < 100° F/hr

  p = Reactor Pressure Vessel (RPV) normal operating pressure, p = 1040 psig

  r = RPV inner radius, r = 110.25"

  t = RPV wall thickness, t = 6.875"

  r_{iN2} = inner radius for Recirculation Inlet N2 nozzles, r_{iN2} = 6.0"

  r_{oN2} = outer radius for Recirculation Inlet N2 nozzles, r_{oN2} = 10.22"

  r_{iNI} = inner radius for Recirculation Outlet N1 nozzles, r_{iN1} = 12.69"

  r_{oNI} = outer radius for Recirculation Outlet N1 nozzles, r_{oNI} =21.66"

The results of the equations in Attachment 2 demonstrate the applicability of the BWRVIP-108NP report to James A. FitzPatrick by showing the NRC Safety Evaluation Section 5.0 criteria are met for all nozzles listed in Table 4.1 with the exception of the JAF Recirculation system inlet (N2) nozzles.

Safety Evaluation Section 5.0 indicates that only the recirculation inlet and outlet nozzles criteria needs to be checked because the conditional probability of failure P(F|E), for other nozzles is an order of magnitude lower. The JAF N2 nozzles did not meet the SE third criterion and therefore Code Case N-702 would not be applied to the N2 nozzles.

Safety Evaluation Section 5.0 criteria and basis for using Code Case N-702 is demonstrated for James A. FitzPatrick for all nozzles listed in Attachment 1.

6. Duration of Proposed Alternative

Upon approval by the NRC staff, this relief request will be utilized through the remainder of James A. FitzPatrick's fourth inspection interval (March 1, 2007 - December 31, 2016) for the nozzle assemblies listed in Attachment 1.

7. Precedents

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

1) Pilgrim Nuclear Power Station, Docket No. 50-293, TAC No. ME3290 / August 25, 2010
2) Duane Arnold Energy Center, Docket No. 50-331, TAC No. MD8193 / August 29, 2008
3) Perry Nuclear Power Plant, Docket No. 50-440, TAC No. MD8458 / December 29, 2008
4) Columbia Generating Station, Docket No. 50-397, TAC No. MD9850 / April 8, 2009
5) Clinton Power Station, Docket No. 50-461, TAC No. ME0218 / August 24, 2009
6) Dresden Nuclear Power Station, Docket Nos. 50-237 & 50-249, TAC Nos. ME0882 & ME0883 / November 3, 2009

8. References

1) ASME Boiler and Pressure Vessel Code, Section XI, Division 1, 2001 Edition with the 2003 Addenda.
2) 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," February 20, 2004.
3) ASME Boiler and Pressure Vessel Code, Code Case N-648-1, “Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles,” September 7, 2001.
4) BWRVIP-108NP: 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 1016123, November 2007.

5) 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, October 2002.

6) 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.

7) BWRVIP letter 2007-349, Rick Libra, BWRVIP Chairman, to NRC Document Control Desk, "Project No. 704- BWRVIP-108NP: 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 21, 2007.

1) 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**.**

Table of ASME Code Components Affected at JAF			
Component ID	**Description**	**Code Category**	**Code Item**
N-1A	28" Recirc Outlet Nozzle to Vessel Weld	B-D	B3.90
N-1A-IR	28" Recirc Outlet Nozzle Inner Radius	B-D	B3.100
N-1B	28" Recirc Outlet Nozzle to Vessel Weld	B-D	B3.90
N-1B-IR	28" Recirc Outlet Nozzle Inner Radius	B-D	B3.100
N-3A	24" Main Steam Nozzle to Vessel Weld	B-D	B3.90
N-3A-IR	24" Main Steam Nozzle Inner Radius	B-D	B3.100
N-3B	24" Main Steam Nozzle to Vessel Weld	B-D	B3.90
N-3B-IR	24" Main Steam Nozzle Inner Radius	B-D	B3.100
N-3C	24" Main Steam Nozzle to Vessel Weld	B-D	B3.90
N-3C-IR	24" Main Steam Nozzle Inner Radius	B-D	B3.100
N-3D	24" Main Steam Nozzle to Vessel Weld	B-D	B3.90
N-3D-IR	24" Main Steam Nozzle Inner Radius	B-D	B3.100
N-5A	10" Core Spray Nozzle to Vessel Weld	B-D	B3.90
N-5A-IR	10" Core Spray Nozzle Inner Radius	B-D	B3.100
N-5B	10" Core Spray Nozzle to Vessel Weld	B-D	B3.90
N-5B-IR	10" Core Spray Nozzle Inner Radius	B-D	B3.100
N-8A	4" Jet Pump Instrumentation Nozzle to Vessel Weld	B-D	B3.90
N-8A-IR	4" Jet Pump Instrumentation Nozzle Inner Radius	B-D	B3.100
N-8B	4" Jet Pump Instrumentation Nozzle to Vessel Weld	B-D	B3.90
N-8B-IR	4" Jet Pump Instrumentation Nozzle Inner Radius	B-D	B3.100
N-TH-A	5.75" CH Instrument Nozzle to Vessel Weld	B-D	B3.90
N-TH-A-IR	5.75" CH Instrument Nozzle Inner Radius	B-D	B3.100
N-TH-B	3.812" CH Vent Nozzle to Vessel Weld	B-D	B3.90
N-TH-B-IR	3.812" CH Vent Nozzle to Vessel Inner Radius	B-D	B3.100
N-TH-C	5.75" CH Instrument Nozzle to Vessel Weld	B-D	B3.90
N-TH-C-IR	5.75" CH Instrument Nozzle Inner Radius	B-D	B3.100

Response to NRC Plant-Specific Applicability of BWRVIP-108 Criteria

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

(1) Max RPV Heatup / Cooldown Rate

1st Criterion - the maximum RPV heatup / cooldown rate is limited to < 115°F/hr

In accordance with Technical Specification 3.4.9, RCS Pressure and Temperature (P/T) is limited to ≤100°F when averaged over any one hour period. JAF meets the requirement of Criterion 1.

(2) Recirculation Inlet (N2) Nozzles

2nd Criterion - Equation: $(pr/t) / C_{i\text{-}RPV} < 1.15$

$[(1040)(110.25)/6.825]/19332 = 0.87 < 1.15$

The JAF result is 0.87 and thus meets the requirement of Criterion 2 to be less than 1.15.

(3) Recirculation Inlet (N2) Nozzles

3rd Criterion - Equation: $[p(r_{oN2}^2 + r_{iN2}^2) / (r_{oN2}^2 - r_{iN2}^2)] / C_{i\text{-}NOZZLE} < 1.15$

$[1040 (10.22^2 + 6^2) / (10.22^2 - 6^2)] / 1637 = 1.303 < 1.15$

The JAF result is 1.303 and thus does not meet the requirement of Criterion 3 to be less than 1.15.

(4) Recirculation Outlet (N1) Nozzles

4th Criterion - Equation: $(pr/t) / C_{o\text{-}RPV} < 1.15$

$[(1040)(110.25) / 6.825] / 16171 = 1.04 < 1.15$

The JAF result is 1.04 and thus meets the requirement of Criterion 4 to be less than 1.15

(5) Recirculation Outlet (N1) Nozzles

5th Criterion - Equation: $[p(r_{0N1}^2 + r_{iN1}^2) + (r_{0N1}^2 - r_{iN1}^2)] / C_{o\text{-}NOZZLE} < 1.15$

$[1040(21.66^2 + 12.69^2) / (21.66^2 - 12.69^2)] / 1977 = 1.08 < 1.15$

The JAF result is 1.08 and thus meets the requirement of Criterion 5 to be less than 1.15

JAF 4th INTERVAL OUTAGE SCHEDULE

4th Inspection Interval started March 1, 2007 and ends December 31, 2016.

PERIOD	OUTAGE	OUTAGE DATE
1	RFO18	September 2008
1	RFO19	September 2010
2	RFO20	September 2012
3	RFO21	September 2014
3	RFO22	September 2016