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U.S. Nuclear Regulatory Commission
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Subject: Alternative Examination Requirements for James A. FitzPatrick Nuclear Power Plant Nozzle-to-Vessel Welds and Nozzle Inner Radii Using ASME Code Case N-702 and BWRVIP-241

James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(z)(1), Entergy Nuclear Operations, Inc. (Entergy) requests NRC authorization to implement alternative examination requirements based on the American Society of Mechanical Engineers (ASME) Code Case N-702 and Boiling Water Reactor Vessel Inspection Program (BWRVIP)-241 as documented in the enclosed James A. FitzPatrick Nuclear Power Plant (JAF) Inservice Inspection Program Relief Request (RR)-18.

The NRC provided a Safety Evaluation approving the generic technical bases and acceptability criteria for application of Code Case N-702 and BWRVIP-241, which Entergy has followed as detailed in the enclosure. Entergy requests approval of the proposed alternative on or before January 7, 2017 to accommodate application of this request during the next refueling outage. Entergy plans to implement this alternative for the remainder of the fourth ISI interval. Although this review is neither exigent nor emergency, your prompt review is requested.

There are no new regulatory commitments made in this letter. Should you have any questions, please contact the Regulatory Assurance Manager, Mr. William C. Drews, at (315) 349-6562.

Very truly yours,

William C. Drews
Regulatory Assurance Manager

WCD:ds

Enclosure 1: James A. FitzPatrick Nuclear Power Plant Inservice Inspection Program RR-18

cc: USNRC, Regional Administrator, Region I
USNRC, Project Directorate
USNRC, Resident Inspector

JAFP-16-0136

Enclosure 1

James A. FitzPatrick Nuclear Power Plant
Inservice Inspection Program RR-18
(8 pages)

Entergy Nuclear Operations, Inc
James A. FitzPatrick Nuclear Power Plant
Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)
Fourth Interval ISI Program Relief Request No. RR-18

1. ASME Code Component(s) Affected

Code Class:	ASME Section XI Code Class 1
Component Numbers:	N2
Code References:	ASME Section XI, 2001 Edition with 2003 Addenda
	ASME Code Cases 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."
	BWRVIP-241: BWR Vessel and Internals Project: "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii."
Examination Category:	B-D (Inspection Program B)
Item Number(s):	B3.90 and B3.100
Unit/Inspection Interval:	James A. FitzPatrick Nuclear Power Plant (JAF) / Fourth (4^{th}) 10-year interval starting March 1, 2007, ending February 3, 2017.

2. Applicable ASME Code Requirements

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, "Performed Demonstration for Ultrasonic Examination Systems," is implemented; as required and modified by 10CFR50.55a(b)(2)(xv). The subject components for this request for alternative examination requirements are the N2 Recirculation Inlet Nozzle-to-Vessel Welds (Items B3.90) and the N2 Recirculation Inlet Nozzle Inner Radius Sections (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 exposure. JAF has estimated that the proposed reduction of inspection requirements would result in an approximate cost savings

of $750,000 and reduction in worker dose of 4.5 Rem over the remainder of the current interval while providing an acceptable level of quality and safety.

4. Proposed Alternative and Basis for Use

Pursuant to 10 CFR 50.55a(z)(1), an alternative is requested from performing the required examinations on 100% of the N2 Recirculation Inlet nozzles (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 nominal pipe size. JAF has a total of ten N2 Recirculation Inlet nozzle assemblies, all of nominal 12" pipe size. Fulfillment of the Code Case N-702 requirement will be accomplished via inspection of three N2 Recirculation Inlet nozzle assemblies. Five of the N2 Recirculation Inlet nozzle assemblies or 50% have been inspected during the current interval, with no recordable indications identified. Therefore, the Code Case N-702 requirements have been met.

JAF received NRC approval to utilize ASME Code Case N-702 for the fourth 10-year inservice inspection interval by letter dated October 17, 2012 (Relief Request No. 8; Reference 10). The N2 Recirculation Inlet nozzles were excluded from the alternative associated with Relief Request No. 8 because they did not meet the third criterion specified in Section 5.0 of the staff's safety evaluation for the BWRVIP-108 report for plant-specific application of ASME Code Case N-702. On April 19, 2013, the NRC issued a safety evaluation (Reference 9) approving the use of BWRVIP-241, which contains relaxed criteria. As demonstrated herein, JAF meets the BWRVIP-241 criteria. Therefore, JAF is requesting NRC approval to apply ASME Code Case N-702 to the N2 Recirculation Inlet nozzles for the remainder of the fourth 10-year inservice inspection interval (ending February 3, 2017).

5. Basis for Proposed Alternative

In August of 2014, Revision 17 to Regulatory Guide (RG) 1.147 (Reference 11) was issued by the NRC. This revision added Code Case N-702 to Table 2: Conditionally Acceptable Section XI Code Cases with the following condition:

> "The technical basis supporting the implementation of this Code Case is addressed by 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 (ML-023330203) and BWRVIP-241: BWR Vessel and Internals Project, "Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," EPRI Technical Report 1021005, October 2010 (ML11119A041). The applicability of

Code Case N-702 must be shown by demonstrating that the criteria in Section 5.0 of NRC Safety Evaluation regarding BWRVIP-108 dated December 18, 2007 (ML073600374) or Section 5.0 of NRC Safety Evaluation regarding BWRVIP-241 dated April 19, 2013 (ML13071A240) are met. The evaluation demonstrating the applicability of the Code Case shall be reviewed and approved by the NRC prior to the application of the Code Case."

The applicability of the criteria in Section 5.0 of NRC Safety Evaluation regarding BWRVIP-241 to the recirculation inlet nozzles at JAF is demonstrated as shown below:

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

  $C_{i\text{-}RPV}$ = recirculation inlet nozzles (from BWRVIP-108NP model) = 19332 psi
  $C_{i\text{-}NOZZLE}$ = recirculation inlet nozzles (from BWRVIP-108NP model) = 1637 psi

- The JAF 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 = 110.375"
  t = RPV wall thickness, t = 6.875" "

  r_{iN2} = inner radius for Recirculation Inlet N2 nozzles, r_{iN2} = 6.19"
  r_{oN2} = outer radius for Recirculation Inlet N2 nozzles, r_{oN2} = 10.22"

(1) Max RPV Heatup / Cooldown Rate
First 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) Limits, the maximum RPV heatup / cooldown rate is limited to ≤ 100°F when averaged over any one hour period. JAF meets this criterion.

(2) Recirculation Inlet (N2) Nozzles
Second criterion – Equation: $(pr/t) / C_{i\text{-}RPV} < 1.15$
$[(1040)(110.375)/6.875]/19332 = 0.864 < 1.15$
The JAF result is 0.864, which meets the requirement of this criterion.

(3) Recirculation Inlet (N2) Nozzles
Third criterion – Equation: $[p(r_{oN2}^2+r_{iN2}^2)/(r_{oN2}^2-r_{iN2}^2)] / C_{i\text{-}NOZZLE} < 1.47$
$[1040\ (10.22^2 + 6.19^2) / (10.22^2 - 6.19^2)] /1637 = 1.371 < 1.47$
The JAF result is 1.371, which meets the requirement of this criterion.

Criteria 4 and 5 relate solely to recirculation outlet (N1) nozzles which were granted relief to utilize Code Case N-702 on October 17, 2012 as part of Relief Request No. 8 (Reference 10).

The NRC Safety Evaluation Section Criteria are met for all nozzles listed in Attachment 1. Therefore, the basis for using Code Case N-702 is demonstrated for the JAF N2 Recirculation Inlet nozzles.

5. Duration of Proposed Alternative

Upon approval by the NRC staff, this alternative will be utilized through the remainder of JAF's fourth inspection interval (March 1, 2007 – February 3, 2017) for the N2 Recirculation Inlet nozzle assemblies (Attachment 1).

6. Precedents

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

1) COLUMBIA GENERATING STATION - REQUEST FOR ALTERNATIVE 3ISI-14 TO THE REQUIREMENTS OF THE ASME CODE (TAC NO. MF3435) dated February 13, 2015, ML15036A220
2) PILGRIM NUCLEAR POWER PLANT - RELIEF REQUEST PRR-24 REGARDING NOZZLE-TO-VESSEL WELDS AND NOZZLE INNER RADII EXAMINATIONS (TAC NO. MF4187) dated April 21, 2015, ML 15103A069

7. 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, "Alternate 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 letter 2002-323, Carl Terry, 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.
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) EPRI Technical Report 1021005, "BWRVIP-241, Probabilistic Fracture Mechanics Evaluation for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii," dated October 2010.
7) NRC Safety Evaluation of Proprietary EPRI Report, "BWR Vessels 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.
8) 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.
9) NRC SE of the Boiling Water Reactor Vessel Internals Project (BWRVIP) – 241 Report, Probabilistic Fracture Mechanics for the Boiling- Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii (TAC NO. ME6238) dated April 19, 2013.
10) James A. FitzPatrick Nuclear Power Plant Issuance of Relief From the Requirements of The American Society of Mechanical Engineers Boiler And Pressure Vessel Code (TAC No. ME7243) dated October 17, 2012.
11) Regulatory Guide 1.147, Revision 17: Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1 dated August 2014.

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Fourth Interval ISI Program Relief Request No. RR-18

Attachment 1

Table of ASME Code Components Affected at JAF

Component ID	Description	Code Category	Code Item	Inspections	Indications (note 6)
N-2A-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1990, 1998	NRI
N-2A	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1977, 1990, 1998	1990 (note 2) 1998 (note 4)
N-2B-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1995, 1998, 2008	NRI
N-2B	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1995, 1998, 2008	NRI
N-2C-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1988, 2006	NRI
N-2C	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1978, 1989, 2006	NRI
N-2D-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1988, 2006	NRI
N-2D	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1989, 2006	1989 (note 1)
N-2E-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1995, 1998, 2008	NRI

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Component ID	Description	Code Category	Code Item	Inspections	Indications (note 6)
N-2E	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1977, 1995, 1998, 2008	NRI
N-2F-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1988, 2002, 2008	NRI
N-2F	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1989, 2002, 2008	NRI
N-2G-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1988, 2006	NRI
N-2G	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1989, 2006	NRI
N-2H-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1995, 1998, 2012	NRI
N-2H	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1977, 1995, 1998, 2012	NRI
N-2J-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1988, 1992, 2006	NRI
N-2J	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1981, 1992, 2006	1992 (note 3)

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Component ID	Description	Code Category	Code Item	Inspections	Indications (note 6)
N-2K-IR	12" Recirc Inlet Nozzle to Inner Radius	B-D	B3.100	1995, 1998, 2012	NRI
N-2K	12" Recirc Inlet Nozzle to Vessel Weld	B-D	B3.90	1995, 1998, 2012	1998 (note 5)

Notes:

1. N-2D - 1989, Laminar Reflector was evaluated in the base metal and was found acceptable under ASME XI.
2. N-2A – 1990, Laminar indication noted approximately 1" x 1" and evaluated as acceptable under ASME XI.
3. N-2J – 1992, Fabrication indications/reflectors identified in the pre-service inspection were also identified in the 1992 inspection.
4. N-2A – 1998, Typical of plate segregates and required no evaluation for acceptance – acceptable.
5. N-2K - 1998, Typical of plate segregates and required no evaluation for acceptance – acceptable.
6. No Reportable Indications (NRI)