

February 28, 2008

Vice President, Operations
Entergy Nuclear Operations, Inc
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT – RELIEF REQUEST
NO. RR-6, IMPLEMENTATION OF BWRVIP GUIDELINES IN LIEU OF ASME
CODE, SECTION XI REQUIREMENTS ON REACTOR VESSEL INTERNALS
COMPONENTS INSPECTION (TAC NO. MD4758)

Dear Sir or Madam:

By letter dated February 27, 2007, as supplemented by letters dated August 20, 2007 and December 4, 2007, Entergy Nuclear Operations, Inc. (Entergy or the licensee) submitted Relief Request No. RR-6 for James A. FitzPatrick Nuclear Power Plant (JAFNPP). The licensee's submittal proposed to use various Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines as an alternative to certain requirements of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for inservice inspection (ISI) of reactor vessel internal components. The request was made pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i).

As documented in the enclosed safety evaluation (SE), the Nuclear Regulatory Commission (NRC) staff reviewed your submittal and concluded that, with the exception of the proposed uses of BWRVIP-41, Revision 1 and BWRVIP-138, the proposed alternative to the ASME Code requirements is acceptable. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), relief is authorized for the fourth 10-year interval ISI program.

If you have any questions regarding this matter, please contact Adrian Muñiz at 301-415-4093.

Sincerely,

/RA/

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosure:
As stated

cc w/encl: See next page

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*With Comments

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NAME	AMuñiz	JBoska	SLittle	MMitchell	JAdler "NLO"	MKowal
DATE			2/13/08	2/25/08	2/27/08*	

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FitzPatrick Nuclear Power Plant
cc:

Senior Vice President
Entergy Nuclear Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Vice President Oversight
Entergy Nuclear Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Senior Manager, Nuclear Safety & Licensing
Entergy Nuclear Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Senior Vice President and COO
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Assistant General Counsel
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Manager, Licensing
Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
P.O. Box 110
Lycoming, NY 13093

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Resident Inspector's Office
James A. FitzPatrick Nuclear Power Plant
U. S. Nuclear Regulatory Commission
P.O. Box 136
Lycoming, NY 13093

Mr. Charles Donaldson, Esquire
Assistant Attorney General
New York Department of Law
120 Broadway
New York, NY 10271

Mr. Paul Tonko
President and CEO
New York State Energy, Research, and
Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Mr. John P. Spath
New York State Energy, Research,
and Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Mr. Paul Eddy
New York State Dept. of Public Service
3 Empire State Plaza
Albany, NY 12223-1350

Oswego County Administrator
Mr. Steven Lyman
46 East Bridge Street
Oswego, NY 13126

Supervisor
Town of Scriba
Route 8, Box 382
Oswego, NY 13126

Mr. James H. Sniezek
BWR SRC Consultant
5486 Nithsdale Drive
Salisbury, MD 21801-2490

Mr. Michael D. Lyster
BWR SRC Consultant
5931 Barclay Lane
Naples, FL 34110-7306

Mr. John Doering
BWR SRC Consultant
P.O. Box 189
Parker Ford, PA 19457

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST NO. RR-6

FOR THE FOURTH 10-YEAR INTERVAL OF THE INSERVICE INSPECTION PROGRAM

ENTERGY NUCLEAR OPERATIONS, INC.

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated February 27, 2007, as supplemented by letters dated August 20, 2007, and December 4, 2007, Entergy Nuclear Operations, Inc. (Entergy or the licensee) submitted its fourth 10-year interval inservice inspection (ISI) program plan Request for Relief No. RR-6 for James A. FitzPatrick Nuclear Power Plant (JAFNPP). The licensee's submittal proposes to use various Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines as an alternative to certain requirements of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for ISI of reactor vessel internal (RVI) components.

2.0 REGULATORY REQUIREMENTS

ISI of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC if: (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for ISI of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b),

Enclosure

twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable ASME Code of record for the fourth 10-year ISI interval for JAFNPP is the 2001 Edition with 2003 Addenda of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

3.1 Components for Which Relief is Requested

ASME Code, Section XI, Class 1, Examination Categories B-N-1 and B-N-2.

Code item Numbers:

B13.10, Vessel Interior
B13.20, Interior Attachments within Beltline Region
B13.30, Interior Attachments beyond Beltline Region
B13.40, Core Support Structures

3.2 Examination Requirements from which Relief is Requested

ASME Code, Section XI requires the visual examination (VT) of certain RVI components. These examinations are included in Table IWB-2500-1, Categories B-N-1 and B-N-2, and identified with the following item numbers:

- B13.10 - Examine accessible areas of the RV interior each period using a technique which meets the requirements for a VT-3 examination, as defined in paragraph IWA-2213 of the ASME Code, Section XI.
- B13.20 - Examine interior attachment welds within the beltline region each interval using a technique which meets the requirements for a VT-1 examination as defined in paragraph IWA-2211 of the ASME Code, Section XI.
- B13.30 - Examine interior attachment welds beyond the beltline region each interval using a technique which meets the requirements for a VT-3 examination, as defined in paragraph IWA-2213 of the ASME Code, Section XI.
- B13.40 - Examine surfaces of the core support structure each interval using a technique which meets the requirements for a VT-3 examination, as defined in paragraph IWA-2213 of the ASME Code, Section XI.

These examinations are performed to assess the structural integrity of the RVI components.

3.3 Applicable ASME Code Edition and Addenda

The ASME Code of Record for the fourth 10-year ISI interval for JAFNPP is the 2001 Edition with 2003 Addenda, of ASME Code, Section XI.

3.4 Licensee's Basis

The licensee concluded that the alternative inspections (described below) will maintain an adequate level of quality and safety of the affected welds and will not adversely impact the health and safety of the public. As part of its justification for the relief, the licensee stated that boiling-water reactors (BWRs) now examine RVI components in accordance with BWRVIP guidelines. These guidelines have been written to address the examination of safety significant RVI components using appropriate methods and reexamination frequencies. The licensee also noted that the NRC has agreed with the BWRVIP approach, in principle, and has issued safety evaluations (SEs) for these guidelines. [Note: "in principle" means that, for some reports, final SE reports have been written, but the final BWRVIP acceptance reports which incorporate these SEs for some of the reports may not have been issued]. Relief from examinations in Table IWB-2500-1 of the ASME Code are requested pursuant to 10 CFR 50.55a(a)(3)(i).

3.5 Alternative Examination

In lieu of the requirements of the 2001 Edition with 2003 Addenda of the ASME Code, Section XI, the licensee proposed to examine the RVI components in accordance with BWRVIP Guideline requirements. The licensee stated that the particular guidelines that are applicable to the various RVI components are:

- BWRVIP-18-A, "BWRVIP Core Spray Internals Inspection and Flaw Evaluation Guidelines"
- BWRVIP-25, "BWRVIP Core Plate Inspection and Flaw Evaluation Guidelines"
- BWRVIP-26-A, "BWRVIP Top Guide Inspection and Flaw Evaluation Guidelines"
- BWRVIP-27-A, "BWRVIP BWR Standby Liquid Control System/Core Plate Delta P Inspection and Flaw Evaluation Guidelines"
- BWRVIP-38, "BWRVIP Shroud Support Inspection and Flaw Evaluation Guideline"
- BWRVIP-41, Revision 1, "BWRVIP Jet Pump Assembly Inspection and Flaw Evaluation Guidelines"
- BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines"
- BWRVIP-48-A, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines"
- BWRVIP-76, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines"
- BWRVIP-138, "BWRVIP Updated Jet Pump Beam Inspection and Flaw Evaluation Guidelines"

The licensee made a commitment to incorporate the requirements of the BWRVIP-94 Report, "Program Implementation Guideline," at JAFNPP. The BWRVIP-94 Report states that where guidance in existing BWRVIP documents has been supplemented or revised by subsequent correspondence approved by the BWRVIP Executive Committee, the most current approved guidance will be implemented.

In addition to the BWRVIP reports noted above, the licensee identified NUREG-0619 "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," as the basis for its proposed alternative examinations for the feedwater sparger tee welds and the feedwater sparger piping and brackets.

The licensee, in its submittal dated February, 27, 2007, provided a comparison of the required ASME Code, Section XI Category B-N-1 and B-N-2 examination requirements with the above current BWRVIP Guideline requirements that are applicable to JAFNPP. In response to the NRC staff's request for additional information (RAI) (2B), by licensee letter dated August 20, 2007, the licensee provided RVI component inspection histories including results from the last inspections performed during the most recent refueling outage (RO17, October 2006). Furthermore, the licensee identified the applicable inspection program for the RVI components and the total number of welds in each of the RVI components. The licensee, as an example, provided additional information regarding the BWRVIP inspection requirements for the following welds of the RVI components and their subcomponents representing each of the aforementioned ASME Code, Section XI category/item numbers (Item Numbers B13.10, B13.20, B13.30, and B13.40).

- Core Spray
- Jet pump
- Core Shroud Support
- Vessel Attachment Welds (e.g., steam dryer hold-down brackets, guide rod brackets, and surveillance specimen holders)

The licensee claimed that these examples demonstrated that the inspection techniques that are recommended by the BWRVIP inspection guidelines are superior to the inspection techniques mandated by the ASME Code, Section XI ISI program. Additionally, these examples proved that the BWRVIP inspection guidelines require more frequent inspections of the RVI components than the corresponding ASME Code, Section XI ISI program. The licensee claimed that by implementing the BWRVIP inspection guidelines the aging degradation of the RVI components can be identified in a timely manner so that proper corrective action can be taken to restore the integrity of the applicable RVI component. Therefore, the licensee concluded that implementation of the BWRVIP inspection guidelines for the JAFNPP's RVI components would provide an acceptable level of quality and safety. The licensee's proposed alternative for the RVI components and subcomponents covered under the scope of this Relief Request is summarized in the Attachment to this SE.

3.6 NRC Staff Evaluation

The NRC staff reviewed the information provided by the licensee in its submittal dated February 27, 2007, regarding its proposed alternatives to the ASME Code, Section XI ISI requirements and the technical bases for the licensee's proposed alternatives. The NRC staff reviewed the status of each of the referenced BWRVIP guidance documents and the applicability of the information provided in NUREG-0619. The NRC staff found all of the referenced BWRVIP reports (with the exception of the BWRVIP-41, Revision 1 and BWRVIP-138 reports) to be acceptable, with any additional conditions associated with the implementation of the subject BWRVIP reports outlined in the corresponding NRC staff SE for that report. The NRC staff also confirmed the applicability of the information given in NUREG-0619 to supporting the licensee's proposed alternative for the feedwater sparger tee welds and the feedwater sparger piping and brackets. The NRC staff did, however, identify some issues which required additional clarification by the licensee or which required the licensee to modify its proposed alternatives. The following paragraphs address the NRC staff's RAIs, the licensee's responses, and the NRC staff's evaluation of the RAIs.

To ensure that the attachments in this relief request were properly identified, in the RAI letter dated August 1, 2007, the NRC staff requested that the licensee indicate attachment numbers 2, 3, 4, and 5 on relevant pages of the relief request. In a letter dated August 20, 2007, consistent with the NRC staff's request, the licensee revised the relevant pages. The NRC staff accepts the licensee's revised version and, therefore, considers its concern resolved.

In RAI letter dated August 1, 2007, the NRC staff stated that Section 4.1, item 5 of the BWRVIP-100-A Report, "Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds," dated August 2006, indicates that fracture toughness values of stainless steel materials that are exposed to neutron fluence levels greater than 1×10^{21} n/cm² (E > 1 MeV) are lower than those used in Appendix C of the BWRVIP-76 Report. The NRC staff requested that the applicant confirm that the planned inspections of the JAFNPP core shroud and/or core shroud repair hardware for the unit's fourth ISI interval are consistent with both BWRVIP-76 and BWRVIP-100-A reports. In a letter dated August 20, 2007, the licensee stated that for core shroud and core shroud repair hardware it will comply with the requirements specified in the BWRVIP-76 and BWRVIP-100-A reports. The NRC staff finds this response acceptable and, therefore, considers its concern resolved.

In Attachment 5 of the licensee's response dated August 20, 2007, the licensee indicated that the core plate hold-down bolts will be inspected in accordance with the requirements specified in the ASME Code, Section XI ISI program during the fourth 10-year ISI interval. In the NRC staff's SE (ADAMS Accession Number ML072110136, dated July 31, 2007) for the JAFNPP license renewal application (LRA), the NRC staff accepted a licensee commitment (LRA Commitment # 23) in which it stated that one of the following options will be implemented 2 years prior to the license renewal period:

Option # 1 – Install core plate wedges

Option # 2 – Complete plant-specific analysis per the BWRVIP-25 report to ensure maintenance of structural integrity of the core plate and provide inspection plan for the core plate hold-down bolts

Based on the aforementioned commitment, the NRC staff determined that during the fourth 10-year ISI interval, the licensee will be implementing the ASME Code, Section XI ISI requirements up until 2 years prior to the license renewal period. At that time, the licensee will be using the inspection guidelines specified in the BWRVIP-25 report in lieu of the ASME Code, Section XI ISI requirements. In a conference call on October 2, 2007, the NRC staff discussed this issue with the licensee, and in its letter dated December 4, 2007, stated that it plans to perform VT-3 inspections of approximately 25 percent of the core plate hold-down bolts prior to implementing its LRA Commitment 23. The NRC staff finds this response acceptable because these inspections will provide information regarding the condition of the core plate hold-down bolts. Additionally, implementation of LRA Commitment 23 during the fourth 10-year ISI interval will provide reasonable assurance that the radiation induced stress relaxation of the core plate hold-down bolts is adequately monitored during the fourth 10-year ISI interval and beyond.

Consistent with the determination that was made in the NRC staff's SEs which approved each of the cited BWRVIP reports (with the exception of the BWRVIP-41, Revision 1 and BWRVIP-138 reports), the BWRVIP inspection requirements (as supplemented by the NUREG-0619

requirements) incorporated into the licensee's proposed alternative will identify aging degradation of the RVI components in a timely manner. Therefore, the NRC staff has concluded that the implementation of the inspection requirements specified in the licensee's proposed alternative will ensure that the integrity of the RVI components will be maintained with an acceptable level of quality and safety.

By letter dated July 18, 2007, the EPRI BWRVIP withdrew the BWRVIP-41, Revision 1 and BWRVIP-138 reports from the NRC review process. Therefore, the licensee's proposed alternative inspection requirements which rely on the technical bases established by the BWRVIP-41, Revision 1 and BWRVIP-138 are not authorized for the fourth ten-year interval. The licensee shall follow the applicable ASME Code, Section XI requirements.

The NRC staff, however, notes that a subsequent relief request will be required if the licensee decides to take exceptions to, or deviations from, the NRC staff-approved BWRVIP inspection guidelines (specifically, those inspection requirements listed in the Attachment to this SE) or the ASME Code, Section XI ISI requirements in the future.

Therefore, based on the information in the licensee's submittals dated February 27, 2007, August 20, 2007, and December 4, 2007, the NRC staff has confirmed that the licensee's proposed alternatives (as documented in the Attachment to this SE) are consistent with the technical bases documented in NUREG-0619 and the BWRVIP Reports cited in Section 3.0 of this SE.

4.0 CONCLUSION

Based on the information provided in the licensee's submittal, the NRC staff concludes that the alternatives proposed in Request for Relief RR-6 (except for the proposed alternatives that rely on the technical bases established by the BWRVIP-41, Revision 1 and BWRVIP-138), and as summarized in the Attachment to this SE, will ensure that the integrity of the RVI components is maintained with an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternatives (except for the proposed alternatives that rely on the technical bases established by the BWRVIP-41, Revision 1 and BWRVIP-138), are authorized for the fourth 10-year inspection interval. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector. Any components that are not included in this relief request will continue to be inspected in accordance with the ASME Code, Section XI requirements.

Attachment: Tables

Principal Contributor: G. Cheruvenki

Date: February 28, 2008

James A. FitzPatrick Comparison of ASME Category B-N-1 and B-N-2 Requirements
With BWRVIP Guidance Requirements ⁽¹⁾

ASME Item No. Table IWB-2500-1	Component	ASME Exam Scope	ASME Exam	ASME Frequency	Applicable BWRVIP Document	BWRVIP Exam Scope	BWRVI P Exam	BWRVIP Frequency
B13.10	Reactor Vessel Interior (Note 2)	Accessible Areas (Non- specific)	VT-3	Each period	BWRVIP-18-A, 25, 26-A, 27-A, 38, 47-A, 48-A, and 76.	In accordance with applicable BWRVIP document.		
B13.20	Interior Attachments Within Beltline – Jet Pump Riser Braces	Accessible Welds	VT-1	Each 10- year Interval	BWRVIP-48-A Table 3-2	Riser Brace Attachment	EVT-1	100% in first 12 years (with 50% to be inspected in the first 6 years); 25% during each subsequent 6 years
	Lower Surveillance Specimen Holder Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-1	Each 10-year Interval

ASME Item No. Table IWB-2500-1	Component	ASME Exam Scope	ASME Exam	ASME Frequency	Applicable BWRVIP Document	BWRVIP Exam Scope	BWRVIP Exam	BWRVIP Frequency
B13.30	Interior Attachments Beyond Beltline – Steam Dryer Hold-down Brackets	Accessible Welds	VT-3	Each 10-year Interval	BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Guide Rod Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Steam Dryer Support Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Each 10-year Interval
	Feedwater Sparger Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Each 10-year Interval
	Core Spray Piping Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Every 4 Refueling Cycles
	Upper and Middle Surveillance Specimen Holder Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Shroud Support (Weld H9)				BWRVIP-38 3.1.3.2, Figure 3-5	Weld H9	EVT-1 or UT	Maximum of 6 years for one sided EVT-1, Maximum of 10 years for UT
	Weld H12				Not Applicable	Not Applicable	Not Applicable	Not Applicable

ASME Item No. Table IWB-2500-1	Component	ASME Exam Scope	ASME Exam	ASME Frequency	Applicable BWRVIP Document	BWRVIP Exam Scope	BWRVIP Exam	BWRVIP Frequency
B13.40	Integrally Welded Core Support Structure – Shroud Support	Accessible Surfaces	VT-3	Each 10- year Interval	BWRVIP-38 3.1.3.2, 3.2.1, Figures 3-5 and 3-6	Weld H9 and Gusset Attachments	EVT-1 or UT	Maximum 6 years for one-sided EVT-1, 10 years for UT
	Shroud				BWRVIP-76 Figures 3-3 and 3-4	Vertical and Top Guide Ring Segment Welds	EVT-1 or UT	Maximum 10 years (per designer recommendations)
					BWRVIP-76 3.5 and 3.6	Tie-rod Repair	VT-3 and EVT-1	All 10 tie rods within 10 years

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

Note (2) Per New York Port Authority (NYPA) letter to NRC (JPN-97-013), "Core Spray Internals Inspection," dated March 24, 1997, JAFNPP informed the NRC of a new commitment to perform Core Spray System piping and spargers inspections inside the RPV in accordance with the BWRVIP-18 guidelines.