Entergy

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David N. Lorfing
Manager, Licensing

RBG-46977

November 30, 2009

U. S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Alternative RBS-ISI-015
Proposed Alternative to 10 CFR 50.55a Examination Requirements for Reactor Pressure Vessel Weld Inspections
Docket No. 50-458
License No. NPF-47

REFERENCES:
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

Dear Sir or Madam:

In accordance with 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3)(i), Entergy requests NRC approval of the proposed alternative to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Sub Article IWB-2500 to allow reduced requirements for nozzle-to-vessel weld and inner radius examinations. This alternative is requested for the third 10-year interval of the River Bend Station (RBS) Inservice Inspection Program.

The details of the 10 CFR 50.55a proposed alternative are enclosed as Attachment 1, and the specific components affected by this request are tabulated in Attachment 2. The NRC provided a Safety Evaluation (Reference 1) approving the generic technical basis and acceptability criteria for application of ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds, Section XI, Division 1," on December 19, 2007, which Entergy has followed as detailed in the attached request. The plant specific applicability of the BWRVIP-108 report to RBS is demonstrated in Attachment 3.

Entergy requests approval of this request by December 31, 2010, to support planning for the sixteenth refueling outage (RF-16) scheduled for early 2011.

A047
NRR

This letter contains no new regulatory commitments.

If you have any questions concerning this letter, please contact me at 225-381-4157.

Respectfully,

Manager, Licensing
River Bend Station - Unit 1

DNL/bmb

Attachments:
1. Request for Alternative - RBS-ISI-015
2. Table of Affected Components
3. Responses to BWRVIP-108 Plant Specific Applicability Criteria

cc: Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

NRC Senior Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

U. S. Nuclear Regulatory Commission
Attn: Mr. Alan B. Wang
MS O-7 D1
Washington, DC 20555-0001

Mr. Jeffrey P. Meyers
Louisiana Department of Environmental Quality
Office of Environmental Compliance
Attn. OEC - ERSD
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Baton Rouge, LA 70821-4312

ATTACHMENT 1 TO

RBG-46977

RIVER BEND STATION – UNIT 1
THIRD 10 YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR ALTERNATIVE

RBS-ISI-015

RIVER BEND STATION – UNIT 1
THIRD 10 YEAR INTERVAL INSERVICE INSPECTION PROGRAM
REQUEST FOR ALTERNATIVE
RBS-ISI-015

Component(s) Affected	See Attachment 2
Code Class:	ASME Code Class 1
References:	1. ASME Section XI 2001 Edition, 2003 Addenda, Table IWB-2500-1 2. ASME Code Case N-702
Examination Category:	B-D, Full Penetration Welded Nozzles in Vessels – Inspection Program B
Item Number(s):	1. B3.90, Nozzle –to-Vessel Welds 2. B3.100, Nozzle Inside Radius Section
Unit / Inspection Interval Applicability:	River Bend Station (RBS), Third (3rd)10-year interval June 1, 2008 – May 31, 2018

I. Applicable Code Requirement(s)

ASME Code, Section XI, 2001 Edition, 2003 Addenda, Table IWB-2500-1, Examination Category B-D, Full Penetration Welded Nozzles in Vessels – Inspection Program B. Item B3.90 requires volumetric examination of all Nozzle-to-Vessel welds. Item B3.100 requires volumetric examination of all Nozzle Inside Radius sections.

II. Relief Requested

The twenty-five percent sampling provision of ASME Code Case N-702 (Reference 3) provides a significant reduction in worker radiological exposure. River Bend Station (RBS) estimates that the proposed alternative inspection requirements would result in a reduction in worker radiological exposure of approximately 35 Rem over the third ISI interval.

III. Proposed Alternative and Basis for Use

Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy requests an alternative from performing the ASME Code required examinations of 100% of the vessel nozzle assemblies identified in Attachment 2. As an alternative, Entergy proposes the use of Code Case N-702 (Reference 3), which 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. Table 1 below summarizes the proposed inspection requirements for the affected vessel nozzle assemblies listed in Attachment 2. Both the inner radius and the nozzle-to-shell weld would be examined for each of the identified nozzle assemblies.

The ASME Code requires that all thirty one (31) nozzle assemblies listed in Table 1 and Attachment 2 be examined each ISI Inspection Interval. RBS has completed the required

examinations for the First and Second ISI Intervals. Under the proposed alternative, Entergy would examine only 16 vessel nozzle assemblies as outlined in Table 1 for the Third ISI Inspection Interval.

TABLE 1

Group	Description	Quantity	Minimum Examined	Comments
B13-D001-N01	Recirculation Outlet	2	1	
B13-D001-N02	Recirculation Inlet	10	3	
B13-D001-N03	Main Steam	4	1	
B13-D001-N04	Feedwater	4	4	Excluded by N-702
B13-D001-N05	Core Spray	2	1	
B13-D001-N06	Low Pressure Core Injection	3	1	
B13-D001-N07	Top Head Spray	1	1	
B13-D001-N08	Top Head Spare	1	1	Blind flanged – not used.
B13-D001-N09	Jet Pump Instrumentation	2	1	
B13-D001-N10	CRD Return	1	1	Excluded by N-702
B13-D001-N16	Vibration Instrumentation	1	1	Blind flanged – not used.
TOTAL		31	16	

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). Entergy has adopted ASME Code Case N-648-1, Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles, with the provisions stipulated in Regulatory Guide 1.147, in the RBS Third Interval ISI Program Plan. Entergy may therefore perform examinations on inner radius sections with either the VT-1 or the volumetric examination method.

Basis for Use

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 ASME Code Case N-702. The evaluation found that failure probability due to a Low Temperature Overpressure event at the nozzle blend radius region and nozzle-to-vessel shell weld is 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 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 1) 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 RBS-specific applicability is demonstrated in Attachment 3.

In conclusion, the proposed alternative use of ASME Code Case N-702 in lieu of the ASME Code, Section XI requirements 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 welds and Nozzle inside Radius Sections identified in Table 1 and Attachment 2.

IV. Duration of Proposed Alternative

Upon approval by NRC, this request for alternative will be utilized through the Third ISI Inspection Interval for the nozzle assemblies listed in Attachment 2. Re-submittal of this request will occur prior to the Fourth ISI Inspection Interval. 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.

V. 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

VI. 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 TO

RBG-46977

TABLE OF AFFECTED COMPONENTS

RIVER BEND STATION – UNIT 1
THIRD 10 YEAR INTERVAL INSERVICE INSPECTION PROGRAM
REQUEST FOR ALTERNATIVE RBS-ISI-015

TABLE OF AFFECTED COMPONENTS

COMPONENT NO	CATEGORY	ITEM NUMBER	DESCRIPTION
B13-D001-N01A-0	B-D	B3.100	20.00" Reactor Recirculation Outlet Nozzle Inside Radius Section
B13-D001-N01A-1	B-D	B3.90	20.00" Reactor Recirculation Outlet Nozzle-to-Vessel weld
B13-D001-N01B-0	B-D	B3.100	20.00" Reactor Recirculation Outlet Nozzle Inside Radius Section
B13-D001-N01B-1	B-D	B3.90	20.00" Reactor Recirculation Outlet Nozzle-to-Vessel weld
B13-D001-N02A-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02A-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02B-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02B-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02C-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02C-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02D-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02D-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02E-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02E-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02F-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02F-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02G-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02G-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02H-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02H-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02J-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02J-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N02K-0	B-D	B3.100	10.00" Reactor Recirculation Inlet Nozzle Inside Radius Section
B13-D001-N02K-1	B-D	B3.90	10.00" Reactor Recirculation Inlet Nozzle-to-Vessel weld
B13-D001-N03A-0	B-D	B3.100	24.00" Main Steam Nozzle Inside Radius Section
B13-D001-N03A-1	B-D	B3.90	24.00" Main Steam Nozzle-to-Vessel weld
B13-D001-N03B-0	B-D	B3.100	24.00" Main Steam Nozzle Inside Radius Section
B13-D001-N03B-1	B-D	B3.90	24.00" Main Steam Nozzle-to-Vessel weld
B13-D001-N03C-0	B-D	B3.100	24.00" Main Steam Nozzle Inside Radius Section
B13-D001-N03C-1	B-D	B3.90	24.00" Main Steam Nozzle-to-Vessel weld
B13-D001-N03D-0	B-D	B3.100	24.00" Main Steam Nozzle Inside Radius Section

RIVER BEND STATION – UNIT 1
THIRD 10 YEAR INTERVAL INSERVICE INSPECTION PROGRAM
REQUEST FOR ALTERNATIVE RBS-ISI-015

TABLE OF AFFECTED COMPONENTS

B13-D001-N03D-1	B-D	B3.90	24.00" Main Steam Nozzle-to-Vessel weld
B13-D001-N04A-0	B-D	B3.100	12.00" Feedwater Nozzle Inside Radius Section
B13-D001-N04A-1	B-D	B3.90	12.00" Feedwater Nozzle-to-Vessel weld
B13-D001-N04B-0	B-D	B3.100	12.00" Feedwater Nozzle Inside Radius Section
B13-D001-N04B-1	B-D	B3.90	12.00" Feedwater Nozzle-to-Vessel weld
B13-D001-N04C-0	B-D	B3.100	12.00" Feedwater Nozzle Inside Radius Section
B13-D001-N04C-1	B-D	B3.90	12.00" Feedwater Nozzle-to-Vessel weld
B13-D001-N04D-0	B-D	B3.100	12.00" Feedwater Nozzle Inside Radius Section
B13-D001-N04D-1	B-D	B3.90	12.00" Feedwater Nozzle-to-Vessel weld
B13-D001-N05A-0	B-D	B3.100	12.00" Core Spray Nozzle Inside Radius Section
B13-D001-N05A-1	B-D	B3.90	12.00" Core Spray Nozzle-to-Vessel weld
B13-D001-N05B-0	B-D	B3.100	12.00" Core Spray Nozzle Inside Radius Section
B13-D001-N05B-1	B-D	B3.90	12.00" Core Spray Nozzle-to-Vessel weld
B13-D001-N06A-0	B-D	B3.100	10.00" Low Pressure Core Injection Nozzle Inside Radius Section
B13-D001-N06A-1	B-D	B3.90	10.00" Low Pressure Core Injection Nozzle-to-Vessel weld
B13-D001-N06B-0	B-D	B3.100	10.00" Low Pressure Core Injection Nozzle Inside Radius Section
B13-D001-N06B-1	B-D	B3.90	10.00" Low Pressure Core Injection Nozzle-to-Vessel weld
B13-D001-N06C-0	B-D	B3.100	10.00" Low Pressure Core Injection Nozzle Inside Radius Section
B13-D001-N06C-1	B-D	B3.90	10.00" Low Pressure Core Injection Nozzle-to-Vessel weld
B13-D001-N07-0	B-D	B3.100	6.00" Top Head Spray Nozzle Inside Radius Section
B13-D001-N07-1	B-D	B3.90	6.00" Top Head Spray Nozzle-to-Vessel weld
B13-D001-N08-0	B-D	B3.100	6.00" Top Head Spare Nozzle Inside Radius Section
B13-D001-N08-1	B-D	B3.90	6.00" Top Head Spare Nozzle-to-Vessel weld
B13-D001-N09A-0	B-D	B3.100	4.00" Jet Pump Instrumentation Nozzle Inside Radius Section
B13-D001-N09A-1	B-D	B3.90	4.00" Jet Pump Instrumentation Nozzle-to-Vessel weld
B13-D001-N09B-0	B-D	B3.100	4.00" Jet Pump Instrumentation Nozzle Inside Radius Section
B13-D001-N09B-1	B-D	B3.90	4.00" Jet Pump Instrumentation Nozzle-to-Vessel weld
B13-D001-N10B-0	B-D	B3.100	4.00" CRD Return Nozzle Inside Radius Section
B13-D001-N10B-1	B-D	B3.90	4.00" CRD Return Nozzle-to-Vessel weld
B13-D001-N16-0	B-D	B3.100	8.00" Vibration Instrumentation Nozzle Inside Radius Section
B13-D001-N16-1	B-D	B3.90	8.00" Vibration Instrumentation Nozzle-to-Vessel weld

ATTACHMENT 3 TO

RBG-46977

RESPONSE TO BWRVIP-108
PLANT SPECIFIC APPLICABILITY CRITERIA

RIVER BEND STATION – UNIT 1
THIRD 10 YEAR INTERVAL INSERVICE INSPECTION PROGRAM
REQUEST FOR ALTERNATIVE RBS-ISI-015

RESPONSE TO BWRVIP-108 PLANT-SPECIFIC APPLICABILITY CRITERIA

In order to demonstrate the plant-specific applicability of the BWRVIP-108 report, the following general and nozzle-specific criteria below must be satisfied. RBS applicability was evaluated and demonstrated under RBS Calculation G13.18.10.1-019 Rev. 000. The pertinent data from the calculation has been provided in this attachment.

Criteria 1:
The maximum Reactor Pressure Vessel (RPV) Heatup/Cooldown rate is limited to less than 115 °F/hour.

For the Recirculation Inlet Nozzles, the following criteria must be met:

Criteria 2:

$$\frac{\frac{(p \times r)}{t_2}}{C_{RPV2}} < 1.15$$

p = RPV normal operating pressure
r = RPV inner radius
t_2 = RPV wall thickness
C_{RPV2} = constant defined in Attachment A

Criteria 3:

$$\frac{\frac{p \times (r_o^2 + r_i^2)}{(r_o^2 - r_i^2)}}{C_{nozzle3}} < 1.15$$

p = RPV normal operating pressure
r_o = nozzle outer radius
r_i = nozzle inner radius
$C_{nozzle5}$ = constant defined in Attachment A

For the Recirculation Outlet Nozzles, the following criteria must be met:

Criteria 4:

$$\frac{\frac{(p \times r)}{t_4}}{C_{RPV4}} < 1.15$$

Criteria 5:

$$\frac{\frac{p \times (r_o^2 + r_i^2)}{(r_o^2 - r_i^2)}}{C_{nozzle5}} < 1.15$$

Plant Specific Parameters

The following values were utilized to demonstrate satisfaction of the plant-specific criteria for RBS:

- RPV normal operating pressure, p = 1070 psia -14.7 = 1055.3 psig
- RPV inner radius, r = 109.9375 in.
- The RBS maximum heatup and cooldown rate is 100°F/Hour
- Average longitudinal RPV wall thickness at N2, AvgLong = 6.2292 in
- Average transverse RPV wall thickness at N2, AvgTrans = 6.2917 in
- RPV wall thickness at Nozzle N2, t_2 = 6.2605 in ((AvgLong +AvgTrans)/2)
- RPV constant for inlet nozzle, C_{RPV2} = 19332 psi
- Nozzle outer radius for inlet nozzles, r_o = 11.6875 in
- Nozzle inner radius for inlet nozzles, r_i = 5.8125 in
- Nozzle constant for inlet nozzle, $C_{nozzle3}$ = 1637 psi
- Average longitudinal RPV wall thickness at N1, AvgLong = 6.2292 in
- Average transverse RPV wall thickness at N1, AvgTrans = 6.3229 in
- RPV wall thickness at Nozzle N1, t_4 = 6.2761 in ((AvgLong +AvgTrans)/2)
- RPV Constant for outlet nozzle, $C_{RPV\,4}$ = 16171 psi
- Nozzle outer radius for outlet nozzles, r_o = 16.3125 in
- Nozzle inner radius for outlet nozzles, r_i = 9.016 in
- Nozzle constant for outlet nozzle, $C_{nozzle5}$ = 1977 psi

Assumptions

The following assumptions were made in developing the RBS plant-specific calculations:

- The vessel inner radius is taken to be the maximum as-built dimension at location R3 because a larger inner radius is more conservative for this determination. Location R3 was chosen because it is closer to the N1 and N2 nozzles.
- An average of the longitudinal and the transverse section is used for the RPV wall thickness at nozzle N1 and N2. Since these values are not as-built dimensions, the average of the nominal value, minimum tolerance, and maximum tolerance is used.
- The maximum tolerance for the inner radius and the minimum tolerance for the outer radius was used for the N1 and N2 nozzle radii because these values yield a larger number for Criteria 3 and 5 which is more conservative.

Calculations

Criteria 1:

$Rate_{constant}$=115°F/Hour
$Rate_{actual}$=100°F/Hour
100°F/Hour < 115°F/Hour
Criteria 1 is Met

Inlet Nozzles

Criteria 2:

$$\frac{\frac{(p \times r)}{t_2}}{C_{RPV\,2}} = \frac{\frac{(1055.3\,psi \times 109.9375in)}{6.2605in}}{19332\,psi} = 0.959$$

0.959 < 1.15
Criteria 2 is Met

Criteria 3:

$$\frac{\frac{p \times (r_o^2 + r_i^2)}{(r_o^2 - r_i^2)}}{C_{Nozzle3}} = \frac{\frac{1055.3\,psi(11.6875^2 + 5.8125^2)}{(11.6875^2 - 5.8125^2)}}{1637\,psi}$$

$$= \frac{1748.86\,psi}{1637\,psi} = 1.068$$

1.068 < 1.15
Criteria 3 is Met

Outlet Nozzles

Criteria 4:

$$\frac{\frac{(p \times r)}{t_4}}{C_{RPV\,4}} = \frac{\frac{(1055.3\,psi \times 109.9375in)}{6.2761in}}{16171\,psi} = 1.143$$

1.143 < 1.15
Criteria 4 is Met

Criteria 5:

$$\frac{\frac{p \times (r_o^2 + r_i^2)}{(r_o^2 - r_i^2)}}{C_{Nozzle5}} = \frac{\frac{1055.3\,psi(16.3125^2 + 9.016^2)}{(16.3125^2 - 9.016^2)}}{1977}$$

$$= \frac{1983.65}{1977} = 1.003$$

1.003 < 1.15
Criteria 5 is Met