UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 3, 2010

Vice President, Operations
Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61N
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION, UNIT 1 - SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUESTS FOR RELIEF RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-010, AND RBS-ISI-011 (TAC NOS. ME1466, ME1469, ME1470, ME1471, AND ME1472)

Dear Sir or Madam:

By letter dated May 29, 2009, as supplemented by letters dated October 30, 2009, and February 18, 2010, Entergy Operations, Inc. (Entergy, the licensee), submitted relief request (RR) Nos. RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-010, and RBS-ISI-011 for the second 10-year interval inservice inspection (ISI) program at the River Bend Station, Unit 1 (RBS). In its submittal, the licensee requested relief from certain requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI pertaining to volumetric and visual examinations at RBS on the basis that the Code requirement is impractical. In several locations, the required coverage cannot be obtained due to interference or geometry.

The NRC staff has reviewed the licensee's submittals and determined that imposition of these ASME Code requirements would create a burden on the licensee, and that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject welds. Based on the enclosed SE and pursuant to 10 CFR 50.55a(g)(6)(i), the Commission authorizes RRs RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-0010, and RBS-ISI-011 on the basis that obtaining the ASME Code-required coverage is impractical. The NRC staff has determined that granting the relief requests pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other ASME Code requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact Alan Wang at 301-415-1445 or via e-mail at alan.wang@nrc.gov.

Sincerely,

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM RELIEF REQUEST NOS. RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-010, AND RBS-ISI-011 FOR ENTERGY OPERATIONS, INC. RIVER BEND STATION, UNIT 1 DOCKET NO. 50-458

1.0 INTRODUCTION

By letter dated May 29, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091560230), Entergy Operations, Inc. (Entergy, the licensee), proposed for its second 10-year inservice inspection (ISI) interval program Relief Request (RR) Nos. RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-010, and RBS-ISI-011 for the River Bend Station, Unit 1 (RBS). By letters dated October 30, 2009, and February 18, 2010 (ADAMS Accession Nos. ML093140094 and ML100541843, respectively), the licensee submitted additional information regarding the RRs in response to the U.S. Nuclear Regulatory Commission (NRC) staff's request for additional information dated July 16, 2009 (ADAMS Accession No. ML091970549).

The NRC staff, with technical assistance from its contractor, the Pacific Northwest National Laboratory (PNNL), has reviewed and evaluated the RRs requested by the licensee. The staff has adopted the evaluations and recommendations for granting relief contained in PNNL's Technical Letter Report (TLR) dated April 12, 2010 (ADAMS Accession No. ML101020259), which has been incorporated into this safety evaluation (SE). The Attachment to this SE lists each relief request and the status of approval.

2.0 REGULATORY REQUIREMENTS

Inservice inspection of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code, and applicable addenda, as required by paragraph 50.55a(g) of Title 10 of the *Code of Federal Regulations* (10 CFR), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulations in 10 CFR 50.55a(a)(3) state that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that (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 preservice examination requirements, set forth in the ASME Code, Section XI, 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, which was incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ASME Code of record for the second 10-year ISI interval at RBS, which ended on May 31, 2008, is the 1992 Edition, with portions of the 1993 Addenda, of the ASME Code, Section XI, as approved by the NRC.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the requests for relief from ASME Code requirements has been evaluated and the bases for disposition are documented below. For clarity, the licensee's requests have been evaluated in according to ASME Code Examination Category and corresponding request for relief.

3.1 Request for Relief RBS-ISI-007, ASME Code, Section XI, Examination Category B-A, Item B1.40, Pressure Retaining Welds in Reactor Vessel

3.1.1 ASME Code Requirement

ASME Code, Section XI, Examination Category B-A, Item B1.40 requires essentially 100 percent volumetric and surface examination, as defined by ASME Code, Section XI, Figure IWB-2500-5, of the length of reactor pressure vessel (RPV) head-to-flange welds. "Essentially 100 percent," as clarified by ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in Regulatory Guide 1.147, Revision 15, "Inservice Inspection Code Case Acceptability" (RG 1.147, Revision 15).

3.1.2 Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required essentially 100 percent volumetric examination of ASME Code, Class 1 RPV Head-to-Flange Weld B13-D001-AG.

3.1.3 Licensee's Basis for Relief Request (as stated)

> [Ultrasonic (UT)] scanning is limited to single side access due to configuration. Scanned from head side only. Entergy has used the best available techniques to

examine the subject weld, therefore demonstrating an acceptable level of integrity. To improve upon this examination coverage would require modification and/or replacement of the component.

3.1.4 Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the extent practical.

3.1.5 NRC Staff Evaluation

The ASME Code requires essentially 100 percent volumetric examination of pressure retaining welds in the RPV. However, the geometric configuration of the RPV head-to-flange weld limits examination of the ASME Code inspection volume. In order to effectively increase the examination coverage, the RPV head and flange would require design modifications or replacement.

As shown in the sketch and technical descriptions included in the licensee's submittals, examinations of RPV Head-to-Flange Weld B13-D001-AG have been performed to the extent practical, with the licensee obtaining coverage of 50.0 percent of the ASME Code-required inspection volume. UT scanning on RPV Head-to-Flange Weld B13-D001-AG was restricted by the curvature of the blend radius between the flange and the RPV head which only allows scanning access from the head side. The UT examinations included 0-degree longitudinal, and 45- and 60-degree shear waves that encompassed most of the weld and base materials. No recordable indications were observed on this weld.

The RPV head-to-flange weld is constructed of carbon steel material, with stainless steel inside diameter (ID) cladding. Although UT scans were limited to the head side only, recent studies have found that inspections conducted through carbon steel are equally effective whether the ultrasonic waves have only to propagate through the base metal, or have to also propagate through the carbon steel weldment.[1] Therefore, due to the fine-grained carbon steel microstructures, it is expected that the UT techniques employed would have detected structurally significant flaws that may have occurred on either side of the subject welds. In addition, the licensee completed an ASME Code-required magnetic particle (MT) surface examination for the RPV head-to-flange weld with no indications being detected.

Based on the above, the NRC staff concludes that the licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject weld due to the geometrical design and that to require the licensee to perform the ASME Code-required examinations would place a burden on the licensee. In addition, the NRC staff has concluded that based on the volumetric coverage obtained, along with the full ASME Code-required surface examination completed on the subject head-to-flange weld, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. The NRC staff concluded that the

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[1] P. G. Heasler and S. R. Doctor, 1996, *Piping Inspection Round Robin*, NUREG/CR-5068, PNNL-10475, U.S. Nuclear Regulatory Commission, Washington, DC.

examinations performed provide reasonable assurance of structural integrity of the subject welds, and the proposed request for relief is, therefore, acceptable.

3.2 Request for Relief RBS-ISI-008, ASME Code, Section XI, Examination Category B-D, Item B3.90, Full Penetration Welded Nozzles in Vessels

3.2.1 ASME Code Requirement

ASME Code, Section XI, Examination Category B-D, Item B3.90 requires 100 percent volumetric examination, as defined by ASME Code, Section XI, Figure IWB-2500-7 (a) through (d), as applicable, of full penetration Class 1 RPV nozzle-to-vessel welds. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 15, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent (i.e., greater than 90 percent examination coverage is obtained).

3.2.2 Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examinations of ASME Code, Class 1 RPV nozzle-to-vessel welds listed in Tables 3.2.1 and 3.2.2 below.

Table 3.2.1 – ASME Code, Section XI, Examination Category B-D, Pre-Appendix VIII

ASME Code Item	Weld ID	Weld Type	Coverage Obtained
B3.90	N03A-1	24" Main Steam, RPV Nozzle-to-Shell	50.0%
B3.90	N03B-1	24" Main Steam, RPV Nozzle-to-Shell	50.0%
B3.90	N03C-1	24" Main Steam, RPV Nozzle-to-Shell	50.0%
B3.90	N03D-1	24" Main Steam, RPV Nozzle-to-Shell	50.0%
B3.90	N16-1	12" Reactor Coolant System (RCS) Inlet Nozzle-to-Vessel	50.0%
B3.90	N04A-1	12" Feedwater Nozzle-to-Vessel	50.0%
B3.90	N04B-1	12" Feedwater Nozzle-to-Vessel	50.0%
B3.90	N04C-1	12" Feedwater Nozzle-to-Vessel	50.0%
B3.90	N04D-1	12" Feedwater Nozzle-to-Vessel	50.0%

Table 3.2.2 – ASME Code Section XI, Examination Category B-D, Post Appendix VIII			
ASME Code Item	**Weld ID**	**Weld Type**	**Coverage Obtained**
B3.90	N02A-1	10" RCS Inlet Nozzle-to-Vessel	85.0%
B3.90	N02B-1	10" RCS Inlet Nozzle-to-Vessel	85.0%
B3.90	N02C-1	10" RCS Inlet Nozzle-to-Vessel	79.0%
B3.90	N02D-1	10" RCS Inlet Nozzle-to-Vessel	79.0%
B3.90	N02E-1	10" RCS Inlet Nozzle-to-Vessel	85.0%
B3.90	N02F-1	10" RCS Inlet Nozzle-to-Vessel	85.0%
B3.90	N02G-1	10" RCS Inlet Nozzle-to-Vessel	85.0%
B3.90	N02H-1	10" RCS Inlet Nozzle-to-Vessel	79.0%
B3.90	N02J-1	10" RCS Inlet Nozzle-to-Vessel	79.0%
B3.90	N02K-1	10" RCS Inlet Nozzle-to-Vessel	85.0%

3.2.3 Licensee's Basis for Relief Request (as stated)

> Due to the geometric configuration of the nozzle-to-vessel welds listed [above in Tables 3.2.1 and 3.2.2], [certain examination] volumes, as depicted in ASME [Code,] Section XI, cannot be examined to the extent of obtaining full [ASME Code] coverage.
>
> Radiography [(RT)] is not practical on these types of nozzle-to-vessel weld configurations, which prevent placement of the film and exposure source. The examinations performed on the subject items in addition to the examination of other vessel welds contained in the ISI program would detect generic degradation, if it existed, therefore demonstrating an acceptable level of integrity.

3.2.4 Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

3.2.5 NRC Staff Evaluation

The ASME Code requires 100 percent volumetric examination of Class 1 RPV nozzle-to-vessel welds. In addition, the ASME Code requires that the volumetric examination be conducted from both sides of these pressure-retaining welds. However, the design configurations of the subject nozzle-to-vessel welds limit access for UT scanning primarily to the vessel side of the welds. In order to effectively increase the examination coverage, the nozzle-to-head welds would require design modifications or replacement.

The subject RPV nozzle-to-vessel welds shown in Tables 3.2.1 and 3.2.2 above are constructed of carbon steel material, with stainless steel ID cladding. The welds extend the full thickness of the RPV. These nozzles are of the "set-in" design which essentially makes the welds concentric

rings aligned parallel with the nozzle axes in the through-wall direction of the RPV. This design geometry limits ASME Code-required UT angle beam examinations to be performed primarily from the vessel side of the welds. Additionally, four of the 10-inch RCS inlet nozzles listed in Table 3.2.2 above were also limited due to the close proximity of nozzle transitions and the location of nozzle N9.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject nozzle-to-vessel welds have been completed to the extent practical with aggregate coverage of the ASME Code-required volumes ranging from 50 to 85 percent (see Tables 3.2.1 and 3.2.2 above). The UT examinations for nozzles in Table 3.2.1 above included 0-degree longitudinal and 45- and 60-degree shear waves from the RPV side. These weld examinations were examined prior to the implementation of performance demonstration requirements outlined in ASME Code, Section XI, Appendix VIII; therefore, these examinations were conducted using ASME Code-required technical guidance at the time of the examinations. The UT examinations on the remaining RPV nozzle-to-vessel welds (Table 3.2.2 above) included 35- and 50-degree shear waves and 60-degree refracted longitudinal waves and were conducted with equipment, procedures and personnel that were qualified to the process outlined in ASME Code, Section XI, Appendix VIII.

The examination volumes included the weld and base materials near the inside surface of the weld joint, which are typically the highest regions of stress, and where one would expect degradation sources to be manifested should they occur. No indications were recorded during these examinations. Although UT scans were primarily limited to the vessel side only, recent studies have found that inspections conducted through carbon steel are equally effective whether the UT waves have only to propagate through the base metal, or have to also propagate through the carbon steel weldment.[2] Therefore, due to the fine-grained carbon steel microstructures, it is expected that the UT techniques employed would have detected structurally significant flaws that may have occurred on either side of the subject welds.

Based on the above, the NRC staff concludes that the licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject RPV nozzle-to-vessel welds due to the nozzle designs and component obstructions and that to require the licensee to perform the ASME Code-required examinations would place a burden on the licensee. Based on the volumetric coverage obtained for the subject welds, and considering the licensee's performance of ultrasonic techniques employed to maximize this coverage, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. The staff concludes that the examinations performed provide reasonable assurance of structural integrity of the subject welds, and the proposed request for relief is, therefore, acceptable.

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[2] P. G. Heasler, and S. R. Doctor, 1996, *Piping Inspection Round Robin*, NUREG/CR-5068, PNNL-10475, U.S. Nuclear Regulatory Commission, Washington, DC.

3.3 Request for Relief RBS-ISI-009, ASME Code, Section XI, Examination Category B-G-1, Item B6.40, Pressure Retaining Bolting, Greater Than 2 Inches in Diameter

3.3.1 ASME Code Requirement

ASME Code, Section XI, Examination Category B-G-1, Item B6.40 requires 100 percent volumetric examination, as defined by ASME Code, Section XI, Figure IWB-2500-12, of Class 1 RPV threads-in-flange. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 15, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent (i.e., greater than 90 percent examination coverage is obtained).

3.3.2 Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100 percent volumetric examination of Class 1 RPV Threads-in-Flange FLG LIG A1-A8 through FLG LIG H1-H8.

3.3.3 Licensee's Basis for Relief Request (as stated)

> During [UT] examination of the threaded area in the upper [RPV] flange, 100% coverage of the required examination volume could not be obtained.
>
> Examination of threaded flange requires scanning a 1" area around the RPV stud hole. The scan was limited to approximately 85% around the circumference of each stud hole due to the RPV head seal surface.
>
> To obtain additional coverage would necessitate modification and/or replacement of the component. The examinations performed on the subject areas would detect generic degradation, if it existed, therefore demonstrating an acceptable level of integrity.

3.3.4 Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the extent practical.

3.3.5 NRC Staff Evaluation

The ASME Code requires 100 percent volumetric examination of ASME Code, Class 1 RPV threads-in-flange. However, the interference of the raised seal face limits the coverage of the ASME Code inspection volume. Achieving greater coverage on these threads would require that the RPV head sealing surface be redesigned and modified.

As shown on the sketches and technical descriptions included in the licensee's submittals, examination of RPV Threads-in-Flange, FLG LIG A1-A8 through FLG LIG H1-H8, have been performed to the extent practical, with the licensee obtaining approximately 87 percent of the

ASME Code-required volume. The UT scanning is limited due to the raised seal surface obstructing portions of the 1-inch annular surface area between 333 degrees and 27 degrees at each threaded stud hole on the inner diameter side of these RPV threaded ligament areas. The licensee examined the subject threads using a 0-degree longitudinal wave from all unobstructed surfaces. No recordable flaw indications were observed during these examinations.

Based on the above, the NRC staff concludes that the licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for RPV threads-in-flange due to the interference caused by the raised seal face of the flange and that to require the licensee to perform the ASME Code-required examinations would place a burden on the licensee. In addition, based on the volumetric coverage obtained with the examination techniques applied, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. The NRC concludes that the examinations performed provide reasonable assurance of structural integrity of the subject welds and is, therefore, acceptable.

3.4 Request for Relief RBS-ISI-010, ASME Code, Section XI, Examination Category B-J, Items B9.11 and B9.31, Pressure Retaining Welds in Piping

3.4.1 ASME Code Requirement

ASME Code, Section XI, Examination Category B-J, Items B9.11 and B9.31 require essentially 100 percent volumetric and surface examinations, as defined by ASME Code, Section XI, Figures IWB-2500-8, -9, -10, and -11, as applicable, for circumferential piping and branch connection welds 4-inch NPS, or larger, in diameter. "Essentially 100 percent," as clarified by ASME Code Case N-460, is greater than 90 percent coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in RG 1.147, Revision 15.

3.4.2 Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required essentially 100 percent volumetric examination of the circumferential piping and branch connection welds listed in Tables 3.4.1 and 3.4.2 below.

Table 3.4.1 – ASME Code, Section XI, Examination Category B-J, Pre-Appendix VIII

ASME Code Item	Weld ID	Weld Type	Coverage Obtained
B9.11	RCS-900B-FWB06	RCS pump to 20" Pipe	80.7%
B9.11	RCS-900C-FWB15	Sweep-O-Let to 10" Pipe	85.0%
B9.11	RCS-900C-FWB16	Sweep-O-Let to 10" Pipe	85.0%
B9.31	RCS-900CX-SW014BC	16" Pipe-to-Sweep-O-Let	86.0%
B9.31	RCS-900CX-SW014CB	16" Pipe-to-Sweep-O-Let	86.0%
B9.11	WCS-001A1-XI-FW005	4" Pipe-to-valve	70.9%
B9.11	WCS-001A3-XI-FW011	4" Pipe-to-reducer	79.0%

Table 3.4.2 – ASME Code, Section XI, Examination Category B-J, Post Appendix VIII			
ASME Code Item	**Weld ID**	**Weld Type**	**Coverage Obtained**
B9.11	WCS-005A-XI-SW002	6" Pipe-to-tee	80.5%
B9.11	WCS-005A-XI-SW003	6" Tee-to-branch	77.3%
B9.11	WCS-001A3-XI-SW002	6" Pipe-to-tee	80.5%

3.4.3 Licensee's Basis for Relief Request (as stated)

> During [UT] examination of the piping welds listed in Table 1 [Tables 3.4.1 and 3.4.2 above] of this relief request, 100% coverage of the required examination volume could not be obtained.
>
> [ASME Code,] Class 1 piping and components are often designed with welded joints such as nozzle-to-pipe, pipe-to-valve and pipe-to-pump which can physically obstruct a large portion of the required examination volume.
>
> Entergy has used the best available techniques to examine the subject piping welds. To improve upon these examination coverage percentages, modification and/or replacement of the component would be required.

3.4.4 Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the extent practical.

3.4.5 NRC Staff Evaluation

The ASME Code requires essentially 100 percent volumetric examination of selected Class 1 pressure retaining welds in piping. However, complete volumetric examinations are restricted by several factors, including pump, sweep-o-let, valve, reducer, and tee configurations. These conditions preclude the licensee from obtaining full volumetric examinations from both sides of these welds. To gain access for examination, the welds would require design modifications. Imposition of this requirement would create a burden on the licensee; therefore, the ASME Code-required volumetric examinations are considered impractical.

As shown on the sketches and technical descriptions included in the licensee's submittals, examinations of the subject welds have been performed to the extent practical with the licensee obtaining coverage ranging from 70.9 to 86.0 percent from at least one side of the weld (see Tables 3.4.1 and 3.4.2 above). Various scan limitations were caused by the pipe-to-pump, sweep-o-let, valve, reducer, and tee configurations of the welds. The UT examinations conducted by the licensee shown in Table 3.4.1 above included 45-degree shear wave and either a 60-degree refracted longitudinal wave (L-wave) or a 70-degree shear wave from the accessible side of the welds. In addition, the licensee performed a 45-degree refracted longitudinal wave for Pipe-to-Pump Weld RCS-900B-FWB06 for axial and circumferential scans

due to an overlay. The combined shear and L-wave examinations account for the aggregate coverage reported.

The L-wave technique is believed capable of detecting planar ID surface-breaking flaws on the far-side of austenitic stainless steel welds. Studies[3,4] reported in the technical literature recommend the use of both shear and L-waves to obtain the best detection results, with minimum false calls, in austenitic welds. These weld examinations were completed prior to the implementation of inspection techniques qualified under ASME Code, Section XI, Appendix VIII therefore these examinations were conducted using ASME Code-required technical guidance at the time of the examinations.

The UT weld examinations conducted for welds listed in Table 3.4.2 above included 45- and 60-degree shear waves and 60-degree longitudinal wave from the accessible side of the welds and used equipment, procedures and personnel that where qualified to the process outlined in ASME Code, Section XI, Appendix VIII. The licensee completed the ASME Code-required surface examinations on the welds as listed in Tables 3.4.1 and 3.4.2 above with no limitations. No unacceptable indications were observed during the ultrasonic and surface examinations.

Based on the above, the NRC staff concludes that the licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject welds due to the design geometry of the welds and that to require the licensee to perform the ASME Code-required examinations would place a burden on the licensee. In addition, based on the volumetric coverage obtained, along with the full ASME Code-required surface examination completed, it is reasonable to conclude that if significant service-induced degradation had occurred in the subject welds, evidence of it would have been detected by the examinations performed. The NRC staff concludes that the examinations performed provide reasonable assurance of structural integrity of the subject welds, and the proposed request for relief is, therefore, acceptable.

3.5 Request for Relief RBS-ISI-011, ASME Code, Section XI, Examination Category B-K, Item B10.10, Integral Attachments for Class 1 Vessels, Piping, Pumps, and Valves

3.5.1 ASME Code Requirement

ASME Code, Section XI, Examination Category B-K, Item B10.10 requires essentially 100 percent surface examination, as defined by ASME Code, Section XI, Figures IWB-2500-13, -14, and -15, as applicable, of selected integrally welded attachments to Class 1 components. "Essentially 100 percent," as clarified by ASME Code Case N-460, is greater than 90 percent coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in RG 1.147, Revision 15.

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[3] F.V. Ammirato, X. Edelmann, and S.M. Walker, 1987. "Examination of Dissimilar Metal Welds in BWR Nozzle-to-Safe End Joints," 8th International Conference on NDE in the Nuclear Industry, ASM International.

[4] P. Lemaitre, T.D. Koble, and S.R. Doctor, 1995. "PISC III Capability Study on Wrought-to-Wrought Austenitic Steel Welds: Evaluation at the Level of Procedures and Techniques," *Effectiveness of Nondestructive Examination Systems and Performance Demonstration*, PVP-Volume 317, NDE-Volume 14, American Society of Mechanical Engineers.

Note: During the third ISI interval, the licensee invoked ASME Code Case N-509, "Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments," which replaces Category B-H, Integral Attachments for Vessels, and Category B-K-1, Integral Attachments for Piping, Pumps, and Valves, in Table IWB 2500-1 with Category B-K, Integral Attachments for Class 1 Vessels, Piping, Pumps and Valves. ASME Code Case N-509 has been approved for use by the NRC in RG 1.147, Revision 13, subject to the following condition in addition to those conditions specified in the Code Case: "A minimum 10 percent sample of integrally welded attachments for each item in each code class per interval should be examined." RBS has met this condition and, therefore, the subject request for relief has been evaluated using ASME Code Case N-509, Category B-K.

3.5.2 Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required essentially 100 percent surface examination of the RPV Support Skirt Attachment Weld B13-D001-CG.

3.5.3 Licensee's Basis for Relief Request (as stated)

> During surface examination of both the RPV Skirt weld and pipe support integral attachment weld, 100% coverage of the required examination area could not be obtained.
>
> The configuration of the Reactor Vessel Support Skirt Weld B13-D001-CG is such that access is only available from the outside surface of the support, leaving half of the examination volume inaccessible. Refer to [ASME Code, Section XI,] Figure IWB-2500-13 for examination volume. The later Edition of the ASME Code recognizes this and only requires the examination from the accessible surface.
>
> In order to perform any type of additional [ASME] Code examination, modification and/or replacement of the component would be required.

3.5.4 Licensee's Proposed Alternative Examination

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the extent practical.

3.5.5 NRC Staff Evaluation

The ASME Code requires 100 percent surface examination of selected ASME Code, Class 1 RPV integral attachment welds. However, surface examinations on the subject weld is limited due to partial inaccessibility caused by the design. In order for the licensee to obtain 100 percent of the ASME Code-required surface examination coverage, the integral attachment weld would have to be redesigned and modified.

The MT surface examinations of the RPV support skirt attachment weld have been performed to the extent practical, with the licensee obtaining 50 percent coverage of the ASME Code requirement. The RPV support skirt design limits the examination to only the outside surface of the weld because there are no access points to the inside surface as shown on the sketch and technical descriptions included in the licensee's submittals. No reportable indications were detected during these surface examinations.

Based on the above, the NRC staff concludes that the licensee has shown that it is impractical to meet the ASME Code-required surface examination coverage for the subject ASME Code, Class 1 RPV integral attachment weld and that to require the licensee to perform the ASME Code-required examinations would place a burden on the licensee. In addition, based on the surface coverage obtained, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would be have been detected by the examinations that were performed. The NRC staff concludes that the examinations performed provide reasonable assurance of structural integrity of the subject welds, and the proposed request for relief is, therefore, acceptable.

4.0 CONCLUSIONS

The NRC staff has reviewed the licensee's submittals and concludes that ASME Code examination coverage requirements are impractical for the subject welds listed in RRs RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-010, and RBS-ISI-011 and that imposition of these ASME Code requirements would create a burden on the licensee. The NRC staff further determined that based on the volumetric and surface coverage, if applicable, obtained on the subject welds, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed. Therefore, the NRC staff concluded that examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject welds.

Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i), and is in compliance with the requirements of 10 CFR 50.55a with the granting of these reliefs. Therefore, the NRC staff grants relief for the subject examinations of the components contained in RRs RBS-ISI-007, RBS-ISI-008, RBS-ISI-009, RBS-ISI-0010, and RBS-ISI-011 for RBS. The NRC staff has further determined that granting these RRs pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: T. McLellan
C. Nove

Date: May 3, 2010

Attachment

TABLE 1
SUMMARY OF RELIEF REQUESTS
River Bend Station, Unit 1
Second 10-Year ISI Interval

Relief Request Number	TLR RR Sec.	System or Component	Exam. Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
RBS-ISI-007	3.1	Pressure Retaining Welds in Reactor Vessel	B-A	B1.40	100% of Class 1 RPV head-to-flange welds	Volumetric and Surface	Use volumetric and surface coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)
RBS-ISI-008	3.2	Full Penetration Welded Nozzles in Vessels	B-D	B3.90	100% of Class 1 RPV nozzle-to-vessel welds	Volumetric	Use volumetric coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)
RBS-ISI-009	3.3	Pressure Retaining Bolting, Greater Than 2 Inches In Diameter	B-G-1	B6.40	100% of Class 1 RPV threads-in-flange	Volumetric	Use volumetric coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)
RBS-ISI-010	3.4	Pressure Retaining Welds in Piping	B-J	B9.11 B9.31	100% of Class 1 circumferential piping and branch pipe connection welds, NPS 4 or larger	Surface and Volumetric	Use volumetric and surface coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)
RBS-ISI-011	3.5	Integral Attachments for Class 1 Vessels, Piping, Pumps, and Valves	B-K	B10.10	100% of Class 1 integrally welded attachment for pressure vessels	Surface	Use surface coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)

If you have any questions, please contact Alan Wang at 301-415-1445 or via e-mail at alan.wang@nrc.gov.

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosure:
Safety Evaluation

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