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

February 5, 2010

Mr. Mano Nazar
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT 1 - THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUEST FOR RELIEF 31, REVISION 1 AND REQUEST FOR RELIEF 32, REVISION 1 (TAC NO. ME0662)

Dear Mr. Nazar:

By letter dated February 6, 2009, as supplemented by two separate letters dated July 20, 2009, Florida Power and Light Company (the licensee) submitted a relief request that proposed its third 10-Year Inservice Inspection (ISI) Interval Program Plan Request for Relief (RR) 31, Revision 1, and RR 32, Revision 1, from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, for St. Lucie Plant, Unit 1.

Specifically, in accordance with Title 10, *Code of Federal Regulation* (10 CFR) Section 50.55a(g)(5)(iii), the licensee submitted RR31 for relief from the ASME Code-required 100 percent volumetric examination of Intermediate Shell-to-Lower Shell Circumferential Weld 9-203, Bottom Head-to-Lower Shell Circumferential Weld 10-203, Upper Shell Longitudinal Seam Weld 1-203B at 15 degrees, and Lower Head Peel Segment (meridional) Welds 204-03-A through F on the RPV. Further, in accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examination of Steam Generator Primary Head-to-Stay Cylinder Weld 1-SGA-W4. Regarding RR 32, in accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100 percent volumetric examination of specific ASME Code, Class 1 piping welds.

Based on the information provided in RRs 31 and 32, the Nuclear Regulatory Commission (NRC) staff concluded that it is impractical for the licensee to comply with the applicable ASME Code requirements, and that imposing these requirements would be a burden on the licensee. The NRC staff also finds that the licensee's proposed alternatives continue to provide reasonable assurance of structural integrity and are, therefore, acceptable.

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. However, based on the volumetric coverage obtained, and the ultrasonic techniques employed, 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.

Furthermore, the NRC staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff grants the ISI program alternatives proposed in RRs 31 and 32, on the basis that they are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Brenda Mozafari at (301) 415-2020.

Sincerely,

/RA/

Eva Brown, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

REQUESTS FOR RELIEF

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-335

1.0 INTRODUCTION

The U. S. Nuclear Regulatory Commission (NRC, the Commission) staff, with technical assistance from its contractor, the Pacific Northwest National Laboratory (PNNL), has reviewed and evaluated the information provided by Florida Power and Light Company (the licensee) in its letter dated February 06, 2009 (Agencywide Documents Access & Management System (ADAMS) ML090430304), which proposed its third 10-Year Inservice Inspection (ISI) Interval Program Plan Request for Relief (RR) 31 and RR 32 from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, for St. Lucie Nuclear Plant, Unit 1 (St. Lucie). Additionally, in response to an NRC Request for Additional Information (RAI), the licensee submitted revisions to RR 31 and RR 32, and included further information, in two separate letters dated July 20, 2009.

Attachment 1 to this SE lists each RR and the status of approval.

2.0 REGULATORY REQUIREMENTS

ISI of the 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 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 Section 50.55a(g)(6)(i). The regulation at 10 CFR 50.55a(a)(3) states 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 St. Lucie third 10-year interval ISI program, which ended on February 10, 2008, is the 1989 Edition, no Addenda, of Section XI of the ASME Boiler and Pressure Vessel Code.

3.0 EVALUATION

The information provided by the licensee in support of each RR from, or alternative to, ASME Code requirements has been evaluated and the bases for disposition are documented below.

3.1 Request for Relief 31, Revision 1, ASME Code, Section XI, Examination Category B-A, Items B1.11, B1.12, B1.21 and B1.22, Pressure Retaining Welds in Reactor Vessel

ASME Code Requirement

ASME code, Section XI, Examination Category B-A, Items B1.11 and B1.12 require essentially 100% volumetric examination, as defined by figures IWB-2500-1 and -2, respectively, of the length of reactor pressure vessel (RPV) circumferential and longitudinal shell welds. Items B1.21 and B1.22 require essentially 100% volumetric examination, as defined by Figure IWB-2500-3, of the "accessible length" of circumferential and meridional head welds on the RPV. "Essentially 100%," as clarified by ASME Code Case N-460, Alternative Examination Coverage for Class 1 and Class 2 Welds, is greater than 90% 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 (RG 1.147, Revision 15), "Inservice Inspection Code Case Acceptability ASME, Section XI, Division 1."

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% volumetric examination of Intermediate Shell-to-Lower Shell Circumferential Weld 9-203, Bottom Head-to-Lower Shell Circumferential Weld 10-203, Upper Shell Longitudinal Seam Weld 1-203B at 15 degrees, and Lower Head Peel Segment (meridional) Welds 204-03-A through F on the RPV.

Licensee's Basis for Relief Request (as stated)

> RPV Intermediate Shell-to-Lower Shell Circumferential Weld (9-203). The examination of the [ASME Code, Section XI,] Figure IWB-2500-1 RPV Intermediate Shell-to-Lower Shell Circumferential Weld (9-203). The examination of the [ASME Code, Section XI,] Figure IWB-2500-1 A-B-C-D volume is limited due to the surveillance capsule holders. Access to approximately 16.9% of the examination volume is restricted.
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> RPV Circumferential Bottom Head-to-Lower Shell Weld (10-203)
> The examination of the [ASME Code, Section XI,] Figure IWB-2500-3

A-B-C-D volume is limited due to the proximity of the Core Barrel Stabilizers and Core Lugs. Access to approximately 29.4% of the examination volume is restricted.

RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (1-203B). The examination of the [ASME Code, Section XI,] Figure IWB-2500-2 A-B-C-D volume is limited due to the outlet nozzle at zero degrees integral extension. Access to approximately 36.8% of the examination volume is restricted.

RPV Lower Head Peel Segment Welds (204-03-A through F). The examination of the [ASME Code, Section XI,] Figure IWB-2500-3 E-F-G-H volume is limited due to the proximity of the flow baffle. Approximately 46.7% of [the examination volume for] welds 204-03-B, 204-03-D, 204-03-F and 56.6% of [the examination volume for] welds 204-03-A, 204-03-C, 204-03-E, is restricted due to limited access behind the flow baffle.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires essentially 100% volumetric examination of the entire length of RPV circumferential and longitudinal shell welds, and essentially 100% of the "accessible length" of meridional and circumferential head welds on the RPV. However, for the subject welds at St. Lucie, complete examinations are restricted by the geometric configuration of the welds and scan limitations caused by adjacent appurtenances. The RPV would require design modifications to increase the weld volume that can be inspected. Imposing this requirement would place a burden on the licensee, therefore, the ASME Code-required 100% volumetric examinations are considered impractical.

The design of the St. Lucie RPV limits the examination of the subject welds as shown in technical descriptions and sketches[1] provided by the licensee. Examination of the subject welds are performed with a remote device from the inside of the RPV. For Intermediate Shell-to-Lower Shell Circumferential Weld 9-203, the ultrasonic transducer sled of the automated device is restricted from accessing the entire scan region due to the presence of adjacent material surveillance capsule holders. The licensee was able to obtain approximately 83.1% of the required ASME volumetric coverage for this circumferential weld. On Circumferential Bottom Head-to-Lower Shell Weld 10-203, scan restrictions caused by the core barrel stabilizers and core support lugs allowed approximately 70.6% of the required ASME Code volume to be completed. Scans on the Upper Shell Longitudinal Seam Weld 1-203B at 15 degrees are limited due to the

1 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

close proximity of the outlet nozzle integral extension, which allowed approximately 63.2% volumetric coverage of this longitudinal seam weld. Lower Head Peel Segment Welds 204-03-A through F have also been performed to the extent practical, with the licensee obtaining coverage between approximately 43.4% and 53.3% of the ASME Code-required inspection volumes. The examinations were conducted with equipment, procedures and personnel that where qualified to the process outlined in ASME Code Section XI, Appendix VIII. The licensee did not detect any unacceptable indications for the weld volumes that were examined.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject welds due to their design and proximity of adjacent permanent appurtenances. Based on the examination volumes that were obtained, along with the full examination of other pressure retaining RPV 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.2 Request for Relief 32, Revision 1, Part A, ASME Code, Section XI, Examination Category B-B, Item B2.31, Pressure Retaining Welds in Vessels Other than Reactor Vessels

ASME Code Requirement

ASME Code, Section XI, Examination Category B-B, Item B2.31 requires essentially 100% volumetric examination, as defined by ASME Code, Section XI, Figure IWB-2500-3, of the length of steam generator circumferential head welds. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% 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.

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 examination of Steam Generator Primary Head-to-Stay Cylinder Weld 1-SGA-W4.

Licensee's Basis for Relief Request (as stated)

> Inservice examination limited along length of weld due to one side configuration.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires essentially 100% volumetric examination of Steam Generator Primary Head-to-Stay Cylinder Weld 1-SGA-W4. However, complete examination of the subject weld is restricted by the geometric configuration of the weld, which only provides access from a single side. In order to increase the volumetric coverage, the steam generator stay cylinder would require design modifications. Imposing this requirement would create a burden on the licensee; therefore, the ASME Code-required 100% volumetric examination is considered impractical.

As shown on the sketches and technical descriptions[2] included in the licensee's submittal, examination of Steam Generator Primary Head-to-Stay Cylinder Weld 1-SGA-W4 has been performed to the extent practical with the licensee obtaining volumetric coverage of approximately 58% of the ASME Code-required volume. The steam generator-to-stay cylinder weld is fabricated from SA 508 carbon steel, with stainless steel cladding on the primary side. The weld design limits scanning access to one side of the weld. No scan access from the stay cylinder side is available due to the curvature of the forged stay cylinder and the orientation of the weld. Ultrasonic examination of this weld included a 0-degree longitudinal wave, and 30-, 45-, and 60-degree shear waves from the head side of the weld. The examination volume 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.

Although ultrasonic scans were limited to the head side of the weld only, 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.[3] Therefore, it is expected that the ultrasonic techniques employed by the licensee would detect structurally significant flaws that might occur on either side of the subject weld due to the fine-grained carbon steel microstructures in these materials. No unacceptable indications were noted during the examination.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject weld due to the design of the stay cylinder and steam generator head. Based on the volumetric coverage obtained, and considering the increased effectiveness of ultrasonic techniques on fine-grained carbon steel materials associated with this 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

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2 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

3 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 32, Revision 1, Part B, ASME Code, Section XI, Examination Category B-D, Item B3.130, Full Penetration Welded Nozzles in Vessels

ASME Code Requirement

ASME Code, Section XI, Examination Category B-D, Item B3.130 requires 100% volumetric examination, as defined by ASME Code, Section XI, Figures IWB 2500-7(a) through (d), as applicable, of ASME Code, Class 1 steam generator nozzle-to-vessel welds. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 15, 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%, i.e., greater than 90% examination coverage is obtained.

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% volumetric examination of Steam Generator Inlet Nozzle-to-Shell Welds 1-SGA-W5 and 1-SGB-W5, on Steam Generators 1A and 1B, respectively.

Licensee's Basis for Relief Request (as stated)

> Inservice examination limited along length of weld due to one side configuration.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires 100% volumetric examination of ASME Code, Class 1 nozzle-to-vessels welds. However, the design configurations of Steam Generator Inlet Nozzle-to-Vessel Welds 1-SGA-W5 and 1-SGB-W5 limit main access for ultrasonic scanning to the nozzle side of the welds only. In order to effectively increase the examination coverage, the nozzle-to-vessel welds would require design modifications, or replacement. This would place a burden on the licensee; thus, 100% ASME Code-required volumetric examinations from both sides of the welds are considered impractical.

The subject inlet nozzle welds are located on the steam generator primary head, and consist of SA-508 Class 3 carbon steel with stainless steel cladding on the inside surface. The nozzles' design essentially makes these welds concentric rings aligned perpendicular with the nozzle axes. The primary head forging is also SA-508 carbon steel, made with an integral raised extension ring for purposes of welding the nozzle to the head. This design geometry primarily limits ASME Code-required ultrasonic angle beam examinations to be performed only from the nozzle side of the welds. As shown

on the sketches and technical descriptions[4] included in the licensee's submittal, examinations of the subject nozzle-to-vessel welds have been completed to the extent practical with significant aggregate volumetric coverage of approximately 85% of the ASME Code-required volume. The ultrasonic examinations included 0-degree longitudinal wave, and 30-, 45-, and 60-degree shear waves performed from the nozzle side of the welds. The examination coverage included most of the weld and base materials near the inside surface of the vessel; only a small portion of the required volume on the primary head base material near the outside surface could not be examined.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject inlet nozzle-to-head welds due to the nozzle-to-shell design and outside diameter (OD) surface configuration. Based on the volumetric coverage obtained for 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.4 Request for Relief 32, Revision 1, Part C, ASME Code, Section XI, Examination Category B-J, Item B9.11, Pressure Retaining Welds in Piping

ASME Code Requirement

ASME Code, Section XI, Examination Category B-J, Item B9.11, requires essentially 100% volumetric and surface examinations, as defined by Figure IWB-2500-8(c), for piping circumferential welds 4-inch nominal pipe size (NPS), and greater, in diameter. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% 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.

Note: On March 25, 2004, the licensee received approval by NRC SE (ADAMS ML040850587) to implement a risk-informed ISI (RI-ISI) program for the subject piping welds. However, the examinations described in the current request were performed prior to the RI-ISI approval and remain as ASME Code, Section XI, Category B-J, Item B9.11, for purposes of this evaluation. Three welds performed after the implementation of the RI-ISI program have been evaluated as ASME Code, Section XI, Category R-A in this SE.

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% volumetric examination of the ASME Code, Class 1 piping welds shown in Table 3.4.1 below.

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4 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

Table 3.4.1 – ASME Code, Section XI, Examination Category B-J, Item B9.11			
Weld ID	Weld Configuration	Pipe Size - Schedule	Coverage Obtained
SI-112-1-SW-5	Tee-to-Pipe	6" - 160	81.5%
SI-112-1-SW-6	Reducer-to-Tee	6" - 160	81.5%
SI-148-2-SW-4	Pipe-to-Tee	6" - 160	50%
SI-148-FW-5	Elbow-to-Valve	12" - 160	50%
RC-151-FW-1	Valve-to-Elbow	12" - 160	50%
SI-148-FW-1	Valve-to- Pipe	12" - 160	50%
RC-115-FW-3-500E	Pump (Cast) to Safe-end (Cast)	30" – 3.5" (thickness)	50%

Licensee's Basis for Relief Request (as stated)

> For each of the piping welds shown in Table 3.4.1 above, the examinations have been limited due to [OD] surface and weld joint configurations. As is indicated by volumetric coverage obtained, most of the welds are only examined from a single side due to these conditions.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires essentially 100% volumetric examination for selected Section XI, Examination Category B-J pressure retaining welds in piping. However, complete volumetric examinations are restricted by several factors, including cast materials, and valve, elbow 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[5] included in the licensee's submittal, examinations of the subject welds have been performed to the extent practical

5 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

with the licensee obtaining coverage ranging from 50 to 81.5% from at least one side of the weld (see Table 3.4.1 above). Various scan limitations were caused by the configuration of the welds and materials of welded components such as cast stainless valves and safe ends. The ultrasonic examinations conducted by the licensee included 45- and/or 60-degree shear waves from the accessible side of the welds. In addition, the licensee performed 45- and/or 60-degree refracted longitudinal wave (L-wave) examinations from the accessible side of these welds. The combined shear and L-wave examinations account for the aggregate coverage reported. The L-wave technique is believed capable of detecting planar inside diameter (ID) surface-breaking flaws on the far-side of wrought stainless steel welds. Studies[6,7] 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. The licensee completed the ASME Code-required surface examinations on the subject welds with no limitations. No recordable indications were observed during the ultrasonic and surface examinations.

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 materials of construction. Based on the volumetric coverage obtained, and considering the full examination of other pressure retaining piping welds, 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.5 Request for Relief 32, Revision 1, Part D, ASME Code, Section XI, Examination Category R-A, Item R1.11, Piping Welds Subject to a Risk-Informed Inspection Program

ASME Code Requirement

The examination requirements for the subject piping welds at St. Lucie are governed by a Risk-Informed Inservice Inspection (RI-ISI) program that was approved by the NRC in a Safety Evaluation (SE) dated March 25, 2004 (ADAMS ML040850587). The RI-ISI program was developed in accordance with the Westinghouse Owners Group Topical Report WCAP-14572, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report, Revision 1-NP-A, February 1999. As part of the NRC-approved RI-ISI program plan, the licensee has implemented inspection requirements listed in ASME Code Case N-577,[8] "*Risk-Informed Requirements for ASME Code, Class 1, 2 or 3 Piping, Method A,*" with more detailed

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

7 P. Lemaitre, T. D. Koble, and S. R. Doctor, 1995. "PISC [Program for the Inspection of Steel Components] 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, ASME.

8 ASME Code Case N-577 has not been approved for use in RG-1.147, Revision 15. Licensees base their RI-ISI inspection sample size and examination methodology on Table 1 of ASME Code Case N-577.

provisions contained in WCAP-14572. The topical report includes a provision for requesting relief from volumetric examinations if 100% of the required volumes cannot be examined.

Table 1 of ASME Code Case N-577 assigns the Examination Category R-A, Item R1.11, to piping inspection elements subject to a thermal fatigue damage mechanism. This table requires 100% of the examination location volume, as described in ASME Code, Figures IWB-2500-8, 9, 10, or 11, as applicable, including an additional ½-inch of base metal adjacent to the ASME Code volume, be completed for selected Class 1 circumferential piping 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%, i.e., greater than 90% examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100% volumetric examination of the piping welds shown in Table 3.5.1 below.

Table 3.5.1 – ASME Code, Section XI, Examination Category R-A, Item R1.11

Weld ID	Weld Configuration	Pipe Size - Schedule	Coverage Obtained
RC-109-FW-2003	Valve-to-Pipe	3" - 160	50%
RC-103-FW-2000	Tee-to-Nozzle	4" - 160	84.5%
RC-103-FW-2002	Tee-to-Pipe	4" - 160	84.5%

Licensee's Basis for Relief Request (as stated)

> Weld RC-109-FW-2003 – Examination complete of the pipe side including best effort examination of valve side through weld material. No access for scanning of the valve side due to weld crown and taper.
>
> Weld RC-103-FW-2000 – Examination complete of the nozzle side and scanning limited from the tee side in area of radius. Best effort examination of tee side in area of radius performed through weld material.
>
> Weld RC-103-FW-2002 – Examination complete of the pipe side and scanning limited from the tee side in area of radius. Best effort examination of tee side in area of radius performed through weld material.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The examination requirements for the subject small-bore (3- and 4-inch NPS) piping welds are governed by a RI-ISI program that was approved by the NRC in an SE dated March 25, 2004. This program requires that selected piping welds be volumetrically examined in accordance with the requirements Table 1 of ASME Code Case N-577. However, the design configuration of these welds limit volumetric examinations. In order to increase coverage, the welds would have to be re-designed and modified; therefore, the ASME Code Case-required volumetric examinations are considered impractical.

As shown in the technical descriptions and sketches[9] provided in the licensee's submittals, examinations of the subject welds have been performed to the extent practical, with the licensee obtaining volumetric coverage ranging from 50 to 84.5% (see Table 3.5.1 above) of the required volumes from at least one side of the welds. The design of these small-bore piping welds prevents full volume scanning due to tapers, radii, and materials of the welded components. Welds RC-103-FW-2000 and RC-103-FW-2002 are 4-inch NPS, Schedule 160 stainless steel piping welds in tee-to-nozzle and pipe-to-tee configurations, respectively. The OD blend radius at 180-degrees circumference prevents scanning from the tee side of the welds in this area. The licensee performed 45- and 60-degree shear wave, and 60-degree refracted longitudinal wave, examinations on these welds to obtain 84.5% of the required coverage. Weld RC-109-FW-2003 is a 3-inch NPS, Schedule 160 stainless steel valve-to-pipe weld where ultrasonic scanning was limited to the pipe side-of-the weld only due to the cast material and taper on the valve side. This weld was examined with 45-, 60-, and 70-degree shear waves. The ultrasonic examinations did not reveal any unacceptable flaws.

The subject welds were new replacement welds fabricated during the third inspection interval, after the RI-ISI program had been implemented. The licensee's RR is for volumetric limitations experienced on these replacement welds during preservice examinations. The licensee stated that these piping welds, as part of the risk-informed population, were not selected for future inservice examinations based on their risk significance, however, since no guidance exists in the RI-ISI program for examinations of repaired and/or replaced welds, the licensee elected to perform baseline examinations in accordance with ASME Code. Further, Weld RC-109-FW-2003, being a 3-inch NPS piping weld, would not be required to be volumetrically examined per ASME Code. However, the licensee elected to perform volumetric examination because this weld is also part of the RI-ISI population.

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9 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

As replacement welds, the licensee performed in-process and final surface examination, and final radiographic examination, during the installation activities. These examinations were performed in accordance with 1992 Edition of ASME Code, Section III. No recordable flaws were noted during these fabrication examinations.

The licensee has shown that it is impractical to meet the ASME Code-required preservice volumetric examination coverage for the subject replacement welds due to the design geometry of the welds and materials of construction. Based on the ultrasonic results and coverage obtained, and the results of surface and radiographic examinations performed during installation, it is reasonable to conclude that the subject welds are adequate to meet their intended design functions, and that the preservice examinations performed provide an adequate baseline for comparison of future inservice examinations, if required. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.6 Request for Relief 32, Revision 1, Part E, ASME Code, Section XI, Examination Category C-A, Items C1.10 and C1.30, Pressure Retaining Welds in Pressure Vessels

ASME Code Requirement

ASME Code, Section XI, Examination Category C-A, Items C1.10 and C1.30, require essentially 100% volumetric examination, as defined by Figure IWC-2500-1 or -2, as applicable, of the length of pressure retaining flange-to-shell and tubesheet-to-shell welds in Class 2 pressure vessels. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% 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.

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% volumetric examination of Circumferential Flange-to-Shell Weld 2-2701 and Tubesheet-to-Shell Weld 2-2702 on the shutdown cooling heat exchanger.

Licensee's Basis for Relief Request (as stated)

> Weld 2-2701 – Inservice examination limited by weld crown, taper and flange configuration. Axial scan from the shell side only. Circumferential scan limited by weld crown, taper and flange configuration.
>
> Weld 2-2702 – Inservice examination limited by weld crown and tubesheet configuration. Axial scan from the body [shell] side only. Circumferential scan limited by weld crown and tubesheet configuration.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires 100% volumetric examination of circumferential shell and tubesheet welds on selected ASME Code, Class 2 pressure vessels. However, for the subject welds on the St. Lucie, Unit 1 shutdown cooling heat exchanger, complete examinations are limited due to their design configuration. In order to achieve greater volumetric coverage, the shutdown cooling heat exchanger would have to be redesigned and modified. This would place a burden on the licensee, therefore the ASME Code examinations are considered impractical.

As shown on the sketches and technical descriptions[10] included in the licensee's submittal, examinations of Circumferential Shell-to-Flange Weld 2-2701 and Tubesheet-to-Shell Weld 2-2702 have been performed to the extent practical, with the licensee obtaining approximately 36 and 40% of the required examination volumes, respectively. The shutdown cooling heat exchanger is fabricated of carbon steel, with ID stainless steel cladding. The licensee examined these welds from the shell side using 45- and 60-degree shear waves to achieve limited circumferential and axial coverage along the weld length. No scans could be performed from the opposite side of the welds due to the taper, weld crowns, and flange and tubesheet geometries. No recordable flaw indications were observed during these examinations.

Although ultrasonic scans were limited to the shell side of the welds only, 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.[11] Therefore, it is expected that the ultrasonic techniques employed by the licensee would detect structurally significant flaws that might occur on either side of the subject weld due to the fine-grained carbon steel microstructures in these materials.

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. However, based on the volumetric coverage obtained, and the ultrasonic techniques employed, 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

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10 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

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

3.7 Request for Relief 32, Revision 1, Part F, ASME Code, Section XI, Examination Category C-B, Item C2.21, Pressure Retaining Nozzle Welds in Vessels

ASME Code Requirement

ASME Code, Section XI, Examination Category C-B, Item C2.21 requires 100% volumetric and surface examinations, as defined by Figure IWC-2500-4(a) or (b), as applicable, of pressure retaining nozzle-to-shell welds in ASME Code, Class 2 vessels. 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%, i.e., greater than 90% examination coverage is obtained.

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 Shutdown Cooling Heat Exchanger Nozzle-to-Vessel Welds 2-2741-1 and 2-2742-1. These welds are the inlet and outlet nozzle welds, respectively, on the shutdown cooling heat exchanger.

Licensee's Basis for Relief Request (as stated)

> Weld 2-2741-1 – Inservice examination limited to one sided access due to nozzle configuration. Axial scan from the shell side only. Circumferential scan limited by taper.
>
> Weld 2-2742-1 – Inservice examination limited to one sided access due to nozzle configuration. Axial scan from the shell side only. Circumferential scan limited by taper.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires 100% volumetric and surface examination of full penetration nozzle-to-shell welds on selected ASME Code, Class 2 pressure vessels. However, for the inlet and outlet nozzle welds on the St. Lucie, Unit 1 shutdown cooling heat exchanger, complete examinations are limited due to their design configuration. In order to achieve greater volumetric coverage, the shutdown cooling heat exchanger would have to be redesigned and modified. This would place a burden on the licensee, therefore the ASME Code examinations are considered impractical.

As shown on the sketches and technical descriptions[12] included in the licensee's submittal, examinations of Shutdown Cooling Heat Exchanger Inlet and Outlet Nozzle-to-Shell Welds 2-2741-1 and 2-2742-1 have been performed to the extent practical, with the licensee obtaining approximately 50% of the required examination volume. The shutdown cooling heat exchanger is fabricated of carbon steel, with ID stainless steel cladding. The nozzles' "set-in" design essentially makes these welds concentric rings aligned parallel with the nozzle axes. For this reason, no scans could be performed from the nozzle side of the welds. The licensee examined these welds from the shell side using 45- and 60-degree shear waves to achieve limited circumferential and axial coverage along the weld length. The licensee completed the ASME Code-required surface examinations on the subject welds with no limitations. No recordable flaw indications were observed during these examinations.

Although ultrasonic scans were limited to the shell side of the welds only, 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.[13] Therefore, it is expected that the ultrasonic techniques employed by the licensee would detect structurally significant flaws that might occur on either side of the subject weld due to the fine-grained carbon steel microstructures in these materials.

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. However, based on the volumetric coverage obtained, and the ultrasonic techniques employed, 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. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.8 Request for Relief 32, Revision 1, Part G, ASME Code, Section XI, Examination Category C-F-1, Items C5.11 and C5.21, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping

ASME Code Requirement

ASME Code, Section XI, Examination Category C-F-1, Items C5.11 and C5.21 require 100% volumetric and surface examinations, as defined by ASME Code, Section XI, Figure IWC-2500-7, of selected ASME Code, Class 2 austenitic stainless steel or high alloy circumferential and longitudinal piping welds. ASME Code Case N-460, as an alternative approved for use by 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

12 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

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

acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

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 the high alloy piping welds shown in Table 3.8.1 below.

Table 3.8.1 – ASME Code, Section XI, Examination Category C-F-1				
ASME Code Item	Weld ID	Weld Configuration	Volumetric Coverage Obtained	Pipe Size - Schedule
C5.11	SI-213-1-SW-2	Tee-to-Reducer	50%	6"-120
C5.21	SI-210-FW-5	Pipe-to-Valve	50%	4"-80
C5.11	SI-129-FW-1	Valve-to-Pipe	50%	6"-160
C5.11	SI-113-FW-9	Pipe-to-Valve	50%	6"-160
C5.11	SI-212-FW-1A	Tee-to-Pipe	50%	6"-160
C5.11	SI-212-FW-1	Pipe-to-Valve	50%	6"-160
C5.11	SI-105-FW-1	Valve-to-Pipe	50%	6"-160
C5.11	SI-213-FW-2	Valve-to-Pipe	50%	6"-120
C5.21	SI-210-FW-4	Valve-to-Pipe	50%	4"-80
C5.21	SI-209-FW-2	Valve-to-Pipe	50%	3"-160
C5.21	SI-210-FW-8	Reducer-to-Tee	77%	4"-80
C5.21	SI-211-11-SW-2	Pipe-to-Elbow	68%	3"-160

Licensee's Basis for Relief Request (as stated)

> It is not possible to obtain ultrasonic interrogation of greater than 90% of the required examination volume[s] due to interference caused by configuration and/or permanent attachments. Configuration, permanent attachments and/or structural interferences prohibit 100% ultrasonic examination of [ASME] Code required volume. Additional ultrasonic techniques are employed where practical to achieve the code-required volume.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires 100% volumetric and surface examination for selected Examination Category C-F-1 pressure retaining welds in piping. The volumetric examination must be applied from both sides of the weld to maximize coverage. However, volumetric examinations are limited by the geometry of the welds, which restricts scanning to one side only. 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 100% volumetric examinations from both sides of the welds are considered impractical.

As shown on the sketches and technical descriptions[14] included in the licensee's submittal, access for examination of the subject welds is limited to the pipe side only due to tapers and materials caused by valve-to-pipe, pipe-to-tee, pipe-to-reducer, and reducer-to-tee weld configurations (see Table 3.8.1). The ultrasonic techniques employed for these welds have been qualified through the industry's Performance Demonstration Initiative, which meets ASME Code Section XI, Appendix VIII requirements. These techniques have been qualified for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort." For this reason, the licensee has taken credit for completing only 50% of the ASME Code-required inspection volume on many of the subject piping welds. The licensee completed the ASME Code-required surface examinations to their full extent. No recordable indications were noted during the performance of the volumetric or surface examinations.

Depending on the piping wall thickness (see Table 3.8.1), the licensee's ultrasonic techniques included 45-, 60-, and 70-degree, shear and refracted longitudinal waves (L-waves), which have been shown to provide enhanced detection on the far side of austenitic stainless steel welds.[15,16] While the licensee has only taken credit for obtaining 50% volumetric coverage, the techniques employed would have provided coverage beyond the near-side of the welds. A review of the typical weld cross-sectional information[17] indicates that limited volumetric coverage on the far-side of the welds has been obtained by the licensee.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject piping welds due to their design and ultrasonic access restrictions. Although the ASME Code-required coverage could not be obtained, the ultrasonic techniques employed would have provided full volumetric

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14 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

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

16 P. Lemaitre, T. D. Koble, and S. R. Doctor, *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, ASME, 1995.

17 Cross-sectional data provided by the licensee in its letter dated February 6, 2009, is not included in this SE.

coverage for the near-side of the welds and limited volumetric coverage for the weld fusion zone and base materials on the opposite side of the welds. Based on the aggregate coverage obtained for the subject welds, and considering the licensee's performance of ultrasonic techniques used to maximize this coverage, it is reasonable to conclude that if significant service-induced degradation had occurred, evidence of it would have been detected. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

3.9 Request for Relief 32, Revision 1, Part H, Examination Category C-F-2, Item C5.51, Pressure Retaining Welds in Carbon or Low Alloy Steel Piping

ASME Code Requirement

ASME Code, Section XI, Examination Category C-F-2, Item C5.51 requires 100% volumetric and surface examinations, as defined by ASME Code, Section XI, Figure IWC-2500-7, of selected ASME Code, Class 2 carbon or low alloy steel circumferential piping 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%, i.e., greater than 90% examination coverage is obtained.

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 examination of carbon steel weldolet-to-pipe Weld-MS-1-1-SW-18.

Licensee's Basis for Relief Request (as stated)

> Examination completed from the pipe side and no access from the weldolet side due to weld crown and taper. Examination coverage of weldolet side claimed from pipe side through weld material.

Licensee's Proposed Alternative Examination

The licensee did not propose an alternative examination; however, it did perform the ASME Code-required examinations to the extent practical.

NRC Staff Evaluation

The ASME Code requires 100% volumetric and surface examination of selected ASME Code, Class 2 low alloy pressure retaining circumferential piping welds. However, for weld MS-1-1-SW-18, the volumetric examination is limited due to the configuration of the weld. In order to increase volumetric coverage, this weld would require design modifications. Imposition of this requirement would create a burden on

the licensee, therefore, the ASME Code-required 100% volumetric examination of the subject weld is considered impractical.

Weld MS-1-1-SW-18 is a carbon steel pipe weldolet-to-pipe configuration. As shown on the sketches and technical descriptions[18] included in the licensee's submittal, access for examination of the subject weld is limited to the pipe side only due to the extreme taper on the weldolet side. The licensee obtained 75% volumetric coverage from the pipe side of the weld, using 45-, 60-, and 70-degree shear waves. The ultrasonic procedure used to examine this weld met the performance demonstration requirements of ASME Section XI, Appendix VIII, Supplement 3. Results of recent NDE reliability studies[19] for ultrasonic examination have typically shown a high probability (>0.9) of detecting significant flaws in ferritic welds. In addition, the licensee completed the ASME Code-required surface examinations to their full extent. No recordable indications were noted during the performance of the volumetric or surface examinations.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for Weld MS-1-1-SW-18 due to the weldolet configuration. Based on the limited examination performed, and considering the enhanced detection capabilities of performance demonstrated techniques on ferritic welds, it is reasonable to conclude that, if significant service-induced degradation had occurred in the subject weld, evidence of it would have been detected by the examination that was performed. Furthermore, the staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

4.0 CONCLUSIONS

The NRC staff has reviewed the licensee's submittal and concludes that ASME Code examination coverage requirements are impractical for the subject welds listed in RR 31, Revision 1 and RR 32, Revision 1, Parts A through H. Furthermore, 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. Furthermore, the 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 complies with the requirements of 10 CFR 50.55a with the granting of this relief. Therefore, the NRC staff grants relief for the subject examinations of the components contained in RR 31, Revision 1, and RR 32, Revision 1, Parts A through H at St. Lucie, Unit 1 for the Third 10-year ISI interval.

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18 Sketches and technical descriptions provided by the licensee in its letter dated February 6, 2009, are not included in this SE.

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

The NRC staff has further determined that granting RR 31, Revision 1 and RR 32, Revision 1, Parts A through H 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.

Principle Contributors: Thomas K. McLellan
Keith M. Hoffman

Date: February 5, 2010

TABLE 1
SUMMARY OF RELIEF REQUESTS

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
RR-31, Rev. 1	3.1	Circumferential Shell and Head Welds	B-A	B1.11 B1.12 B1.21 B1.22	100% of Class 1 RPV circumferential shell and head welds	Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part A	3.2	Steam Generator Head-to-stay cylinder weld	B-B	B2.31	100% of Class 1 SG primary head welds	Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part B	3.3	Steam Generator Nozzle-to-vessel Welds	B-D	B3.130	100% of Class 1 SG nozzle to vessel welds	Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part C	3.4	Class 1 Piping Welds	B-J	B9.11	100% of selected Class 1 piping welds	Surface and Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part D	3.5	Risk-informed Piping Welds	R-A	R1.11	100% of selected piping welds	Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part E	3.6	Class 2 Vessel Shell and Head Welds	C-A	C1.10 C1.30	100% of shell and head welds on selected Class 2 vessels	Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part F	3.7	Class 2 Nozzle-to - Shell Welds	C-B	C2.21	100% of nozzle-to-shell welds on selected Class 2 vessels	Surface and Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part G	3.8	Class 2 High Alloy Piping Welds	C-F-1	C5.11 C5.21	100% of selected Class 2 piping welds	Surface and Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)
RR-32, Rev. 1 Part H	3.9	Class 2 Low Alloy Piping Welds	C-F-2	C5.51	100% of selected Class 2 piping welds	Surface and Volumetric	Use volumetric coverage obtained	Granted 10 CFR 50.55a(g)(6)(i)

Furthermore, the NRC staff determined that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject weld.

Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff grants the ISI program alternatives proposed in RRs 31 and 32, on the basis that they are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Brenda Mozafari at (301) 415-2020.

Sincerely,

/RA/

Eva Brown, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure: Safety Evaluation

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