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SOUTHERN COMPANY

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2
REQUESTS FOR ADDITIONAL INFORMATION (RAIs),
FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

Ladies and Gentlemen:

By letter dated July 8, 2010 Southern Nuclear Operating Company, Inc. (SNC), submitted relief requests for the Fourth 10-Year Interval Inservice Inspection Program.

By letter dated October 5, 2010 the NRC requested additional information resulting from a review of relief requests ISI-RR-02, ISI-RR-06 and ISI-RR-07. It should be noted that there are no RAIs associated with ISI-RR-02. The SNC response to these RAIs is provided in Enclosure 1.

Additionally, by letter dated October 22, 2010 the NRC further requested additional information in support of review of relief requests ISI-RR-03, ISI-RR-04, ISI-RR-05, ISI-RR-08, ISI-RR-09, ISI-RR-10, and ISI-RR-11. The SNC response to these NRC RAIs is provided in Enclosure 2.

This letter contains no NRC commitments. If you have any questions, please contact N. J Stringfellow at 205-992-7037.

Respectfully submitted,

Mark J Ajluni

M. J. Ajluni
Nuclear Licensing Director

MJA/PAH

A047
NRR

Enclosures: 1. Response to RAIs Contained in NRC letter of October 5, 2010 ISI-RR-02, ISI-RR-06 and ISI-RR-07

2. Response to RAIs Contained in NRC letter of October 22, 2010 ISI-RR-03, ISI-RR-04, ISI-RR-05, ISI-RR-08, ISI-RR-09, ISI-RR-10, and ISI-RR-11

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EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2
REQUESTS FOR ADDITIONAL INFORMATION (RAIs),
FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

Enclosure 1

Response to RAIs Contained in NRC letter of October 5, 2010
ISI-RR-02, ISI-RR-06, and ISI-RR-07

EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2
REQUESTS FOR ADDITIONAL INFORMATION (RAIs),
FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

Enclosure 1

By letter dated July 8, 2010 Southern Nuclear Operating Company, Inc., submitted relief requests for the Fourth 10-Year Interval Inservice Inspection Program. By letter dated October 5, 2010 the NRC requested additional information regarding the relief requests ISI-RR-06 and ISI-RR-07.

ISI- RR-06, (HNP, Unit 2) ASME Code, Section XI, Examination Category C-G, Pressure Retaining Welds in Pump Casings

1. **NRC RAI**

It was stated in ISI-RR-06 (Hatch, Unit 2), "Pressure Retaining Welds in Pump Casings," that this is the first relief request regarding the surface examination of Weld 2E11-2RHR-PMI-A and Weld 2E21-2CS-PMI-A (American Society of Mechanical Engineers (ASME) Code, Section XI, Class 2, Category C-G, Item C6.10).

How did you achieve the ASME Code-required coverage for the surface examination of these welds in prior inspection intervals? What type of surface examination techniques did you use in this interval when compared to those used in prior intervals? Why can't you achieve the same coverage that you had accomplished previously?

SNC Response

In order to discuss the previous examinations, it must be understood that the Hatch Unit 2 first interval was shortened by approximately three years and the second interval began on January 1, 1986 (per approved relief request 6.1.2). Therefore, only the second, third, and fourth interval examinations have been performed. Each of these examinations utilized similar magnetic particle examination techniques using a magnetizing yoke with dry particles. Examination coverage for each of the intervals is shown below.

- Second interval coverage for RHR pump A was 61%. No Core Spray pumps were examined because second interval examinations were limited to one of the six pumps (three RHR pumps plus three Core Spray pumps). No relevant indications were detected during the examinations. Relief was requested for the second interval and approval was granted July 30, 1998 (TAC NOS. M99767 and M99768).

- Third interval examination coverage was listed as 91% for RHR Pump A and 91% for Core Spray Pump A. Given that similar techniques were used and that similar restrictions were believed to be present, the coverage was over-estimated. No relevant indications were detected during the examinations.

- Fourth interval coverage was 61% for RHR Pump A and 54% for Core Spray Pump A. No relevant indications were detected during the examinations.

  The second and fourth interval coverage for RHR Pump A was the same. Since a Core Spray pump was not required to be examined during the second interval and since the third interval data was over-estimated, a direct comparison with previous data is not practical. The discrepancies in examination coverage have been documented in our corrective action program.

2. <u>NRC RAI</u>

It was stated in ISI-RR-06 that supplemental visual examination was performed to increase the amount of coverage to greater than 90 percent. Please confirm that this supplemental visual examination is the VT-2 examination that you mentioned later under Section 6, "Proposed Alternative and Basis for Use," which is associated with the leakage test.

If the supplemental visual examination that your are referring to is not the VT-2 examination associated with the leakage test, provide additional information regarding how the supplemental visual examination was performed, what standards were used to determine the effectiveness of the examination, how the inspectors were qualified to perform the examination, etc.

<u>SNC Response</u>

The supplemental visual examination discussed in the relief request is not the VT-2 examination associated with the leakage test. A direct VT-1 examination was performed of the examination area to supplement the limited magnetic particle examinations. Welds and adjacent base material were thoroughly examined for service induced conditions, such as cracks, erosion, corrosion, or physical deterioration. None were identified.

The direct VT-1 examinations were performed in accordance with the Section XI requirements of IWA-2210, Visual Examinations using Level II personnel qualified per the requirements of IWA-2300, Qualification of Nondestructive Examination Personnel. Light meters and cards containing specified text were used to assure that there was sufficient illumination and resolution available to detect service induced conditions.

3. **NRC RAI**

ISI-RR-06 did not discuss previous surface examination results for Weld 2E11-2RHR-PMI-A and Weld 2E21-2CS-PMI-A. Provide this information, including the degree of coverage obtained, whether any relevant indications were identified, and how those indications, if any, were dispositioned. Further, discuss any industry examination results or operating experience regarding degradation found in similar pressure retaining welds in pump casings. The staff will use this information to assess the likelihood of having flaws in the uninspected region of these two welds.

SNC Response

Previous surface examination results for Weld 2E11-2RHR-PMI-A and Weld 2E21-2CS-PMI-A were discussed in the response to Question 1.

After reviewing past operating experience and industry examination results, no degradation in similar pressure retaining welds in pump casings was found. Furthermore, Southern Nuclear Operating Company has not observed degradation in similar pressure retaining welds in pump casings within our fleet.

In addition, ASME removed category C-G examinations in the 2008 Addenda of Section XI based on no inservice issues.

ISI- RR-07, (HNP, Unit 1) ASME Code, Section XI, Examination Category B-K, Welded Attachments for Piping

4. **NRC RAI**

ISI-RR-07 (Hatch, Unit 1), "Welded Attachments for Piping," did not discuss previous surface examination results for the subject piping welded attachments under ASME Code, Section XI, Table IWB-2500-1, "Examination Categories," Category B-K, Item B10.20. Provide this information, including the degree of coverage obtained, whether any relevant indications were identified, and how those indications, if any, were dispositioned. Further, discuss any industry examination results or operating experience regarding degradation found in similar piping welded attachments. The staff will use this information to assess the likelihood of having flaws in the uninspected region of these welds.

SNC Response

Welded Attachments 1E41-1HPCI-10-D-7HL-B-1 and 2 received a limited examination of 57% coverage during the third interval. No relevant indications were detected during the third interval examination. A Relief Request was submitted for the Third Interval and approval was granted on

July 20, 2007. The SER can be found using ADAMS Accession Number ML071830010.

After reviewing past operating experience and industry examination results, no degradation in similar piping welded attachments was found. In addition, Southern Nuclear Operating Company has had instances of IWF components to fail or have structural deformation. In these cases, the piping welded attachments were examined and no degradation was identified.

EDWIN I. HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2
REQUESTS FOR ADDITIONAL INFORMATION (RAIs),
FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

Enclosure 2

Response to RAIs Contained in NRC letter of October 22, 2010
ISI-RR-03, ISI-RR-04, ISI-RR-05, ISI-RR-08,
ISI-RR-09, ISI-RR-10, and ISI-RR-11

Enclosure 2

By letter dated July 8, 2010 Southern Nuclear Operating Company, Inc., submitted relief requests for the Fourth 10-Year Interval Inservice Inspection Program. By letter dated October 22, 2010 the NRC requested additional information regarding the relief requests ISI-RR-03, ISI-RR-04, ISI-RR-05, ISI-RR-08, ISI-RR-09, ISI-RR-10, and ISI-RR-11.

For each of the requests listed below, please address the following generic questions:

1. Were Appendix VIII qualified procedures, personnel and equipment used? If so, what American Society of Mechanical Engineers (ASME) Code edition was used for these Appendix VIII examinations?

2. Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

3. Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

4. What system(s) are each of these welds located in?

Generic Question 1 is answered below and applies to Relief Requests ISI-RR-03, ISI-RR-04, ISI-RR-05, ISI-RR-08, ISI-RR-09, ISI-RR-10, and ISI-RR-11. The responses to Generic Questions 2, 3, and 4 and are found for under respective ISI Relief Request listed below.

Generic Question 1

Were Appendix VIII qualified procedures, personnel and equipment used? If so, what American Society of Mechanical Engineers (ASME) Code edition was used for these Appendix VIII examinations?

SNC Response

Appendix VIII qualified procedures, personnel and equipment were used to perform the examinations. The Code edition used for these Appendix VIII examinations was the 2001 Edition. This is based on 10 CFR 50.55a(b)(2)(xxiv) which states, "The use of Appendix VIII and the supplements to Appendix VIII and Article I-3000 of Section XI of the ASME BPV Code, 2002 Addenda through the latest edition and addenda incorporated by reference in paragraph (b)(2) of this section, is prohibited".

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-03

Generic Question 2 for ISI-RR-03

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Each of the weld configurations in ISI-RR-03 are wrought austenitic stainless steel weldments. The procedure used to examine wrought austenitic piping weld configurations is based on generic procedure PDI-UT-2. PDI-UT-2 requires that, when accessibility is limited to a single side in materials with a nominal wall thickness equal to or less than 0.50-inch thick, a 2.25 MHz, 70-degree shear wave search unit be used for the detection and length sizing of flaws on the far side of the weld. When the material thickness is greater than 0.50-inch, a longitudinal wave search unit that provides adequate coverage on the far side of the weld is required to be used for the detection and length sizing of flaws. The UT angles and wave modes are provided below for each weld in ISI-RR-03.

Weld 1G31-1RWCUM-6-D-20

Circumferential flaw coverage was obtained using 45° and 70° shear wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

The reason for not using the L-Wave technique for weld 1G31-1RWCUM-6-D-20 is because it is an austenitic weld with a nominal wall thickness of 0.432-inch.

Weld 2B31-1RCM-28AD-3

Circumferential flaw coverage was obtained using 45° and 60° shear wave and 60° refracted longitudinal wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

Weld 2E11-1RHRM-24A-13

Circumferential flaw coverage was obtained using 45° shear wave and 60° refracted longitudinal wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

Generic Question 3 for ISI-RR-03

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

Generic Question 4 for ISI-RR-03

What system(s) are each of these welds located in?

SNC Response

Weld 1G31-1RWCUM-6-D-20 is located in the Reactor Water Cleanup System, weld 2B31-1RCM-28AD-3 is located in the Reactor Circulation System, and weld 2E11-1RHRM-24A-13 is located in the Residual Heat Removal System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-04

NRC Generic Question 2 for ISI-RR-04

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 2B21-1FW-12AA-8

Circumferential flaw coverage was obtained using 30°, 45°, 60°, and 70° refracted longitudinal wave search units along with a 45° shear wave search unit.

Axial flaw coverage was obtained using a 25°, 35°, 45°, and 55° refracted longitudinal wave search units skewing ±2.5° increments and 35°, 45°, and 55° shear wave search units skewing ±2.5° increments.

NRC Generic Question 3 for ISI-RR-04

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

NRC Generic Question 4 for ISI-RR-04

What system(s) are each of these welds located in?

SNC Response

Weld 2B21-1FW-12AA-8 is located in the Feed Water System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-05

NRC Generic Question 2 for ISI-RR-05

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 2E41-2HPCI-16-TS-18 (carbon steel piping)

Circumferential flaw coverage was obtained using 45° and 70° shear wave search units.

Axial flaw coverage was obtained using a 45° shear wave search units.

NRC Generic Question 3 for ISI-RR-05

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

NRC Generic Question 4 for ISI-RR-05

What system(s) are each of these welds located in?

SNC Response

Weld 2E41-2HPCI-16-TS-18 is located in the High Pressure Coolant Injection System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-08

NRC Generic Question 2 for ISI-RR-08

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 2E11-1RHRM-20RS-3

Circumferential flaw coverage was obtained using a 45° and 60° refracted longitudinal wave search units.

The base material was examined using a 45° shear wave search unit.

Axial flaw coverage was obtained using a 45° refracted longitudinal wave search units.

NRC Generic Question 3 for ISI-RR-08

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

NRC Generic Question 4 for ISI-RR-08

What system(s) are each of these welds located in?

SNC Response

Weld 2E11-1RHRM-20RS-3 is located in the Residual Heat Removal System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-09

NRC Generic Question 2 for ISI-RR-09

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 2B21-1FW-12BC-12

Circumferential flaw coverage was obtained using 30°, 45°, 60°, and 70° refracted longitudinal wave search units along with a 45° shear wave search unit.

Axial flaw coverage was obtained using a 25°, 35°, 45°, and 55° refracted longitudinal wave search units skewing ±2.5° increments and 35°, 45°, and 55° shear wave search units skewing ±2.5° increments.

NRC Generic Question 3 for ISI-RR-09

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

NRC Generic Question 4 for ISI-RR-09

What system(s) are each of these welds located in?

SNC Response

Weld 2B21-1FW-12BC-12 is located in the Feedwater System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-10

NRC Generic Question 2 for ISI-RR-10

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 2E21-1CS-10A-21

Circumferential flaw coverage was obtained using 30°, 45°, 60°, and 70° refracted longitudinal wave search units along with a 45° shear wave search unit.

Axial flaw coverage was obtained using a 25°, 35°, 45°, and 55° refracted longitudinal wave search units skewing ±2.5° increments and 35°, 45°, and 55° shear wave search units skewing ±2.5° increments.

Weld 2E21-1CS-10B-20

Circumferential flaw coverage was obtained using 30°, 45°, 60°, and 70° refracted longitudinal wave search units along with a 45° shear wave search unit.

Axial flaw coverage was obtained using a 25°, 35°, 45°, and 55° refracted longitudinal wave search units skewing ±2.5° increments and 35°, 45°, and 55° shear wave search units skewing ±2.5° increments.

NRC Generic Question 3 for ISI-RR-10

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

Weld 2E21-1CS-10A-21

Two subsurface planar flaws were detected in weld 2E21-1CS-10A-21. The flaws were in the circumferential orientation. The flaws were acceptable per Table IWB-3514-2.

Weld 2E21-1CS-10B-20

One subsurface planar flaw was detected in weld 2E21-1CS-10B-20. The flaw was in the circumferential orientation. The flaw was acceptable per Table IWB-3514-2.

NRC Generic Question 4 for ISI-RR-10

What system(s) are each of these welds located in?

SNC Response

Welds 2E21-1CS-10A-21 and 2E21-1CS-10B-20 are both located in the Core Spray System.

GENERIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-11

NRC Generic Question 2 for ISI-RR-11

Fully clarify the wave modality and insonification angles for all ultrasonic (UT) examinations (e.g., in ISI-RR-03, what UT angles and wave modes were used for the axial flaw coverage).

SNC Response

Weld 1B31-1RC-12BR-A-1

Circumferential flaw coverage was obtained using 45° and 60° shear wave search units along with a 60° refracted longitudinal wave search unit.

Axial flaw coverage was obtained using a 45° shear wave search unit.

Weld 2G31-1RWCUM-6-D-15

Circumferential flaw coverage was obtained using 45° and 70° shear wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

Weld 2G31-1RWCUM-6-D-16

Circumferential flaw coverage was obtained using 45° and 70° shear wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

Weld 2G31-1RWCUM-6-D-17

Circumferential flaw coverage was obtained using 45° and 70° shear wave search units.

Axial flaw coverage was obtained using a 45° shear wave search unit.

NRC Generic Question 3 for ISI-RR-11

Were any indications identified as a result of the Code-required exams? If so, how were these indications dispositioned?

SNC Response

There were no indications identified as a result of the Code-required examinations.

NRC Generic Question 4 for ISI-RR-11

What system(s) are each of these welds located in?

SNC Response

Weld 1B31-1RC-12BR-A-1 is located in the Reactor Recirculation System. Welds 2G31-1RWCUM-6-D-15, 2G31-1RWCUM-6-D-16, and 2G31-1RWCUM-6-D-17 are located in the Reactor Water Cleanup System.

SPECIFIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-03

NRC RAI 1

ISI-RR-03 states that ASME Code Case N-663 was applicable to the components in this relief request. Code Case N-663 states that "in lieu of the surface examination requirements for piping welds of Examination Category B-F (NPS 4 and larger), B-J (NPS 4 and larger), C-F-1, and C-F-2, surface examinations may be limited to areas identified by the Owner as susceptible to outside surface attack." However, this relief request does not indicate if there were any areas identified by the Owner as susceptible to outside surface attack. If so, please identify and describe any surface exams that were conducted for these welds, and what the results of the examinations were.

SNC Response

There have been no areas in Examination Categories B-F (NPS 4 and larger), B-J (NPS 4 and larger), C-F-1, and C-F-2 identified by the SNC as susceptible to outside surface attack using the provisions described in Code Case N-663.

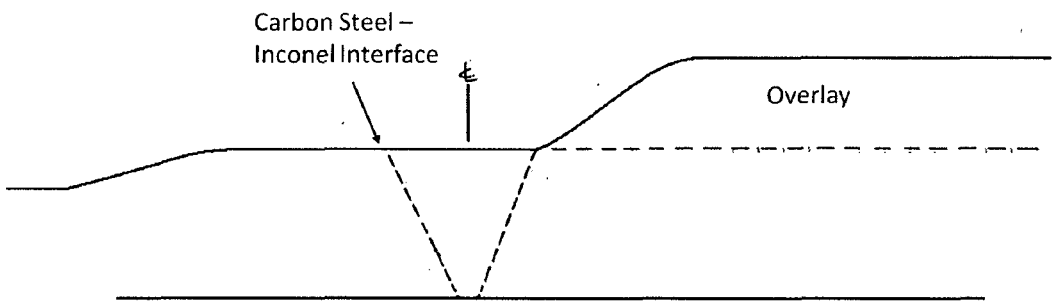
SPECIFIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-04

NRC RAI 1

Please provide a more legible copy of Figure 1 on page 4 of 5.

SNC Response

Figure 1 was replaced by a new Figure 1, as shown below.



NRC RAI 2

Relief Request RR-47, dated July 10, 2006, reports 75% coverage on this same weld when it was examined prior to the implementation of Appendix VIII and the Performance Demonstration Initiative (PDI) Program. The total coverage for this weld exam included examination from the Inconel side of the weld, through the weld overlay. Specifically, the examination through the weld overlay was performed using an automated system utilizing a 60-degree refracted longitudinal wave search unit. No limitations due to the overlay were noted in the relief request. Additionally, no unacceptable indications in the weld were reported. In light of the apparent successful examination of the required weld volume (lower 1/3T) through the weld overlay in the 3rd 10-Year ISI interval, please justify the omission of this (supplemental) exam for 4th 10-year ISI interval. The NRC understands that there are currently no PDI-qualified techniques to perform the examination of the lower 1/3T through a weld overlay.

SNC Response

As depicted in revised Figure 1, the configuration for weld 2B21-1FW-12AA-8 consists of a tapered area to the left side of the weld, a relatively flat area from the taper to overlay, and a full-structural weld overlay over adjacent weld 2B21-1FW-12AA-9. The 3rd 10-Year ISI interval examinations were performed prior to Appendix VIII, Supplement 10 requirements which were not required to be met until November 22, 2002. These pre-Appendix VIII examinations met requirements of the 1989 Edition of Section XI (no addenda). Scans were performed from the tapered area to the left side of the weld, from the flat surfaces, and from the overlay side of the weld. The only area not scanned was the overlay taper.

For the Appendix VIII examinations performed during the 4th 10-Year ISI interval, personnel and procedures were qualified through the Performance Demonstration Initiative (PDI) as administered by EPRI. The examinations were performed as follows:

- To examine the required volume from the overlayed side of the weld would require examination through a full-structural weld overlay using qualified Appendix VIII, Supplement 11 personnel and procedures. However, during the PDI qualification process for Supplement 11 it was determined that qualified examination of the volume beneath a full-structural overlay was limited to about the upper 25% of the original weld. Therefore, a qualified examination of the weld 2B21-1FW-12AA-8 required examination volume (lower 1/3rd of the weld) through the full-structural weld overlay was not feasible.

- To examine the required volume from the non-overlayed side requires the use of qualified Appendix VIII, Supplement 10 personnel and procedures. During the PDI qualification process for Supplement 10 it was determined that the examination surface must be essentially flat with minimal taper to successfully detect indications. Therefore, the 4th 10year ISI interval examinations were limited to the flat surface. Additionally, since the examination was only being performed from one side of the weld, the qualified generic PDI procedure required that two beam angles be used to interrogate the examination volume to claim Code credit. To maximize coverage, a phased-array system was utilized. From the flat surface approximately 87% of the examination volume was interrogated with one beam angle and about 30% of the examination volume was interrogated by two beam angles.

NRC RAI 3

Please explain why the weld overlay does not cover weld 2B21-1FW-12AA-8.

SNC Response

Weld 2B21-1FW-12AA-9 was overlayed in 1991 after indications were found during the non-destructive (NDE) examination. Adjacent weld 2B21-1FW-12AA-8 was not overlayed because:

1. Weld 2B21-1FW-12AA-8 had no recordable indications during the 1991 examinations.

2. Using the non-Appendix VIII NDE techniques (as discussed in RAI 2), there were no significant coverage limitations of weld 2B21-1FW-12AA-8 expected to be present during future examination as a result of the adjacent overlay. This was later demonstrated during the 1994 and 1997 outages where coverage was 100% using non-Appendix VIII techniques.

3. It was determined that the appropriate mitigation approach would be to use the mechanical stress improvement process (MSIP). MSIP was performed in 1994.

SPECIFIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-05

NRC RAI 1

Pease confirm that the dimensions shown under Figure 1 on page 3 of 3 are correct (i.e., is the Code-required volume = 0.2 sq. inches as indicated).

SNC Response

The Code-required volume shown on Figure 1 actually depicts the cross-sectional examination area for the weld. The Code-required volume is the cross-sectional examination area times the diameter. However, since the diameter is constant, it is not normally factored into coverage calculations unless the examination of a portion of the diameter is restricted (e.g., by a lug). The cross-sectional examination area of 0.2 sq. inches is correct and is calculated by using the following dimensions:

Measured Pipe Thickness: 0.4 inches
Weld Width (Toe to Toe): 1.0 inch

The following shows how the examination area was calculated:

Height of Examination Area: 1/3 x 0.4 inch = 0.133 inch
Width of Examination Area: ¼ inch + 1 inch + ¼ inch = 1.5 inches
Examination Area: 0.133 inch x 1.5 inches = 0.2 sq. inches

NRC RAI 2

This relief request notes that "scans for axial flaws were not required for this carbon steel weld." Please confirm that no longitudinal weld intersects this circumferential weld, and how this was determined.

SNC Response

No longitudinal welds intersect this circumferential weld per the pipe specification. The pipe specification shows that for pipe 24" diameter and smaller seamless ASTM B-106, Grade B material was used and for fittings 2 ½" diameter thru 24" diameter seamless ASTM A-234, Grade WPB material was used. Weld 2E41-2HPCI-16-TS-18 connects a 16" diameter elbow to a 16" diameter tee.

However, when performing ultrasonic examinations there are cases when the existence of longitudinal welds is often uncertain and considerable time would be needed to verify whether they are present. In order to eliminate the uncertainty, clockwise and counter-clockwise scans to detect axially-oriented indication flaws in the examination volume are included in PDI-UT-1, which was the basis for the SNC procedure used to examine this weld.

SPECIFIC QUESTIONS AND RESPONSES FOR RELIEF REQUEST ISI-RR-11

NRC RAI 1

Prior to the implementation of PDI examinations, greater coverage (82%) was reported on weld 2G31-1RWCUM-6-D-16 in Relief Request RR-56 dated 7/10/2006. Please explain why it was possible to achieve 100% coverage for axial indications in the 3rd ISI interval and only 50% in the 4th interval. Additionally, it appears that it was possible to achieve some coverage from the taper side of the weld for circumferential indications in the prior interval. Why was that not achieved in this interval? If PDI qualified examinations were not possible on the taper side, were non-PDI exams possible with results reported as supplemental information?

SNC Response

Weld 2G31-1RWCUM-6-D-16 joins a wrought austenitic pipe to a valve. The thickness was measured as 0.432". As shown in Figure 3 of ISI-RR-11, the valve taper begins at the edge of the weld and the inside surface and the outside surface are non-parallel. With this configuration, it is not practical to scan on the valve side of the weld for axial or circumferential indications located in the examination volume. In addition, the valve is a cast material not wrought material and there is not a qualified Appendix VIII Supplement 2 technique. Therefore, obtaining additional coverage from the taper side of the weld is not practical. Coverage comparisons for the 3rd (pre Appendix VIII) and 4th (Appendix VIII) ISI intervals are discussed below.

Coverage for axial Indications – (3rd Interval 100%, 4th Interval 50%).

For the 3rd ISI interval (pre Appendix VIII), coverage was achieved by scanning on the pipe side of the weld and on the weld to the extent practical (based on the flatness of the weld). For the 4th ISI interval, scanning was essentially performed on the same surface areas as covered during the 3rd ISI interval. Skewing of the transducer was used to increase the coverage during both intervals; however, the additional volume gained by skewing is difficult to quantify and was not credited in the 4th ISI interval coverage.

Coverage for circumferential indications – (3rd Interval 65%, 4th Interval 50%).

For the 3rd ISI Interval (pre Appendix VIII), scanning was performed from the pipe side of the weld using 45^0 and 60^0 shear wave search units. To gain additional coverage the technique allowed the use of a 1-1/2 V-path scan by bouncing shear waves off of the inside surfaces. Using this technique, coverage was claimed for the pipe side of the weld, the weld, and a portion of the examination volume on the far side of the weld.

For the 4th ISI interval (Appendix VIII), scanning was performed from the pipe side of the weld (i.e., a single-sided examination) per the requirements in PDI Generic procedure PDI-UT-2. A single V-path was used because the 1-1/2 V-path technique through the weld has not been qualified for austenitic stainless steel. A 45^0 shear wave was used as the primary examination angle; however, PDI-UT-2 requires that when any portion of the examination accessibility is limited to a single side in materials equal to or less than 0.50" thick, a 70^0 shear wave search unit shall also be used for detection and length sizing of flaws on the far side of the weld. As a result, additional coverage of the examination volume on the tapered side of the weld was obtained from the pipe side. However, this is a "best effort", unqualified examination technique and per 10 CFR 50.55a(b)(2)(xv)(A)(2) full-coverage credit from a single side cannot be claimed until a successful single-sided Appendix VIII demonstration is performed. Therefore, even though more than 50% of the volume was examined, Code coverage was given as 50%.

NRC RAI 2

In light of the above, please address each of the other 3 welds listed in ISI-RR-11 in terms of whether it is possible to achieve greater coverage in the 4th ISI interval, even if the technique used is non-PDI qualified and only reported as supplemental information.

SNC Response

2G31-1RWCUM-6-D-15

Weld 2G31-1RWCUM-6-D-15 joins a wrought austenitic penetration to a pipe. The thickness was measured as 0.432". As shown in Figure 2 of ISI-RR-11, the penetration taper begins at the edge of the weld and the inside surface and the outside surface are non-parallel. With this configuration, it is not practical to scan on the penetration side of the weldment for axial or circumferential indications located in the examination volume. Therefore, obtaining additional coverage from the taper side of the weld is not practical.

Coverage comparisons for the 3rd (pre Appendix VIII) and 4th (Appendix VIII) ISI intervals are discussed below.

Coverage for axial Indications – (3rd Interval 100%, 4th Interval 50%).

For the 3rd ISI interval (pre Appendix VIII), coverage was achieved by scanning on the pipe side of the weld and on the weld to the extent practical (based on the flatness of the weld). For the 4th ISI interval, scanning was essentially performed on the same surface areas as covered during the 3rd ISI interval. Skewing of the transducer was used to increase the coverage during both intervals; however, the additional volume gained by skewing is difficult to quantify and was not credited in the 4th ISI interval coverage.

Coverage for circumferential indications – (3rd Interval 100%, 4th Interval 50%).

For the 3rd ISI Interval (pre Appendix VIII), scanning was performed from the pipe side of the weld using 45^0 and 60^0 shear wave search units. To gain additional coverage the technique allowed the use of a 1-1/2 V-path scan by bouncing shear waves off of the inside surfaces. Using this technique, coverage was claimed for the pipe side of the weld, the weld, and the examination volume on the far side of the weld.

For the 4th ISI interval (Appendix VIII), scanning was performed from the pipe side of the weld (i.e., a single-sided examination) per the requirements in PDI Generic procedure PDI-UT-2. A single V-path was used because the 1-1/2 V-path technique through the weld has not been qualified for austenitic stainless steel. A 45^0 shear wave was used as the primary examination angle; however, PDI-UT-2 requires that when any portion of the examination accessibility is limited to a single side in materials equal to or less than 0.50" thick, a 70^0 shear wave search unit shall also be used for detection and length sizing of flaws on the far side of the weld. As a result, additional coverage of the examination volume on the tapered side of the weld was obtained from the pipe side. However, this is a "best effort", unqualified examination technique and per 10 CFR 50.55a(b)(2)(xv)(A)(2) full-coverage credit from a single side cannot be claimed until a successful single-sided Appendix VIII demonstration is performed. Therefore, even though more than 50% of the volume was examined, Code coverage was given as 50%.

2G31-1RWCUM-6-D-17

Weld 2G31-1RWCUM-6-D-17 joins a wrought austenitic pipe penetration to a valve. The thickness was measured as 0.432". As shown in Figure 4 of ISI-RR-11, the valve taper begins at the edge of the weld and the inside surface and the outside surface are non-parallel. With this configuration, it is not practical to scan on the valve side of the weldment for axial or circumferential indications located in the examination volume. Therefore, obtaining additional coverage from the taper side of the weld is not practical. Coverage comparisons for the 3rd (pre Appendix VIII) and 4th (Appendix VIII) ISI intervals are discussed below.

Coverage for axial Indications – (3rd Interval 50%, 4th Interval 50%).

The coverage for both the 3rd ISI Interval and the 4th ISI Interval was the same.

Coverage for circumferential indications - – (3rd Interval 100%, 4th Interval 50%).

For the 3rd ISI Interval (pre Appendix VIII), scanning was performed from the penetration side of the weld using 45^0 and 60^0 shear wave search units. To gain additional coverage the technique allowed the use of a 1-1/2 V-path scan by bouncing shear waves off of the inside surfaces. Using this technique, coverage was claimed for the penetration side of the weld, the weld, and the examination volume on the far side of the weld.

For the 4th ISI interval (Appendix VIII), scanning was performed from the penetration side of the weld (i.e., a single-sided examination) per the requirements in PDI Generic procedure PDI-UT-2. A single V-path was used because the 1-1/2 V-path technique through the weld has not been qualified for austenitic stainless steel. A 45^0 shear wave was used as the primary examination angle; however, PDI-UT-2 requires that when any portion of the examination accessibility is limited to a single side in materials equal to or less than 0.50" thick, a 70^0 shear wave search unit shall also be used for detection and length sizing of flaws on the far side of the weld. As a result, additional coverage of the examination volume on the tapered side of the weld was obtained from the penetration side. However, this is a "best effort", unqualified examination technique and per 10 CFR 50.55a(b)(2)(xv)(A)(2) full-coverage credit from a single side cannot be claimed until a successful single-sided Appendix VIII demonstration is performed. Therefore, even though more than 50% of the volume was examined, Code coverage was given as 50%.

1B31-1RC-12BR-A-1

Weld 1B31-1RC-12BR-A-1 joins a wrought austenitic pipe to a sweepolet. The thickness was measured as 0.568". As shown in Figure 1 of ISI-RR-11, the sweepolet taper begins at the edge of the weld and the inside surface and the outside surface are non-parallel. With this configuration, it is not practical to scan on the sweepolet side of the weld for axial or circumferential indications located in the examination volume. Therefore, obtaining additional coverage from the taper side of the weld is not practical. Coverage comparisons for the 3rd (pre Appendix VIII) and 4th (Appendix VIII) ISI intervals are discussed below.

<u>Coverage for axial Indications</u> – (3rd Interval 50%, 4th Interval 50%).

The coverage for both the 3rd ISI Interval and the 4th ISI Interval was the same.

<u>Coverage for circumferential indications</u> – (3rd Interval 100%, 4th Interval 50%).

For the 3rd ISI Interval (pre Appendix VIII), scanning was performed from the pipe side of the weld using 45^0 shear wave, 60^0 shear wave, and 70^0 refracted longitudinal (RL) wave search units. To gain additional coverage the technique allowed the use of a 1-1/2 V-path scan by bouncing shear waves off of the inside surfaces. Using this technique, coverage was claimed for the pipe side of the weld, the weld, and the examination volume on the far side of the weld.

For the 4th ISI interval (Appendix VIII), scanning was performed from the pipe side of the weld (i.e., a single-sided examination) per the requirements in PDI Generic procedure PDI-UT-2. A 45^0 shear wave search unit, a 60^0 shear wave search unit, and a 60^0 RL wave search unit were used to perform the examination. A single V-path was used because the 1-1/2 V-path technique through the weld has not been qualified for austenitic stainless steel. Using a single V-path the 60^0 search units interrogated the pipe side of the examination volume, the weld root area, and a small portion of the examination volume on the sweepolet side.

However, per 10 CFR 50.55a(b)(2)(xv)(A)(2) full-coverage credit from a single side cannot be claimed until a successful single-sided Appendix VIII demonstration is performed. A successful single-side demonstration has not been performed, therefore, even though more than 50% of the volume was examined, Code coverage was given as 50%.

NRC RAI 3

For welds 2G31-1RWCUM-6-D-15, 2G31-1RWCUM-6-D-16, and 2G31-1RWCUM-6-D-17, please explain why refracted longitudinal waves were not used for the examination.

SNC Response

The reason for not using the L-Wave technique for welds 2G31-1RWCUM-6-D-15, 2G31-1RWCUM-6-D-16, and 2G31-1RWCUM-6-D-17 is because it is an austenitic weld with a nominal wall thickness of 0.432-inch. The procedure used to examine wrought austenitic piping weld configurations after the implementation of Appendix VIII was the SNC Supplement 2 procedure that utilized generic procedure PDI-UT-2. PDI-UT-2 requires that, when accessibility is limited to a single side in materials with a nominal wall thickness equal to or less than 0.50-inch thick, a 2.25 MHz, 70-degree shear wave search unit shall be used for the detection and length sizing of flaws on the far side of the weld. When the material is greater than 0.50-inch thick, a longitudinal wave search unit that provides adequate coverage on the far side of the weld shall be used for the detection and length sizing of flaws.