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Stephenie L. Pyle Manager, Licensing Arkansas Nuclear One

2CAN041202

April 13, 2012

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

- SUBJECT: Response to the Request for Additional Information Regarding Request for Alternative ANO2-ISI-007 Code Case N-770-1 Baseline Examination Arkansas Nuclear One, Unit 2 Docket No. 50-368 License No. NPF-6
- REFERENCES: 1. Entergy letter dated November 30, 2011, "Use of Alternate ASME Code Case N-770-1 Baseline Examination Request for Alternative ANO2-ISI-007" (2CAN111101) (ML113340158)
  - NRC email dated February 23, 2012, "RAI for the Request to use Alternate ASME Code Case N-770-1 Baseline Examination, Request for Alternative ANO2-ISI-007" (TAC No. ME7646) (ML120541089)

Dear Sir or Madam:

Entergy Operations, Inc. requested NRC's approval of Request for Alternative for Arkansas Nuclear One, Unit 2 via Reference 1. The request is associated with the use of an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Code Case N-770-1 as conditioned in the Final Rule 10 CFR 50.55a(g)(6)(ii)(F)(3), dated June 21, 2011.

In Reference 2, the NRC determined that additional information was needed to complete the review of Reference 1. Attached are the requests for additional information and corresponding responses.

This submittal contains no regulatory commitments.

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Should you have any questions, please contact me.

Sincerely,

#### Original signed by Stephenie L. Pyle

SLP/rwc

- Attachment: Response to Request for Additional Information Use of ASME Code Case N-770-1 Baseline Examination
- cc: Mr. Elmo E. Collins Regional Administrator U. S. Nuclear Regulatory Commission, Region IV 1600 East Lamar Boulevard Arlington, TX 76011-4511

NRC Senior Resident Inspector Arkansas Nuclear One P. O. Box 310 London, AR 72847

U. S. Nuclear Regulatory Commission Attn: Mr. Kaly Kalyanam MS O-8 B1 One White Flint North 11555 Rockville Pike Rockville, MD 20852 Attachment to

2CAN041202

Response to Request for Additional Information Use of ASME Code Case N-770-1 Baseline Examination

#### REQUEST FOR ADDITIONAL INFORMATION USE OF ASME CODE CASE N-770-1 BASELINE EXAMINATION

## 1. Please confirm that the present Request for Alternative is only for satisfying the ASME Code Case N-770-1 baseline examination requirements, as required and conditioned by 10 CFR 50.55a(g)(6)(ii)(F).

The Request for Alternative presented in Reference 1 is for satisfying the American Society of Mechanical Engineers (ASME) Code Case N-770-1 baseline examinations requirements, as required and conditioned by 10 CFR 50.55a(g)(6)(ii)(F) for Arkansas Nuclear One, Unit 2.

It should be noted that two of the welds presented in the request for alternative associated with ASME Code Case N-770-1 are also included in the Reference 2 request for relief. The two requests are separate.

## 2. Was the previous examination performed within the re-inspection period as defined in ASME Code Case N-770-1?

ASME Code Case N-770-1, Table 1, Inspection Item B lists the frequency of examination as once per interval, every second inspection period not to exceed seven years. These welds were last examined in 2009 (three years ago) to meet the requirements of Reference 3.

The requirements for these welds as specified in Reference 3 include:

Page 5-2, "Inspection Volume," fourth bullet

For DM butt welds joining to cast stainless steel components (CASS), for which no ASME Section XI, Appendix VIII supplement exists, volumetric interrogation of the cast stainless steel material is not required (CASS is not known to be susceptible to PWSCC or any other service-related cracking degradation mechanism that is relevant within the RCS operating environment).

Page 5-6, Paragraph 5.1.5

If greater than 90% coverage for axial flaws cannot be met but greater than 90% coverage is obtained for circumferential flaws (using qualified personnel and procedures), then the examination for axial flaws will be completed to achieve the maximum coverage possible with limitations noted in the examination report.

3. Please identify the PDI contractor and procedure that was used for the previous examination. Was the procedure PDI qualified for a ASME Code, Section XI, supplement 10 single sided axial examination of 100 percent of the susceptible

## material? Please identify any specific limitations associated with the scope of the procedure.

Structural Integrity Associates (SIA) was the Performance Demonstration Initiative (PDI)-qualified contractor that performed the inspection. SIA procedure SI-UT-130, Revision 3, Addendum 0, "Procedure for the Phased Array Ultrasonic Examination of Dissimilar Metal Welds," was used to perform the examinations.

Per PDQS 632, this procedure was PDI qualified for ASME Code Section XI, Supplement 10 single-sided axial coverage. The limitations of this procedure include:

- This procedure / candidate is not qualified for examinations performed from the cast stainless steel side of the component
- This procedure / candidate is only qualified to depth size flaws in accessible regions of the examination volume.
- This procedure / candidate is only qualified to length size circumferentially oriented flaws.
- This procedure / candidate is not qualified for examination where the ultrasound is required to propagate through an adjacent austenitic weld prior to impinging on the dissimilar metal weld.
- This procedure / candidate is not qualified for detection or sizing axial flaws on the far side of components with single-sided access and tapered weld surfaces.

#### 4. ASME Code Case N-770-1, as required and conditioned by 10 CFR 50.55a(g)(6)(ii)(F), defines the volume of material required to be examined in Figure 1 of the Code Case and requires that the examinations conform to ASME Code, Section XI, Appendix VIII requirements. Since Appendix VIII Supplement 9 is in preparation, Appendix VIII requires the use of an Appendix III procedure to perform scans from the cast austenitic stainless steel (CASS) side of the weld.

The welds that are subject to this request are dissimilar metal welds and fall under the examination requirements of ASME Section XI, Appendix VIII, Supplement 10, not Supplement 9. The procedure used to perform the examinations was qualified through the PDI process for Supplement 10 and for single-sided examinations. It would have been impractical to perform a separate Appendix III examination procedure on the CASS side only with results that were not proven or qualified. The additional scans would not provide a beneficial increase in the quality of the examination.

## a. Did the procedure used to scan the CASS material from the CASS side of the weld conform to the Supplement 10 procedure?

The subject welds were not scanned from the CASS material; however, the procedure used to perform the examination conformed to the requirements of Supplement 10 for dissimilar metal welds and was qualified for single-sided access.

## b. For each weld please provide coverage data of the required volume of the CASS material for Appendix III compliant scans (both axial and circumferential) from the CASS side of the weld.

The welds were not scanned from the CASS side of the weld with Appendix III procedures. The welds were scanned from the ferritic pipe side and onto the weld with Appendix VIII qualified procedure.

c. If the Appendix VIII procedure was not qualified for a single sided axial examination of 100 percent of the susceptible material, for each weld please provide coverage data of the required volume of the susceptible material (nickel alloy weld and butter) for Appendix III compliant axial scans from the CASS side of the weld.

The procedure used was PDI-qualified for ASME Code, Section XI, Appendix VIII, Supplement 10, single-sided axial coverage. The welds were not scanned from the CASS side of the weld.

## d. If less than 100 percent coverage was attained for either (b) or (c). please describe the reason(s) for the limited coverage and provide a coverage map (as appropriate).

The welds were not scanned from the CASS side of the weld; however, the CASS material was interrogated from the opposite weld side with the Appendix VIII procedure using multiple angles with a phased array process. Because the CASS material is not included in the procedure qualification, code coverage credit was not taken for the scan. Theoretical beam paths into the CASS material from the carbon steel side were reviewed to develop an estimated coverage. This information is listed in Table 1.

- 5. Table 1 provides the aggregate coverage obtained for both the wrought material and the susceptible material. Since ASME Code Case N-770-1 paragraph -2500, "Examination Requirements," is concerned with the examination coverage of the susceptible material volume, the NRC staff would like to see the coverage broken out between the susceptible material and the wrought material.
  - a. For each weld, please provide coverage data for Appendix VIII compliant scans (both axial and circumferential) of the required volume of the susceptible weld material. If less than 100 percent coverage was attained,

### please describe the reason(s) for the limited coverage and provide a coverage map (as appropriate).

100 percent coverage of the susceptible weld material was obtained in the axial direction.

Less than 100 percent coverage of the susceptible inconel butter weld material and the susceptible butt weld material was obtained in the circumferential direction. The coverage numbers for each weld are provided in Table 1. The reported limitations indicated surface condition of the weld, which would include irregular weld surface or tapered surfaces.

Generic coverage maps were provided via Reference 1.

b. For each weld, please provide coverage data for Appendix VIII compliant scans (both axial and circumferential) of the required volume of the wrought material. If less than 100 percent coverage was attained, please describe the reason(s) for the limited coverage and provide a coverage map (as appropriate).

The weld joints consist of a ferritic steel pipe that is clad on the inside surface and has A182 inconel weld buttering at the weld, joined by an A182 inconel weld to a CASS safe end.

100 percent coverage of the adjacent ferritic material was obtained in the axial direction.

Less than 100 percent coverage of the ferritic material was obtained in the circumferential direction. The coverage numbers for each weld are provided in Table 1. The reported limitations indicated surface conditions of the weld which would include irregular weld surface or tapered surfaces.

Generic coverage maps were provided via Reference 1.

# 6. The transducer for the circumferential scan in Figure 2 is shown on the CASS side of the weld in contradiction to the text. Table 1 for this weld that states that the component was scanned from the pipe side only. Please explain what Figure 2 is trying to depict.

Figure 2 is a typical scan drawing used for technique development. It does not show actual locations of the transducer. Although the transducer may have been scanned onto the CASS material, the transducer scan-end location is the edge of the weld per the Non-Destructive Examination report. Scan coverage was only credited for the non-CASS volume.

Attachment to 2CAN041202 Page 5 of 9

#### **REFERENCES**

- Entergy letter dated November 30, 2011, "Use of Alternate ASME Code Case N-770-1 Baseline Examination Request for Alternative ANO2-ISI-007" (2CAN111101) (ML113340158)
- Entergy letter dated March 26, 2012, "Requests for Relief from American Society of Mechanical Engineers (ASME) Section XI Volumetric and Surface Examination Requirements – Third 10-Year Interval" (2CAN031203)
- 3. "Material Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline (MRP-139, Revision1)," Final Report, December 2008

Table 1 Limited R-A Examinations										
Component Description				Additional Information						
ltem Number	Comp. ID	Item Description	Estimated % Coverage of Section XI Code Required Volume	MRP-139 Estimated % Coverage	Susceptible Material Estimated % Coverage	Ferritic Material Estimated % Coverage	Theoretical CASS Coverage % from Carbon Steel (CS) Side	Exam Method and Limitations Examination Summary	Exam Results	
R1.20	08-014	Reactor Coolant Pump (RCP) 2P-32B Suction Nozzle Elbow-to-Safe End (SE) Circumferential Weld	60% No credit taken for Cast Austenitic Stainless Steel (CASS)	100% axial scan for circumferential flaws 87.2% circumferential scan for axial flaws No credit taken for CASS	100 axial 87.2 circumferential	100 axial 87.2 circumferential	100 axial 0 circumferential	Manual ultrasonic testing (UT) Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	
R1.20	09-008	RCP 2P-32B Discharge Nozzle SE-to-Pipe Circumferential Weld	56% No credit taken for CASS	100% axial scan for circumferential flaws 73.8% circumferential scan for axial flaws No credit taken for CASS	100 axial 73.8 circumferential	100 axial 73.8 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	

Table 1 (cont')   Limited R-A Examinations										
Component Description				Additional Information						
ltem Number	Comp. ID	Item Description	Estimated % Coverage of Section XI Code Required Volume	MRP-139 Estimated % Coverage	Susceptible Material Estimated % Coverage	Wrought (ferritic) Material Estimated % Coverage	Theoretical CASS Coverage % from CS Side	Exam Method and Limitations Examination Summary	Exam Results	
R1.20	10-014	RCP 2P-32A Suction Nozzle Elbow-to-SE Circumferential Weld	55% No credit taken for CASS	100% axial scan for circumferential flaws 84.1% circumferential scan for axial flaws No credit taken for CASS	100 axial 84.1 circumferential	100 axial 84.1 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	
R1.20	11-008	RCP 2P-32A Discharge Nozzle SE- to-Pipe Circumferential Weld	56.7% No credit taken for CASS	100% axial scan for circumferential flaws 76.3% circumferential scan for axial flaws No credit taken for CASS	100 axial 76.3 circumferential	100 axial 76.3 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	

Table 1 (cont') Limited R-A Examinations										
Component Description				Additional Information						
ltem Number	Comp. ID	Item Description	Estimated % Coverage of Section XI Code Required Volume	MRP-139 Estimated % Coverage	Susceptible Material Estimated % Coverage	Wrought (ferritic) Material Estimated % Coverage	Theoretical CASS Coverage % from CS Side	Exam Method and Limitations Examination Summary	Exam Results	
R1.20	12-014	RCP 2P-32C Suction Nozzle Elbow-to-SE Circumferential Weld	56.3% No credit taken for CASS	100% axial scan for circumferential flaws 85.3% circumferential scan for axial flaws No credit taken for CASS	100 axial 85.3 circumferential	100 axial 85.3 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	
R1.20	13-008	RCP 2P-32C Discharge Nozzle SE-to-Pipe Circumferential Weld	60.1% No credit taken for CASS	100% axial scan for circumferential flaws 89.7% circumferential scan for axial flaws No credit taken for CASS	100 axial 89.7 circumferential	100 axial 89.7 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	

Table 1 (cont') Limited R-A Examinations										
Component Description				Additional Information						
ltem Number	Comp. ID	Item Description	Estimated % Coverage of Section XI Code Required Volume	MRP-139 Estimated % Coverage	Susceptible Material Estimated % Coverage	Wrought (ferritic) Material Estimated % Coverage	Theoretical CASS Coverage % from CS Side	Exam Method and Limitations Examination Summary	Exam Results	
R1.20	14-014	RCP 2P-32D Suction Nozzle Elbow-to-SE Circumferential Weld	57.5% No credit taken for CASS	100% axial scan for circumferential flaws 87% circumferential scan for axial flaws No credit taken for CASS	100 axial 87 circumferential	100 axial 87 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	
R1.20	15-008	RCP 2P-32D Discharge Nozzle- SE-to Pipe Circumferential Weld	62.8% No credit taken for CASS	100% axial scan for circumferential flaws 89.8% circumferential scan for axial flaws No credit taken for CASS	100 axial 89.8 circumferential	100 axial 89.8 circumferential	100 axial 0 circumferential	Manual UT Phased Array examination Scanned on pipe side and on the weld. Weld surface, taper and CASS material are limitations. The circumferential scan was performed with +/- 10 degree oscillation of the search unit.	No indications were recorded.	