



**Tennessee Valley Authority**, Post Office Box 2000, Decatur, Alabama 35609-2000

August 24, 2007

10 CFR 50.55a

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop: OWFN P1-35  
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of ) Docket No. 50-296  
Tennessee Valley Authority )

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM, THIRD TEN-YEAR INSPECTION INTERVAL - REQUESTS FOR RELIEF 3-ISI-22 AND 3-ISI-23

In accordance with 10 CFR 50.55a(g)(5) TVA is requesting relief from certain inservice inspection requirements in Section XI of the ASME Boiler and Pressure Vessel Code. This letter submits BFN Unit 3 requests for relief 3-ISI-22, and 3-ISI-23.

Request for relief 3-ISI-22, addresses one (1) Reactor Water Recirculation (RECIRC) system full penetration piping to valve weld. The design configuration of the component precludes a 100 percent ultrasonic (UT) examination of the required volume for the full penetration weld.

Request for relief 3-ISI-23, addresses nine (9) Reactor Pressure Vessel (RPV) nozzle-to-vessel full penetration welds and seven (7) RPV nozzle inner radius sections. The design configuration of the RPV nozzle-to-vessel welds precludes a 100 percent ultrasonic (UT) examination of the required volume for the full penetration welds of the nozzles.

A047  
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Enclosures

cc (Enclosures):

Mr. Malcolm T. Widmann, Branch Chief  
U.S. Nuclear Regulatory Commission  
Region II  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW, Suite 23T85  
Atlanta, Georgia 30303-8931

NRC Resident Inspector  
Browns Ferry Nuclear Plant  
10833 Shaw Road  
Athens, Alabama 35611-6970

Ms. Eva A. Brown, Project Manager  
U.S. Nuclear Regulatory Commission  
One White Flint, North  
(MS 08G9)  
11555 Rockville Pike  
Rockville, Maryland 20852-2739



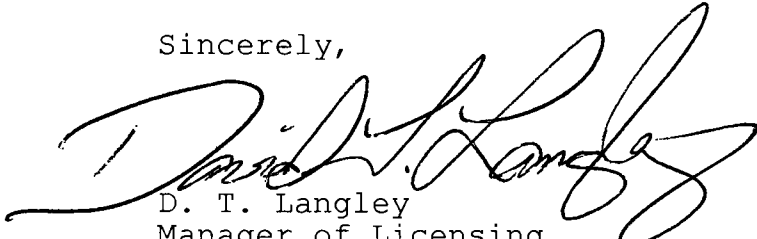
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Enclosure 1 of this letter contains request for relief 3-ISI-22. Previous ASME Section XI Code examinations of RECIRC weld GR-3-63 cited in request for relief 3-ISI-22 were performed prior to rulemaking for 10 CFR 50.55a(b)(2)(xv)(A)(2). This weld received 100 percent Code coverage in accordance with earlier Code requirements and therefore, did not require a request for relief.

Enclosure 2 contains request for relief 3-ISI-23. Request for relief 3-ISI-23 is consistent with the BFN Unit 3 Second Ten-Year ISI inspection interval requests for relief 3-ISI-7, Revision 0, 3-ISI-14, and 3-ISI-15 by letters dated March 26, 1999, and May 9, 2003 respectively. NRC approved these requests by letters dated August 2, 1999, and February 11, 2004.

There are no new regulatory commitments in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,



D. T. Langley  
Manager of Licensing  
and Industry Affairs

cc: See Page 3



ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNIT 3  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)  
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM  
(THIRD TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-22

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(SEE ATTACHED)



TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNIT 3  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)  
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM  
(THIRD) TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-22

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Executive  
Summary:

This request for relief addresses one (1) Reactor Water Recirculation (RECIRC) System, Full Penetration Piping Weld examined in the first period (Cycle 12, Spring 2006) of the Third Ten-Year ISI inspection interval.

The subject weld was examined with the latest ultrasonic (UT) techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, as mandated by 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(g)(6)(ii)(C).

A UT examination was performed on this piping weld of the accessible areas to the maximum extent practical due to the component configuration. Credit for the one-sided only ultrasonic examination provided 75 percent coverage due to the requirement mandated in 10 CFR 50.55a(b)(2)(xv)(A)(2), which states, "Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaw on the opposite side of the weld." There is no Appendix VIII Program for cast austenitic piping welds. Therefore, only 75 percent coverage can be claimed for RECIRC System weld GR-3-63.

The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety since the data obtained from the volume examined provides sufficient information to judge the overall integrity of the piping welds. The examination limitation does not affect the sizing of the previously recorded indication.



Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 3, Third Ten-Year ISI inspection interval.

Unit: Three (3)

System: Reactor Water Recirculation (RECIRC) System, System 068

Components: 1 (one) Full Penetration Piping to valve Weld (Austenitic Stainless Steel)

ASME Code Class: ASME Code Class 1

ASME Section XI Edition: 2001 Edition, as amended by 10 CFR 50.55a(b)(2)(xv)(A)(2) and 10 CFR 50.55a(b)(2)(xxiv)

ASME Code Table: Code Case N-577, N-577-2500, Table I

Examination Category: R-A, Risk-Informed Piping Examinations

Examination Item Number: R1.16, Elements Subject to Intergranular Stress Corrosion Cracking (IGSCC)

ASME Code Requirement: Code Case N-577, N-577-2500, Table I, Examination Category R1.16, Requires Volumetric Examination of 100 percent of the Weld and Adjacent Base Material as depicted in Figure IWB-2500-8(c).

ASME Code Requirement From Which Relief Is Requested: Relief is requested from the Risk-Informed Inservice Inspection Program, Code Case N-577 requirement (Table I, N-577-2500) Examination Category R-A, Item No. R1.16) to perform essentially 100 percent volumetric examination of the weld and adjacent base material.

List Of Items Associated With The Relief Request: RECIRC System, Weld GR-3-63, Valve to Pipe (28-inch NPS, Austenitic Stainless Steel)



**Basis for Relief:**

It is not possible to perform the volumetric ultrasonic examination from both sides of the weld due to the configuration of the component. Also, because of a recent requirement mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2) which states, "Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaw on the opposite side of the weld." Presently, there is no Appendix VIII Program for cast austenitic piping welds; therefore, only 75 percent coverage can be claimed.

Under the previous ASME Section XI Code requirements [i.e., prior to rulemaking that added 10 CFR 50.55a(b)(2)(xv)(2)] UT coverage attained would have been 100 percent.

The examination limitations for Weld GR-3-63 were due the configuration of the component, valve to pipe. The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety since the data obtained from the volume examined provides sufficient information to judge the overall integrity of the piping welds. A detailed description of the UT examination limitations are provided in Table 1.

**Alternative Examination:**

None. In lieu of the Code required essentially 100 percent volume ultrasonic examination, TVA proposes an ultrasonic examination of accessible areas to the maximum extent practical given the component design configuration of the aforementioned valve to piping weld.

**Justification For The Granting Of Relief:**

The weld was examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, in accordance with the requirements of the 2001 Edition, as amended by 10 CFR 50.55a(b)(2)(xv)(A) and 10 CFR 50.55a(b)(2)(xxiv), of ASME Section XI, Division 1, Appendix VIII as mandated by



10 CFR 50.55a(g)(4) and 10 CFR 50.55a(g)(6)(ii)(C).

An ultrasonic examination was performed on the piping weld of the accessible areas to the maximum extent practical given the component configuration. Credit for the one-sided only ultrasonic examination provided 75 percent coverage because of a requirement mandated in 10 CFR 50.55a(b)(2)(xv)(2), which states, "Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaw on the opposite side of the weld." Currently, there is no Appendix VIII Program for cast austenitic piping welds; therefore, only 75 percent coverage can be claimed. Under the original ASME Section XI Code requirements UT coverage attained would have been 100 percent.

The performance of the ultrasonic examination of the subject weld to the maximum extent practical provides an acceptable level of quality and safety because the information and data obtained from the volume examined is sufficient to judge the overall integrity of the piping welds. The examination limitation does not affect the sizing of the previously recorded indication.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the Third Ten-Year ISI inspection interval.

**Implementation  
Schedule:**

This request for relief is applicable to the BFN Unit 3, Third Ten-Year ISI inspection interval (November 19, 2005 to November 18, 2015). The weld listed in Table 1 was examined during the first period (Cycle 12, i.e., Spring 2006) of the Third Ten-Year ISI inspection interval.

**Attachments:**

Attachment A - 1 Drawing

Drawing 3-ISI-0328-C, Sheet 2



Attachment B Examination Data  
Report:

Weld Number GR-3-63 - Report R-031



**TABLE 1**

| WELD NUMBERS               | NPS | ISI DRAWING  | PERCENT<br>COVERAGE | UNIT/CYCLE | REMARKS   |
|----------------------------|-----|--------------|---------------------|------------|---|
| GR-3-63<br>(RECIRC System) | 28" | 3-ISI-0328-C | 75%                 | 3/12       | <p>Limitations due to component configuration and the new requirements in 10 CFR 50.55a (b)(2)(xv)(A)(2), which requires UT of one-side of austenitic welds to be qualified to Appendix VIII Program to claim full ASME Code coverage.</p> <p>At this time there is no Appendix VIII Program for single sided austenitic welds nor is one planned for the future. Also, the limitation prevented scanning in both axial directions.</p> <p>Circumferential scans were performed from both sides of the weld centerline. Therefore, only 75 percent coverage can be claimed.</p> |

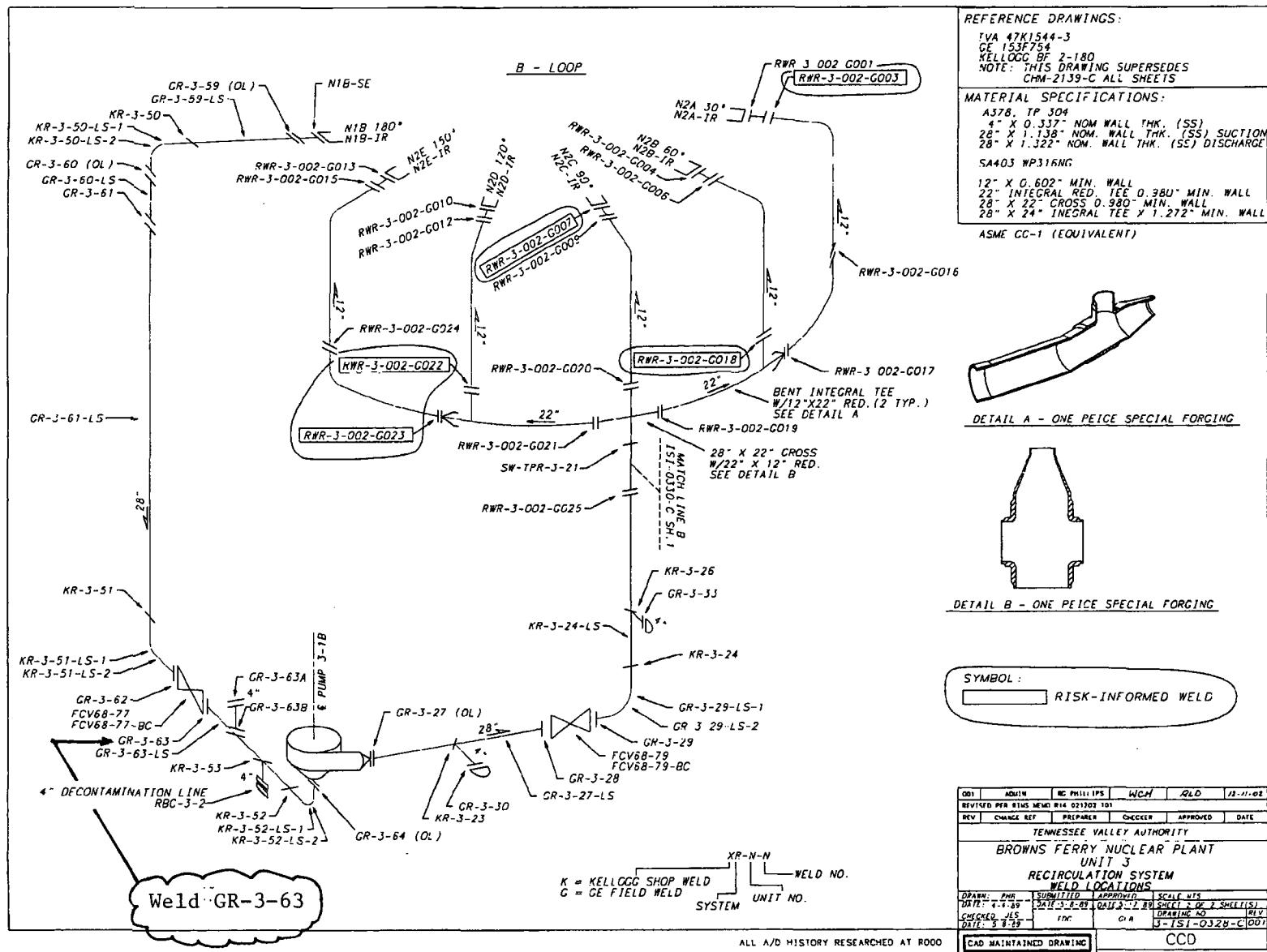


# **Attachment A**

One (1) Drawing

Drawing 3-ISI-0328-C, Sheet 2







# **Attachment B**

Weld Examination Data Report:

Weld GR-3-63 - Report R-031



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|   |                             |   |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
|---|-----------------------------|---|-----------------------------|---|-------------------------|----------|--------|-----------|------------|----------|---|-----------|----------|---|------------------|----------|---|
| TENNESSEE VALLEY<br>AUTHORITY   |                             | EXAMINATION SUMMARY<br>AND<br>RESOLUTION SHEET            |                             | REPORT NUMBER:<br><i>R031</i>                           |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| PROJECT: <i>BFN</i> UNIT: <i>3</i> CYCLE <i>12</i>  |                             | COMPONENT ID: <i>GR-3-63</i>                              |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| EXAMINATION METHOD  |                             |   |                             | SYSTEM: <i>RECIR</i> ISI DWG NO: <i>3-ISI-0328-C-02</i> |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| MT <input type="checkbox"/>   | PT <input type="checkbox"/> | UT <input checked="" type="checkbox"/>                    | VT <input type="checkbox"/> | CONFIGURATION:  | CATEGORY                |          |        |           |            |          |   |           |          |   |                  |          |   |
| PROCEDURE: <i>N-UT-640</i>  |                             | REV <i>08</i>   | TC: <i>N/A</i>              | <i>VLV TO P</i>   | <i>R-A</i>              |          |        |           |            |          |   |           |          |   |                  |          |   |
| EXAMINER:<br><i>ARLEN JENSEN</i>  |                             | EXAMINER:<br><i>N/A</i>                                   |                             | EXAMINER:<br><i>N/A</i>                                 | EXAMINER:<br><i>N/A</i> |          |        |           |            |          |   |           |          |   |                  |          |   |
| LEVEL: <i>II</i>  |                             | LEVEL:  |                             | LEVEL:  | LEVEL:                  |          |        |           |            |          |   |           |          |   |                  |          |   |
| <p>Total coverage calculated to be approximately <i>75</i> %</p> <p><i>75% CODE COVERAGE WAS OBTAINED DUE TO COMPONENT CONFIGURATION (ONE SIDED EXAM).</i></p> <p><i>EXAMINATION WAS PERFORMED WITH A 45° SHEAR AND 60° RL IN ONE DIRECTION AXIALLY AND TWO DIRECTIONS CIRCUMFERENTIALLY.</i></p> <p><i>2.5" x .43" x 89" = TOTAL VOLUME REQUIRED FOR 100% CODE COVERAGE</i><br/><i>[95.68"]</i></p> <table> <tr> <td>UPSTREAM</td> <td>- 0% -</td> <td><i>0"</i></td> </tr> <tr> <td>DOWNSTREAM</td> <td>- 100% -</td> <td><i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i></td> </tr> <tr> <td>CLOCKWISE</td> <td>- 100% -</td> <td><i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i></td> </tr> <tr> <td>COUNTERCLOCKWISE</td> <td>- 100% -</td> <td><i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i></td> </tr> </table> <p><i>400" ÷ 300" = 75%.</i></p> <p><i>① This TVA/ISO procedure implements PDI procedure, PDI-UT-2, revision C, addendum 1. <i>Walter Welch</i> 3/6/05</i></p> <p><i>This exam satisfies the requirements of ASME Section XI, category R-A, Plan R1.16E, EXREQ 03E-03.</i><br/><i><i>Walter Welch</i> 3/6/05</i></p> |                             |   |                             |   |                         | UPSTREAM | - 0% - | <i>0"</i> | DOWNSTREAM | - 100% - | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> | CLOCKWISE | - 100% - | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> | COUNTERCLOCKWISE | - 100% - | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> |
| UPSTREAM  | - 0% -                      | <i>0"</i>   |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| DOWNSTREAM  | - 100% -                    | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| CLOCKWISE   | - 100% -                    | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| COUNTERCLOCKWISE  | - 100% -                    | <i>(2.5 width x .43 depth x 89" weld length) = 95.68"</i> |                             |   |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| RESOLUTION BY:<br><i>Arden Jensen</i>   |                             | REVIEWED BY:<br><i>Walter Welch</i>                       |                             | ANII: <i>Robert H. H. H.</i>                            |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
| LEVEL <i>II</i> DATE: <i>3/5/05</i>   |                             | LEVEL: <i>III</i> DATE: <i>3/6/06</i>                     |                             | DATE: <i>3/30/06</i>                                    |                         |          |        |           |            |          |   |           |          |   |                  |          |   |
|   |                             |   |                             | Page: <i>1</i> OF <i>10</i>                             |                         |          |        |           |            |          |   |           |          |   |                  |          |   |



0117

|  |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
|--|--|--|-----|---|-----------|--|-----------|---------------------------------------|-----------|-------------------|-----------|---------------------------|----------|-------|--|
| TENNESSEE VALLEY<br>AUTHORITY  |  | DIGITAL ULTRASONIC<br>CALIBRATION<br>DATA SHEET  |     | REPORT NUMBER:<br><i>R031</i>                                 |           |  |           |                                       |           |                   |           |                           |          |       |  |
| PROJECT: <i>BEN</i> UNIT <i>3</i> CYCLE: <i>12</i>   |  | CALIBRATION DATE: <i>3/5/06</i>  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| PROC.: <i>N-UT-64</i> REV: <i>8</i> TC: <i>N/A</i>   |  | CALIBRATION BLOCK NO.: <i>WB 85</i> TEMP: <i>74</i> °F   |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| INSTR. MFG: <i>KRAUTKRAMER</i> DUE DATE: <i>8/2/06</i>   |  | SIMULATOR BLOCK NO.: <i>ROMPAS</i>   |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| MODEL/TYPE: <i>USN 60</i> M & TE NO.: <i>E36305</i>  |  | THERMOMETER S/N: <i>E39056</i> DUE DATE: <i>9/6/06</i>   |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| TRANSDUCER MFG: <i>RTD</i>   |  | COUPLANT: <i>ULTRAGEL II</i> BATCH: <i>04/25/0</i>   |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| S/N <i>89-652</i> SIZE: <i>20x34</i> FREQ: <i>2.0</i> MHz  |  | EXAM TYPE: <input type="checkbox"/> SHEAR <input type="checkbox"/> LONG <input checked="" type="checkbox"/> RL |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| CABLE TYPE: <i>RG-174</i> LENGTH: <i>6'</i> inches   |  | ANGLE VERIFICATION   |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| BLOCK TYPE: <i>ROMPAS</i> S/N: <i>6026-83</i>  |  | INSTRUMENT SETTINGS  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| NOMINAL ANGLE: <i>60</i> ACTUAL ANGLE: <i>59</i>   |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> 100<br/>80<br/>60<br/>40<br/>20<br/>0 </div> <div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <div style="width: 80%;"> <div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; top: 10%; left: 10%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 10%; left: 40%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 10%; left: 70%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 40%; left: 10%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 40%; left: 40%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 40%; left: 70%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 70%; left: 10%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 70%; left: 40%; width: 10%; height: 10%; border: 1px solid black;"></div> <div style="position: absolute; top: 70%; left: 70%; width: 10%; height: 10%; border: 1px solid black;"></div> </div> </div> <div style="width: 10%; text-align: center;"> 1.5" NOTCH<br/>* </div> </div> <div style="margin-left: 10px; writing-mode: vertical-rl; transform: rotate(180deg);"> A<br/>M<br/>P<br/>L<br/>I<br/>T<br/>U<br/>D<br/>E </div> </div> </div> |  | REFLECTOR  |     | REFERENCE   |           | MEMORY   |           |                                       |           |                   |           |                           |          |       |  |
|  |  | SCAN DIRECT.   |     | NTCH  |           | SDH  |           | SENSITIVITY                           |           | NUMBER            |           |                           |          |       |  |
|  |  | AXIAL  |     | <input checked="" type="checkbox"/>                           |           | <input type="checkbox"/>   |           | <i>75</i> dB                          |           | <i>GR 36360RL</i> |           |                           |          |       |  |
|  |  | CIRC   |     | <input type="checkbox"/>                                      |           | <input type="checkbox"/>   |           | <i>N/A</i> dB                         |           | <i>N/A</i>        |           |                           |          |       |  |
|  |  | RANGE: <i>3.654"</i>   |     |   |           | *INST. FREQ.: <i>2.25</i> Mhz  |           |                                       |           |                   |           |                           |          |       |  |
|  |  | PROBE DELAY: <i>13.2512</i>  |     |   |           | *RECTIFY: <i>FULL WAVE</i>   |           |                                       |           |                   |           |                           |          |       |  |
|  |  | VELOCITY: <i>.2326</i>   |     |   |           | DUAL <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF     |           |                                       |           |                   |           |                           |          |       |  |
|  |  | DISPLAY DELAY: <i>0</i>  |     |   |           | *REJECT: <i>0</i> %  |           |                                       |           |                   |           |                           |          |       |  |
|  |  | *ENERGY: <i>HIGH</i>   |     |   |           | *DISPLAY START: <i>1P</i>  |           |                                       |           |                   |           |                           |          |       |  |
|  |  | *DAMPING: <i>1000 OHMS</i>   |     |   |           | DET: <input type="checkbox"/> PEAK <input checked="" type="checkbox"/> FLANK |           |                                       |           |                   |           |                           |          |       |  |
| *PRF MODE: <i>AUTO HIGH</i>  |  |  |     | TCG: ON <input type="checkbox"/> OFF <input type="checkbox"/> |           |  |           |                                       |           |                   |           |                           |          |       |  |
| CALIBRATION TIMES  |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| REF. REFLECTOR: <i>1" RADIUS on ROMPAS</i> GAIN: dB <i>75</i>  |  |  |     |   |           | INITIAL TIME: <i>735</i> FINAL TIME: <i>1040</i>                             |           |                                       |           |                   |           |                           |          |       |  |
| AMPLITUDE: <i>50%</i> METAL PATH: <i>1.06"</i>   |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| VERIFICATION TIMES 1) <i>920</i> 2) 3) 4) 5) 6) 7) 8) 9)   |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| * PDI QUALIFIED INSTRUMENT SETTINGS:   |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2<br>OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !   |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| LINEARITY CHECK  |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| VERTICAL   |  | SIGNAL 1   |     | 100   | 90        | 80   | 70        | 60                                    | 50        | 40                | 30        | 20                        | 10       |       |  |
|  |  | SIGNAL 2   |     | 50  | <i>45</i> | <i>40</i>  | <i>35</i> | <i>30</i>                             | <i>25</i> | <i>20</i>         | <i>15</i> | <i>10</i>                 | <i>5</i> |       |  |
| ATTENUATOR   |  | GAIN   | SET | -6 dB   |           | -12 dB   |           | SET                                   |           | +12               |           | SET                       |          | +6    |  |
|  |  | AMP  | 80  | 32-48   |           | 16-24  |           | 20                                    |           | 64-96             |           | 40                        |          | 64-96 |  |
|  |  | <i>40</i>  |     | <i>20</i>   |           | <i>80</i>  |           | <i>80</i>                             |           | <i>80</i>         |           | <i>80</i>                 |          |       |  |
| COMMENTS: <i>ALTERNATIVE CAL BLOCK WAS USED FOR CALIBRATIONS.</i>  |  |  |     |   |           | WELDS/ITEMS EXAMINED: <i>GR-3-63</i>   |           |                                       |           |                   |           |                           |          |       |  |
|  |  |  |     |   |           |  |           |                                       |           |                   |           |                           |          |       |  |
| EXAMINER: <i>ARLEN JENSEN</i>  |  |  |     | EXAMINER: <i>N/A</i>  |           |  |           | REVIEWER: <i>Walter White</i>         |           |                   |           | ANII: <i>Salt Lake</i>    |          |       |  |
| LEVEL: <i>II</i>   |  |  |     | LEVEL:  |           |  |           | LEVEL: <i>III</i> DATE: <i>3/6/06</i> |           |                   |           | DATE: <i>3/30/06</i>      |          |       |  |
|  |  |  |     |   |           |  |           |                                       |           |                   |           | PG. <i>2</i> OF <i>10</i> |          |       |  |



0118

|  |          |   |           |   |           |                                      |           |           |           |           |          |
|--|----------|---|-----------|---|-----------|--------------------------------------|-----------|-----------|-----------|-----------|----------|
| TENNESSEE VALLEY<br>AUTHORITY  |          | DIGITAL ULTRASONIC<br>CALIBRATION<br>DATA SHEET     |           | REPORT NUMBER:<br><b>R031</b>   |           |                                      |           |           |           |           |          |
| PROJECT: <b>BEN UNIT 3</b>   |          | CYCLE: <b>12</b>                                    |           | CALIBRATION DATE: <b>3/5/06</b>   |           |                                      |           |           |           |           |          |
| PROC.: <b>N-UT-64</b>  |          | REV: <b>8</b> TC: <b>N/A</b>                        |           | CALIBRATION BLOCK NO.: <b>WB 85</b> TEMP: <b>74 °F</b>  |           |                                      |           |           |           |           |          |
| INSTR. MFG: <b>KRAUTKRAMER</b>   |          | DUE DATE: <b>8/2/06</b>                             |           | SIMULATOR BLOCK NO: <b>6026-83</b>  |           |                                      |           |           |           |           |          |
| MODEL/TYPE: <b>USN 60V</b>   |          | M & TE NO.: <b>E36305</b> ✓                         |           | THERMOMETER S/N: <b>E39056</b> ✓ DUE DATE: <b>9/6/06</b>  |           |                                      |           |           |           |           |          |
| TRANSDUCER MFG: <b>KBA COMPAG</b> ✓  |          | COUPLANT: <b>ULTRAGEL II</b> BATCH: <b>041250</b> ✓ |           |   |           |                                      |           |           |           |           |          |
| S/N: <b>00FCYR</b> / SIZE: <b>.50"</b> ✓   |          | FREQ: <b>1.5</b> MHz                                |           | EXAM TYPE: <input checked="" type="checkbox"/> SHEAR <input type="checkbox"/> LONG <input type="checkbox"/> RL <input type="checkbox"/> |           |                                      |           |           |           |           |          |
| CABLE TYPE: <b>RG-174 BNC to</b>   |          | LENGTH: <b>6'</b> inches                            |           | ANGLE VERIFICATION  |           |                                      |           |           |           |           |          |
| <b>miRobot</b><br>DAC  |          | BLOCK TYPE: <b>RMPAS</b>                            |           | S/N: <b>6026-83</b>   |           |                                      |           |           |           |           |          |
|  |          | NOMINAL ANGLE: <b>45</b>                            |           | ACTUAL ANGLE: <b>44.4</b>   |           |                                      |           |           |           |           |          |
| INSTRUMENT SETTINGS  |          |   |           |   |           |                                      |           |           |           |           |          |
| REFLECTOR  |          |   |           | REFERENCE   |           |                                      |           |           |           |           |          |
| SCAN DIRECT.   |          | NTCH  |           | SDH   |           |                                      |           |           |           |           |          |
| AXIAL  |          | <input checked="" type="checkbox"/>                 |           | <input type="checkbox"/>  |           |                                      |           |           |           |           |          |
| CIRC   |          | <input type="checkbox"/>                            |           | <input type="checkbox"/>  |           |                                      |           |           |           |           |          |
| RANGE: <b>2.938"</b>   |          |   |           | *INST. FREQ.: <b>2.25</b> Mhz ✓   |           |                                      |           |           |           |           |          |
| PROBE DELAY: <b>6.2253</b>   |          |   |           | *RECTIFY: <b>FULL WAVE</b> ✓  |           |                                      |           |           |           |           |          |
| VELOCITY: <b>.1235</b>   |          |   |           | DUAL <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF  |           |                                      |           |           |           |           |          |
| DISPLAY DELAY: <b>0</b>  |          |   |           | *REJECT: <b>0</b> ✓ %   |           |                                      |           |           |           |           |          |
| *ENERGY: <b>HIGH</b> ✓   |          |   |           | *DISPLAY START: <b>LP</b> ✓   |           |                                      |           |           |           |           |          |
| *DAMPING: <b>1000 OHMS</b> ✓   |          |   |           | DET: <input type="checkbox"/> PEAK <input checked="" type="checkbox"/> FLANK  |           |                                      |           |           |           |           |          |
| *PRF MODE: <b>AUTO HIGH</b> ✓  |          |   |           | TCG: ON <input type="checkbox"/> OFF <input checked="" type="checkbox"/>  |           |                                      |           |           |           |           |          |
| CALIBRATION TIMES  |          |   |           |   |           |                                      |           |           |           |           |          |
| REF. REFLECTOR: <b>.75" SDH RMPAS</b> GAIN: dB <b>22</b>   |          |   |           |   |           |                                      |           |           |           |           |          |
| AMPLITUDE: <b>25</b> % METAL PATH: <b>1.018"</b> ✓   |          |   |           |   |           |                                      |           |           |           |           |          |
| VERIFICATION TIMES   |          | 1) <b>905</b>                                       | 2)        | 3)  | 4)        |                                      |           |           |           |           |          |
|  |          | 5)  | 6)        | 7)  | 8)        |                                      |           |           |           |           |          |
|  |          | 9)  |           |   |           |                                      |           |           |           |           |          |
| * PDI QUALIFIED INSTRUMENT SETTINGS:   |          |   |           |   |           |                                      |           |           |           |           |          |
| VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2<br>OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE ! |          |   |           |   |           |                                      |           |           |           |           |          |
| LINEARITY CHECK  |          |   |           |   |           |                                      |           |           |           |           |          |
| VERTICAL   | SIGNAL 1 | 100   | 90        | 80  | 70        | 60                                   | 50        | 40        | 30        | 20        | 10       |
|  | SIGNAL 2 | 50  | <b>45</b> | <b>40</b>   | <b>35</b> | <b>30</b>                            | <b>25</b> | <b>20</b> | <b>15</b> | <b>10</b> | <b>5</b> |
| ATTENUATOR   | GAIN     | SET   | -6 dB     | -12 dB  | SET       | +12                                  | SET       | +6        |           |           |          |
|  | AMP      | 80  | 32-48     | 16-24   | 20        | 64-96                                | 40        | 64-96     |           |           |          |
|  |          | <b>40</b>   | <b>20</b> |   | <b>80</b> |                                      | <b>80</b> |           |           |           |          |
| COMMENTS: <b>ALTERNATIVE CAL BLOCK WAS USED FOR CALIBRATION.</b>   |          |   |           |   |           | WELDS/ITEMS EXAMINED: <b>GR-3-63</b> |           |           |           |           |          |
| EXAMINER: <b>ARLEN JENSEN</b><br><i>Ar J</i>   |          |   |           |   |           | EXAMINER: <b>N/A</b>                 |           |           |           |           |          |
| LEVEL: <b>II</b>   |          |   |           |   |           | REVIEWER: <i>Walter White</i>        |           |           |           |           |          |
|  |          |   |           |   |           | DATE: <b>3/6/06</b>                  |           |           |           |           |          |
|  |          |   |           |   |           | ANII: <i>S. J. Hunt</i>              |           |           |           |           |          |
|  |          |   |           |   |           | DATE: <b>3/30/06</b>                 |           |           |           |           |          |
|  |          |   |           |   |           | PG. <b>3</b> OF <b>10</b>            |           |           |           |           |          |



0119

TENNESSEE VALLEY  
AUTHORITYMANUAL ULTRASONIC  
PIPING EXAMINATION  
DATA SHEET

REPORT NUMBER

R031PROJECT: BFN UNIT/CYCLE 3/12SYSTEM RECIRWELD I.D.: GR-3-63CONFIG.: VLV TO PFLOW PROCEDURE: N-UT-64 REV: 008 TC: N/AW<sub>0</sub> REFERENCE: WELD &L<sub>0</sub> REFERENCE: TDCEXAMINATION DATE 3/5/06START TIME: 845 END TIME: 955EXAM SURFACE ☐ ID ☒ ODMATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSSSURFACE TEMP. 82 PYRO NO. E39056EXAMINATION ANGLE 45 DEG. 60 L DEG.AXIAL SCAN SENSITIVITY 34 dB 81 dBCIRC. SCAN SENSITIVITY 34 dB 81 dB

| IND<br>NO.                          | L (in) FROM REF.               |       |    | AT MAX AMP |        |       | MAX<br>AMP<br>% DAC | EXAM<br>NO.<br>3-14 | NOM.<br>ANG. | NRI                                 | INDICATION INFORMATION:<br>TYPE, DAMPING, ETC. |
|-------------------------------------|--------------------------------|-------|----|------------|--------|-------|---------------------|---------------------|--------------|-------------------------------------|--|
|                                     | L1                             | L Max | L2 | W MAX      | MP MAX | D MAX |                     |                     |              |                                     |  |
| <input checked="" type="checkbox"/> | DID NOT RECORD ANY DATA        |       |    |            |        |       |                     | 4                   | 45           | <input type="checkbox"/> *          | SEE REMARKS                                    |
|                                     | ON PREVIOUS INDICATION.        |       |    |            |        |       |                     | 5                   | 45           | <input checked="" type="checkbox"/> |  |
|                                     | COMPARED RESULTS WITH PREVIOUS |       |    |            |        |       |                     | 4                   | 60           | <input type="checkbox"/> *          | SEE REMARKS                                    |
|                                     | DATA.                          |       |    |            |        |       |                     | 6                   | 45           | <input checked="" type="checkbox"/> |  |
|                                     |                                |       |    |            |        |       |                     |                     |              | <input type="checkbox"/>            |  |
|                                     |                                |       |    |            |        |       |                     |                     |              | <input type="checkbox"/>            |  |

REMARKS/LIMITATIONS ONE SIDED EXAM DUE TO COMPONENT CONFIGURATION.  
 IG-SCC EXAMINATION PREVIOUSLY RECORDED WAS VERIFIED, FURTHER DATA  
 ON INDICATION TO FOLLOW FROM TVA LEVEL III.

EXAMINER: ARLEN JENSENLEVEL: IIANII: Ant HandEXAMINER: N/ALEVEL: N/ADATE: 3/30/06REVIEWED BY: Walt WelchLEVEL: IIIDATE: 3/6/06PAGE 4 OF 10



0120

TVA

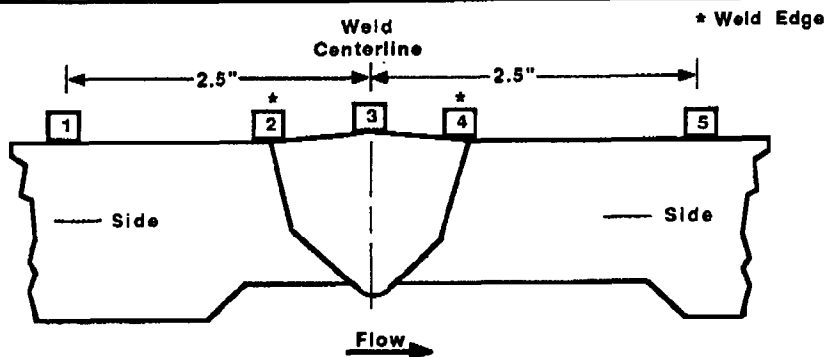
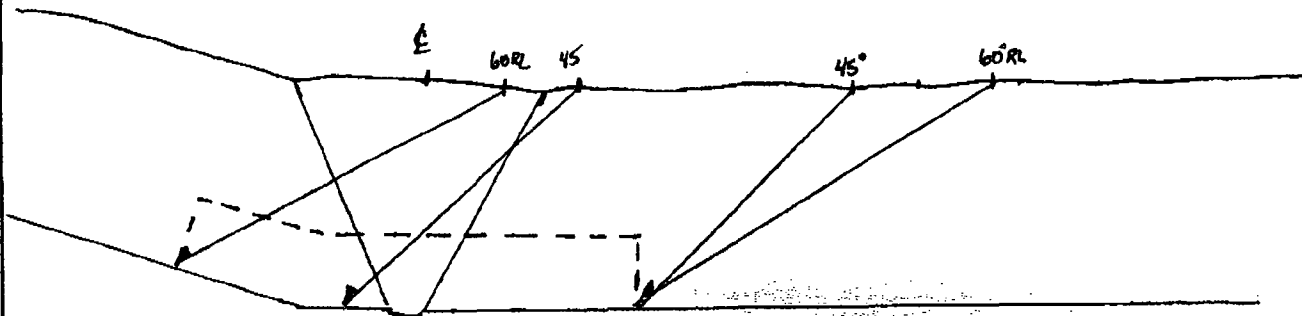
WALL THICKNESS  
PROFILE SHEET

REPORT NO:

R031

PROJECT: BFNWELD NO: GR-3-63UNIT: 3/12SYSTEM: RECIRCRecord Thickness Measurements As  
Indicated, Including Weld Width,  
Edge-To-Edge At 0°

| Position | 0°   | 90° | 180° | 270° |
|----------|------|-----|------|------|
| 1        | N/A  |     |      |      |
| 2        | 1.26 |     | N    |      |
| 3        | 1.37 |     | A    |      |
| 4        | 1.22 |     |      |      |
| 5        | 1.20 |     |      |      |

CROWN HEIGHT: GROUND FLUSHDIAMETER: 28"CROWN WIDTH: 1.50"WELD LENGTH: 89"

CONTOUR

EXAMINER: ARLEN JENSEN *ALJ*REVIEWED BY: *Walter Welch*ANII: *Carl Ford*LEVEL: IILEVEL: IIIDATE: 3/6/06DATE: 3/30/06DATE: 3/5/06PAGE 5 OF 10



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|                                |                             |   |                             |   |                         |
|--------------------------------|-----------------------------|---|-----------------------------|---|-------------------------|
| TENNESSEE VALLEY<br>AUTHORITY  |                             | EXAMINATION SUMMARY<br>AND<br>RESOLUTION DATA SHEET |                             | REPORT NUMBER:<br><i>R031</i>               |                         |
| PROJECT: BFN UNIT: 3           |                             | CYCLE: 12   |                             | COMPONENT ID: GR-3-63                       |                         |
| EXAMINATION METHOD             |                             |   |                             | SYSTEM: Recirc ISI DWG. NO. 3-ISI-0328-C-02 |                         |
| MT <input type="checkbox"/>    | PT <input type="checkbox"/> | UT <input checked="" type="checkbox"/>              | VT <input type="checkbox"/> | CODE CLASS: 1                               | CATEGORY: E             |
| PROCEDURE: N-UT-65             |                             | REV: 4  | TC: NA                      | COFIG.: VLV                                 | TO Pipe                 |
| EXAMINER:<br><i>MATT WELCH</i> |                             | EXAMINER:<br><i>N/A</i>                             |                             | EXAMINER:<br><i>N/A</i>                     | EXAMINER:<br><i>N/A</i> |
| LEVEL: <i>III</i>              |                             | LEVEL:  |                             | LEVEL:                                      | LEVEL:                  |

This report contains the data generated from the through wall sizing ultrasonic examination of weld GR-3-63. This data supplants the detection examination for the same component.

As required by IWB-2420(b) a successive examination of this component was performed. The dimensions of the IGSC crack have remained essentially unchanged (i.e., length and through wall dimensions). This exam satisfies the completion of successive examinations per IWB-2420(c). The successive exams and this exam documented the following dimensions:

|           | Cycle 8 | Cycle 9 | Cycle 10 | Cycle 12 |
|-----------|---------|---------|----------|----------|
| Length    | 1.7"    | 1.7"    | 1.7"     | 1.7"     |
| Thru-wall | .20"    | .20"    | .20"     | .20"     |

The exam was performed using PDI qualified personnel, equipment and techniques required by PDI Procedure PDI-UT-3, revision C and it's associated Tables. This procedure is implemented through TVA/ISO procedure N-UT-65, revision 4.

This exam satisfies the requirements of NUREG 0313 and BWRVIP-75.

|                                       |                                       |                           |
|---------------------------------------|---------------------------------------|---------------------------|
| RESOLUTION BY:<br><i>Matt Welch</i>   | REVIEWED BY:<br><i>Darlene DeLong</i> | ANII: <i>Earl Ford</i>    |
| LEVEL: <i>III</i> DATE: <i>3/6/06</i> | LEVEL: <i>III</i> DATE: <i>3-7-06</i> | DATE: <i>3/30/06</i>      |
|                                       |                                       | PG. <i>6</i> OF <i>10</i> |



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**TVA**

Office of Nuclear Power

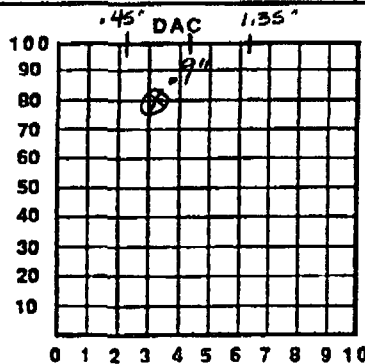
**ULTRASONIC  
SIZING  
DATA SHEET**

CALIBRATION NO.

R031

PROJECT: BFNWELD NO: GR-3-63UNIT: 3SYSTEM: RECIRCPROCEDURE NO: N-UT-65TRANSDUCER: COMP-6CAL. BLK. NO: WB85REVISION NO: 4 PCR N/ASERIAL NUMBER: 00W41WCAL. BLK. THKNS: .5-2.0INSTRUMENT: KRAUTKRAMERSIZE: .5 FREQ: 2.25TEMP: 74° PYRO. NO: E39056MODEL/TYPE: USN60CABLE TYPE/LENGTH: R6174/6'COUPLANT: ULTRAGEL IISERIAL NO: E36305NOMINAL ANGLE: 45°BATCH NO: 0412SDMEASURED ANGLE: 44°TYPE OF ☐ LONGITUDINALEXAM: ☒ SHEAR☐ OTHER

AMPLITUDE

SWEEP/DEPTH  
SCALE RANGE: 0-10 = 2.937② = REF  
@ 50.9 dB**INSTRUMENT SETTINGS**

| REFLECTOR   |                          |  | REFERENCE   | MEMORY     |
|---|--------------------------|--|-------------|------------|
| SCAN DIRECT.  | NTCH                     | SDH  | SENSITIVITY | NUMBER     |
| AXIAL   | <input type="checkbox"/> | <input checked="" type="checkbox"/>  | 50.9 dB     | 45SEZ-25-5 |
| CIRC  | <input type="checkbox"/> | <input type="checkbox"/>   | dB          |            |
| FREQ: 2.25  | MHz                      | REJECT: 0  | %           |            |
| ANGLE: 44   | deg                      | DAMPING: 1K  | ohms        |            |
| DELAY: 6.23   | msec                     | PULSER: <del>AUTO HIGH</del>   | *           |            |
| ZERO: 0.0/FP  | msec                     | FILTER: FIXED  | *           |            |
| VELOCITY: 1235  | msec                     | REP RATE: AUTO HIGH  |             |            |
| RANGE: 2.937  | inches                   | TOF: <input checked="" type="checkbox"/> PEAK <input type="checkbox"/> FLANK |             |            |
| RECTIFIER: FULLWAVE   |                          | POWER: BATT  |             |            |
| DUAL: <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF |                          | TCG: <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF     |             |            |

FIELD SIMULATOR: KOMPAS S/N: 6026-83

|                   |     |   |
|-------------------|-----|---|
| REFLECTOR         | SDH | N |
| MAXIMUM AMPLITUDE | 80% |   |
| METAL PATH        | 1.0 | A |

|                          |      |                    |  |
|--------------------------|------|--------------------|--|
| INITIAL CALIBRATION TIME | 0735 | VERIFICATION TIMES |  |
| FINAL CALIBRATION TIME   | 1005 |                    |  |

LINEARITY CHECK

**VERTICAL**

|          |     |    |    |    |    |    |    |    |    |    |
|----------|-----|----|----|----|----|----|----|----|----|----|
| SIGNAL 1 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 |
| SIGNAL 2 | 50  | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5  |

**ATTENUATOR**SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1  $\pm 5\%$  OF FULL SCALE

|             |     |          |          |     |          |     |          |
|-------------|-----|----------|----------|-----|----------|-----|----------|
| TESTER GAIN | SET | - 6      | - 12     | SET | + 12     | SET | + 6      |
| SIGNAL AMP  | 80% | 32 to 48 | 16 to 24 | 20% | 64 to 96 | 40% | 64 to 96 |
|             |     | 40       | 20       |     | 80       |     | 80       |

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO. N/A

② ENERGY: HKH m3/6/06

TECHNIQUE: ☐ SPOT ☒ PATT ☐ MOST ☐ RLL ☐ OTHER

| INDICATION NUMBER | L(in) FROM ZERO REF. | TOTAL LENGTH | THRUWALL DIMENSION | SIDE OF WELD | TYPE OF REFLECTOR |
|-------------------|----------------------|--------------|--------------------|--------------|-------------------|
| 1                 | 34.5 35.6<br>m3/6/06 | 1.7          | .2"                | DS           | 145CC             |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |

EXAMINER: Mark WalshREVIEWED BY: James D. DickeyANII: Jul ThalLEVEL: III DATE: 3/6/06LEVEL: III DATE: 3.7.06DATE: 3/30/06PAGE 7 OF 10



**TVA**

Office of Nuclear Power

0123

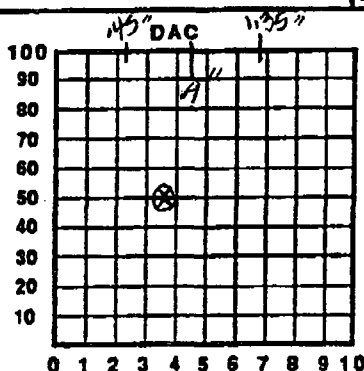
**ULTRASONIC  
SIZING  
DATA SHEET**

CALIBRATION NO.

R031

PROJECT: BFNWELD NO: GR-3-63UNIT: 3SYSTEM: RECIRCPROCEDURE NO: N-VT-65TRANSDUCER: COMP-GCAL. BLK. NO: WB85REVISION NO: 4 PCR N/ASERIAL NUMBER: 00W425CAL. BLK. THKNS: .5-2.0INSTRUMENT: KRAUTKRAMERSIZE: .5 FREQ: 2.25TEMP: 74° PYRO. NO: E39056MODEL/TYPE: USN60CABLE TYPE/LENGTH: R6174/6'COUPLANT: ULTRAGEL IISERIAL NO: E36305NOMINAL ANGLE: 60°BATCH NO: 0412517MEASURED ANGLE: 58°

TYPE OF

EXAM: ☒ LONGITUDINAL☒ SHEAR☐ OTHERA  
M  
P  
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D  
ESCALE RANGE: 0-10 = 2.0**INSTRUMENT SETTINGS**

| REFLECTOR   |                          |                                     | REFERENCE  | MEMORY     |
|---|--------------------------|-------------------------------------|--|------------|
| SCAN DIRECT.  | NTCH                     | SDH                                 | SENSITIVITY  | NUMBER     |
| AXIAL   | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 39.6 dB  | 60822-2551 |
| CIRC  | <input type="checkbox"/> | <input type="checkbox"/>            | N/A dB   | N/A        |
| FREQ: 2.251 MHz   |                          |                                     | REJECT: 0 %  |            |
| ANGLE: 58 deg   |                          |                                     | DAMPING: 1K ohms   |            |
| DELAY: 8.76 msec  |                          |                                     | PULSER: <del>AUTO HIGH</del> <sup>44</sup> 3/6/06                            |            |
| ZERO: 0.0/IP msec   |                          |                                     | FILTER: FIXED *  |            |
| VELOCITY: 1233 msec   |                          |                                     | REP RATE: AUTO HIGH  |            |
| RANGE: 2.0 inches   |                          |                                     | TOF: <input checked="" type="checkbox"/> PEAK <input type="checkbox"/> FLANK |            |
| RECTIFIER: FULLWAVE   |                          |                                     | POWER: BATT  |            |
| DUAL: <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF |                          |                                     | TCG: <input type="checkbox"/> ON <input checked="" type="checkbox"/> OFF     |            |

FIELD SIMULATOR: ROMPAS S/N: 6026-83

|                   |              |   |
|-------------------|--------------|---|
| REFLECTOR         | SDH          | N |
| MAXIMUM AMPLITUDE | 50%          |   |
| METAL PATH        | 1.44/.72dpt. | A |

|                          |      |                    |   |
|--------------------------|------|--------------------|---|
| INITIAL CALIBRATION TIME | 0750 | VERIFICATION TIMES |   |
| FINAL CALIBRATION TIME   | 1010 | N                  | A |

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K**VERTICAL**

|          |     |    |    |    |    |    |    |    |    |    |
|----------|-----|----|----|----|----|----|----|----|----|----|
| SIGNAL 1 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 |
| SIGNAL 2 | 50  | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5  |

**ATTENUATOR**SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1  $\pm$  5% OF FULL SCALE

|             |     |          |          |     |          |     |          |
|-------------|-----|----------|----------|-----|----------|-----|----------|
| TESTER GAIN | SET | - 6      | - 12     | SET | + 12     | SET | + 6      |
| SIGNAL AMP  | 80% | 32 to 48 | 16 to 24 | 20% | 64 to 96 | 40% | 64 to 96 |
|             |     | 40       | 20       |     | 80       |     | 80       |

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO. N/ATECHNIQUE: ☐ SPOT ☒ PATT ☐ MOST ☐ RFL ☐ OTHER

| INDICATION NUMBER | L(in) FROM ZERO REF. | TOTAL LENGTH | THRUWALL DIMENSION | SIDE OF WELD | TYPE OF REFLECTOR |
|-------------------|----------------------|--------------|--------------------|--------------|-------------------|
| 1                 | 35.7                 | 1.7          | .2                 | DS           | 16SCL             |
| N/A               |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |
|                   |                      |              |                    |              |                   |

EXAMINER: Walter WillebREVIEWED BY: Harold D. DuffAMH: Lee H. H.LEVEL: IIIDATE: 3/6/06LEVEL: IIIDATE: 3.7.06DATE: 3/30/06PAGE: 8OF: 10

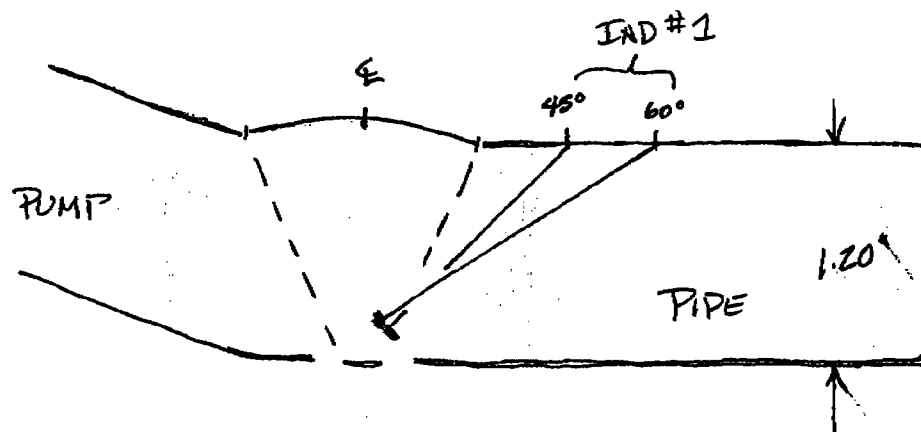


Office of Nuclear Power

Unit: 3 WELD NO.: GR-3-63

R031

| <u>W/MAX</u>                         | <u>DEPTH</u> | <u>MP</u> | <u>RL</u> |
|--------------------------------------|--------------|-----------|-----------|
| <del>44</del> s = 1.1                | 1.0          | 1.39      | .2        |
| 58° <del>60</del> s = 1.6<br>mz 6/86 | 1.0          | 1.88      | .2        |



**BY:**

Man muss

**LEVEL:**

III

DATE:

3/6/06

**PAGE**

4

OF 10

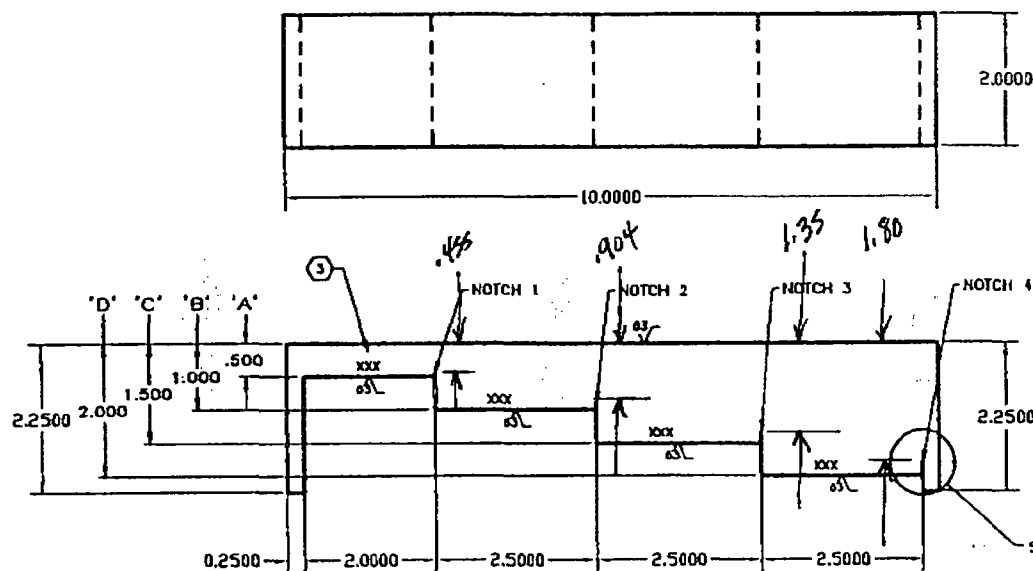
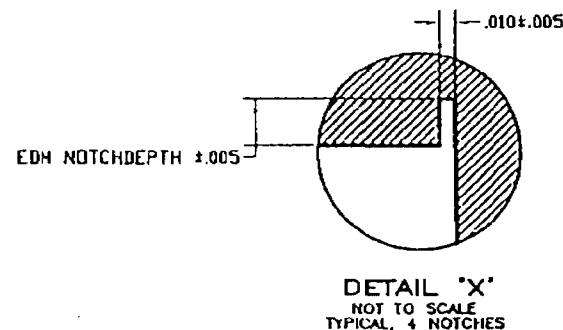


| ID No. | SERIAL &<br>HEAT No.                               | AS-BUILT DIMENSIONS |       |       |       | NOTCH 1 |       | NOTCH 2 |       | NOTCH 4 |       |       |       |
|--------|--|---------------------|-------|-------|-------|---------|-------|---------|-------|---------|-------|-------|-------|
|        |  | 'A'                 | 'B'   | 'C'   | 'D'   | DEPTH   | WIDTH | DEPTH   | WIDTH | DEPTH   | WIDTH | DEPTH | WIDTH |
| WB-B2  | ASTM A240 TYPE 304<br>HEAT 0Y03, SWRI LOG No. 3468 | .503                | 1.002 | 1.501 | 2.001 | .048    | .013  | .098    | .013  | .148    | .013  | .198  | .013  |
| WB-B3  | ASTM A240 TYPE 304<br>HEAT 0Y03, SWRI LOG No. 3468 | .501                | .998  | 1.499 | 2.001 | .048    | .013  | .098    | .013  | .148    | .013  | .198  | .013  |
| WB-B4  | ASTM A240 TYPE 304<br>HEAT 0Y03, SWRI LOG No. 3468 | .504                | 1.004 | 1.503 | 2.003 | .048    | .013  | .098    | .013  | .148    | .013  | .198  | .013  |
| WB-B5  | ASTM A240 TYPE 304<br>HEAT 0Y03, SWRI LOG No. 3468 | .502                | 1.001 | 1.501 | 2.001 | .047    | .013  | .097    | .013  | .148    | .013  | .198  | .013  |

AS-BUILT  
DIMENSIONS

REFERENCE DRAW.  
SWRI D-5339-629

TVA P.D. NUMBER  
11904

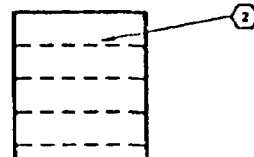


SEE DETAIL 'X'

NOTES:

- BREAK SHARP EDGES AND REMOVE ALL BURRS.
- STEEL STAMP ID No. AND HEAT No. ON SURFACE INDICATED IN CHARACTERS 3/16" MIN HEIGHT.
- STEEL STAMP AS-BUILT BLOCK DIMENSIONS TO NEAREST .001" ON SURFACE INDICATED IN CHARACTERS 1/8" MIN HEIGHT.

*Used for sizing depth calibration  
on GR-3-63. Wm Welch 7/1/66*



WB-B2, B3, B4, B5  
R-13  
HCB  
WBN

| REV                           | BY | DATE | REVISION | APPROVED | DATE |
|-------------------------------|----|------|----------|----------|------|
| 1                             |    |      |          |          |      |
| TEMPERATURE VALLEY AUTHORITY  |    |      |          |          |      |
| CALIBRATION BLOCKS            |    |      |          |          |      |
| STAINLESS STEEL HEAT NO. 0Y03 |    |      |          |          |      |
| AS BUILT FOR WB-B2 WB-B3      |    |      |          |          |      |
| WB-B4 & WB-B5                 |    |      |          |          |      |
| DRAWN BY: [Signature]         |    |      |          |          |      |
| CHECKED BY: [Signature]       |    |      |          |          |      |
| APPROVED BY: [Signature]      |    |      |          |          |      |
| DATE: 7/1/66                  |    |      |          |          |      |
| PAGE: 1 OF 1                  |    |      |          |          |      |
| PROJECT: WB-ALT-55-60         |    |      |          |          |      |

0125

R031



ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNIT 3  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)  
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM  
(THIRD TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-23

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(SEE ATTACHED)



TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNIT 3  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)  
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM  
(THIRD) TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 3-ISI-23

---

Executive  
Summary:

This request for relief addresses nine (9) Reactor Pressure Vessel (RPV) nozzle-to-vessel full penetration welds and seven (7) nozzle Inner Radius Sections. The design configuration of the RPV nozzle-to-vessel and inner-radius welds precludes a 100 percent ultrasonic (UT) examination of the required volume for the full penetration welds of the nozzles listed in Table 1. These examination limitations occur when the ASME Section XI, 2001 Edition, in accordance with 10 CFR 50.55a(b)(2)(xxiv) and, as amended by Sections 10 CFR 50.55a(b)(2)(xv)(B) through 10 CFR 50.55a(b)(2)(xv)(G), and 10 CFR 50.55a(b)(2)(xvi)(A), examination requirements are applied in areas of components constructed and fabricated to early plant designs. Based on a construction permit date prior to January 1, 1971, BFN is exempt from meeting certain provisions of the Code requirements for examination access, to the maximum extent practical, within the limitations of design, geometry, and materials of construction of the components in accordance with 10 CFR 50.55a(g)(4).

A UT examination was performed on accessible areas to the maximum extent practical given the physical limitations of the subject welds. The subject welds were examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, as mandated by 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(g)(6)(ii)(C). The design configuration limits UT examination of the RPV nozzle-to-vessel weld coverage (percentage) to that shown in Table 1. TVA concludes that performance of an UT examination of essentially 100 percent of the RPV nozzle-to-vessel full penetration welds would be impractical. The



performance of the UT examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety since the data obtained from the volume examined provides sufficient information to judge the overall integrity of the welds. Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 3, Third Ten-Year ISI inspection interval.

The 2001 Edition, in accordance with 10 CFR 50.55a(b)(2)(xxiv) and, as amended by Sections 10 CFR 50.55a(b)(2)(xv)(B) through 10 CFR 50.55a(b)(2)(xv)(G), and 10 CFR 50.55a(b)(2)(xvi)(A), ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.100, requires a volumetric examination of the reactor pressure vessel nozzle inner radius section.

In accordance with ASME Code Case N-648-1, TVA performed an enhanced Visual (VT-1) examination, capable of a 1-mil resolution, in accordance with ASME Section XI, VT-1 requirements for the following nozzle inner radius sections; N1A, N2B, N2D, N2F, N3B, N5A, and N8A.

|  |  |
|--|--|
| <b><u>Unit:</u></b>                    | Three (3)  |
| <b><u>System:</u></b>                  | Reactor Pressure Vessel (RPV), System 329  |
| <b><u>Components:</u></b>              | Nine (9) RPV Nozzles full penetration welds and seven (7) Inner Radius Sections as listed in Table 1   |
| <b><u>ASME Code Class:</u></b>         | ASME Code Class 1 (Equivalent)   |
| <b><u>ASME Section XI Edition:</u></b> | 2001 Edition, in accordance with 10 CFR 50.55a(b)(2)(xxiv) and, as amended by Sections 10 CFR 50.55a(b)(2)(xv)(B) through 10 CFR 50.55a(b)(2)(xv)(G), and 10 CFR 50.55a(b)(2)(xvi)(A), by following the Electric Power Research Institute's (EPRI) Performance Demonstration Initiative (PDI) processes. |
| <b><u>ASME Code Table:</u></b>         | IWB-2500-1   |
| <b><u>Examination Category:</u></b>    | B-D, Full Penetration Welds of Nozzles in Vessels  |



Examination  
Item Number:

B3.90, Reactor Vessel Nozzle-to-Vessel Welds  
B3.100, Reactor Vessel Nozzle Inside Radius  
Section

ASME Code  
Requirement:

ASME Section XI, Table IWB-2500-1, Examination  
Category B-D, Item No. B3.90 requires a  
volumetric examination of essentially 100  
percent of the weld and adjacent base material  
as depicted in Figure IWB-2500-7(a).

ASME Section XI, Table IWB-2500-1, Examination  
Category B-D, Item No. B3.100 requires a  
volumetric examination of essentially 100  
percent of the nozzle inner radius area as  
depicted in Figure IWB-2500-7(a).

Reference ASME Code Case N-648-1, Alternate  
Requirement For Inner Radius Examinations of  
Class 1 Reactor Vessel Nozzles Section XI,  
Division 1.

ASME Code  
Requirements  
From Which Relief  
Is Requested:

Relief is requested from the requirements  
of ASME Section XI Code, Table IWB-2500-1,  
Examination Category B-D, Item No. B3.90 to  
perform essentially 100 percent volumetric  
examination of weld and adjacent base material  
and Item No. B3.100 to perform essentially  
100 percent volumetric examination of the  
nozzle inner radius section.

List Of Items  
Associated With  
The Relief Request:

N1A RPV Nozzle-to-Vessel Weld  
N1A RPV Inner Radius Section  
N2B RPV Nozzle-to-Vessel Weld  
N2B RPV Inner Radius Section  
N2D RPV Nozzle-to-Vessel Weld  
N2D RPV Inner Radius Section  
N2F RPV Vessel-to-Nozzle Weld  
N2F RPV Inner Radius Section  
N3B RPV Nozzle-to-Vessel Weld  
N3B RPV Inner Radius Section  
N4B RPV Nozzle-to-Vessel Weld  
N4C RPV Nozzle-to-Vessel Weld  
N5A RPV Nozzle-to-Vessel Weld  
N5A RPV Inner Radius Section  
N8A RPV Nozzle-to-Vessel Weld  
N8A RPV Inner Radius Section



**Basis For Relief:**

The design configuration of the RPV nozzle-to-vessel welds precludes a UT examination of essentially 100 percent of the required volume. The component design configuration limits UT examination coverage of the welds to the percentages shown in Table 1.

Visual examination of the inner radius section for the above nozzles is limited because the reactor internal piping configuration prevents placement of the camera in all positions necessary to examine the surface M-N [See Figures IWB-2500-7(a) through (d)] over the full circumference. This prevents the examination from obtaining essentially 100 percent coverage.

A detailed description of the examination limitations is provided below:

- **N1 nozzles (2), RECIRC Outlet and N3 nozzles (4), Main Steam Outlet**

There are no thermal sleeves or piping inside the nozzles, they are of sufficient size to perform visual examination on the majority of the nozzle bore region. However, to achieve enhanced visual examination criteria the underwater camera would need to be placed inside the nozzle opening and using conventional underwater camera and fixtures, it is not possible to maintain required camera angle to fully examine the inner most portion of the nozzle bore. Therefore, for the examination of the recirculation outlets (N1 nozzles) and the main steam (N3 nozzles), less than 100 percent examination volume was achieved. The estimated examination coverage for these nozzles was 90 percent of the required volume.

- **N2 nozzles (10), RECIRC Inlet Thermal Sleeve and Jet Pump Riser Piping**

The inaccessible area is the inside bend radius of elbow at approximate clock positions 11:00 to 1:00, and at the bottom outside diameter bend of the elbow at approximate clock positions 5:00 to 7:00. The limitations are due to the proximity of the of the jet pump risers.



- **N5A and N5B, Core Spray Nozzles**

Core spray thermal sleeve and tee box and feed water sparger. Feedwater spargers are located above the core spray nozzle and the configuration of the core spray thermal sleeve and tee box prohibits placement of the camera 360 degrees around the nozzle. The limitations are at the top position at approximate clock positions 10:00 to 2:00, and the bottom position at approximate clock positions 4:00 to 8:00.

- **N8A and N8B nozzles, RECIRC Instrumentation**

Twelve instrumentation lines pass through the vessel wall into the vessel. The core shroud support plate is located directly beneath the nozzle preventing placement of the camera from approximate clock positions 4:00 to 8:00.

**Alternative  
Examination:**

In lieu of the Code requirement for essentially 100 percent volume UT examination on the nozzle to vessel weld, TVA proposes a UT examination of accessible areas to the maximum extent practical given the component design and configuration of the RPV nozzle-to-vessel welds.

For the RPV inner radius section in accordance with Code Case N-648-1, in lieu of a UT examination, a visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil width wire or crack, utilizing the allowable flaw length criteria of Table IWB-3512-1 with limiting assumptions on the flaw aspect ratio was performed.

The provisions of the 2001 Edition, in accordance with 10 CFR 50.55a(b)(2)(xxiv) and, as amended by Sections 10 CFR 50.55a(b)(2)(xv)(B) through 10 CFR 50.55a(b)(2)(xv)(G), and 10 CFR 50.55a(b)(2)(xvi)(A), of Table IWB-2500-1, Examination Category B-D, continue to apply except that, in place of examination volumes, the surfaces to be examined are the external surfaces shown in the figures applicable to this table.



The estimated enhanced remote visual (VT-1) examination coverage achieved for each nozzle is provided in Table 1.

**Justification for  
The Granting of  
Relief:**

(1) The design configuration of the subject nozzle-to-vessel welds precludes UT examination of essentially 100 percent of the required examination volume. Access to the nozzle-to-vessel welds is by a series of doorways in the concrete biological shield wall. Insulation behind these doorways is designed for removal around the nozzle circumference. In order to examine the welds in accordance with the Code requirements the RPV would require extensive design modifications. The physical arrangements of the nozzle-to-vessel welds preclude UT examination from the nozzle side. The limitations are inherent to the barrel-type nozzle-to-vessel weld design and are compounded by the close proximity of the biological shield wall.

Scanning from the nozzle surface is ineffective due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge. Coverage was increased by scanning from the outside blend radius of the welds where practical. Experience from the automated UT examinations performed at other BWRs from the inside surface has shown that the nozzle-to-vessel weld coverage would not be greatly improved even if performed from the inside surface utilizing the current state-of-the-art techniques.

The configuration of the nozzle-to-vessel welds precludes UT examination from the nozzle side due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge. The extent of examination coverage from the vessel side provides reasonable assurance that no flaws oriented parallel to the weld are present. The areas receiving little or no examination coverage are located toward the outside surface of the reactor vessel in the general area of the nozzle outside blend radius.



The blend radius restricts the scanning movement and/or transducer contact. The reactor vessel inner-half of the thickness and inside surface are interrogated with the UT beam. Degradation located at the inside surface or inner-half of the vessel would be located.

The subject welds were examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, in accordance with the requirements of the 2001 Edition, in accordance with 10 CFR 50.55a(b)(2)(xxiv) and, as amended by Sections 10 CFR 50.55a(b)(2)(xv)(B) through 10 CFR 50.55a(b)(2)(xv)(G), and 10 CFR 50.55a(b)(2)(xvi)(A), by following the Electric Power Research Institute's (EPRI) Performance Demonstration Initiative (PDI) processes.

(2) Radiographic examination as an alternate volumetric examination method was determined to be impractical due the radiological concerns. Gaining access to the inside surface of the RPV to place radiographic film would require extensive personnel protection due to high radiation and contamination levels. Also, due to the varying thickness at the outside blend radius of the weld several radiographs may be required of one area to obtain the required coverage and/or film density. The additional Code coverage gained by radiography is impractical when weighed against the radiological concerns.

Therefore, TVA concludes that performing an UT examination of essentially 100 percent of the nozzle-to-vessel full penetration welds and a 100 percent enhanced remote Visual VT-1 with 1-mil wire resolution on the inner radius section, would be impractical. Further, it would also be impractical to perform other volumetric examinations (i.e., radiography) which may increase examination coverage. A maximum extent practical UT examination of the subject areas provides an acceptable level of quality and safety. TVA concludes that significant degradation, if present, would be detected during an UT examination performed to the maximum extent practical of the subject welds. As a result, reasonable assurance of operational readiness of the subject welds has been provided.



Accordingly, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 3, Third Ten-Year ISI inspection interval.

**Implementation  
Schedule:**

This request for relief is applicable to the BFN Unit 3, Third Ten-Year ISI inspection interval (November 19, 2005 to November 18, 2015). The nozzle-to-vessel welds listed in Table 1 were examined in the first period (Cycle 12, i.e., Spring 2006) of the Third Ten-Year inspection interval.

Request for Relief 3-ISI-23 is consistent with BFN Unit 3 Second Ten-Year inspection interval requests for relief 3-ISI-7, Revision 0, 3-ISI-14, and 3-ISI-15 submitted by TVA letters dated March 26, 1999, and May 9, 2003 respectively. NRC approved these requests by letters dated August 2, 1999, and February 11, 2004.

**References:**

TVAN Nondestructive Examination Procedure N-GP-31, "Calculation Of ASME Code Coverage For Section XI, Appendix VIII Ultrasonic Examinations."

**Attachments:**

**Attachment A - 4 sketches**

Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3017, N1 RECIRC Nozzles

Sketch SK-B3018, N2 RECIRC Inlet, N3 Main Steam, N4 Feedwater and N5 Core Spray Nozzles

Sketch SK-B3019, Jet-Pump Nozzles N8

**Attachment B Examination Data  
Reports:**

N1A-NV - REPORT R-079  
N1A-IR - REPORT R-057  
N2B-NV - REPORT R-080  
N2B-IR - REPORT R-057  
N2D-NV - REPORT R-081  
N2D-IR - REPORT R-057  
N2F-NV - REPORT R-082  
N2F-IR - REPORT R-057



N3B-NV - REPORT R-083  
N3B-IR - REPORT R-057  
N4B-NV - REPORT R-085  
N4C-NV - REPORT R-087  
N5A-NV - REPORT R-088  
N5A-IR - REPORT R-057  
N8A-NV - REPORT R-089  
N8A-IR - REPORT R-057



# TABLE 1

| WELD NUMBERS               | NPS | Cycle | ISI DRAWING  | PERCENT | Remarks   |
|----------------------------|-----|-------|--------------|---------|---|
| NIA-N/V<br>(Recirc Outlet) | 28" | 12    | 3-ISI-0328-C | 22%     | No transverse scans were performed from the nozzle side |
| NIA-IR<br>(Recirc Outlet)  | 28" | 12    | 3-ISI-0328-C | 90%     |   |
| N2B-N/V<br>(Recirc Inlet)  | 12" | 12    | 3-ISI-0328-C | 42%     | No transverse scans were performed from the nozzle side |
| N2B-IR<br>(Recirc Inlet)   | 12" | 12    | 3-ISI-0328-C | 40%     |   |
| N2D-N/V<br>(Recirc Inlet)  | 12" | 12    | 3-ISI-0328-C | 42%     | No transverse scans were performed from the nozzle side |
| N2D-IR<br>(Recirc Inlet)   | 12" | 12    | 3-ISI-0328-C | 40%     |   |
| N2F-N/V<br>(Recirc Inlet)  | 12" | 12    | 3-ISI-0328-C | 42%     | No transverse scans were performed from the nozzle side |
| N2F-IR<br>(Recirc Inlet)   | 12" | 12    | 3-ISI-0328-C | 40%     |   |
| N3B-N/V<br>(Main Steam)    | 26" | 12    | 3-ISI-0329-C | 36%     | No transverse scans were performed from the nozzle side |



| WELD NUMBERS           | NPS | Cycle | ISI DRAWING  | PERCENT | Remarks   |
|------------------------|-----|-------|--------------|---------|---|
| N3B IR (Main Steam)    | 26" | 12    | 3-ISI-0329-C | 90%     |   |
| N4B-N/V (Feedwater)    | 12" | 12    | 3-ISI-0327-C | 39%     | No transverse scans were performed from the nozzle side |
| N4C-N/V (Feedwater)    | 12" | 12    | 3-ISI-0327-C | 39%     | No transverse scans were performed from the nozzle side |
| N5A-N/V (Core Spray)   | 10" | 12    | 3-ISI-0220-C | 38%     | No transverse scans were performed from the nozzle side |
| N5A-IR (Core Spray)    | 10" | 12    | 3-ISI-0220-C | 40%     |   |
| N8A-N/V (Recirc Inst.) | 4"  | 12    | 3-ISI-0411-C | 64%     | No transverse scans were performed from the nozzle side |
| N8A-IR (Recirc Inst.)  | 4"  | 12    | 3-ISI-0411-C | 40%     |   |



# Attachment A

## Four (4) Sketches

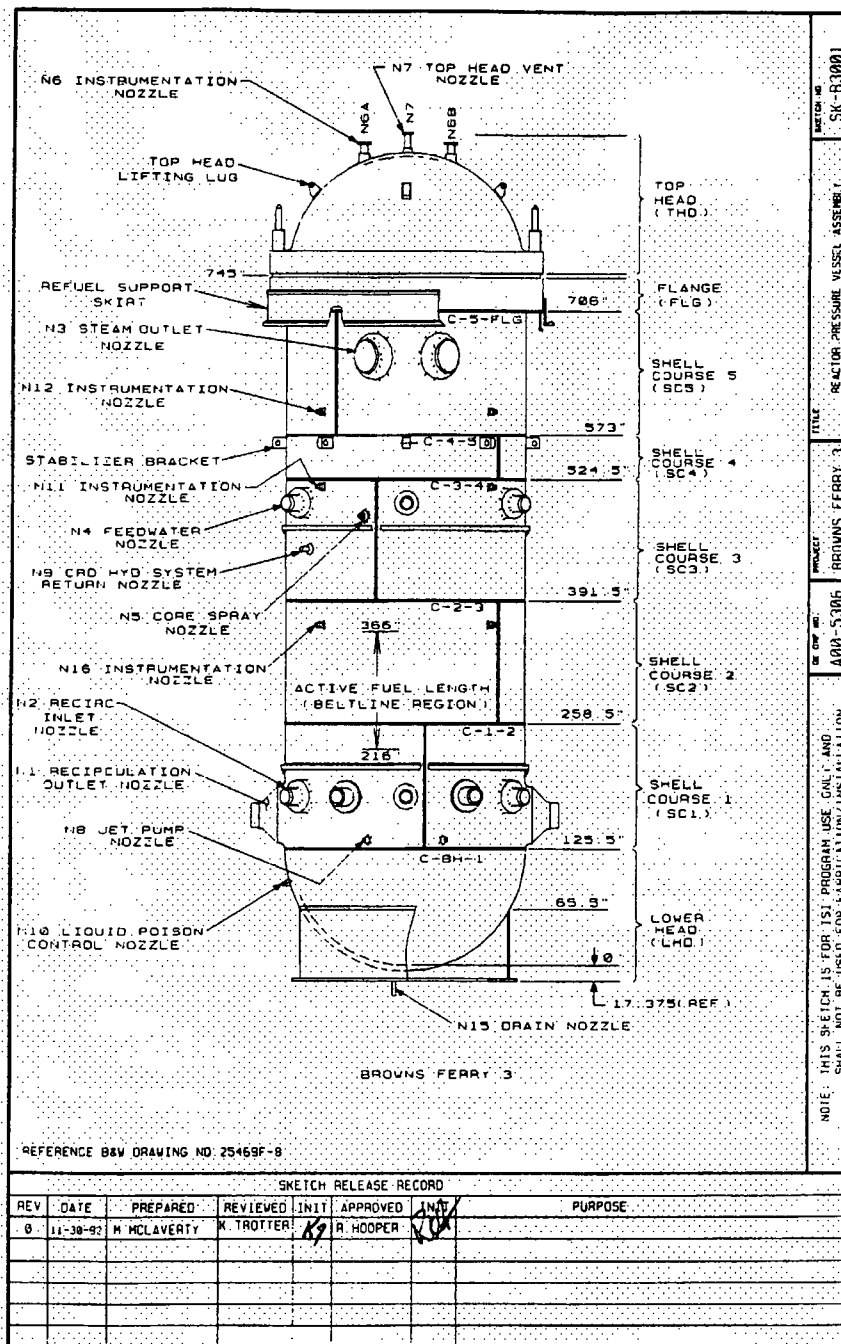
Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3017, N1 Recirculation Nozzles

Sketch SK-B3018, N2 Recirculation Inlet, N3 Main Steam,  
N4 Feedwater, and N5 Core Spray  
Nozzles

Sketch SK-B3019, N8 RECIRC Instrumentation Nozzle





SK-B3001



**SK-B3017**

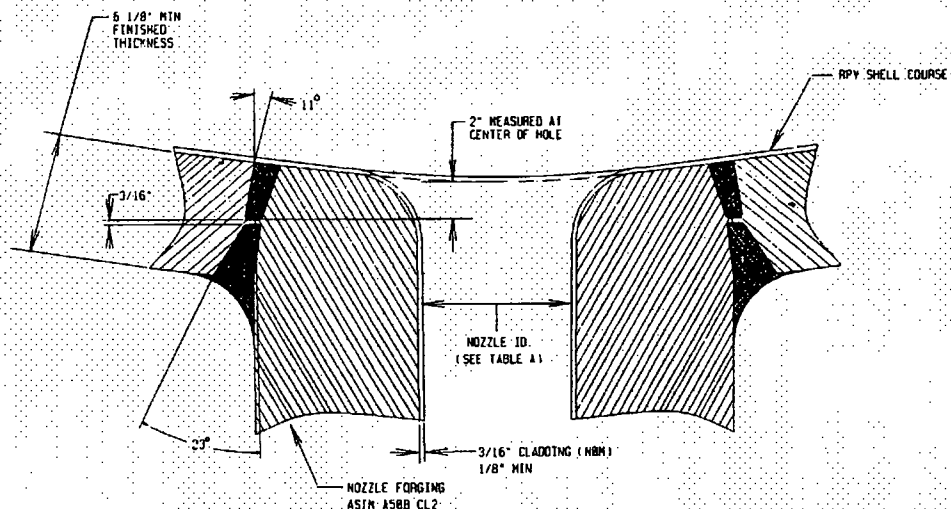
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| REV. DATE:  | PREPARED:      | REVIEWED INIT:                             | APPROVED INIT: | PURPOSE: |
| 0 12-1-83   | M. McLAVERITY  | K. TROTTER                                 | R. HOOPER      |          |
| SKETCH RELEASE RECORD   |                |  |                |          |
|   |                |  |                |          |
| <p>REFERENCE B&amp;W DRAWING NO. 131839E-4 (DETAIL B)<br/>AND NO. 151856E-0 FOR FORGING CONFIGURATION</p> |                |  |                |          |
| <p>NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION.</p>  |                |  |                |          |
| DE. DWF. NO.  | PROJECT        | TITLE                                      | SKETCH NO.     |          |
| A00-5306  | BROWNS FERRY 3 | WELD DETAIL RECIRCULATION OUTLET NOZZLE KI | SK-B3017       |          |



SK-B3018

| SKETCH RELEASE RECORD |          |               |             |
|-----------------------|----------|---------------|-------------|
| REV                   | DATE     | PREPARED BY   | REVIEWED BY |
| 0                     | 11-25-92 | M. McLAVERITY | K. TROTTER  |
|                       |          |               | R. HOOPER   |
| PURPOSE               |          |               |             |



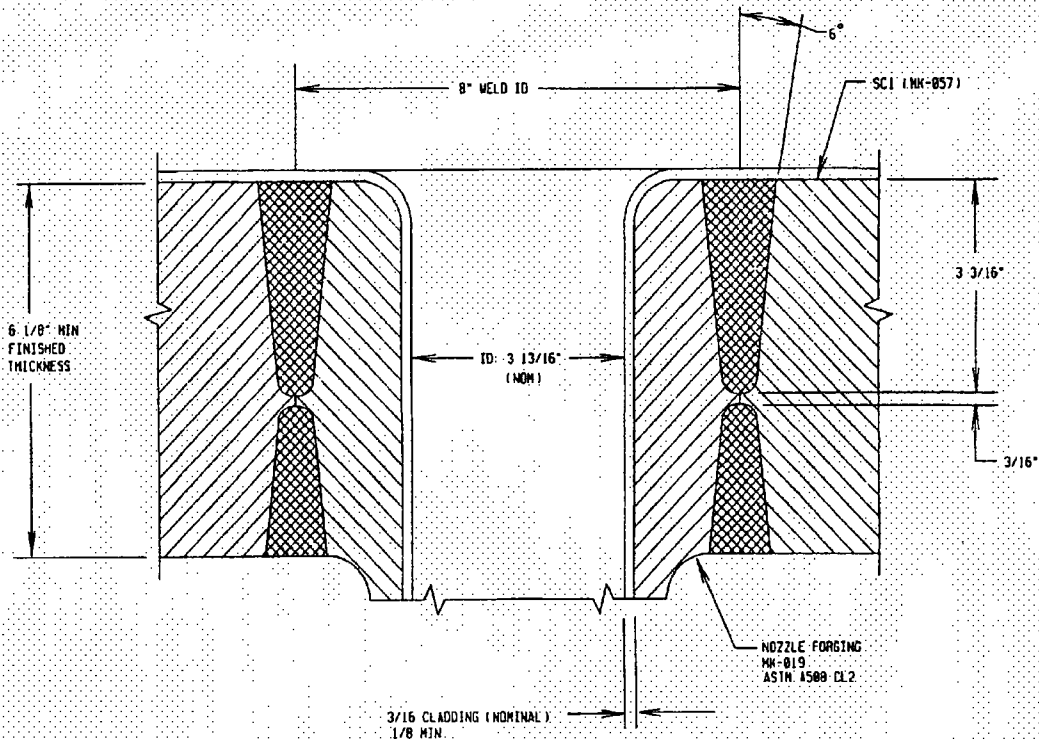
| NOZZLE NO. | NOZZLE DESCRIPTION  | B&W MK. # | NOZZLE ID (NOM.) | SHELL COURSE | COMMENTS                               |
|------------|---------------------|-----------|------------------|--------------|--|
| N2         | RECIRCULATION INLET | MK-007    | 11.56"           | SC1          |  |
| N3         | STEAM OUTLET        | MK-014    | 23.75"           | SC5          |  |
| N4         | FEEDWATER INLET     | MK-010    | 11.76"           | SC3          | CLADDING REMOVED BY PLANT MODIFICATION |
| N5         | CORE SPRAY          | MK-011    | 8.78"            | SC3          |  |

REFERENCE B&W DRAWING NO. 131839E-4 (DETAIL B)  
AND NO 151866E-0

|   |                        |                           |   |                        |
|---|------------------------|---------------------------|---|------------------------|
| NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION. | GE DWG NO.<br>A00-5306 | PROJECT<br>BROWNS FERRY 3 | TITLE<br>VELO DETAIL N2, N3, N4, & N5 NOZZLES | SKETCH NO.<br>SK-B3018 |
|---|------------------------|---------------------------|---|------------------------|





REFERENCE: B8V DRAWING NO. 131839E-4 (DETAIL C)  
AND NO. 131867E-0

SKETCH RELEASE RECORD

| REV. | DATE     | PREPARED      | REVIEWED   | INIT. | APPROVED  | INIT. |
|------|----------|---------------|------------|-------|-----------|-------|
| 0    | 11-25-92 | M. McLAVERITY | K. TROTTER | 19    | R. HOOPER | 21    |

PURPOSE

NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

| GE. DWP. NO. | PROJECT        | TITLE   | SKETCH NO. |
|--------------|----------------|---|------------|
| A00-5306     | BROWNS FERRY 3 | WELD DETAIL JET PUMP<br>INSTRUMENTATION NOZZLE W8 | SK-B3019   |

SK-B3019



# Attachment B

## Weld Examination Data Reports:

N1A-NV - Report R-079  
N1A-1R - Report R-057  
N2B-NV - Report R-080  
N2B-1R - Report R-057  
N2D-NV - Report R-081  
N2D-IR - Report R-057  
N2F-NV - Report R-082  
N2F-IR - Report R-057  
N3B-NV - Report R-083  
N3B-IR - Report R-057  
N4B-NV - Report R-085  
N4C-NV - Report R-087  
N5A-NV - Report R-088  
N5A-IR - Report R-057  
N8A-NV - Report R-089  
N8A-IR - Report R-057



Weld Examination Report R-079

N1A-N/V

RECIRC Outlet Nozzle



C00170

R-079



## EXAMINATION SUMMARY

| Summary No.: U3C12-N1A-NV   |             | Examination Data Sheet : N1A-DS01, N1A-DS02 |   | Exam Date: 3/10/2006                    |  |   |  |  |       |            |              |           |             |        |           |      |       |
|---|-------------|---|---|---|--|---|--|--|-------|------------|--------------|-----------|-------------|--------|-----------|------|-------|
| Customer: Browns Ferry Unit 3 U3C12   |             |   | Examination Methods: Ultrasonic   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| System / Component ID: Recirculation Outlet/N1A-NV  |             |   | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Component Description: Nozzle to Vessel Weld  |             |   | Modeling Number: IR-2003-19 Section 2   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Examination Category: B-D   |             |   | Calibration Sheets No(s):<br>N1A-CS01      N1A-CS04<br>N1A-CS02      N1A-CS05<br>N1A-CS03   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| ISO / Drawing: N1/3-ISI-0328-C  |             |   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00   |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Summary: <i>Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/8/06</i><br>Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.<br>In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.<br>In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications. |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| <table border="1"> <thead> <tr> <th colspan="3">Recirculation Inlet (N2) Nozzle Modeling Parameters</th> </tr> <tr> <th>Probe</th> <th>Probe Skew</th> <th>Scan Surface</th> </tr> </thead> <tbody> <tr> <td>60° Shear</td> <td>±(60 to 78)</td> <td>Vessel</td> </tr> <tr> <td>43° Shear</td> <td>±106</td> <td>Blend</td> </tr> </tbody> </table>   |             |   |   |   |  | Recirculation Inlet (N2) Nozzle Modeling Parameters |  |  | Probe | Probe Skew | Scan Surface | 60° Shear | ±(60 to 78) | Vessel | 43° Shear | ±106 | Blend |
| Recirculation Inlet (N2) Nozzle Modeling Parameters   |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Probe   | Probe Skew  | Scan Surface                                |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| 60° Shear   | ±(60 to 78) | Vessel                                      |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| 43° Shear   | ±106        | Blend                                       |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| 21% coverage of the required examination volume was obtained.   |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.  |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| <b>Note 1:</b> This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 25.76% volumetric coverage due to nozzle blend radius interference.   |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| <b>Note 2:</b> See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.  |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.   |             |   |   |   |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Prepared By: George Chapman LVII  |             | Date: 3/10/2006                             |   | Reviewed By: Adam A. Conli LVIII        |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Sign: <i>George Chapman</i>   |             | Date: 3-10-06                               |   | Sign: <i>Adam A. Conli</i>              |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Customer: Matt Welch  |             | Date: 5/8/06                                |   | ANII Review: <i>Paul J. [Signature]</i> |  |   |  |  |       |            |              |           |             |        |           |      |       |
| Sign: <i>Matt Welch</i>   |             | Date: 5/8/06                                |   | Date: 6/6/06                            |  |   |  |  |       |            |              |           |             |        |           |      |       |

51-9015478-000

Section 5 Tab B

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# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/10/06 20:30

Examination Data Sheet No.: N1A-DS02

Iso / Drawing: N1/3-ISI-0328-C

Calibration Sheet: N1A-CS03, N1A-CS04  
N1A-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 43°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N1A

Lo: TDC

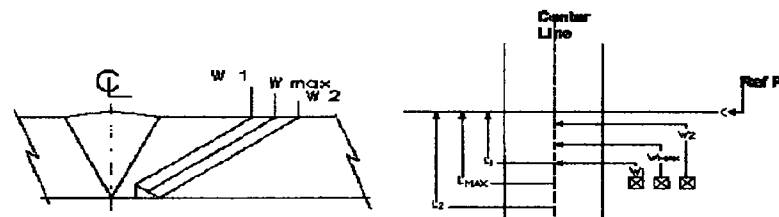
Procedure No.: 54-ISI-850-03

Component Description: 28" Recirculation Outlet Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientations: Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Tommy Brown

Level: II

Date: 3/10/06

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/27/06

ANII Review:

Date:

6/6/06





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/10/2006 17:30

Examination Data Sheet No.: N1A-DS01

Iso / Drawing: N1/3-ISI-0328-C

Calibration Sheet: N1A-CS01, N1A-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N1A

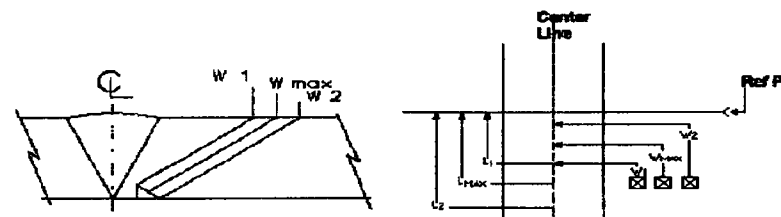
Lo: TDC

Procedure No.: N-UT-78-03

Component Description: 28" Recirculation Outlet Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 DS = Half Max Amplitude  
 HMA = Dist From Ref Pt at Max. Amplitude  
 Lmax = End Point 1&2 (Lateral Movement)  
 L1 - L2  
 RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |      |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |      |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |      |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          | None |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |      |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |      |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |      |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |      |  |  |

## Notes:

1. Search unit orientation: radial and circumferential. Circumferential scans performed with  $\pm 10^\circ$  tangential skew.
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: George G. Chapman Level: II Date: 03/10/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/27/06

ANII Review:

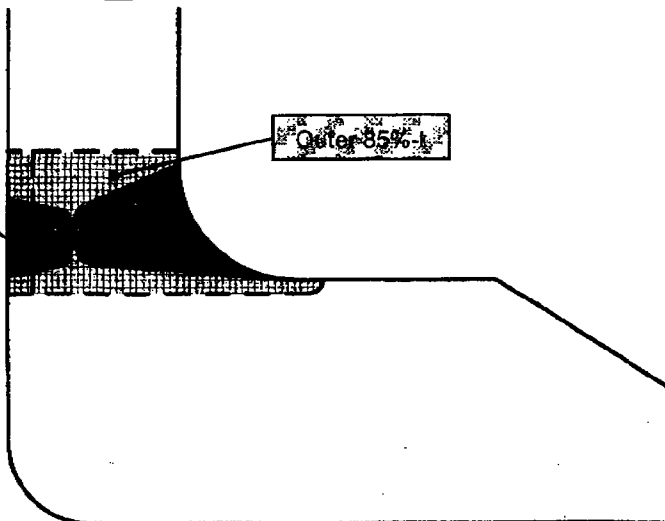
Date:





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N1A | Date: 03/27/06 | Summary No: U3C12-N1A-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   |   | Circumferential Scans   |  |
|---|---|---|--|
| 100%-t  | Inner 15%-t   | Outer 85%-t   |  |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |  |
| <sup>A</sup> Required Examination Volume: 61.951 <sup>2</sup> inches                          | <sup>D</sup> Inner 15%-t Examination Volume: 5.5921 <sup>4</sup> inches.                      | <sup>G</sup> Outer 85%-t Examination Volume: 56.35934 <sup>2</sup> inches.                          |  |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |  |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |  |
| <sup>B</sup> Total Axial Volume Achieved: 20.1105 <sup>2</sup> inches                         | Description of Limitation: N/A  | <sup>H</sup> Outer 85-t% Volume Achieved: 0.8415 <sup>2</sup> inches                                |  |
|   | <sup>F</sup> Inner 15%-t Volume Achieved: 5.59211 <sup>2</sup> inches.                        |   |  |
| <sup>C</sup> Percentage of Axial Coverage: 32% ✓<br>B + A X 100 = C                           | <sup>I</sup> Total Circumferential Examination Coverage: 10% ✓<br>(F + H) + A = J             |   |  |

### Combined Axial and Circumferential Weld Coverage

**<sup>L</sup>Total Examination Coverage: 21% ✓**  
 $(C + J) + 2 = L$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/27/06 | Reviewed by: Adam Conti | Date: 03/27/06 | ANII Review: | Date: |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|

*Bret Flesner*

*Adam Conti*

*Paul Flank*

6/6/06





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

Utility: TVA

Plant: BFN3

Unit: 3

Weld ID: N1A

Date: 03/27/06

Summary No: U3C12-N1A-NV

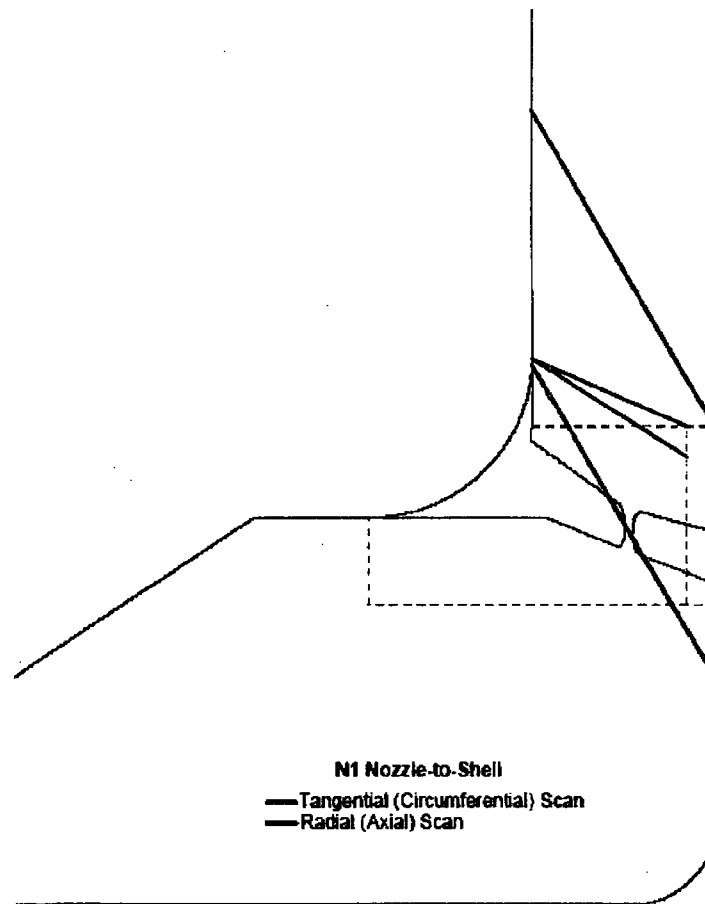
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 21% coverage.



Prepared by: Bret Flesner

Date: 03/27/06

Reviewed by: Adam Conti

Date: 03/27/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Jul Flood 6/6/06*



000075

R-019



## UT CALIBRATION DATA SHEET

|  |                    |                                   |                          |                                |                      |
|--|--------------------|-----------------------------------|--------------------------|--------------------------------|----------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/10/2006             |                          | Calibration No.: N1A-CS01      |                      |
| System / Component I.D.: RPV Nozzle N1A  |                    |                                   |                          |                                |                      |
| Component Description: 28" Recirculation Outlet Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                          |                                |                      |
| ISO / Drawing No.: 3-ISI-0328-C  |                    | Procedure No. / Rev.: N-UT-78 / 3 |                          |                                |                      |
| Material: Clad CS  |                    | Diameter: 28" Nozzle              |                          | Thickness: 6.1" Nominal        |                      |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT                       |                          | CALIBRATION STANDARD           |                      |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD                 | Calibration Block No: BF-18    |                      |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4       | Thickness (in): 6.12"          | Diameter. (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds   |                    | Shape: Rectangle                  | Freq: 2.0 MHz            | Temp (F) Block: 81°            | Temp (F) Comp.: 78°  |
| Delay: 14.000 µS   | Range: 8.0         | Config.: Dual                     | Mode: Long.              | Thermometer No.: VH-9571       |                      |
| Each Major Screen Div. #: 0.8  |                    | Nominal Angle: 60°                | Measured: 61°            | Couplant: Ultragel II          | Batch No.: 05325     |
| Cal in Depth or Sound Path: Sound Path   |                    | Fixture / Size: Integral          |                          | CALIBRATION STANDARD SIMULATOR |                      |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                          | Serial No.: NA                 |                      |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                          | Description: NA                |                      |
| Rep. Rate: Auto High   |                    | DAC PLOT                          |                          | Reflectors                     | NA NA                |
| Pulse Amp: Fixed   | Pulsar: High       |                                   |                          | Sweep Position                 | NA N/A               |
| Reference Sensitivity: 59.0 dB   |                    |                                   |                          | Signal Amp (%)                 | NA N/A               |
| Scan Sensitivity: 75.0 dB  |                    |                                   |                          | Gain DB (dB):                  | NA N/A               |
|  |                    |                                   |                          | Probe Squint Angle 3°          |                      |
| CALIBRATION CHECK  |                    |                                   |                          | Probe Focus: FD ~2.70"         |                      |
|  | Date/Time          | OK                                | Initials                 |                                |                      |
| Initial Cal:   | 3/10/06 1700       | X                                 | AAC                      |                                |                      |
| Init. Sim. Cal:  | N/A                |                                   | N/A                      |                                |                      |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                      |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                      |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                      |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                      |
| Final Cal:   | 3/10/06 1845       | X                                 | AAC                      |                                |                      |
| Beam Direction on Calibration Block  |                    | 0 Deg.                            |                          | Component: N/A                 |                      |
| (Yes / No)   |                    | NO                                |                          | BM: N/A HAZ: N/A               |                      |
|  |                    | YES                               |                          | C/L Weld: N/A                  |                      |
|  |                    | NO                                |                          | Component: N/A                 |                      |
|  |                    |                                   |                          | BM: N/A HAZ: N/A               |                      |
|  |                    |                                   |                          | Crown HT: N/A Weld Width: N/A  |                      |
| Reflector  | 1/4T SDH           |                                   |                          |                                |                      |
| Sweep Position / Depth in Inches   | 3.6                |                                   |                          |                                |                      |
| Amplitude in %   | 80%                |                                   |                          |                                |                      |
| Gain in dB   | 59.0 dB            |                                   |                          |                                |                      |
| Notes: The 60° Zone-1 ultrasonic examination.  |                    |                                   |                          |                                |                      |
| Examiner: George G Chapman   |                    | Examiner: N/A                     |                          | Examiner: N/A                  |                      |
| Sign:  | Level: II          | Date: 3/10/06                     | Sign:                    | Level: NA                      | Date: N/A            |
| Reviewed: Adam A. Conti  | Level: III         | Date: 3/27/06                     | ANII Review: [Signature] | Date: 5/23/06                  |                      |
| Sign:  |                    |                                   | Sign:                    |                                |                      |



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R-079



## UT CALIBRATION DATA SHEET

|  |                    |                                   |                          |                                |                               |
|--|--------------------|-----------------------------------|--------------------------|--------------------------------|-------------------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/10/2006             |                          | Calibration No.: N1A-CS02      |                               |
| System / Component I.D.: RPV Nozzle N1A  |                    |                                   |                          |                                |                               |
| Component Description: 28" Recirculation Outlet Nozzle to Vessel Weld (Zone-2 Examination) |                    |                                   |                          |                                |                               |
| ISO / Drawing No.: 3-ISI-0328-C  |                    | Procedure No. / Rev.: N-UT-78 / 3 |                          |                                |                               |
| Material: Clad CS  |                    | Diameter: 28" Nozzle              |                          | Thickness: 6.1" Nominal        |                               |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT                       |                          | CALIBRATION STANDARD           |                               |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD                 | Calibration Block No: BF-18    |                               |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4"      | Thickness (in): 6.12"          | Diameter (in): Flat           |
| Mat. Cal. / Velocity: 2320 In/Micro Seconds  |                    | Shape: Rectangle                  | Freq: 2.0 MHz            | Temp (F) Block: 81°            | Temp (F) Comp: 78°            |
| Delay: 14.000 µs   | Range: 20.0        | Config.: Dual                     | Mode: Long.              | Thermometer No.: VH- 9571      |                               |
| Each Major Screen Div. #: 2.0  |                    | Nominal Angle: 60°                | Measured: 61°            | Couplant: Ultragel II          | Batch No.: 05325              |
| Cal in Depth or Sound Path: Sound Path   |                    | Fixture / Size: Integral          |                          | CALIBRATION STANDARD SIMULATOR |                               |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                          | Serial No.: NA                 |                               |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                          | Description: NA                |                               |
| Rep. Rate: Auto High   |                    | DAC PLOT                          |                          | Reflectors                     | N/A NA                        |
| Pulse Amp: Fixed   | Pulsar: High       |                                   |                          | Sweep Position                 | N/A N/A                       |
| Reference Sensitivity: 72.0 dB   | Signal Amp (%)     |                                   |                          | N/A N/A                        |                               |
| Scan Sensitivity: 80.0 dB  | Gain DB (dB):      |                                   |                          | N/A N/A                        |                               |
|  |                    |                                   |                          |                                |                               |
| CALIBRATION CHECK  |                    |                                   |                          | Probe Squint Angle 3°          |                               |
|  | Date/Time          | OK                                | Initials                 | Probe Focus: FD ~2.70"         |                               |
| Initial Cal:   | 3/10/06 1655       | X                                 | ABC                      |                                |                               |
| Init. Sim. Cal:  | N/A                |                                   | N/A                      |                                |                               |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                               |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                               |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                               |
| Intermediate:  | N/A                |                                   | N/A                      |                                |                               |
| Final Cal:   | 3/10/06 1850       | X                                 | ABC                      | 0 DEGREE WELD THICKNESS ONLY   |                               |
| Beam Direction on Calibration Block  |                    | 0 Deg.                            | Axial                    | Circ                           | Component: N/A                |
| (Yes / No)   |                    | NO                                | YES                      | NO                             | BM: N/A HAZ: N/A              |
|  |                    |                                   |                          |                                | C/L Weld: N/A                 |
|  |                    |                                   |                          |                                | Component: N/A                |
|  |                    |                                   |                          |                                | BM: N/A HAZ: N/A              |
|  |                    |                                   |                          |                                | Crown HT: N/A Weld Width: N/A |
| Reflector  | ID NOTCH           |                                   |                          |                                |                               |
| Sweep Position / Depth in Inches   | 6.0                |                                   |                          |                                |                               |
| Amplitude in %   | 80%                |                                   |                          |                                |                               |
| Gain in dB   | 72.0 dB            |                                   |                          |                                |                               |
| Notes: The 60° Zone-2 ultrasonic examination.  |                    |                                   |                          |                                |                               |
| Examiner: George G. Chapman  | Level: II          | Date: 3/10/06                     | Examiner: N/A            | Level: NA                      | Date: N/A                     |
| Reviewed: Adam A. Conti  | Level: III         | Date: 3/27/06                     | ANII Review: [Signature] |                                | Date: 6/23/06                 |



000177

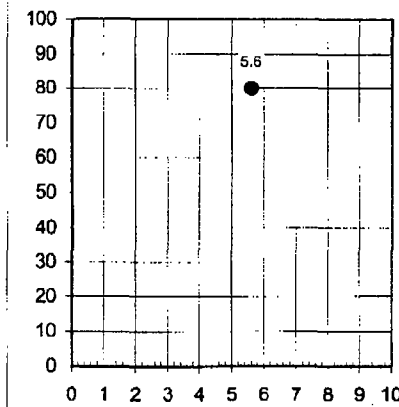
R-019



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |          |   |  |  |  |
|---|---------|---------------------------------------|----------|---|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |          | Summary No.: U3C12-N1A-NV                 |  | Calibration No.: N1A-CS03              |  |
| Nozzle ID.: RPV N1A   |         |                                       |          |   |  |  |  |
| Component ID: RPV N1A   |         |                                       |          |   |  |  |  |
| Exam Description: 28" Outlet Recirculation Nozzle to Vessel Weld                    |         |                                       |          | ASME Section XI: 2001 with 2003 Addenda ✓ |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |          | Figure No.: IWB 2500-7                    |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |          | Nozzle Diameter: 28"                      |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |          | <b>CALIBRATION STANDARD</b>               |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |          | Model: Benchmark                          |  | Cal. Block ID: BF-18                   |  |
| Model: Sonic 136  |         | Serial No.: 00X1XJ                    |          |   |  | Cal. Block Thickness: 6.12" Dia.: Flat |  |
| Serial No.: 136P1200G081455   |         | Size: .5X1.0"                         |          |   |  | Temp. Block: 83°F Comp.: 77°F          |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |          | Shape: Rectangle                          |  | Thermometer VH: 9571                   |  |
| Delay: 7.92"  |         | Mode: Shear                           |          | Config.: Single                           |  | Couplant Type: Ultragel II             |  |
| Velocity: .129 in/usec.   |         | Nominal Refracted Angle: 60°          |          |   |  | Couplant Batch #: 05325                |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 59°         |          |   |  | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |
| Freq.: 2.25 MHz   |         | Pulse: 222 ns                         |          | Nominal Skew Angle (If Applicable): NA    |  | Serial No.: 037405                     |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |          | Measured Skew Angle (If Applicable): NA   |  | Type: Rompas                           |  |
| Filter: Filter 2  |         | Reject: 0%                            |          | Wedge Radius (If Applicable): Flat        |  | Reflector: 10 13                       |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |          |   |  | Sweep Div.: 4 7                        |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |          |   |  | Amp. %: 100 40                         |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         |                                       |          |   |  | Gain dB: 56.8 56.8                     |  |
| Ref. Sensitivity: 73.2 dB   |         |                                       |          |   |  |  |  |
| Scan Sensitivity: 82.0 dB   |         |                                       |          |   |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |          |   |  |  |  |
|   | Date    | Time                                  | Initials |   |  |  |  |
| Initial Cal:  | 3/10/06 | 20:12                                 | TB       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Final Cal.:   | 3/10/06 | 23:38                                 | TB       |   |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |          |   |  |  |  |
| Sweep Position  |         | 5.6                                   |          |   |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |          |   |  |  |  |
| Gain in dB  |         | 73.2                                  |          |   |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen   |         |                                       |          |   |  |  |  |
| Examiner: Thomas Brown  |         | Level: II                             |          | Date: 3/10/06                             |  | Examiner: N/A                          |  |
| Sign: <i>[Signature]</i>  |         |                                       |          |   |  | Level: N/A                             |  |
| Reviewed: Adam Conli  |         | Level: III                            |          | Date: 3/27/06                             |  | Date: N/A                              |  |
| Sign: <i>[Signature]</i>  |         |                                       |          |   |  | ANII Review: <i>[Signature]</i>        |  |
|   |         |                                       |          |   |  | Date: 5/23/06                          |  |



## 0" THICKNESS DATA

|                  |                    |
|------------------|--------------------|
| Upper Shell: N/A | Lower Shell: N/A   |
| Weld CL: N/A     | At Indication: N/A |



000173 R-019



AREVA

# RPV ULTRASONIC CALIBRATION & EXAM DATA SHEET

|   |  |                                       |             |   |  |  |  |
|---|--|---------------------------------------|-------------|---|--|--|--|
| Site: Browns Ferry Unit 3   |  | Exam Date: 3/10/06                    |             | Summary No.: U3C12-N1A-NV                 |  | Calibration No.: N1A-CS04              |  |
| Nozzle ID.: RPV N1A   |  |                                       |             |   |  |  |  |
| Component ID: RPV N1A   |  |                                       |             |   |  |  |  |
| Exam Description: 28" Outlet Recirculation Nozzle to Vessel Weld                    |  |                                       |             | ASME Section XI: 2001 with 2003 Addenda   |  |  |  |
| Drawing No.: 3-ISI-0328-C   |  | Procedure No. / Rev.: 54-ISI-850 / 03 |             | Figure No.: IWB 2500-7                    |  |  |  |
| Material: CS Clad   |  | Thickness: 6.1"                       |             | Nozzle Diameter: 28"                      |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |  | <b>SEARCH UNIT</b>                    |             | <b>CALIBRATION STANDARD</b>               |  |  |  |
| Mfg.: Staveley  |  | Mfg.: KBA                             |             | Model: Benchmark                          |  | Cal. Block ID: BF-18                   |  |
| Model: Sonic 136  |  | Serial No.: 01BV5H                    |             |   |  | Cal. Block Thickness: 6.12" Dia.: Flat |  |
| Serial No.: 136P1200G081455   |  | Size: .5X1.0"                         |             |   |  | Temp: Block: 83°F Comp.: 77°F          |  |
| Range: 10"  |  | Freq: 2.25 MHz                        |             | Shape: Rectangle                          |  | Thermometer VH: 9571                   |  |
| Delay: 8.03"  |  | Mode: Shear                           |             | Config.: Single                           |  | Couplant Type: Ultragel II             |  |
| Velocity: .129 in/us.   |  | Nominal Refracted Angle: 43°          |             |   |  | Couplant Batch #: 05325                |  |
| Each Major Screen Div.: 1.0"  |  | Measured Refracted Angle: 45°         |             | <b>CALIBRATION VERIFICATION BLOCK</b>     |  |  |  |
| Freq.: 2.25 MHz   |  | Pulse: 222 ns                         |             | Nominal Skew Angle (If Applicable): 106 + |  | Serial No.: 037405 Type: Rompas        |  |
| Damping: 500 Ω  |  | Rep. Rate: 2 KHz                      |             | Measured Skew Angle (If Applicable): 106  |  | Reflector: 7 10                        |  |
| Filter: Filter 2  |  | Reject: 0%                            |             | Wedge Radius (If Applicable): 5.25"       |  | Sweep Div.: 1 4                        |  |
| Pulse Amplitude: Fixed  |  | Cable Type: RG-174 Length: 12'        |             | Amp. %: 100 90                            |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |  | No. of Intermediate Connectors: 0     |             | Gain dB: 57.4 57.4                        |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |  | <b>DAC PLOT</b>                       |             |   |  |  |  |
| Ref. Sensitivity: 57.6 dB   |  |                                       |             |   |  |  |  |
| Scan Sensitivity: 64.0 dB   |  |                                       |             |   |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |  |                                       |             |   |  |  |  |
|   |  |                                       |             |   |  |  |  |
|   |  |                                       |             |   |  |  |  |
| Initial Cal:  |  | Date: 3/10/06                         | Time: 20:07 | Initials: TB                              |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Intermediate:   |  | NA                                    | NA          | NA  |  |  |  |
| Final Cal.:   |  | Date: 3/10/06                         | Time: 23:33 | Initials: TB                              |  |  |  |
| Calibration Reflector(s)  |  | Notch                                 |             |   |  |  |  |
| Sweep Position  |  | 2.5                                   |             |   |  |  |  |
| Amplitude in % FSH  |  | 80%                                   |             |   |  |  |  |
| Gain in dB  |  | 57.6                                  |             |   |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen   |  |                                       |             |   |  |  |  |
|   |  |                                       |             |   |  |  |  |
| Examiner: Thomas Brown  |  | Level: II                             |             | Date: 3/10/06                             |  | Examiner: N/A                          |  |
| Sign: [Signature]   |  |                                       |             |   |  | Level: N/A                             |  |
| Reviewed: Adam Conli  |  | Level: III                            |             | Date: 3/27/06                             |  | ANII Review: [Signature]               |  |
| Sign: [Signature]   |  |                                       |             |   |  | Date: 5/23/06                          |  |





000179 R-079



AREVA

# RPV ULTRASONIC CALIBRATION & EXAM DATA SHEET

|                           |                    |                           |                           |
|---------------------------|--------------------|---------------------------|---------------------------|
| Site: Browns Ferry Unit 3 | Exam Date: 3/10/06 | Summary No.: U3C12-N1A-NV | Calibration No.: N1A-CS05 |
|---------------------------|--------------------|---------------------------|---------------------------|

|                     |  |
|---------------------|--|
| Nozzle ID.: RPV N1A |  |
|---------------------|--|

|                       |  |
|-----------------------|--|
| Component ID: RPV N1A |  |
|-----------------------|--|

|  |   |
|--|---|
| Exam Description: 28" Outlet Recirculation Nozzle to Vessel Weld | ASME Section XI: 2001 with 2003 Addenda |
|--|---|

|                           |                                       |                        |
|---------------------------|---------------------------------------|------------------------|
| Drawing No.: 3-ISI-0328-C | Procedure No. / Rev.: 54-ISI-850 / 03 | Figure No.: IWB 2500-7 |
|---------------------------|---------------------------------------|------------------------|

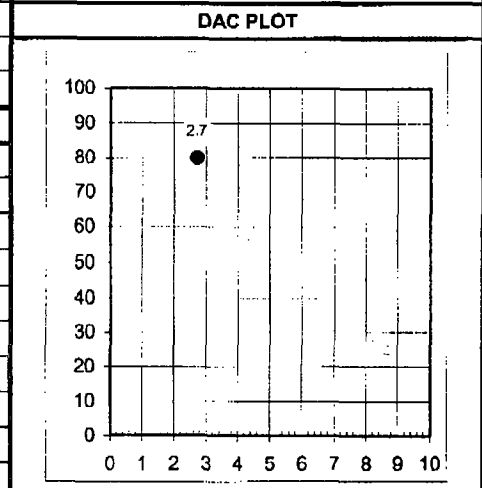
|                   |                 |                      |
|-------------------|-----------------|----------------------|
| Material: CS Clad | Thickness: 6.1" | Nozzle Diameter: 28" |
|-------------------|-----------------|----------------------|

| INSTRUMENT SETTINGS   | SEARCH UNIT                               | CALIBRATION STANDARD                   |
|---|---|--|
| Mfg.: Staveley  | Mfg.: KBA                                 | Model: Benchmark                       |
| Model: Sonic 136  | Serial No.: 015BJR                        | Cal. Block ID: BF-18                   |
| Serial No.: 136P1200G081455   | Size: .5X1.0"                             | Cal. Block Thickness: 6.12" Dia.: Flat |
| Range: 10"  | Freq: 2.25 MHz                            | Temp: Block: 83°F Comp.: 77°F          |
| Delay: 8.03"  | Shape: Rectangle                          | Thermometer VH: 9571                   |
| Velocity: .129 in/usec.   | Mode: Shear                               | Couplant Type: Ultragel II             |
| Each Major Screen Div.: 1.0"  | Config.: Single                           | Couplant Batch #: 05325                |
| Freq.: 2.25 MHz   | Nominal Refracted Angle: 43°              |  |
| Pulse: 222 ns   | Measured Refracted Angle: 46°             |  |
| Damping: 500 Ω  | Nominal Skew Angle (If Applicable): 106°  |  |
| Filter: Filter 2  | Measured Skew Angle (If Applicable): 106° |  |
| Reject: 0%  | Wedge Radius (If Applicable): 5.25"       |  |
| Pulse Amplitude: Fixed  | Cable Type: RG-174 Length: 12'            |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  | No. of Intermediate Connectors: 0         |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |   |  |
| Ref. Sensitivity: 57.6 dB   |   |  |
| Scan Sensitivity: 68.0 dB   |   |  |

| CALIBRATION VERIFICATION BLOCK |              |      |  |
|--------------------------------|--------------|------|--|
| Serial No.: 037405             | Type: Rompas |      |  |
| Reflector:                     | 7            | 10   |  |
| Sweep Div.:                    | 1            | 4    |  |
| Amp. %:                        | 100          | 90   |  |
| Gain dB:                       | 57.4         | 57.4 |  |

| DAC PLOT |  |  |  |
|----------|--|--|--|
|          |  |  |  |

| CALIBRATION / VERIFICATION TIMES |         |       |          |
|----------------------------------|---------|-------|----------|
|                                  | Date    | Time  | Initials |
| Initial Cal:                     | 3/10/06 | 20:15 | TB       |
| Intermediate:                    | NA      | NA    | NA       |
| Intermediate:                    | NA      | NA    | NA       |
| Intermediate:                    | NA      | NA    | NA       |
| Intermediate:                    | NA      | NA    | NA       |
| Intermediate:                    | NA      | NA    | NA       |
| Intermediate:                    | NA      | NA    | NA       |
| Final Cal.:                      | 3/10/06 | 23:30 | TB       |



| 0" THICKNESS DATA |                    |
|-------------------|--------------------|
| Upper Shell: N/A  | Lower Shell: N/A   |
| Weld CL: N/A      | At Indication: N/A |

|                          |       |  |  |  |
|--------------------------|-------|--|--|--|
| Calibration Reflector(s) | Notch |  |  |  |
| Sweep Position           | 2.7   |  |  |  |
| Amplitude in % FSH       | 80%   |  |  |  |
| Gain in dB               | 57.6  |  |  |  |

Notes: Nozzle to Shell 6" delay on screen

|  |            |               |   |            |               |
|--|------------|---------------|---|------------|---------------|
| Examiner: Thomas Brown<br>Sign: <i>[Signature]</i> | Level: II  | Date: 3/10/06 | Examiner: N/A<br>Sign: <i>[Signature]</i> | Level: N/A | Date: N/A     |
| Reviewed: Adam Cont<br>Sign: <i>[Signature]</i>    | Level: III | Date: 3/27/06 | ANII Review:<br>Sign: <i>[Signature]</i>  |            | Date: 5/23/06 |





## Weld Examination Report R-057

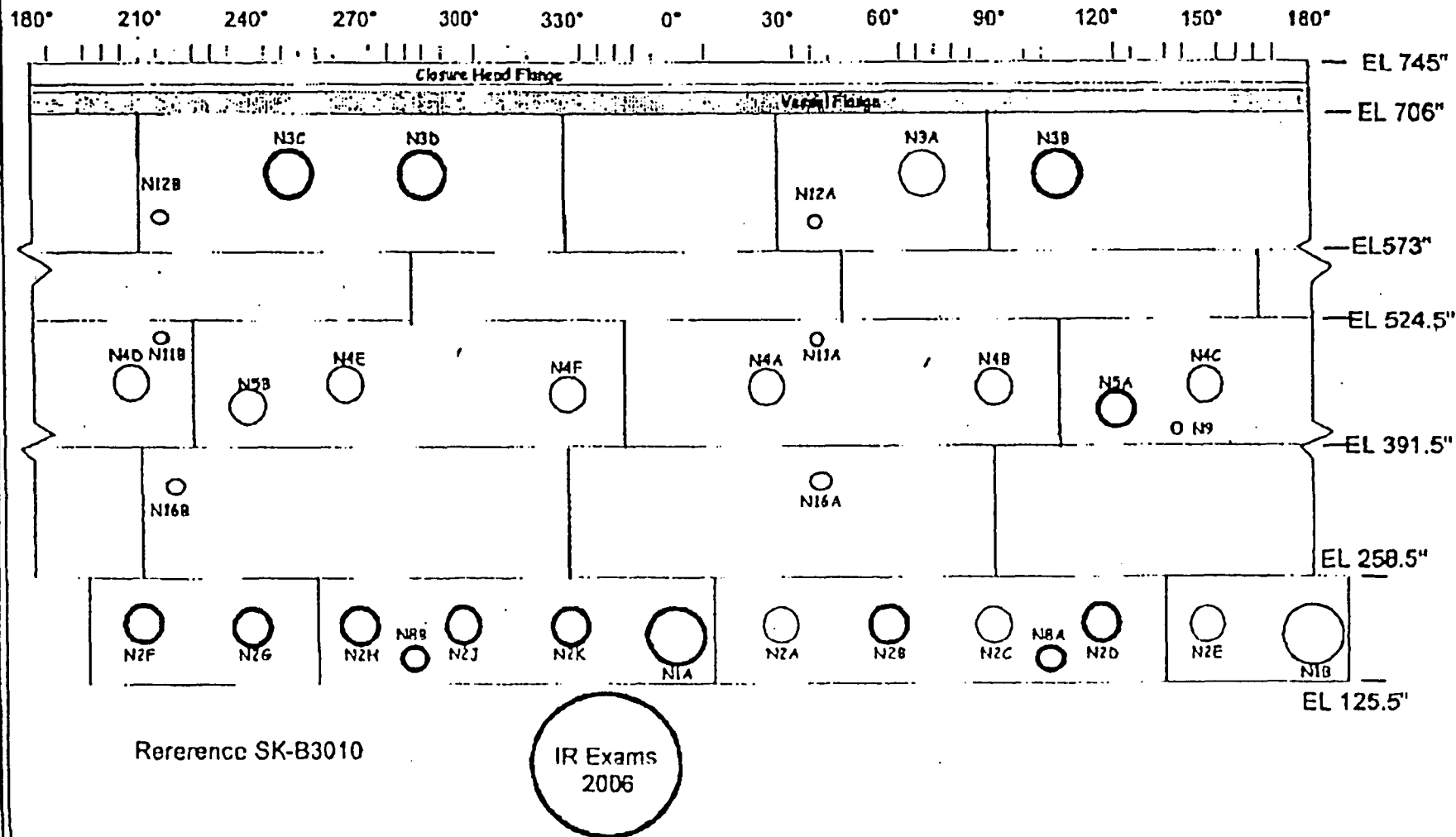
N1A-IR, N2B-IR, N2D-IR, N2F-IR, N3B-IR,  
N5A-IR, And N8A-IR

Inner Radius Examinations for RECIRC  
Outlet (1), RECIRC Inlet (3), Main Steam  
(1), Core Spray (1), and RECIRC  
Instrumentation (1) Nozzle



**A**  
**AREVA**

# RPV Roll-out Map Inside View



NOTES

PROJECT

Browns Ferry U3

PREPARED BY

LCR  
16 Feb 2008

TITLE

RPV ROLL-OUT - Inside View

SKETCH NO

Interior Att

0095 R-057





# Browns Ferry 3 - Cycle 12 - (2006 Outage)

## Visual Inspection of RPV Interior



Revision 0

| Component / Description | Az.  | Exam Type     | Cal # | Cleaning Assmt. Req'd. | Cleaning By: | Disk Number | Title Number | Exam Results | Examiner | Level | Date      | Remarks/Comments  |
|-------------------------|------|---------------|-------|------------------------|--------------|-------------|--------------|--------------|----------|-------|-----------|---|
| <b>RPV Interior</b>     |      |               |       |                        |              |             |              |              |          |       |           |   |
| N2-B IR                 | 60°  | EVT-1<br>VT-3 | 26    | Yes                    | NA           | 17          | 8            | NRI          | DJB      | II    | 11/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |
| N2-D IR                 | 120° | EVT-1<br>VT-3 | 26    | Yes                    | NA           | 17          | 6            | NRI          | DJB      | II    | 11/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |
| N2-F IR                 | 210° | EVT-1<br>VT-3 | 23    | Yes                    | NA           | 14          | 21           | NRI          | DJB      | II    | 10/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser, Diffusers and the Surveillance sample holder above. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR |
| N2-G IR                 | 240° | EVT-1<br>VT-3 | 26    | Yes                    | NA           | 17          | 4            | NRI          | DJB      | II    | 11/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |
| N2-H IR                 | 270° | EVT-1<br>VT-3 | 25    | Yes                    | NA           | 15          | 4            | NRI          | JLB      | II    | 10/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |
| N2-J IR                 | 300° | EVT-1<br>VT-3 | 22    | Yes                    | NA           | 12          | 3 / 4        | NRI          | AJ / JLB | II    | 10/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |
| N2-K IR                 | 330° | EVT-1<br>VT-3 | 22    | Yes                    | NA           | 11          | 15 / 16      | NRI          | DJB      | II    | 9/Mar/06  | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Riser and Diffusers. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                                       |

0096 R-057





# Browns Ferry 3 - Cycle 12 - (2006 Outage)

## Visual Inspection of RPV Interior



Revision 0

| Component / Description | Az.  | Exam Type     | Cal # | Cleaning Assmt. Req'd. | Cleaning By: | Disk Number | Title Number | Exam Results | Examiner | Level | Date      | Remarks/Comments  |
|-------------------------|------|---------------|-------|------------------------|--------------|-------------|--------------|--------------|----------|-------|-----------|---|
| N1-A IR                 | 0°   | EVT-1<br>VT-3 | 22    | Yes                    | NA           | 11          | 5            | NRI          | JLB      | II    | 9/Mar/06  | Examined Nozzle Inner Radius from outer nozzle to vessel tangential point to 8" inside nozzle bore. Est. 90% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                            |
| N3-B IR                 | 110° | EVT-1<br>VT-3 | 1     | Yes                    | NA           | 1           | 2 / 3        | NRI          | DR       | II    | 2/Mar/06  | Examined Nozzle Inner Radius from outer nozzle to vessel tangential point to 8" inside nozzle bore. Est. 90% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                            |
| N3-C IR                 | 260° | EVT-1<br>VT-3 | 1     | Yes                    | NA           | 1           | 4            | NRI          | DR       | II    | 2/Mar/06  | Examined Nozzle Inner Radius from outer nozzle to vessel tangential point to 8" inside nozzle bore. Est. 90% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                            |
| N3-D IR                 | 290° | EVT-1<br>VT-3 | 1     | Yes                    |              | 1           | 5            | NRI          | CMT      | II    | 2/Mar/06  | Examined Nozzle Inner Radius from outer nozzle to vessel tangential point to 8" inside nozzle bore. Est. 90% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR                            |
| N5-A IR                 | 120° | EVT-1<br>VT-3 | 11    | Yes                    | NA           | 6           | 9            | NRI          | JLB      | II    | 7/Mar/06  | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the T-Box and thermal sleeve. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR <i>Est. 40% Coverage 3/2/06</i> |
| N8-A IR                 | 105° | EVT-1<br>VT-3 | 26    | Yes                    | NA           | 17          | 7            | NRI          | DJB      | II    | 11/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Diffusers and the JP Instrument lines. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR |
| N8-B IR                 | 285° | EVT-1<br>VT-3 | 22    | Yes                    | NA           | 12          | 7/8          | NRI          | JLB      | II    | 10/Mar/06 | Nozzle Inner Radius examination limited to accessible areas due to the proximity of the Diffusers and the JP Instrument lines. Est. 40% Coverage. Include overall VT-3 for ASME SECT. XI (B-N-1, B13.10). LCR |

0097

R-057





# Browns Ferry 3 - Cycle 12 - (2006 Outage)

Visual Inspection of RPV Interior



Revision 0

| Component / Description | Az. | Exam Type | Cal # | Cleaning Assmt. Req'd. | Cleaning By: | Disk Number | Title Number | Exam Results | Examiner | Level | Date | Remarks/Comments |
|-------------------------|-----|-----------|-------|------------------------|--------------|-------------|--------------|--------------|----------|-------|------|------------------|
|-------------------------|-----|-----------|-------|------------------------|--------------|-------------|--------------|--------------|----------|-------|------|------------------|

Examined By: DJB

*[Signature]*

Level:

II

Date:

3-13-06

Examined By: JLB

*A.L. Clay for Jacob Briggs*

Level:

II

Date:

3/13/06

Examined By: AJ

*[Signature]*

Level:

II

Date:

3-13-06

Examined By: CMT

*[Signature]*

Level:

II

Date:

3-13-06

Examined By: DR

*[Signature]*

Level:

II

Date:

3-13-06

FRA-ANP Level III Review:

*LCR A.L. Clay for Larry Reeves 3/13/06*

R-057  
0093



Weld Examination Report R-080

N2B-N/V

RECIRC Inlet Nozzle



000130

R-080

**A****AREVA****EXAMINATION SUMMARY**

|  |   |  |
|--|---|--|
| Summary No.: U3C12-N2B-NV  | Examination Data Sheet : N2B-DS01, N2B-DS02   | Exam Date: 3/10/2006<br>3/10/2006  |
| Customer: Browns Ferry Unit 3 U3C12                              | Examination Methods: Ultrasonic   |  |
| System / Component ID: Recirculation Inlet/N2B-NV                | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |  |
| Component Description: Nozzle to Vessel Weld                     | Modeling Number: IR-2003-19 Section 3   |  |
| Examination Category: B-D  | Calibration Sheets No(s):<br>N2B-CS01      N2B-CS04<br>N2B-CS02      N2B-CS05<br>N2B-CS03 |  |
| ISO / Drawing: N2/3-ISI-0328-C                                   | Examination Results:  | <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |
| Framatome ANP Safety Document Change Notices:                    |   |  |
| *SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 |   |  |

Summary: *Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/6/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPR1 modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Recirculation Inlet (N2) Nozzle Modeling Parameters |             |              |
|---|-------------|--------------|
| Probe   | Probe Skew  | Scan Surface |
| 60° Shear   | ±(36 to 66) | Vessel       |
| 40° Shear   | ±120        | Blend        |

42% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 51.39% volumetric coverage due to nozzle blend radius interference.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a ½" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                                 |                     |                                  |                     |
|---------------------------------|---------------------|----------------------------------|---------------------|
| Prepared By: Wade Holloway LVII | Date: 3/10/2006     | Reviewed By: Adam A. Conti LVIII | Date: 3/22/2006     |
| Sign: <i>Wade Holloway</i>      |                     | Sign: <i>Adam A. Conti</i>       |                     |
| Customer: Matt Welch            | Date: <i>5/8/06</i> | ANII Review: <i>Sam Flord</i>    | Date: <i>6/6/06</i> |
| Sign: <i>Matt Welch</i>         |                     |                                  |                     |

51-9015478-000

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*5/6/06* ✓





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/10/2006 20:45

Examination Data Sheet No.: N2B-DS01

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2B-CS01, N2B-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N2B

Lo: TDC

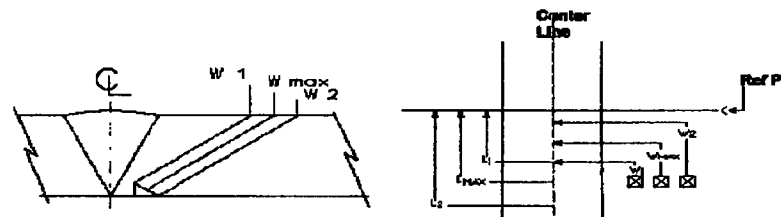
Procedure No.: N-UT-78-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |

Notes:

1. Search unit orientation: radial and circumferential.

2. Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

|                         |           |                |               |        |       |                         |            |                |
|-------------------------|-----------|----------------|---------------|--------|-------|-------------------------|------------|----------------|
| Examiner: Wade Holloway | Level: II | Date: 03/10/06 | Examiner: N/A | Level: | Date: | Reviewed: Adam A. Conti | Level: III | Date: 03/22/06 |
|                         |           |                |               |        |       |                         |            |                |
| ANII Review:            | Date:     |                |               |        |       |                         |            |                |
|                         |           | 6/6/06         |               |        |       |                         |            |                |

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# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/10/06 20:30

Examination Data Sheet No.: N2B-DS02

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2B-CS03, N2B-CS04  
N2B-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N2B

Lo: TDC

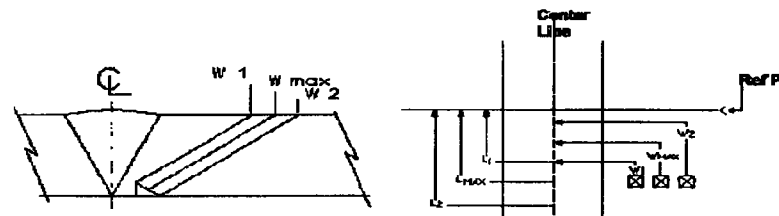
Procedure No.: 54-ISI-850-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
HMA = Half Max Amplitude  
Lmax = Dist From Ref Pt at Max Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |
|                           |                   |                   |   |       |       | W 1          | D1 | W2       | D2 |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |

## Notes:

1. Search unit orientations: Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Thomas Brown

Level: II

Date: 3/10/2006

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/22/06

ANII Review:

Date:

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m6/6/06

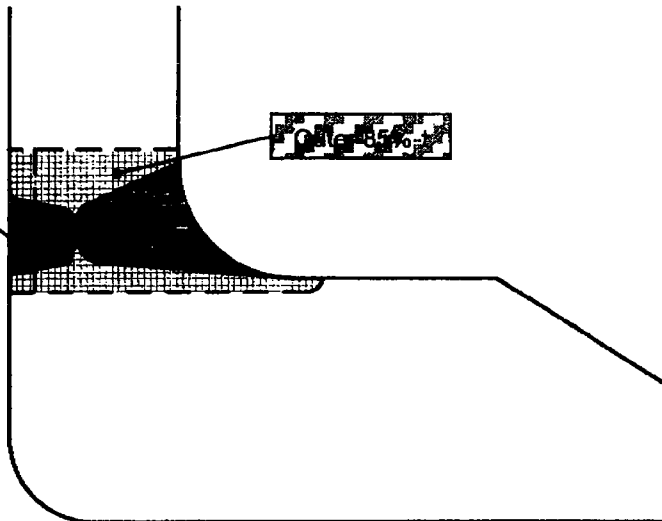
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## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N2B | Date: 03/21/06 | Summary No: U3C12-N2B-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   |  | Circumferential Scans   |   |
|---|--|---|---|
| 100%-t  |  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   |  | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 43.73 <sup>2</sup> inches                           |  | <sup>B</sup> Inner 15%-t Examination Volume: 5.01 <sup>2</sup> inches.                        | <sup>C</sup> Outer 85%-t Examination Volume: 38.72 <sup>2</sup> inches.                             |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |  | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  |  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 24.91 <sup>2</sup> inches                           |  | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 7.015 <sup>2</sup> inches                                 |
| <sup>C</sup> Percentage of Axial Coverage: 57%<br>$B + A \times 100 = C$                      |  | <sup>F</sup> Inner 15%-t Volume Achieved: 5.01 <sup>2</sup> inches.                           | <sup>I</sup> Total Circumferential Examination Coverage: 27%<br>$(F + H) + A = J$                   |

### Combined Axial and Circumferential Weld Coverage

**<sup>L</sup>Total Examination Coverage: 42% ✓**  
 $(C + J) + 2 = L$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/22/06 | Reviewed by: Adam Conti | Date: 03/22/06 | ANII Review: | Date: |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|

*Bret Flesner*

*Adam Conti*

*Adam Flesner* 8/6/06





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N2B | Date: 03/22/06 | Summary No: U3C12-N2B-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

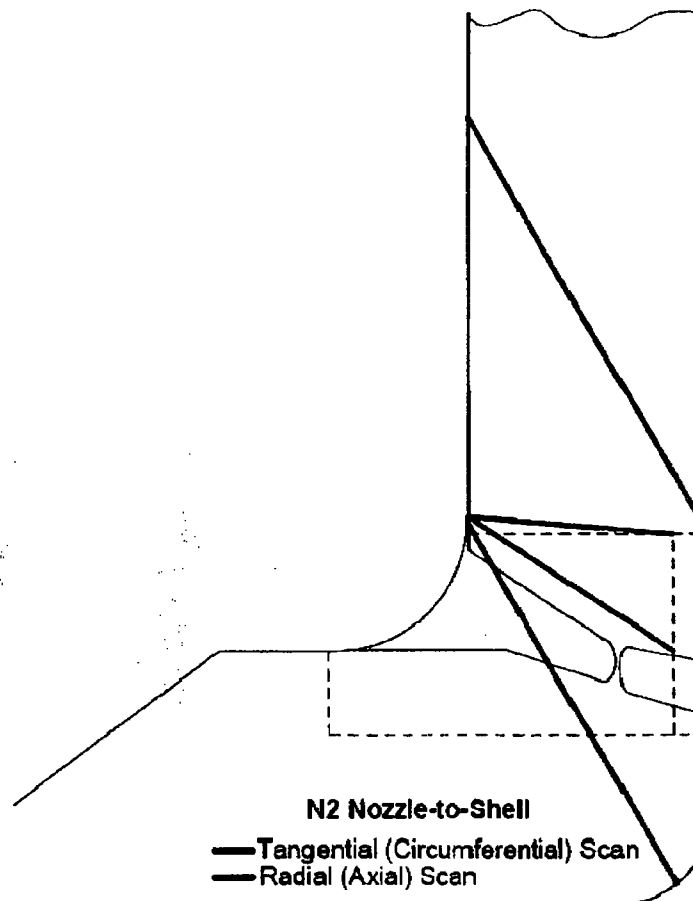
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 42% coverage.



Prepared by: Bret Flesner

Date: 03/22/06

Reviewed by: Adam Conti

Date: 03/22/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Adam Conti* 6/1/06



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R-080



## UT CALIBRATION DATA SHEET

|   |                    |                                   |                         |                                  |                     |
|---|--------------------|-----------------------------------|-------------------------|----------------------------------|---------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/10/2006             |                         | Calibration No.: N2B-CS01        |                     |
| System / Component I.D.: RPV Nozzle N2B   |                    |                                   |                         |                                  |                     |
| Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                         |                                  |                     |
| ISO / Drawing No.: 34SI-0328-C  |                    | Procedure No. / Rev.: N-UT-78 / 3 |                         |                                  |                     |
| Material: Clad CS   |                    | Diameter: 12" Nozzle              |                         | Thickness: 6.1" Nominal          |                     |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT                       |                         | CALIBRATION STANDARD             |                     |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD                | Calibration Block No: BF-18      |                     |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4      | Thickness (in): 6.12"            | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds  |                    | Shape: Rectangle                  | Freq: 2.0 MHz           | Temp (F) Block: 82°              | Temp (F) Comp.: 78° |
| Delay: 14.00 µS   | Range: 8.0         | Config.: Dual                     | Mode: Long.             | Thermometer No.: VH-9571         |                     |
| Each Major Screen Div. #: 0.8   |                    | Nominal Angle: 60°                | Measured: 61°           | Couplant: Ultragel II            | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral          |                         | CALIBRATION STANDARD SIMULATOR   |                     |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                         | Serial No.: 03-7406              |                     |
| Damping: 1 K  | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                         | Description: Carbon Steel Rompas |                     |
| Rep. Rate: Auto High  |                    | DAC PLOT                          |                         | Reflectors                       | N/A                 |
| Pulse Amp: Fixed  | Pulsar: High       |                                   |                         | Sweep Position                   | N/A                 |
| Reference Sensitivity: 59.0 dB  |                    |                                   |                         | Signal Amp (%)                   | N/A                 |
| Scan Sensitivity: 73.0 dB   |                    |                                   |                         | Gain DB (dB):                    | N/A                 |
|   |                    |                                   |                         |                                  |                     |
| CALIBRATION CHECK   |                    |                                   |                         | Probe Squint Angle 3°            |                     |
|   | Date/Time          | OK                                | Initials                | Probe Focus: FD ~2.70"           |                     |
| Initial Cal:  | 3/10/06 2045       | X                                 | W.H.                    |                                  |                     |
| Init. Sim. Cal:   | N/A                |                                   | N/A                     |                                  |                     |
| Intermediate:   | N/A                |                                   | N/A                     |                                  |                     |
| Intermediate:   | N/A                |                                   | N/A                     |                                  |                     |
| Intermediate:   | N/A                |                                   | N/A                     |                                  |                     |
| Intermediate:   | N/A                |                                   | N/A                     |                                  |                     |
| Final Cal:  | 3/10/06 2302       | X                                 | W.H.                    | 0 DEGREE WELD THICKNESS ONLY     |                     |
| Beam Direction on Calibration Block   |                    | 0 Deg.                            |                         | Component: N/A                   |                     |
| (Yes / No)  |                    | NO                                |                         | BM: N/A                          |                     |
|   |                    | YES                               |                         | HAZ: N/A                         |                     |
|   |                    | NO                                |                         | C/L Weld: N/A                    |                     |
|   |                    |                                   |                         | Component: N/A                   |                     |
|   |                    |                                   |                         | BM: N/A                          |                     |
|   |                    |                                   |                         | HAZ: N/A                         |                     |
|   |                    |                                   |                         | Crown HT: N/A                    |                     |
|   |                    |                                   |                         | Weld Width: N/A                  |                     |
| Reflector   | 1/4T SDH           |                                   |                         |                                  |                     |
| Sweep Position / Depth in Inches  | 3.6                |                                   |                         |                                  |                     |
| Amplitude in %  | 80%                |                                   |                         |                                  |                     |
| Gain in dB  | 59.0 dB            |                                   |                         |                                  |                     |
| Notes: The 60° Zone-1 ultrasonic examination.   |                    |                                   |                         |                                  |                     |
| Examiner: Wade Holloway   | Level: II          | Date: 3/10/06                     | Examiner: N/A           | Level: NA                        | Date: N/A           |
| Reviewed: Adam A. Gont  | Level: III         | Date: 3/22/06                     | ANII Review: Paul Flood |                                  | Date: 5/24/06       |
| Sign: [Signature]   |                    |                                   |                         |                                  |                     |



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# UT CALIBRATION DATA SHEET

|   |                    |  |                    |                                  |                      |
|---|--------------------|--|--------------------|----------------------------------|----------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/10/2006  |                    | Calibration No.: N2B-CS02        |                      |
| System / Component I.D.: RPV Nozzle N2B   |                    |  |                    |                                  |                      |
| Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-2 Examination) |                    |  |                    |                                  |                      |
| ISO / Drawing No.: 3-ISI-0328-C   |                    | Procedure No. / Rev.: N-UT-78 / 3  |                    |                                  |                      |
| Material: Clad CS   |                    | Diameter: 12" Nozzle   |                    | Thickness: 6.1" Nominal          |                      |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT  |                    | CALIBRATION STANDARD             |                      |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848  | Mfg: RTD           | Calibration Block No: BF-18      |                      |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST   | Size: 2(24x42) 1/4 | Thickness (in): 6.12"            | Diameter. (in): Flat |
| Mat. Cal. / Velocity: .2320 In/Micro Seconds  |                    | Shape: Rectangle   | Freq: 2.0 MHz      | Temp (F) Block: 82°              | Temp (F) Comp.: 78°  |
| Delay: 14.00 µS   | Range: 20.0        | Config.: Dual  | Mode: Long.        | Thermometer No.: VH-9571         |                      |
| Each Major Screen Div. #: 2.0   |                    | Nominal Angle: 60°   | Measured: 61°      | Couplant: Ultragel II            | Batch No.: 05325     |
| Cal in Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral   |                    | CALIBRATION STANDARD SIMULATOR   |                      |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25'  |                    | Serial No.: 03-7406              |                      |
| Damping: 1 K  | Freq (MHz): 2 - 25 | No. of Connectors: 0   |                    | Description: Carbon Steel Rompas |                      |
| Rep. Rate: Auto High  |                    | DAC PLOT   |                    | Reflectors                       | NA NA                |
| Pulse Amp: Fixed  | Pulsar: High       |  |                    | Sweep Position                   | NA N/A               |
| Reference Sensitivity: 72.0 dB  | Signal Amp (%)     |  |                    | NA N/A                           |                      |
| Scan Sensitivity: 80.0 dB   | Gain DB (dB):      |  |                    | NA N/A                           |                      |
|   |                    |  |                    |                                  |                      |
| CALIBRATION CHECK   |                    |  |                    | Probe Squint Angle 3°            |                      |
|   | Date/Time          | OK   | Initials           | Probe Focus: FD -2.70"           |                      |
| Initial Cal:  | 3/10/06 2040       | X  | W.H.               |                                  |                      |
| Init. Sim. Cal:   | N/A                |  | N/A                |                                  |                      |
| Intermediate:   | N/A                |  | N/A                |                                  |                      |
| Intermediate:   | N/A                |  | N/A                |                                  |                      |
| Intermediate:   | N/A                |  | N/A                |                                  |                      |
| Intermediate:   | N/A                |  | N/A                |                                  |                      |
| Intermediate:   | N/A                |  | N/A                |                                  |                      |
| Final Cal:  | 3/10/06 2300       | X  | W.H.               | 0 DEGREE WELD THICKNESS ONLY     |                      |
| Beam Direction on Calibration Block   |                    | Circ Scan Exam Angle is <= the inverse sine of the Nominal ID/OD ratio?                          |                    | Component: N/A                   |                      |
| (Yes / No)  |                    | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                    | BM: N/A HAZ: N/A                 |                      |
|   |                    |  |                    | C/L Weld: N/A                    |                      |
|   |                    |  |                    | Component: N/A                   |                      |
|   |                    |  |                    | BM: N/A HAZ: N/A                 |                      |
|   |                    |  |                    | Crown HT: N/A Weld Width: N/A    |                      |
| Reflector   | ID NOTCH           |  |                    |                                  |                      |
| Sweep Position / Depth in Inches  | 6.0                |  |                    |                                  |                      |
| Amplitude in %  | 80%                |  |                    |                                  |                      |
| Gain in dB  | 72.0 dB            |  |                    |                                  |                      |
| Notes: The 60° Zone-2 ultrasonic examination.   |                    |  |                    |                                  |                      |
| Examiner: Wade Holloway   |                    | Examiner: N/A  |                    | Level: NA                        |                      |
| Sign:   | Level: II          | Date: 3/10/06  | Sign:              | Date: N/A                        |                      |
| Reviewed: Adam A. Con   | Level: III         | Date: 3/22/06  | ANII Review:       | Date: 5/24/06                    |                      |
| Sign:   |                    |  |                    |                                  |                      |



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## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
|--|------------|---------------------------------------|-------------------------------------|--|---------------|--|--|------------------------|-----------|---------------|---------------|------------|-----------|----------------------|------------|---------------|-------------------------------------|--|---------------|
| Site: Browns Ferry Unit 3  |            | Exam Date: 3/10/06                    |                                     | Summary No.: U3C12-N2B-NV                    |               | Calibration No.: N2B-CS03              |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Nozzle ID.: RPV N2B  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Component ID: RPV N2B  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld  |            |                                       |                                     | ASME Section XI: 2001 with 2003 Addenda      |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Drawing No.: 3-ISI-0328-C  |            | Procedure No. / Rev.: 54-ISI-850 / 03 |                                     | Figure No.: IWB 2500-7                       |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Material: CS Clad  |            | Thickness: 6.1"                       |                                     | Nozzle Diameter: 12"                         |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| <b>INSTRUMENT SETTINGS</b>   |            | <b>SEARCH UNIT</b>                    |                                     | <b>CALIBRATION STANDARD</b>                  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Mfg.: Staveley   |            | Mfg.: KBA                             |                                     | Model: Benchmark                             |               | Cal. Block ID: BF-18                   |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Model: Sonic 136   |            | Serial No.: 00X1XJ                    |                                     |  |               | Cal. Block Thickness: 6.12" Dia.: Flat |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Serial No.: 136P1200G081455  |            | Size: .5X1.0"                         |                                     |  |               | Temp: Block: 83°F Comp.: 77°F          |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Range: 10"   |            | Freq: 2.25 MHz                        |                                     | Shape: Rectangle                             |               | Thermometer VH: 9571                   |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Delay: 7.92"   |            | Mode: Shear                           |                                     | Config.: Single                              |               | Couplant Type: Ultragel II             |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Velocity: .129 in/μsec.  |            | Nominal Refracted Angle: 60°          |                                     |  |               | Couplant Batch #: 05325                |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Each Major Screen Div.: 1.0"   |            | Measured Refracted Angle: 59°         |                                     |  |               | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Freq: 2.25 MHz   |            | Pulse: 222 ns                         |                                     | Nominal Skew Angle (If Applicable): 36°-66°  |               | Serial No.: 037405 Type: Rompas        |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Damping: 500 Ω   |            | Rep. Rate: 2 KHz                      |                                     | Measured Skew Angle (If Applicable): 36°-66° |               | Reflector: 10 13                       |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Filter: Filter 2   |            | Reject: 0%                            |                                     | Wedge Radius (If Applicable): Flat           |               | Sweep Div.: 4 7                        |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Pulse Amplitude: Fixed   |            | Cable Type: RG-174 Length: 12'        |                                     |  |               | Amp. %: 100 40                         |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo   |            | No. of Intermediate Connectors: 0     |                                     |  |               | Gain dB: 56.8 56.8                     |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive  |            | <b>DAC PLOT</b>                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Ref. Sensitivity: 73.2 dB  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Scan Sensitivity: 76.0 dB  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| <b>CALIBRATION / VERIFICATION TIMES</b>  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
|  | Date       |                                       |                                     | Time   | Initials      |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Initial Cal:   | 3/10/06    |                                       |                                     | 20:12  | TB            |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         |                                       |                                     | NA   | NA            |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         |                                       |                                     | NA   | NA            |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         |                                       |                                     | NA   | NA            |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         | NA                                    | NA                                  |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         | NA                                    | NA                                  |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Intermediate:  | NA         | NA                                    | NA                                  |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Final Cal.:  | 3/10/06    | 23:38                                 | TB                                  |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Calibration Reflector(s)   |            | Notch                                 |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Sweep Position   |            | 5.6                                   |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Amplitude in % FSH   |            | 80%                                   |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Gain in dB   |            | 73.2 dB                               |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Notes: Nozzle to Shell 6" delay on screen  |            |                                       |                                     |  |               |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| <table border="1"> <tr> <td>Examiner: Thomas Brown</td> <td>Level: II</td> <td>Date: 3/10/06</td> <td>Examiner: N/A</td> <td>Level: N/A</td> <td>Date: N/A</td> </tr> <tr> <td>Reviewed: Adam Conti</td> <td>Level: III</td> <td>Date: 3/21/06</td> <td>ANII Review Sign: <i>Paul Flunk</i></td> <td></td> <td>Date: 5/24/06</td> </tr> </table> |            |                                       |                                     |  |               |  |  | Examiner: Thomas Brown | Level: II | Date: 3/10/06 | Examiner: N/A | Level: N/A | Date: N/A | Reviewed: Adam Conti | Level: III | Date: 3/21/06 | ANII Review Sign: <i>Paul Flunk</i> |  | Date: 5/24/06 |
| Examiner: Thomas Brown   | Level: II  | Date: 3/10/06                         | Examiner: N/A                       | Level: N/A                                   | Date: N/A     |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |
| Reviewed: Adam Conti   | Level: III | Date: 3/21/06                         | ANII Review Sign: <i>Paul Flunk</i> |  | Date: 5/24/06 |  |  |                        |           |               |               |            |           |                      |            |               |                                     |  |               |



C00188

R-080



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |          |   |  |  |  |
|---|---------|---------------------------------------|----------|---|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |          | Summary No.: U3C12-N2B-NV                 |  | Calibration No.: N2B-CS04              |  |
| Nozzle ID.: RPV N2B   |         |                                       |          |   |  |  |  |
| Component ID: RPV N2B   |         |                                       |          |   |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld                     |         |                                       |          | ASME Section XI: 2001 with 2003 Addenda   |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |          | Figure No.: IWB 2500-7                    |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |          | Nozzle Diameter: 12"                      |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |          | <b>CALIBRATION STANDARD</b>               |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |          | Model: Benchmark                          |  | Cal. Block ID: BF-18                   |  |
| Model: Sonic 136  |         | Serial No.: 01BV5J                    |          |   |  | Cal. Block Thickness: 6.12" Dia.: Flat |  |
| Serial No.: 136P1200G081455   |         | Size: 5X1.0"                          |          |   |  | Temp: Block: 83°F Comp.: 77°F          |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |          | Shape: Rectangle                          |  | Thermometer VH: 9571                   |  |
| Delay: 4.52"  |         | Mode: Shear                           |          | Config.: Single                           |  | Couplant Type: Ultragel II             |  |
| Velocity: 129 in/μsec.  |         | Nominal Refracted Angle: 40°          |          |   |  | Couplant Batch #: 05325                |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 42°         |          |   |  | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |
| Freq.: 2.25 MHz   |         | Pulse: 222 ns                         |          | Nominal Skew Angle (If Applicable): 120 + |  | Serial No.: 037405                     |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |          | Measured Skew Angle (If Applicable): 120  |  | Type: Rompas                           |  |
| Filter: Filter 2  |         | Reject: 0%                            |          | Wedge Radius (If Applicable): 3.5"        |  | Reflector: 7 10                        |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |          |   |  | Sweep Div.: 4 7                        |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |          |   |  | Amp. %: 100 30                         |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         |                                       |          |   |  | Gain dB: 36.2 36.2                     |  |
| Ref. Sensitivity: 52.4 dB   |         | <b>DAC PLOT</b>                       |          |   |  |  |  |
| Scan Sensitivity: 59.0 dB   |         |                                       |          |   |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |          |   |  |  |  |
|   | Date    | Time                                  | Initials |   |  |  |  |
| Initial Cal:  | 3/10/06 | 20:08                                 | TB       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA      | NA                                    | NA       |   |  |  |  |
| Final Cal.:   | 3/10/06 | 23:35                                 | TB       |   |  |  |  |
| <b>0" THICKNESS DATA</b>  |         |                                       |          |   |  |  |  |
| Upper Shell: N/A  |         | Lower Shell: N/A                      |          |   |  |  |  |
| Weld CL: N/A  |         | At Indication: N/A                    |          |   |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |          |   |  |  |  |
| Sweep Position  |         | 5.0                                   |          |   |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |          |   |  |  |  |
| Gain in dB  |         | 52.4                                  |          |   |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen   |         |                                       |          |   |  |  |  |
| Examiner: Thomas Brown  |         | Level: II                             |          | Date: 3/10/06                             |  | Examiner: N/A                          |  |
| Sign: [Signature]   |         |                                       |          |   |  | Level: N/A                             |  |
| Reviewed: Adam Conti  |         | Level: III                            |          | Date: 3/22/06                             |  | Date: N/A                              |  |
| Sign: [Signature]   |         |                                       |          |   |  | ANII Review: [Signature]               |  |
|   |         |                                       |          |   |  | Date: 5/24/06                          |  |





AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|  |         |                                       |          |   |          |  |  |  |  |
|--|---------|---------------------------------------|----------|---|----------|--|--|--|--|
| Site: Browns Ferry Unit 3  |         | Exam Date: 3/10/06                    |          | Summary No.: U3C12-N2B-NV                 |          | Calibration No.: N2B-CS05              |  |  |  |
| Nozzle ID.: RPV N2B  |         |                                       |          |   |          |  |  |  |  |
| Component ID: RPV N2B  |         |                                       |          |   |          |  |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld  |         |                                       |          | ASME Section XI: 2001 with 2003 Addenda   |          |  |  |  |  |
| Drawing No.: 3-ISI-0328-C  |         | Procedure No. / Rev.: 54-ISI-850 / 03 |          | Figure No.: IWB 2500-7                    |          |  |  |  |  |
| Material: CS Clad  |         | Thickness: 6.1"                       |          | Nozzle Diameter: 12"                      |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>   |         | <b>SEARCH UNIT</b>                    |          | <b>CALIBRATION STANDARD</b>               |          |  |  |  |  |
| Mfg.: Staveley   |         | Mfg.: KBA                             |          | Model: Benchmark                          |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136   |         | Serial No.: 0111PP                    |          |   |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455  |         | Size: .5X1.0"                         |          |   |          | Temp. Block: 83°F Comp.: 77°F          |  |  |  |
| Range: 10"   |         | Freq: 2.25 MHz                        |          | Shape: Rectangle                          |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"   |         | Mode: Shear                           |          | Config.: Single                           |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/μsec.  |         | Nominal Refracted Angle: 40°          |          |   |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"   |         | Measured Refracted Angle: 40°         |          |   |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq: 2.25 MHz   |         | Pulse: 222 ns                         |          | Nominal Skew Angle (If Applicable): 120°  |          | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω   |         | Rep. Rate: 2 KHz                      |          | Measured Skew Angle (If Applicable): 120° |          | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2   |         | Reject: 0%                            |          | Wedge Radius (If Applicable): 3.5"        |          | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed   |         | Cable Type: RG-174 Length: 12'        |          | Amp. %: 100 30                            |          | Gain dB: 36.2 36.2                     |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo   |         | No. of Intermediate Connectors: 0     |          |   |          |  |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive  |         | <b>DAC PLOT</b>                       |          |   |          |  |  |  |  |
| Ref. Sensitivity: 53.8 dB  |         |                                       |          |   |          |  |  |  |  |
| Scan Sensitivity: 59.0 dB  |         |                                       |          |   |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>  |         |                                       |          |   |          |  |  |  |  |
|  | Date    |                                       |          | Time                                      | Initials |  |  |  |  |
| Initial Cal:   | 3/10/06 |                                       |          | 20:10                                     | T. Brown |  |  |  |  |
| Intermediate:  | NA      |                                       |          | NA  | NA       |  |  |  |  |
| Intermediate:  | NA      |                                       |          | NA  | NA       |  |  |  |  |
| Intermediate:  | NA      | NA                                    | NA       |   |          |  |  |  |  |
| Intermediate:  | NA      | NA                                    | NA       |   |          |  |  |  |  |
| Intermediate:  | NA      | NA                                    | NA       |   |          |  |  |  |  |
| Intermediate:  | NA      | NA                                    | NA       |   |          |  |  |  |  |
| Final Cal:   | 3/10/06 | 23:34                                 | T. Brown |   |          |  |  |  |  |
| Calibration Reflector(s)   |         | Notch                                 |          |   |          |  |  |  |  |
| Sweep Position   |         | 4.8                                   |          |   |          |  |  |  |  |
| Amplitude in % FSH   |         | 80%                                   |          |   |          |  |  |  |  |
| Gain in dB   |         | 53.8 dB                               |          |   |          |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen.   |         |                                       |          |   |          |  |  |  |  |
| * Metu Welch, TUA/ISONDE LIII, for THOMAS D. BROWN per email dated 6/6/06. Metu Welch 6/6/06<br>Examiner: Mike W. Kleinman - THOMAS BROWN Level: II Date: 3/10/06 Examiner: N/A Level: N/A Date: N/A<br>Sign: [Signature] Date: 6/6/06<br>Reviewed: Adam Conti Level: III Date: 3/21/2006 ANII Review: [Signature] Date: 6/24/06<br>Sign: [Signature] Date: 6/6/06 |         |                                       |          |   |          |  |  |  |  |



Welch, Matthew C

From: Brown, Thomas [thomas01.brown@wgint.com]  
Sent: Tuesday, June 06, 2006 1:59 PM  
To: Welch, Matthew C  
Subject: N2B-NV

I performed a manual ultrasonic examination on N2B-NV on 03/10/2006 between the hours of 1800 & 0600 during U3C12 outage. I scanned the nozzle blend with a 40 degree shearwave transducer with a -120 degree skew. No Recordable Indications were noted.

Thomas D. Brown  
NDE Level II Washington Group Int.

*Received 1400 - 6/6/06  
Matt Welch*

*ISI Report R-080  
C000100*



Weld Examination Report R-081

N2D-N/V

RECIRC Inlet Nozzle





## EXAMINATION SUMMARY

|   |   |                                 |
|---|---|---------------------------------|
| Summary No.: U3C12-N2D-NV   | Examination Data Sheet : N2D-DS01, N2D-DS02   | Exam Date: 3/9/2006 - 3/10/2006 |
| Customer: Browns Ferry Unit 3 U3C12   | Examination Methods: Ultrasonic   |                                 |
| System / Component ID: Recirculation Inlet/N2D-NV   | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                                 |
| Component Description: Nozzle to Vessel Weld  | Modeling Number: IR-2003-19 Section 3   |                                 |
| Examination Category: B-D   | Calibration Sheets No(s):<br>N2D-CS01      N2D-CS04<br>N2D-CS02      N2D-CS05<br>N2D-CS03   |                                 |
| ISO / Drawing: N2/3-ISI-0328-C  | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                                 |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 |   |                                 |

Summary: *Ref. TVA PER numbers 99373 and 99581. Matt Welch 3/9/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Recirculation Inlet (N2) Nozzle Modeling Parameters |             |              |
|---|-------------|--------------|
| Probe   | Probe Skew  | Scan Surface |
| 60° Shear   | ±(36 to 66) | Vessel       |
| 40° Shear   | ±120        | Blend        |

42% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 51.39% volumetric coverage due to nozzle blend radius interference.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                                 |                        |                                  |                 |
|---------------------------------|------------------------|----------------------------------|-----------------|
| Prepared By: Wade Holloway LVII | Date: 3/10/2006        | Reviewed By: Adam A. Conti LVIII | Date: 3/21/2006 |
| Sign: <i>Wade Holloway</i>      |                        | Sign: <i>Adam A. Conti</i>       |                 |
| Customer: Matt Welch            | an 3/9/06 Date: 5/4/06 | ANII Review: <i>Paul Flood</i>   | 6/6/06          |
| Sign: <i>Matt Welch</i>         |                        |                                  |                 |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/09/2006 23:22

Examination Data Sheet No.: N2D-DS01

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2D-CS01, N2D-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D. RPV Nozzle N2D

Lo: TDC

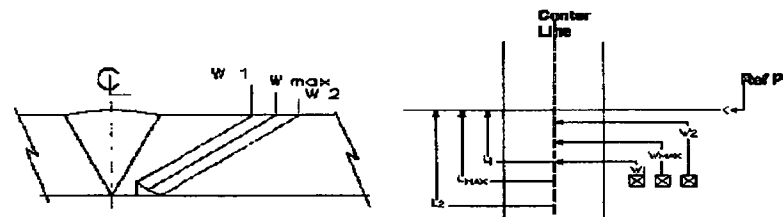
Procedure No.: N-UT-78-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max. Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    | L1                | D1 | L2 | D2 |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |

Notes:

1. Search unit orientation: radial and circumferential.

2. Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Wade Holloway Level: II Date: 03/10/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/21/06

ANII Review:

Date:

*Sanj Flord* 6/6/06

000132 R-081





# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/10/06 08:35

Examination Data Sheet No.: N2D-DS02

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2D-CS03, N2D-CS04  
N2D-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N2D

Lo: TDC

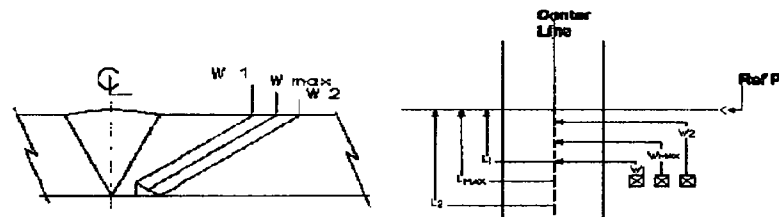
Procedure No.: 54-ISI-850-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientations: Tangential

2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Mike W. Kleinjan

Level: II

Date: 3-10-06

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/21/06

ANIL Review:

Date:

51-9015478-000

Section 5 Tab D

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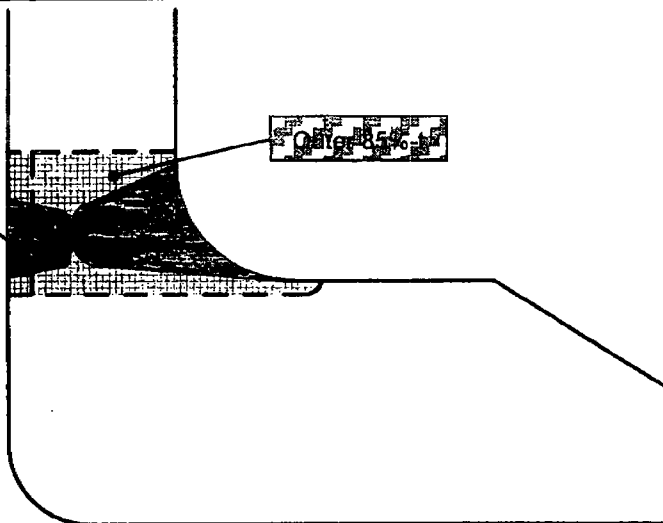
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## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N2D | Date: 03/21/06 | Summary No: U3C12-N2D-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   | Circumferential Scans   |   |
|---|---|---|
| 100%-t  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 43.73 <sup>2</sup> inches                           | <sup>B</sup> Inner 15%-t Examination Volume: 5.01 <sup>2</sup> inches.                        | <sup>C</sup> Outer 85%-t Examination Volume: 38.72 <sup>2</sup> inches.                             |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 24.91 <sup>2</sup> inches                           | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 7.015 <sup>2</sup> inches                                 |
|   | <sup>F</sup> Inner 15%-t Volume Achieved: 5.01 <sup>2</sup> inches.                           |   |
| <sup>C</sup> Percentage of Axial Coverage: 57%<br>$B + A \times 100 = C$                      | <sup>J</sup> Total Circumferential Examination Coverage: 27%<br>$(F + H) + A = J$             |   |

### Combined Axial and Circumferential Weld Coverage

<sup>L</sup>**Total Examination Coverage: 42%**

$$(C + J) + 2 = L$$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/21/06 | Reviewed by: Adam Conti | Date: 03/21/06 | ANII Review: | Date: |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|

*Bret Flesner*

*Adam Conti*

*Adam Conti* 6/6/06

C00204 R-081





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N2D | Date: 03/21/06 | Summary No: U3C12-N2D-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

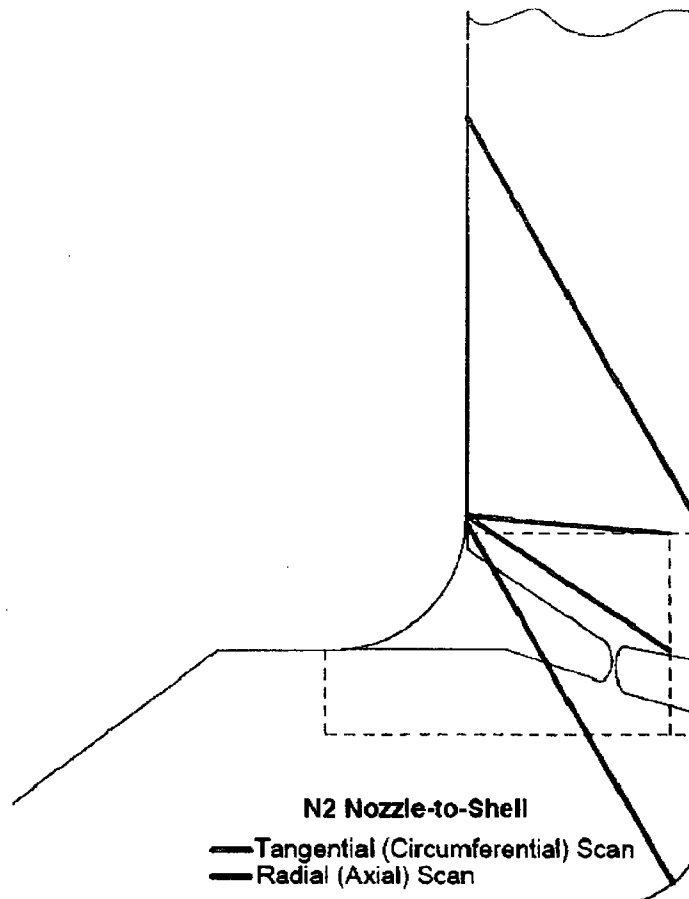
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 42% coverage.



Prepared by: Bret Flesner

Date: 03/21/06

Reviewed by: Adam Conti

Date: 03/21/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Paul F. Furl* 6/8/06

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R-081



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R-081


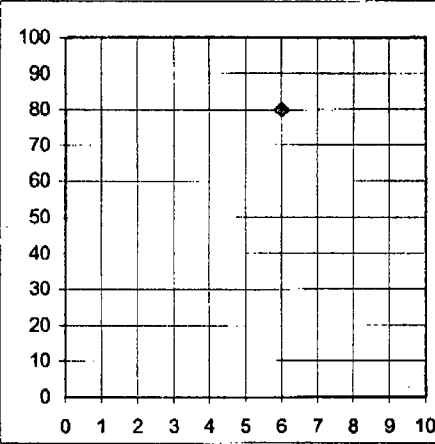
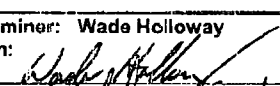
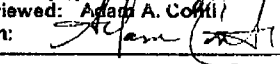
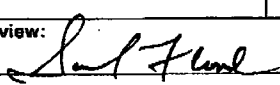


# UT CALIBRATION DATA SHEET

|   |                    |                                   |                        |                                  |                               |
|---|--------------------|-----------------------------------|------------------------|----------------------------------|-------------------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/10/2006             |                        | Calibration No.: N2D-CS01        |                               |
| System / Component I.D.: RPV Nozzle N2D   |                    |                                   |                        |                                  |                               |
| Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                        |                                  |                               |
| ISO / Drawing No.: 3-HSI-0328-C   |                    | Procedure No. / Rev.: N-UT-78 / 3 |                        |                                  |                               |
| Material: Clad CS   |                    | Diameter: 12" Nozzle              |                        | Thickness: 6.1" Nominal          |                               |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT                       |                        | CALIBRATION STANDARD             |                               |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD               | Calibration Block No: BF-18      |                               |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4"    | Thickness (in): 6.12"            | Diameter (in): Flat           |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds  |                    | Shape: Rectangle                  | Freq: 2.0 MHz          | Temp (F) Block: 82°              | Temp (F) Comp.: 78°           |
| Delay: 14.00 µS   | Range: 8.0         | Config.: Dual                     | Mode: Long.            | Thermometer No.: VH-9571         |                               |
| Each Major Screen Div. #: 0.8   |                    | Nominal Angle: 60°                | Measured: 61°          | Couplant: Ultragel II            | Batch No.: 05325              |
| Cal in Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral          |                        | CALIBRATION STANDARD SIMULATOR   |                               |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                        | Serial No.: 03-7406              |                               |
| Damping: 1 K  | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                        | Description: Carbon Steel Rompas |                               |
| Rep. Rate: Auto High  |                    | DAC PLOT                          |                        | Reflectors                       | N/A                           |
| Pulse Amp: Fixed  | Pulsar: High       |                                   |                        | Sweep Position                   | N/A                           |
| Reference Sensitivity: 59.0 dB  | Signal Amp (%)     |                                   |                        | N/A                              |                               |
| Scan Sensitivity: 74.0 dB   | Gain DB (dB):      |                                   |                        | N/A                              |                               |
|   |                    |                                   |                        |                                  |                               |
| CALIBRATION CHECK   |                    |                                   |                        | Probe Squint Angle 3°            |                               |
|   | Date/Time          | OK                                | Initials               | Probe Focus: FD ~2.70"           |                               |
| Initial Cal:  | 3/09/06 2322       | X                                 | W.H.                   |                                  |                               |
| Init. Sim. Cal:   | N/A                |                                   | N/A                    |                                  |                               |
| Intermediate:   | N/A                |                                   | N/A                    |                                  |                               |
| Intermediate:   | N/A                |                                   | N/A                    |                                  |                               |
| Intermediate:   | N/A                |                                   | N/A                    |                                  |                               |
| Intermediate:   | N/A                |                                   | N/A                    |                                  |                               |
| Intermediate:   | N/A                |                                   | N/A                    |                                  |                               |
| Final Cal:  | 3/10/06 0245       | X                                 | W.H.                   | 0 DEGREE WELD THICKNESS ONLY     |                               |
| Beam Direction on Calibration Block   |                    | 0 Deg.                            | Axial                  | Circ                             | Component: N/A                |
| (Yes / No)  |                    | NO                                | YES                    | NO                               | BM: N/A HAZ: N/A              |
| Reflector   | 1/4T SDH           |                                   |                        |                                  | C/L Weld: N/A                 |
| Sweep Position / Depth in Inches  | 3.6                |                                   |                        |                                  | Component: N/A                |
| Amplitude in %  | 80%                |                                   |                        |                                  | BM: N/A HAZ: N/A              |
| Gain in dB  | 59.0 dB            |                                   |                        |                                  | Crown HT: N/A Weld Width: N/A |
| Notes: The 60° Zone-1 ultrasonic examination.   |                    |                                   |                        |                                  |                               |
| Examiner: Wade Holloway   | Level: II          | Date: 3/10/06                     | Examiner: N/A          | Level: NA                        | Date: N/A                     |
| Sign: <i>Wade Holloway</i>  |                    |                                   | Sign: <i>Lat Flood</i> |                                  |                               |
| Reviewed: Adam A. Conti   | Level: III         | Date: 3/21/06                     | ANII Review:           |                                  | Date: 5/24/06                 |
| Sign: <i>Adam A. Conti</i>  |                    |                                   | Sign: <i>Lat Flood</i> |                                  |                               |



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|  |               |   |  |               |   |                                  |               |                      |
|--|---------------|---|--|---------------|---|----------------------------------|---------------|----------------------|
|                                     |               | <h2 style="margin: 0;">UT CALIBRATION DATA SHEET</h2> |  |               |   |                                  |               |                      |
| Customer: Browns Ferry Unit 3  |               |   | Exam Date: 03/10/2006  |               |   | Calibration No.: N2D-CS02        |               |                      |
| System / Component I.D.: RPV Nozzle N2D  |               |   |  |               |   |                                  |               |                      |
| Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-2 Examination)                            |               |   |  |               |   |                                  |               |                      |
| ISO / Drawing No.: 3-ISI-0328-C  |               |   | Procedure No. / Rev.: N-UT-78 / 3  |               |   |                                  |               |                      |
| Material: Clad CS  |               |   | Diameter: 12" Nozzle   |               |   | Thickness: 6.1" Nominal          |               |                      |
| INSTRUMENT SETTINGS  |               |   | SEARCH UNIT  |               |   | CALIBRATION STANDARD             |               |                      |
| Mfg: Krautkramer   | Model: USN58L |   | Serial No: 03-848  |               | Mfg: RTD  | Calibration Block No: BF-18      |               |                      |
| Serial / MT&E #: 0100D0  |               |   | Model: TRL2-AUST   |               | Size: 2(24x42) 1/4  | Thickness (in): 6.12"            |               | Diameter. (in): Flat |
| Mat. Cal. / Velocity: .2320 In/Micro Seconds   |               |   | Shape: Rectangle   |               | Freq: 2.0 MHz   | Temp (F) Block: 82°              |               | Temp (F) Comp.: 78°  |
| Delay: 14.00 µS  |               | Range: 20.0   | Config.: Dual  |               | Mode: Long.   | Thermometer No.: VH-9571         |               |                      |
| Each Major Screen Div. #: 2.0  |               |   | Nominal Angle: 60°   |               | Measured: 61°   | Couplant: Ultragel II            |               | Batch No.: 05325     |
| Cal in Depth or Sound Path: Sound Path   |               |   | Fixture / Size: Integral   |               |   | CALIBRATION STANDARD SIMULATOR   |               |                      |
| Filter: Full Wave  |               | Reject: 0%  | Cable Type & Length: RG-174 / 25'  |               |   | Serial No.: 03-7406              |               |                      |
| Damping: 1 K   |               | Freq (MHz): 2 - 25                                    | No. of Connectors: 0   |               |   | Description: Carbon Steel Rompas |               |                      |
| Rep. Rate: Auto High   |               |   | DAC PLOT   |               |   | Reflectors                       |               |                      |
| Pulse Amp: Fixed   |               | Pulsar: High  |               |               |   | NA                               |               | NA                   |
| Reference Sensitivity: 72.0 dB   |               | Sweep Position  |  |               |   | NA                               | N/A           |                      |
| Scan Sensitivity: 80.0 dB  |               | Signal Amp (%)  |  |               |   | NA                               | N/A           |                      |
|  |               | Gain DB (dB):   |  |               |   | NA                               | N/A           |                      |
|  |               |   |  |               |   |                                  |               |                      |
| CALIBRATION CHECK  |               |   |  |               |   | Probe Squint Angle 3°            |               |                      |
|  | Date/Time     | OK  | Initials   |               | Probe Focus: FD ~2.70"  |                                  |               |                      |
| Initial Cal:   | 3/09/06 2320  | X   | W.H.   |               |   |                                  |               |                      |
| Init. Sim. Cal:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Intermediate:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Intermediate:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Intermediate:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Intermediate:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Intermediate:  | N/A           |   | N/A  |               |   |                                  |               |                      |
| Final Cal:   | 3/10/06 0240  | X   | W.H.   |               |   |                                  |               |                      |
| Beam Direction on Calibration Block  |               |   | Circ Scan Exam Angle is =< the inverse sine of the Nominal ID/OD ratio?                          |               |   | 0 DEGREE WELD THICKNESS ONLY     |               |                      |
| (Yes / No)   |               |   | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |               |   | Component: N/A                   |               |                      |
|  |               |   | 0 Deg.   Axial   Circ  |               |   | BM: N/A   HAZ: N/A               |               |                      |
|  |               |   | NO   YES   NO  |               |   | C/L Weld: N/A                    |               |                      |
|  |               |   |  |               |   | Component: N/A                   |               |                      |
|  |               |   |  |               |   | BM: N/A   HAZ: N/A               |               |                      |
|  |               |   |  |               |   | Crown HT: N/A   Weld Width: N/A  |               |                      |
| Reflector  |               |   | ID NOTCH   |               |   |                                  |               |                      |
| Sweep Position / Depth in Inches   |               |   | 6.0  |               |   |                                  |               |                      |
| Amplitude in %   |               |   | 80%  |               |   |                                  |               |                      |
| Gain in dB   |               |   | 72.0 dB  |               |   |                                  |               |                      |
| Notes: The 60° Zone-2 ultrasonic examination.  |               |   |  |               |   |                                  |               |                      |
| Examiner: Wade Holloway<br>Sign:  |               |   | Level: II  | Date: 3/10/06 | Examiner: N/A<br>Sign: _____  |                                  | Level: NA     | Date: N/A            |
| Reviewed: Adam A. Conli<br>Sign:  |               |   | Level: III   | Date: 3/21/06 | ANII Review:  |                                  | Date: 4/24/06 |                      |



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AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

Site: Browns Ferry Unit 3      Exam Date: 3/10/06      Summary No.: U3C12-N2D-NV      Calibration No.: N2D-CS03

Nozzle ID.: RPV N2D

Component ID: RPV N2D

Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld

ASME Section XI: 2001 with 2003 Addenda

Drawing No.: 3-ISI-0328-C

Procedure No. / Rev.: 54-ISI-850 / 03

Figure No.: IWB 2500-7

Material: CS Clad

Thickness: 6.1"

Nozzle Diameter: 12"

## INSTRUMENT SETTINGS

## SEARCH UNIT

## CALIBRATION STANDARD

Mfg.: Staveley

Mfg.: KBA

Model: Benchmark

Cal. Block ID: BF-18

Model: Sonic 136

Serial No.: 00X1XJ

Cal. Block Thickness: 6.12"      Dia.: Flat

Serial No.: 136P1200GC81455

Size: .5X1.0"

Temp. Block: 83°F      Comp.: 77°F

Range: 10"

Freq: 2.25 MHz

Shape: Rectangle

Thermometer VH: 9571

Delay: 7.92"

Mode: Shear

Config.: Single

Couplant Type: Ultragel II

Velocity: .129 in/μsec.

Nominal Refracted Angle: 60°

Couplant Batch #: 05325

Each Major Screen Div.: 1 0"

Measured Refracted Angle: 59°

## CALIBRATION VERIFICATION BLOCK

Freq.: 2.25 MHz

Pulse: 222 ns

Nominal Skew Angle (If Applicable): 36°-66°

Serial No.: 037405

Type: Rompas

Damping: 500 Ω

Rep. Rate: 2 KHz

Measured Skew Angle (If Applicable): 36°-66°

Reflector:

10

13

Filter: Filter 2

Reject: 0%

Wedge Radius (If Applicable): Flat

Sweep Div.:

4

7

Pulse Amplitude: Fixed

Cable Type: RG-174

Length: 12'

Amp. %:

100

40

Mode: ☐ Dual ☒ Pulse Echo

No. of Intermediate Connectors: 0

Gain dB:

56.8

56.8

Jack: ☒ Transmit ☐ Receive

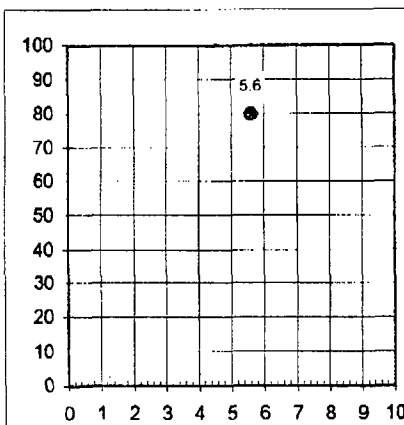
## DAC PLOT

Ref. Sensitivity: 73.2 dB

Scan Sensitivity: 76.0 dB

## CALIBRATION / VERIFICATION TIMES

|               | Date    | Time | Initials |
|---------------|---------|------|----------|
| Initial Cal:  | 3/10/06 | 0835 | ml       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Intermediate: | NA      | NA   | NA       |
| Final Cal.:   | 3/10/06 | 1325 | ml       |



## 0° THICKNESS DATA

Upper Shell: N/A

Lower Shell: N/A

Weld CL: N/A

At Indication: N/A

Calibration Reflector(s)

Notch

Sweep Position

5.6

Amplitude in % FSH

80%

Gain in dB

73.2 dB

Notes: Nozzle to Shell 6" delay on screen

Examiner: Mike W. Klejnar

Level: II

Date: 3/10/06

Examiner: N/A

Level: N/A

Date: N/A

Reviewed: Adam Conti

Level: III

Date: 3/21/06

ANII Review:

Date:

Sign:

Sign:

5/24/06



R-081



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |           |   |           |  |  |  |  |
|---|---------|---------------------------------------|-----------|---|-----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |           | Summary No.: U3C12-N2D-NV                 |           | Calibration No.: N2D-CS04              |  |  |  |
| Nozzle ID: RPV N2D  |         |                                       |           |   |           |  |  |  |  |
| Component ID: RPV N2D   |         |                                       |           |   |           |  |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld                     |         |                                       |           | ASME Section XI: 2001 with 2003 Addenda   |           |  |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                    |           |  |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |           | Nozzle Diameter: 12"                      |           |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>               |           |  |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |           | Model: Benchmark                          |           | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |         | Serial No.: 01BV5J                    |           |   |           | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |         | Size: .5X1.0"                         |           |   |           | Temp: Block: 83°F Comp.: 77°F          |  |  |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |           | Shape: Rectangle                          |           | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"  |         | Mode: Shear                           |           | Config.: Single                           |           | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/μsec.   |         | Nominal Refracted Angle: 40°          |           |   |           | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 42°         |           |   |           | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz   |         | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): 120 + |           | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): 120  |           | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2  |         | Reject: 0%                            |           | Wedge Radius (If Applicable): 3.5"        |           | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |           | Amp. %: 100 30                            |           | Gain dB: 36.2 36.2                     |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |           |   |           |  |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         | <b>DAC PLOT</b>                       |           |   |           |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |         |                                       |           |   |           |  |  |  |  |
| Scan Sensitivity: 63.0 dB   |         |                                       |           |   |           |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |           |   |           |  |  |  |  |
|   | Date    |                                       |           | Time                                      | Initials  |  |  |  |  |
| Initial Cal:  | 3/10/06 |                                       |           | 0830                                      | <i>ml</i> |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Final Cal:  | 3/10/06 | 1320                                  | <i>ml</i> |   |           |  |  |  |  |
|   |         | <b>0° THICKNESS DATA</b>              |           |   |           |  |  |  |  |
|   |         | Upper Shell: N/A                      |           | Lower Shell: N/A                          |           |  |  |  |  |
|   |         | Weld CL: N/A                          |           | At Indication: N/A                        |           |  |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |           |   |           |  |  |  |  |
| Sweep Position  |         | 5.0                                   |           |   |           |  |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |           |   |           |  |  |  |  |
| Gain in dB  |         | 52.4                                  |           |   |           |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen   |         |                                       |           |   |           |  |  |  |  |
|   |         |                                       |           |   |           |  |  |  |  |
| Examiner: Mike W Kleinjan   |         | Level: II                             |           | Date: 3/10/06                             |           | Examiner: N/A                          |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |         |                                       |           |   |           | Level: N/A                             |  |  |  |
| Reviewed: Adam Conti  |         | Level: III                            |           | Date: 3/21/06                             |           | ANII Review: <i>Paul Flunk</i>         |  |  |  |
| Sign: <i>Adam Conti</i>   |         |                                       |           |   |           | Date: 3/24/06                          |  |  |  |



R-081



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |           |   |           |  |  |  |  |
|---|---------|---------------------------------------|-----------|---|-----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |           | Summary No.: U3C12-N2D-NV                 |           | Calibration No.: N2D-CS05              |  |  |  |
| Nozzle ID.: RPV N2D   |         |                                       |           |   |           |  |  |  |  |
| Component ID: RPV N2D   |         |                                       |           |   |           |  |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld                     |         |                                       |           | ASME Section XI: 2001 with 2003 Addenda   |           |  |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                    |           |  |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |           | Nozzle Diameter: 12"                      |           |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>               |           |  |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |           | Model: Benchmark                          |           | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |         | Serial No.: 0111PP                    |           |   |           | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |         | Size: .5X1.0"                         |           |   |           | Temp: Block: 83°F Comp.: 77°F          |  |  |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |           | Shape: Rectangle                          |           | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"  |         | Mode: Shear                           |           | Config.: Single                           |           | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/usec.   |         | Nominal Refracted Angle: 40°          |           |   |           | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 40°         |           |   |           | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq: 2.25 MHz  |         | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): 120°  |           | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): 120° |           | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2  |         | Reject: 0%                            |           | Wedge Radius (If Applicable): 3.5"        |           | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |           |   |           | Amp. %: 100 30                         |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |           |   |           | Gain dB: 36.2 36.2                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         | <b>DAC PLOT</b>                       |           |   |           |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |         |                                       |           |   |           |  |  |  |  |
| Scan Sensitivity: 63.0 dB   |         |                                       |           |   |           |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |           |   |           |  |  |  |  |
|   | Date    |                                       |           | Time                                      | Initials  |  |  |  |  |
| Initial Cal:  | 3/10/06 |                                       |           | 0815                                      | <i>mk</i> |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA        |   |           |  |  |  |  |
| Final Cal.:   | 3/10/06 | 1318                                  | <i>mk</i> |   |           |  |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |           |   |           |  |  |  |  |
| Sweep Position  |         | 4.8                                   |           |   |           |  |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |           |   |           |  |  |  |  |
| Gain in dB  |         | 52.4 dB                               |           |   |           |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen.  |         |                                       |           |   |           |  |  |  |  |
| Examiner: Mike W Kleinjan   |         | Level: II                             |           | Date: 3/10/06                             |           | Examiner: N/A                          |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |         |                                       |           |   |           | Level: N/A                             |  |  |  |
| Reviewed: Adam Conti  |         | Level: III                            |           | Date: 3/21/2006                           |           | ANII Review: <i>Adam Conti</i>         |  |  |  |
| Sign: <i>Adam Conti</i>   |         |                                       |           |   |           | Date: 3/24/06                          |  |  |  |



Weld Examination Report R-082

N2F-N/V

RECIRC Inlet Nozzle



R-082



AREVA

# EXAMINATION SUMMARY

|   |  |   |   |                                   |  |
|---|--|---|---|-----------------------------------|--|
| Summary No.: U3C12-N2F-NV   |  | Examination Data Sheet : N2F-DS01, N2F-DS02 |   | Exam Date: 3/10/2006<br>3/10/2006 |  |
| Customer: Browns Ferry Unit 3 U3C12   |  |   | Examination Methods: Ultrasonic   |                                   |  |
| System / Component ID: Recirculation Inlet/N2F-NV   |  |   | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                                   |  |
| Component Description: Nozzle to Vessel Weld  |  |   | Modeling Number: IR-2003-19 Section 3   |                                   |  |
| Examination Category: B-D   |  |   | Calibration Sheets No(s):<br>N2F-CS01 N2F-CS04<br>N2F-CS02 N2F-CS05<br>N2F-CS03   |                                   |  |
| ISO / Drawing: N2/3-ISI-0328-C  |  |   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                                   |  |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 |  |   |   |                                   |  |

Summary: *Ref: TVA PER numbers 99373 and 99581. Made which 5/9/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Recirculation Inlet (N2) Nozzle Modeling Parameters |             |              |
|---|-------------|--------------|
| Probe   | Probe Skew  | Scan Surface |
| 60° Shear   | ±(36 to 66) | Vessel       |
| 40° Shear   | ±120        | Blend        |

42% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

Note 1: This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 51.39% volumetric coverage due to nozzle blend radius interference.

Note 2: See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                                 |                 |                                  |                 |
|---------------------------------|-----------------|----------------------------------|-----------------|
| Prepared By: Wade Holloway LVII | Date: 3/10/2006 | Reviewed By: Adam A. Conti LVIII | Date: 3/22/2006 |
| Sign: <i>Wade Holloway</i>      |                 | Sign: <i>Adam A. Conti</i>       |                 |
| Customer: Matt Welch            | Date: 5/9/06    | ANII Review: <i>Sal I. I...</i>  | Date: 6/6/06    |
| Sign: <i>Matt Welch</i>         |                 |                                  |                 |

000201





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/10/2006 21:20

Examination Data Sheet No.: N2F-DS01

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2F-CS01, N2F-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N2F

Lo: TDC

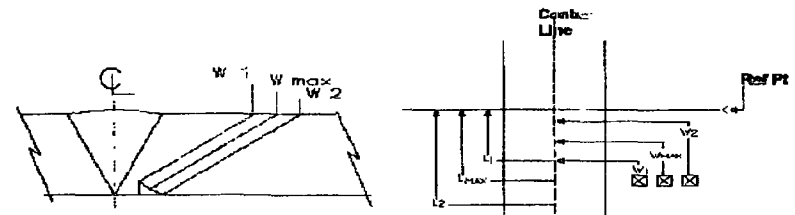
Procedure No.: N-UT-78-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max. Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientation: radial and circumferential.
2. Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

|                                   |                      |                |               |        |       |                         |            |                |
|-----------------------------------|----------------------|----------------|---------------|--------|-------|-------------------------|------------|----------------|
| Examiner: Wade Holloway           | Level: II            | Date: 03/10/06 | Examiner: N/A | Level: | Date: | Reviewed: Adam A. Conti | Level: III | Date: 03/22/06 |
| ANII Review: <i>Wade Holloway</i> | Date: <i>6/16/06</i> |                |               |        |       |                         |            |                |

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# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/10/06 20:50

Examination Data: Sheet No.: N2F-DS02

Iso / Drawing: N2/3-ISI-0328-C

Calibration Sheet: N2F-CS03, N2F-CS04  
N2F-CS05

Wt: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N2F

Lo: TDC

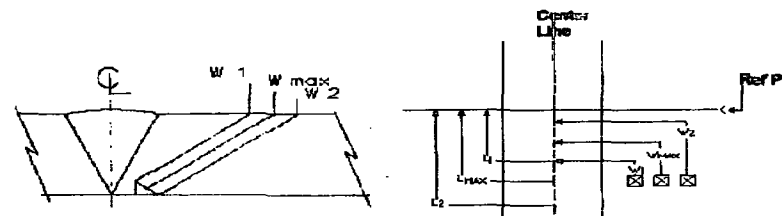
Procedure No.: 54-ISI-850-03

Component Description: 12 Recirculation Inlet Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W 1          | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientations: Tangential

2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Thomas Brown

Level: II

Date: 3/10/2006

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/22/06

ANII Review:

Date:

*Paul F. Ford* 6/16/06

*Adam Conti*

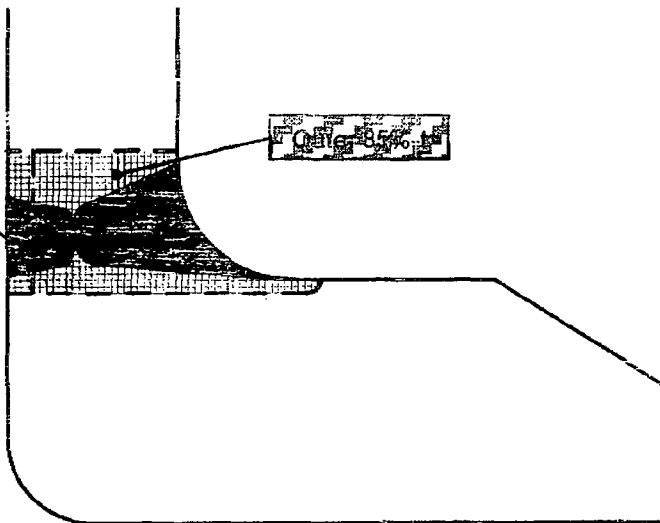
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# RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

Utility: TVA Plant: BFN3 Unit: 3 Weld ID: N2F Date: 03/22/06 Summary No: U3C12-N2F-NV



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   | Circumferential Scans   |   |
|---|---|---|
| 100%-t  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 43.73 <sup>2</sup> inches                           | <sup>B</sup> Inner 15%-t Examination Volume: 5.01 <sup>4</sup> inches.                        | <sup>C</sup> Outer 85%-t Examination Volume: 38.72 <sup>2</sup> inches.                             |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 24.91 <sup>2</sup> inches                           | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 7.015 <sup>2</sup> inches                                 |
| <sup>C</sup> Percentage of Axial Coverage: 57%  | <sup>I</sup> Inner 15%-t Volume Achieved: 5.01 <sup>4</sup> inches.                           | <sup>J</sup> Total Circumferential Examination Coverage: 27%  |
| $B + A \times 100 = C$  |   | $(F + H) + A = J$   |

## Combined Axial and Circumferential Weld Coverage

<sup>L</sup>Total Examination Coverage: 42%

$$(C + J) + 2 = L$$

Prepared by: Bret Flesner Date: 03/22/06 Reviewed by: Adam Conti Date: 03/22/06 ANII Review: Date:

*Bret Flesner*

*Adam Conti*

*Sal Flesner* 3/6/06

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## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

Utility: TVA

Plant: BFN3

Unit: 3

Weld ID: N2F

Date: 03/22/06

Summary No: U3C12-N2F-NV

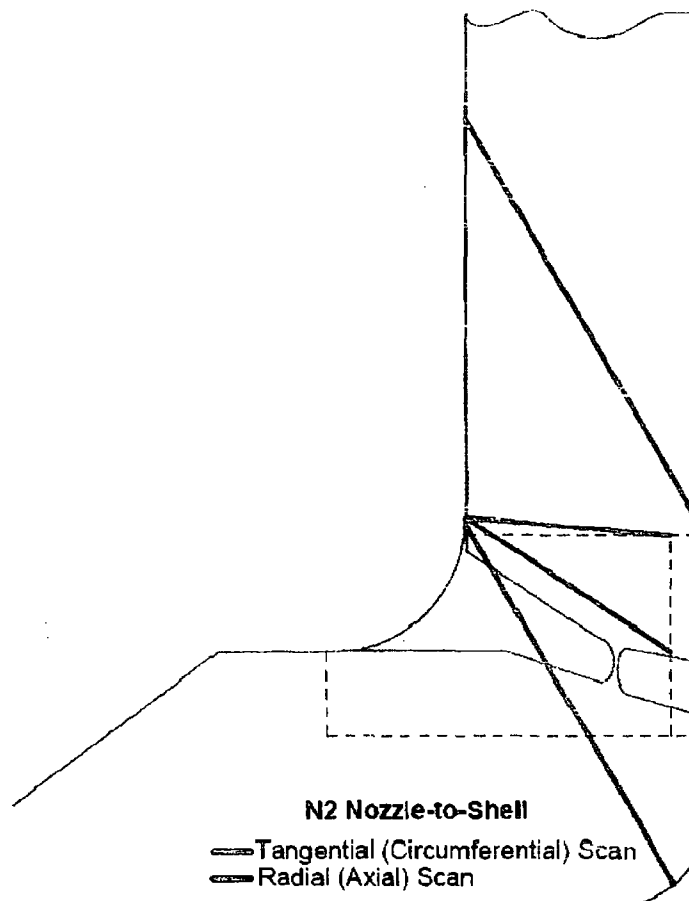
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 42% coverage.



Prepared by: Bret Flesner

Date: 03/22/06

Reviewed by: Adam Conti

Date: 03/22/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Paul Fildes 6/6/06*

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# UT CALIBRATION DATA SHEET

Customer: Browns Ferry Unit 3      Exam Date: 03/10/2006      Calibration No.: N2F-CS01

System / Component I.D.: RPV Nozzle N2F

Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-1 Examination)

IS 3 / Drawing No.: L-481-4325-C

Procedure No. / Rev.: N-UT-78 / 3

Material: Clad CS

Diameter: 12" Nozzle

Thickness: 6.1" Nominal

## INSTRUMENT SETTINGS

## SEARCH UNIT

## CALIBRATION STANDARD

Mfg: Krautkramer      Model: USN58L

Serial No: 03-848

Mfg: RTD

Calibration Block No: BF-18

Serial / MT&E #: 0100D0

Model: TRL2-AUST

Size: 2(24x42) 1/4

Thickness (in): 6.12"      Diameter (in): Flat

Mat. Cal. / Velocity: .2320 in/Micro Seconds

Shape: Rectangle

Freq: 2.0 MHz

Temp (F) Block: 82°      Temp (F) Comp.: 78°

Delay: 14.00 µS      Range: 8.0

Config.: Dual

Mode: Long.

Thermometer No.: VH-9571

Each Major Screen Div. #: 0.5

Nominal Angle: 60°

Measured: 61°

Couplant: Ultragel II      Batch No.: 05325

Cal In Depth or Sound Path: Sound Path

Fixture / Size: Integral

## CALIBRATION STANDARD SIMULATOR

Filter: Full Wave      Reject: 0%

Cable Type & Length: RG-174 / 25'

Serial No.: 03-7406

Damping: 1.1

Freq (MHz): 2 - 25

No. of Connectors: 0

Description: Carbon Steel Rompas

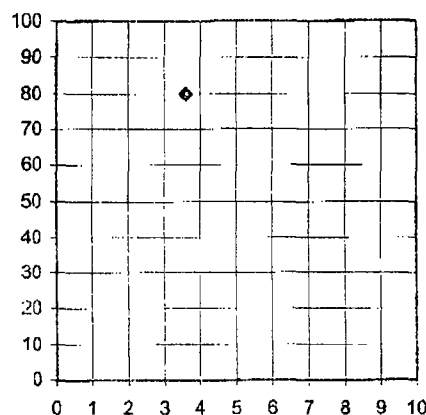
Rep. Rate: Auto High

## DAC PLOT

Pulse Amp: Fixed      Pulsar: High

Reference Sensitivity: 59.0 dB

Scan Sensitivity: 73.0 dB



|                |     |     |
|----------------|-----|-----|
| Reflectors     | N/A | N/A |
| Sweep Position | N/A | N/A |
| Signal Amp (%) | N/A | N/A |
| Gain DB (dB):  | N/A | N/A |

Probe Squint Angle 3°

Probe Focus: FD -2.70"

## CALIBRATION CHECK

|                 | Date/Time    | OK | Initials |
|-----------------|--------------|----|----------|
| Initial Cal:    | 3/10/06 2045 | X  | W.H.     |
| Init. Sim. Cal: | N/A          |    | N/A      |
| Intermediate:   | N/A          |    | N/A      |
| Intermediate:   | N/A          |    | N/A      |
| Intermediate:   | N/A          |    | N/A      |
| Intermediate:   | N/A          |    | N/A      |
| Final Cal:      | 3/10/06 2302 | X  | W.H.     |

Circ Scan Exam Angle is  $\leq$  the inverse sine of the Nominal ID/OD ratio?

☐ YES      ☐ NO      ☒ N/A

## 0 DEGREE WELD THICKNESS ONLY

|            |     |             |     |
|------------|-----|-------------|-----|
| Component: |     | N/A         |     |
| BM:        | N/A | HAZ:        | N/A |
| C/L Weld:  |     | N/A         |     |
| Component: |     | N/A         |     |
| BM:        | N/A | HAZ:        | N/A |
| Crown HT:  | N/A | Weld Width: | N/A |

Beam Direction on Calibration Block

0 Deg.

Axial

Circ

(Yes / No)

NO

YES

NO

Reflector

1/4T SDH

Sweep Position / Depth in Inches

3.6

Amplitude in %

80%

Gain in dB

59.0 dB

Notes: The 60° Zone-1 ultrasonic examination.

Examiner: Wade Holloway

Sign:

Level: II

Date: 3/10/06

Examiner: N/A

Sign:

Level: NA

Date: N/A

Reviewed: Adam A. Boni

Sign:

Level: III

Date: 3/22/06

ANIL Review

Sign:

Date:

3/25/06



R-082



# UT CALIBRATION DATA SHEET

|   |                    |                                   |                    |  |                     |
|---|--------------------|-----------------------------------|--------------------|--|---------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/10/2006             |                    | Calibration No.: N2F-CS02  |                     |
| System / Component ID: RPV Nozzle N2F   |                    |                                   |                    |  |                     |
| Component Description: 12" Recirculation Inlet Nozzle to Vessel Weld (Zone-2 Examination) |                    |                                   |                    |  |                     |
| ISO / Drawing No.: C-481-0323-3   |                    | Procedure No. / Rev.: N-UT-70 / 3 |                    |  |                     |
| Material: Clad CS   |                    | Diameter: 12" Nozzle              |                    | Thickness: 6.1" Nominal  |                     |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT                       |                    | CALIBRATION STANDARD   |                     |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD           | Calibration Block No: BF-18  |                     |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4 | Thickness (in): 6.12"  | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds  |                    | Shape: Rectangle                  | Freq: 2.0 MHz      | Temp (F) Block: 82°  | Temp (F) Comp.: 78° |
| Delay: 14.00 µS   | Range: 20.0        | Config.: Dual                     | Mode: Long.        | Thermometer No.: VH-0571   |                     |
| Each Major Screen Div. #: 2.0   |                    | Nominal Angle: 60°                | Measured: 61°      | Couplant: Ultralag II  | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral          |                    | CALIBRATION STANDARD SIMULATOR   |                     |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                    | Serial No.: 03-7406  |                     |
| Damping: 10   | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                    | Description: Carbon Steel Rompas   |                     |
| Rep. Rate: Auto High  |                    | DAC PLOT                          |                    | Reflectors   | NA NA               |
| Pulse Amp: Fixed  | Pulsar: High       |                                   |                    | Sweep Position   | NA N/A              |
| Reference Sensitivity: 72.0 dB  |                    |                                   |                    | Signal Amp (%)   | NA N/A              |
| Scan Sensitivity: 80.0 dB   |                    |                                   |                    | Gain DB (dB):  | NA N/A              |
|   |                    |                                   |                    | Probe Squint Angle 3°<br>Probe Focus: FD ~2.70"  |                     |
| CALIBRATION CHECK   |                    |                                   |                    |  |                     |
|   | Date/Time          | OK                                | Initials           |  |                     |
| Initial Cal:  | 3/10/06 2040       | X                                 | W.H.               |  |                     |
| Init. Sim. Cal:   | N/A                |                                   | N/A                |  |                     |
| Intermediate:   | N/A                |                                   | N/A                |  |                     |
| Intermediate:   | N/A                |                                   | N/A                |  |                     |
| Intermediate:   | N/A                |                                   | N/A                |  |                     |
| Intermediate:   | N/A                |                                   | N/A                |  |                     |
| Final Cal:  | 3/10/06 2300       | X                                 | W.H.               |  |                     |
| Beam Direction on Calibration Block   |                    | 0 Deg.                            |                    | Circ Scan Exam Angle is =< the inverse sine of the Nominal ID/OD ratio?                          |                     |
| (Yes / No)  |                    | NO                                |                    | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                     |
|   |                    | YES                               |                    | Component: N/A   |                     |
|   |                    | NO                                |                    | BM: N/A HAZ: N/A   |                     |
|   |                    |                                   |                    | C/L Weld: N/A  |                     |
|   |                    |                                   |                    | Component: N/A   |                     |
|   |                    |                                   |                    | BM: N/A HAZ: N/A   |                     |
|   |                    |                                   |                    | Crown HT: N/A Weld Width: N/A  |                     |
| Reflector   | ID NOTCH           |                                   |                    |  |                     |
| Sweep Position / Depth in Inches  | 6.0                |                                   |                    |  |                     |
| Amplitude in %  | 80%                |                                   |                    |  |                     |
| Gain in dB  | 72.0 dB            |                                   |                    |  |                     |
| Notes: The 60° Zone-2 ultrasonic examination.   |                    |                                   |                    |  |                     |
| Examiner: Wade Holloway   |                    | Level: II                         | Date: 3/10/06      | Examiner: N/A  | Level: NA Date: N/A |
| Sign:   |                    |                                   |                    | Sign:  |                     |
| Reviewed: Adam A. Corp  |                    | Level: III                        | Date: 3/22/06      | ANII Review:   |                     |
| Sign:   |                    |                                   |                    | Date: 3/25/06  |                     |



000208

R-082



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |    |  |          |  |  |  |  |
|---|---------|---------------------------------------|----|--|----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |    | Summary No.: U3C12-N2F-NV                    |          | Calibration No.: N2F-CS03              |  |  |  |
| Nozzle ID.: RPV N2F   |         |                                       |    |  |          |  |  |  |  |
| Component ID: RPV N2F   |         |                                       |    |  |          |  |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld                     |         |                                       |    | ASME Section XI: 2001 with 2003 Addenda      |          |  |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |    | Figure No.: IWB 2500-7                       |          |  |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |    | Nozzle Diameter: 12"                         |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |    | <b>CALIBRATION STANDARD</b>                  |          |  |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |    | Model: Eienchmark                            |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |         | Serial No.: 00X1XJ                    |    |  |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |         | Size: .5X1.0"                         |    |  |          | Temp: Block: 83°F Comp.: 77°F          |  |  |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |    | Shape: Rectangle                             |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 7.92"  |         | Mode: Shear                           |    | Config.: Single                              |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/psec.   |         | Nominal Refracted Angle: 60°          |    |  |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 59°         |    |  |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz   |         | Pulse: 222 ns                         |    | Nominal Skew Angle (If Applicable): 36°-66°  |          | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |    | Measured Skew Angle (If Applicable): 36°-66° |          | Reflector: 10 13                       |  |  |  |
| Filter: Filter 2  |         | Reject: 0%                            |    | Wedge Radius (If Applicable): Flat           |          | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |    | Amp. %: 100 40                               |          | Gain dB: 56.8 56.8                     |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |    |  |          |  |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         | <b>DAC PLOT</b>                       |    |  |          |  |  |  |  |
| Ref. Sensitivity: 73.2 dB   |         |                                       |    |  |          |  |  |  |  |
| Scan Sensitivity: 76.0 dB   |         |                                       |    |  |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |    |  |          |  |  |  |  |
|   | Date    |                                       |    | Time   | Initials |  |  |  |  |
| Initial Cal:  | 3/10/06 |                                       |    | 20:12  | TB       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA   | NA       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA   | NA       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA   | NA       |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |  |          |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |  |          |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |  |          |  |  |  |  |
| Final Cal:  | 3/10/06 | 23:38                                 | TB |  |          |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |         |                                       |    |  |          |  |  |  |  |
| Upper Shell: N/A  |         | Lower Shell: N/A                      |    |  |          |  |  |  |  |
| Weld CL: N/A  |         | At Indication: N/A                    |    |  |          |  |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |    |  |          |  |  |  |  |
| Sweep Position  |         | 5.6                                   |    |  |          |  |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |    |  |          |  |  |  |  |
| Gain in dB  |         | 73.2 dB                               |    |  |          |  |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen   |         |                                       |    |  |          |  |  |  |  |
| Examiner: Thomas Brown  |         | Level: II                             |    | Date: 3/10/06                                |          | Examiner: N/A                          |  |  |  |
| Reviewed: Adam Brown  |         | Level: III                            |    | Date: 3/22/06                                |          | Date: N/A                              |  |  |  |
| Sign: <i>Adam Brown</i>   |         |                                       |    | ANII Review: <i>Paul F. Howard</i>           |          | Date: 5/25/06                          |  |  |  |



000009

R-082



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

Site: Browns Ferry Unit 3      Exam Date: 3/10/06      Summary No.: U3C12-N2F-NV      Calibration No.: N2F-CS04

Nozzle ID: RPV N2F

Component ID: RPV N2F

Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld

ASME Section XI: 2001 with 2003 Addenda

Drawing No.: 3-ISI-0328-C

Procedure No. / Rev.: 54-ISI-850 / 03

Figure No.: IWB 2500-7

Material: CS Clad

Thickness: 6.1"

Nozzle Diameter: 12"

## INSTRUMENT SETTINGS

## SEARCH UNIT

## CALIBRATION STANDARD

Mfg.: Staveley

Mfg.: KBA

Model: Benchmark

Cal. Block ID: BF-18

Model: Sonic 136

Serial No.: 01BV5J

Cal. Block Thickness: 6.12"      Dia.: Flat

Serial No.: 136P1200G081455

Size: .5X1.0"

Temp. Block: 83°F      Comp.: 77°F

Range: 10"

Freq: 2.25 MHz

Shape: Rectangle

Thermometer VH: 9571

Delay: 4.52"

Mode: Shear

Config.: Single

Couplant Type: Ultragel II

Velocity: .129 in/usoc

Nominal Refracted Angle: 40°

Couplant Batch #: 05325

Each Major Screen Div.: 1.0°

Measured Refracted Angle: 42°

## CALIBRATION VERIFICATION BLOCK

Freq.: 2.25 MHz

Pulse: 222 ns

Nominal Skew Angle (If Applicable): 120 +

Serial No.: 037405

Type: Rompas

Damping: 500 Ω

Rep. Rate: 2 KHz

Measured Skew Angle (If Applicable): 120

Reflector:

7

10

Filter: Filter 2

Reject: 0%

Wedge Radius (If Applicable): 3.5"

Sweep Div.:

4

7

Pulse Amplitude: Fixed

Cable Type: RG-174      Length: 12'

Amp. %:

100

30

Mode: ☐ Dual ☒ Pulse Echo

No. of Intermediate Connectors: 0

Gain dB:

36.2

36.2

Jack: ☒ Transmit ☐ Receive

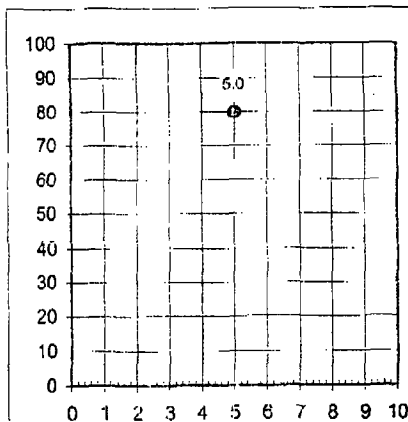
## DAC PLOT

Ref. Sensitivity: 52.4 dB

Scan Sensitivity: 59.0 dB

## CALIBRATION / VERIFICATION TIMES

|               | Date    | Time  | Initials |
|---------------|---------|-------|----------|
| Initial Cal:  | 3/10/06 | 20:08 | TB       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Intermediate: | NA      | NA    | NA       |
| Final Cal:    | 3/10/06 | 23:35 | TB       |



## 0° THICKNESS DATA

Upper Shell: N/A

Lower Shell: N/A

Weld CL: N/A

At Indication: N/A

Calibration Reflector(s)

Notch

Sweep Position

5.0

Amplitude in % FSH

80%

Gain in dB

52.4

Notes: Nozzle to Shell 3" delay on screen

Examiner: Thomas Brown

Level: II

Date: 3/10/06

Examiner: N/A

Level: N/A

Date: N/A

Sign:

Sign:

Reviewed: Adam Conti

Level: III

Date: 3/22/06

ANII Review:

Date: 5/25/06

Sign:

Sign:



000210 R-082



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |         |                                       |    |   |          |  |  |  |  |
|---|---------|---------------------------------------|----|---|----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |         | Exam Date: 3/10/06                    |    | Summary No.: U3C12-N2F-NV                 |          | Calibration No.: N2F-CS05              |  |  |  |
| Nozzle ID: RPV N2F  |         |                                       |    |   |          |  |  |  |  |
| Component ID: RPV N2F   |         |                                       |    |   |          |  |  |  |  |
| Exam Description: 12" Inlet Recirculation Nozzle to Vessel Weld                     |         |                                       |    | ASME Section XI: 2001 with 2003 Addenda   |          |  |  |  |  |
| Drawing No.: 3-ISI-0328-C   |         | Procedure No. / Rev.: 54-ISI-850 / 03 |    | Figure No.: IWB 2500-7                    |          |  |  |  |  |
| Material: CS Clad   |         | Thickness: 6.1"                       |    | Nozzle Diameter: 12"                      |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |         | <b>SEARCH UNIT</b>                    |    | <b>CALIBRATION STANDARD</b>               |          |  |  |  |  |
| Mfg.: Staveley  |         | Mfg.: KBA                             |    | Model: Benchmark                          |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |         | Serial No.: 0111PP                    |    |   |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |         | Size: .5X1.0"                         |    |   |          | Temp: Block: 83°F Comp.: 77°F          |  |  |  |
| Range: 10"  |         | Freq: 2.25 MHz                        |    | Shape: Rectangle                          |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"  |         | Mode: Shear                           |    | Config.: Single                           |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: 129 in/μsec.  |         | Nominal Refracted Angle: 40°          |    |   |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |         | Measured Refracted Angle: 40°         |    |   |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz   |         | Pulse: 222 ns                         |    | Nominal Skew Angle (If Applicable): 120°  |          | Serial No.: 037405                     |  |  |  |
| Damping: 500 Ω  |         | Rep. Rate: 2 KHz                      |    | Measured Skew Angle (If Applicable): 120° |          | Type: Rompas                           |  |  |  |
| Filter: Filter 2  |         | Reject: 0%                            |    | Wedge Radius (If Applicable): 3.5"        |          | Reflector: 7 10                        |  |  |  |
| Pulse Amplitude: Fixed  |         | Cable Type: RG-174 Length: 12'        |    |   |          | Sweep Div.: 4 7                        |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |         | No. of Intermediate Connectors: 0     |    |   |          | Amp. %: 100 30                         |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |         | <b>DAC PLOT</b>                       |    |   |          | Gain dB: 36.2 36.2                     |  |  |  |
| Ref. Sensitivity: 53.8 dB   |         |                                       |    |   |          |  |  |  |  |
| Scan Sensitivity: 59.0 dB   |         |                                       |    |   |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |         |                                       |    |   |          |  |  |  |  |
|   | Date    |                                       |    | Time                                      | Initials |  |  |  |  |
| Initial Cal:  | 3/10/06 |                                       |    | 20:10                                     | TB       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:   | NA      |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |   |          |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |   |          |  |  |  |  |
| Intermediate:   | NA      | NA                                    | NA |   |          |  |  |  |  |
| Final Cal:  | 3/10/06 | 23:34                                 | TB |   |          |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |         |                                       |    |   |          |  |  |  |  |
| Upper Shell: N/A  |         | Lower Shell: N/A                      |    |   |          |  |  |  |  |
| Weld CL: N/A  |         | At Indication: N/A                    |    |   |          |  |  |  |  |
| Calibration Reflector(s)  |         | Notch                                 |    |   |          |  |  |  |  |
| Sweep Position  |         | 4.8                                   |    |   |          |  |  |  |  |
| Amplitude in % FSH  |         | 80%                                   |    |   |          |  |  |  |  |
| Gain in dB  |         | 53.8 dB                               |    |   |          |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen.  |         |                                       |    |   |          |  |  |  |  |
| Examiner: Thomas Brown  |         | Level: II                             |    | Date: 3/10/06                             |          | Examiner: N/A                          |  |  |  |
| Sign: <i>Thomas Brown</i>   |         |                                       |    |   |          | Level: N/A                             |  |  |  |
| Reviewed: Adam Smith  |         | Level: III                            |    | Date: 3/22/2006                           |          | Date: 3/22/06                          |  |  |  |
| Sign: <i>Adam Smith</i>   |         |                                       |    |   |          | ANII Review: <i>Paul Hand</i>          |  |  |  |



Weld Examination Report R-083

N3B-N/V

Main Steam Nozzle



C00251 R-083

AREVA

## EXAMINATION SUMMARY

|  |   |                     |
|--|---|---------------------|
| Summary No.: U3C12-N3B-IV  | Examination Data Sheet : N3B-DS01, N3B-DS02   | Exam Date: 3/7/2006 |
| Customer: Browns Ferry Unit 3 U3C12  | Examination Methods: Ultrasonic   |                     |
| System / Component ID: Main Steam/N3B-NV   | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                     |
| Component Description: Nozzle to Vessel Weld   | Modeling Number: IR-2003-19   |                     |
| Examination Category: B-D  | Calibration Sheets No(s):<br>N3B-CS01      N3B-CS04<br>N3B-CS02      N3B-CS05<br>N3B-CS03   |                     |
| ISO / Drawing: N3/3-ISI-0320-C   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                     |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00 *SDCN: 30-9015396-00 |   |                     |

Summary: *Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/9/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Main Steam (N3) Nozzle Modeling Parameters |             |              |
|--|-------------|--------------|
| Probe                                      | Probe Skew  | Scan Surface |
| 60° Shear                                  | ±(54 to 74) | Vessel       |
| 40° Shear                                  | ±115        | Blend        |

36% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 35.22% volumetric coverage due to nozzle blend radius interference.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number U3.80, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                             |                 |                                  |                 |
|-----------------------------|-----------------|----------------------------------|-----------------|
| Prepared By: George Chapman | Date: 3/22/2006 | Reviewed By: Adam A. Conti LVIII | Date: 3/22/2006 |
| Sign: <i>[Signature]</i>    |                 | Sign: <i>[Signature]</i>         |                 |
| Customer: Matt Welch        | Date: 5/9/06    | ANII Review: <i>[Signature]</i>  | Date: 6/6/06    |
| Sign: <i>[Signature]</i>    |                 |                                  |                 |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/7/2006 13:10

Examination Data Sheet No.: N3B-DS01

Is: Drawing: N3/3-ISI-0329-C

Calibration Sheet: N3B-CS01, N3B-CS02

W: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N3B

Lo: TDC

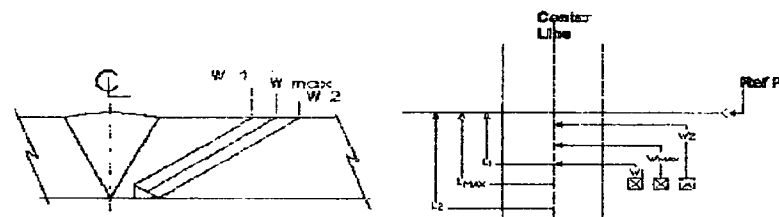
Procedure No.: N-UT-75-03

Component Description: 26" Main Steam Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max. Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientation: radial and circumferential.
2. Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: George Chapman Level: II Date: 3/7/2006

Examiner: N/A Level: Date:

Reviewed: Adam Conti Level: III Date: 3/22/2006

ANII Review: Date:

*Lat Ford* 6/6/06

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# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/7/06 12:44

Examination Data Sheet No.: N3B-DS02

Iso / Drawing: N3/3-ISI-0329-C

Calibration Sheet: N3B-CS03, N3B-CS04  
N3B-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N3B

Lo: TDC

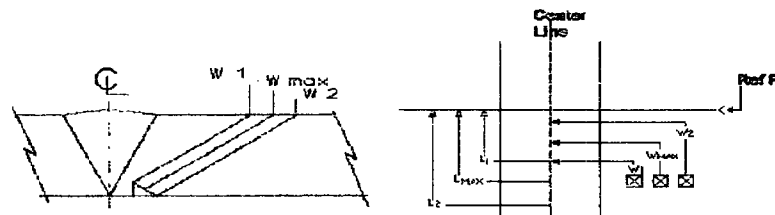
Procedure No.: 54-ISI-850-03

Component Description: 26" Main Steam Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |

Notes:

1. Search unit orientations: Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Mike W. Kleinjan Level: II Date: 3/7/2006

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/22/2006

ANII Review:

Date:

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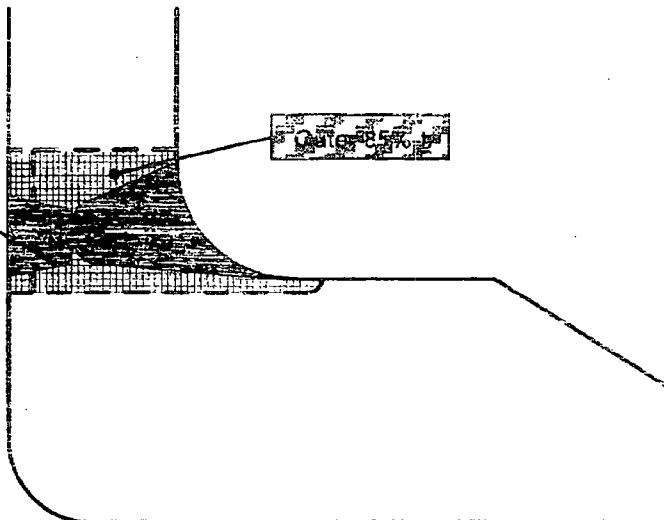




## RPV Nozzle-To-Shell Weld

### Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N3B | Date: 03/22/06 | Summary No: U3C12-N3B-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   | Circumferential Scans   |   |
|---|---|---|
| 100%-t  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 54.37 <sup>2</sup> inches                           | <sup>D</sup> Inner 15%-t Examination Volume: 5.39 <sup>2</sup> inches.                        | <sup>G</sup> Outer 85%-t Examination Volume: 48.98 <sup>2</sup> inches.                             |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 22.639 <sup>2</sup> inches                          | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 10.3059 <sup>2</sup> inches                               |
|   | <sup>F</sup> Inner 15%-t Volume Achieved: 5.39 <sup>2</sup> inches.                           |   |
| <sup>C</sup> Percentage of Axial Coverage: 42%<br>$B + A \times 100 = C$                      | <sup>J</sup> Total Circumferential Examination Coverage: 29%<br>$(F + H) + A = J$             |   |
| <b>Combined Axial and Circumferential Weld Coverage</b>                                       |   |   |
| <b><sup>L</sup>Total Examination Coverage: 36%</b>  |   |   |
| $(C + J) + 2 = L$   |   |   |
| Prepared by: Bret Flesner   | Date: 03/22/06  | Reviewed by: Adam Conti   |
| Date: 03/22/06  |   | ANII Review: <i>Sal Flood</i> 6/6/06  |

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## RPV Nozzle-To-Shell Weld

### Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N3B | Date: 03/22/06 | Summary No: U3C12-N3B-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

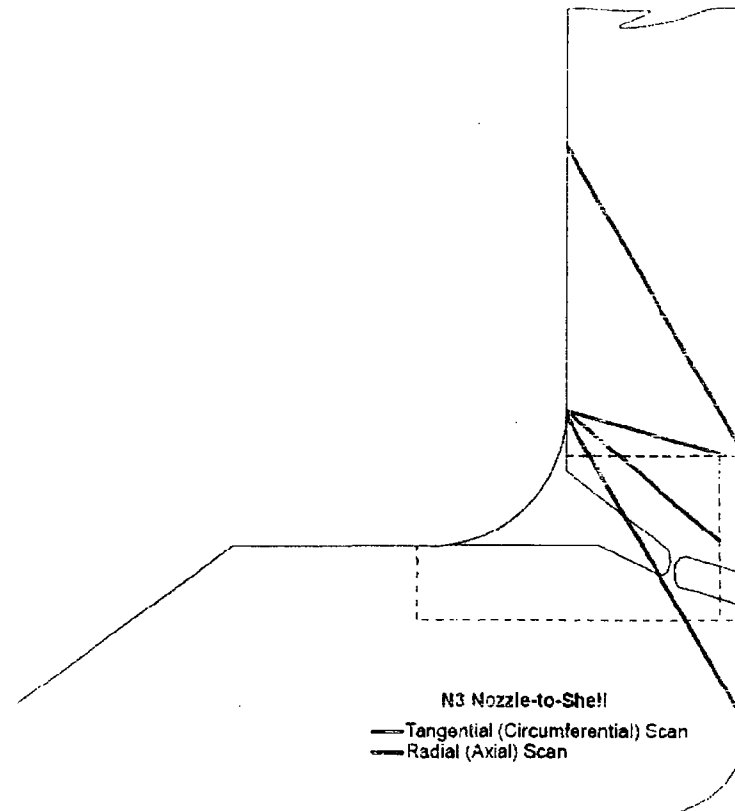
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 36% coverage.



Prepared by: Bret Flesner

Date: 03/22/06

Reviewed by: Adam Conti

Date: 03/22/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Sam Flesner* 6/6/06



COC-36 R-083

| AREVA   |  |                    |  | UT CALIBRATION DATA SHEET         |  |                    |  |                                |  |                     |  |               |  |  |  |
|---|--|--------------------|--|-----------------------------------|--|--------------------|--|--------------------------------|--|---------------------|--|---------------|--|--|--|
| Customer: Browns Ferry Unit 3   |  |                    |  | Exam Date: 03/7/2006              |  |                    |  | Calibration No.: N3B-CS01      |  |                     |  |               |  |  |  |
| System / Component I.D.: RPV Nozzle N3B   |  |                    |  |                                   |  |                    |  |                                |  |                     |  |               |  |  |  |
| Component Description: 26" Main Steam Nozzle-to-Shell weld (Zone-1 Examination) |  |                    |  |                                   |  |                    |  |                                |  |                     |  |               |  |  |  |
| ISO / Drawing No.: 34SI-0329-C  |  |                    |  | Procedure No. / Rev.: N-UT-78 / 3 |  |                    |  |                                |  |                     |  |               |  |  |  |
| Material: Clad CS   |  |                    |  | Diameter: 26" Nozzle              |  |                    |  | Thickness: 6.1" Nominal        |  |                     |  |               |  |  |  |
| INSTRUMENT SETTINGS   |  |                    |  | SEARCH UNIT                       |  |                    |  | CALIBRATION STANDARD           |  |                     |  |               |  |  |  |
| Mfg: Krautkramer  |  | Model: USN58L      |  | Serial No: 03-848                 |  | Mfg: RTD           |  | Calibration Block No: BF-18    |  |                     |  |               |  |  |  |
| Serial / MT8 #: 0100D0  |  |                    |  | Model: TRL2-AUST                  |  | Size: 2(24x42) 1/4 |  | Thickness (in): 6.12"          |  | Diameter (in): Flat |  |               |  |  |  |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds                                    |  |                    |  | Shape: Rectangle                  |  | Freq: 2.0 MHz      |  | Temp (F) Block: 82°            |  | Temp (F) Comp: 88°  |  |               |  |  |  |
| Delay: 14.00 µS   |  | Range: 8.0         |  | Config.: Dual                     |  | Mode: Long.        |  | Thermometer No.: VH-9571       |  |                     |  |               |  |  |  |
| Each Major Screen Div. #: 0.8   |  |                    |  | Nominal Angle: 60°                |  | Measured: 61°      |  | Couplant: Ultragel II          |  | Batch No.: 05325    |  |               |  |  |  |
| Cal in Depth or Sound Path: Sound Path  |  |                    |  | Fixture / Size: Integral          |  |                    |  | CALIBRATION STANDARD SIMULATOR |  |                     |  |               |  |  |  |
| Filter: Full Wave   |  | Reject: 0%         |  | Cable Type & Length: RG-174 / 25' |  |                    |  | Serial No.: N/A                |  |                     |  |               |  |  |  |
| Damping: 1 K  |  | Freq (MHz): 2 - 25 |  | No. of Connectors: 0              |  |                    |  | Description: N/A               |  |                     |  |               |  |  |  |
| Rep. Rate: Auto High  |  |                    |  | DAC PLOT                          |  |                    |  | Reflectors                     |  | 1                   |  | 2             |  |  |  |
| Pulse Amp: Fixed  |  | Pulsar: High       |  |                                   |  |                    |  | Sweep Position                 |  | N/A                 |  | N/A           |  |  |  |
| Reference Sensitivity: 59.0 dB  |  |                    |  |                                   |  |                    |  | Signal Amp (%)                 |  | N/A                 |  | N/A           |  |  |  |
| Scan Sensitivity: 75.0 dB   |  |                    |  |                                   |  |                    |  | Gain DEI (dB):                 |  | N/A                 |  | N/A           |  |  |  |
|   |  |                    |  |                                   |  |                    |  |                                |  |                     |  |               |  |  |  |
| CALIBRATION CHECK   |  |                    |  |                                   |  |                    |  | Probe Squint Angle 3°          |  |                     |  |               |  |  |  |
|   |  | Date/Time          |  | OK                                |  | Initials           |  | Probe Focus: FD ~2.70"         |  |                     |  |               |  |  |  |
| Initial Cal:  |  | 3/7/06 1200        |  | X                                 |  | [Signature]        |  |                                |  |                     |  |               |  |  |  |
| Init. Sim. Cal:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Intermediate:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Intermediate:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Intermediate:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Intermediate:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Intermediate:   |  | N/A                |  |                                   |  | N/A                |  |                                |  |                     |  |               |  |  |  |
| Final Cal:  |  | 3/7/06 1535        |  | X                                 |  | [Signature]        |  |                                |  |                     |  |               |  |  |  |
| Beam Direction on Calibration Block   |  |                    |  | 0 Deg.                            |  |                    |  | Axial                          |  |                     |  | Circ          |  |  |  |
| (Yes / No)  |  |                    |  | NO                                |  |                    |  | YES                            |  |                     |  | NO            |  |  |  |
| Reflector   |  |                    |  | 1/4 T SDH                         |  |                    |  |                                |  |                     |  |               |  |  |  |
| Sweep Position / Depth in Inches  |  |                    |  | 3.6                               |  |                    |  |                                |  |                     |  |               |  |  |  |
| Amplitude in %  |  |                    |  | 80%                               |  |                    |  |                                |  |                     |  |               |  |  |  |
| Gain in dB  |  |                    |  | 59.0 dB                           |  |                    |  |                                |  |                     |  |               |  |  |  |
| Notes: The 60° Zone-1 ultrasonic examination.                                   |  |                    |  |                                   |  |                    |  |                                |  |                     |  |               |  |  |  |
| Examiner: George Chapman  |  |                    |  | Level: II                         |  |                    |  | Date: 03/7/2006                |  |                     |  | Examiner: N/A |  |  |  |
| Sign: [Signature]   |  |                    |  |                                   |  |                    |  |                                |  |                     |  | Level: N/A    |  |  |  |
| Reviewed: [Signature]   |  |                    |  | Level: III                        |  |                    |  | Date: 03/22/2006               |  |                     |  | Date: N/A     |  |  |  |
| Sign: [Signature]   |  |                    |  |                                   |  |                    |  |                                |  |                     |  | Date: 4/25/06 |  |  |  |





# UT CALIBRATION DATA SHEET

|  |                    |                                   |                    |                                 |                              |            |           |
|--|--------------------|-----------------------------------|--------------------|---------------------------------|------------------------------|------------|-----------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 3/7/2006               |                    | Calibration No.: N3B-CS02       |                              |            |           |
| System / Component I.D.: RPV Nozzle N3B  |                    |                                   |                    |                                 |                              |            |           |
| Component Description: 28" Main Steam Nozzle to Vessel Weld (Zone-2 Examination) |                    |                                   |                    |                                 |                              |            |           |
| ISO / Drawing No.: 3-ISI-0329-C  |                    | Procedure No. / Rev.: N-UT-78 / 3 |                    |                                 |                              |            |           |
| Material: Clad CS  |                    | Diameter: 26" Nozzle              |                    | Thickness: 6.1" Nominal         |                              |            |           |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT                       |                    | CALIBRATION STANDARD            |                              |            |           |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD           | Calibration Block No: BF-18     |                              |            |           |
| Serial / MT&E #: 0100DDC   |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4 | Thickness (In): 6.12"           | Diameter. (in): Flat         |            |           |
| Mat. Cal. / Velocity: 0.2320 In/Micro Seconds                                    |                    | Shape: Rectangle                  | Freq: 2.0 MHz      | Temp (F) Block: 82°             | Temp (F) Comp: 88°           |            |           |
| Delay: 14.00 µS  | Range: 20.0"       | Config.: Dual                     | Mode: Long         | Thermometer No.: VH-9571        |                              |            |           |
| Each Major Screen Div. #: 2.0  |                    | Nominal Angle: 60°                | Measured: 61°      | Couplant: Ultragel II           | Batch No.: 05325             |            |           |
| Cal in Depth or Sound Path: Sound Path   |                    | Fixture / Size: Integral          |                    | CALIBRATION STANDARD SIMULATOR  |                              |            |           |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                    | Serial No.: N/A                 |                              |            |           |
| Damping: 1K  | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                    | Description: N/A                |                              |            |           |
| Pop. Rate: Auto High   |                    | DAC PLOT                          |                    | Reflectors                      | 1                            | 2          |           |
| Pulse Amp: Fixed   | Pulsar: High       |                                   |                    | Sweep Position                  | N/A                          | N/A        |           |
| Reference Sensitivity: 72.0 dB   |                    |                                   |                    | Signal Amp (%)                  | N/A                          | N/A        |           |
| Scan Sensitivity: 80.0 dB  |                    |                                   |                    | Gain DB (dB):                   | N/A                          | N/A        |           |
|  |                    |                                   |                    | Probe Squint Angle 3°           |                              |            |           |
| CALIBRATION CHECK  |                    |                                   |                    | Probe Focus: FD ~2.70"          |                              |            |           |
|  | Date/Time          | OK                                | Initials           |                                 |                              |            |           |
| Initial Cal:   | 3/7/06 12:10       | X                                 | <i>hac</i>         |                                 |                              |            |           |
| Init. Sim. Cal:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Intermediate:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Intermediate:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Intermediate:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Intermediate:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Intermediate:  | N/A                |                                   | N/A                |                                 |                              |            |           |
| Final Cal:   | 3/7/06 15:30       | X                                 | <i>hac</i>         |                                 |                              |            |           |
| Beam Direction on Calibration Block  |                    | 0 Deg.                            | Axial              | Circ                            | 0 DEGREE WELD THICKNESS ONLY |            |           |
| (Yes / No)   |                    | NO                                | YES                | NO                              | Component:                   | N/A        |           |
| Reflector  | ID Notch           |                                   |                    |                                 | BM:                          | N/A        |           |
| Sweep Position / Depth in Inches   | 6.0                |                                   |                    |                                 | HAZ:                         | N/A        |           |
| Amplitude in %   | 80%                |                                   |                    |                                 | C/L Weld:                    | N/A        |           |
| Gain in dB   | 72                 |                                   |                    |                                 | Component:                   | N/A        |           |
| Notes: The 60° Zone-2 ultrasonic examination.                                    |                    |                                   |                    |                                 |                              |            |           |
| Examiner: George Chapman   |                    | Level: II                         | Date: 03/7/2006    | Examiner: N/A                   |                              | Level: N/A | Date: N/A |
| Sign: <i>George Chapman</i>  |                    |                                   |                    | Sign:                           |                              |            |           |
| Reviewed: Adam M. Conley   |                    | Level: III                        | Date: 03/22/2006   | AMR Review: <i>Paul F. Hunt</i> |                              | Date:      | 4/25/26   |
| Sign: <i>Adam M. Conley</i>  |                    |                                   |                    | Sign:                           |                              |            |           |



C30133 R-083



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |        |                                       |            |   |            |  |  |  |  |
|---|--------|---------------------------------------|------------|---|------------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/7/06                     |            | Summary No.: U3C12-N3B-NV                       |            | Calibration No.: N3B-CS03              |  |  |  |
| Nozzle ID: RPV N3B  |        |                                       |            |   |            |  |  |  |  |
| Component ID: RPV N3B   |        |                                       |            |   |            |  |  |  |  |
| Exam Description: 26" Main Steam Nozzle to Vessel Weld                              |        |                                       |            | ASME Section XI: 2001 Edition with 2003 Addenda |            |  |  |  |  |
| Drawing No.: 3-ISI-0329-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |            | Figure No.: IWB 2500-7                          |            |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |            | Nozzle Diameter: 26"                            |            |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |            | <b>CALIBRATION STANDARD</b>                     |            |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |            | Model: Benchmark                                |            | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 00X1XJ                    |            |   |            | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G031455   |        | Size: 5X1.0"                          |            |   |            | Temp: Block: 83°F Comp.: 88°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |            | Shape: Rectangle                                |            | Thermometer VH: 9571                   |  |  |  |
| Delay: 7.92"  |        | Mode: Shear                           |            | Config.: Single                                 |            | Couplant Type: Ultragel II             |  |  |  |
| Velocity: 129 in/psec.  |        | Nominal Refracted Angle: 60°          |            |   |            | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 59°         |            |   |            | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq: 2.25 MHz  |        | Pulse: 222 ns                         |            | Nominal Skew Angle (If Applicable): 54-74       |            | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |            | Measured Skew Angle (If Applicable): 54-74      |            | Reflector: 10 13                       |  |  |  |
| Filter: Filter 2  |        | Reject: Off                           |            | Wedge Radius (If Applicable): Flat              |            | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |            |   |            | Amp. %: 100 40                         |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |            |   |            | Gain dB: 56.8 56.8                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |            |   |            |  |  |  |  |
| Ref. Sensitivity: 73.2 dB   |        |                                       |            |   |            |  |  |  |  |
| Scan Sensitivity: 82.0 dB   |        |                                       |            |   |            |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |            |   |            |  |  |  |  |
|   | Date   |                                       |            | Time  | Initials   |  |  |  |  |
| Initial Cal:  | 3/7/06 |                                       |            | 1242  | <i>WPK</i> |  |  |  |  |
| Intermediate:   | NA     |                                       |            | NA  | NA         |  |  |  |  |
| Intermediate:   | NA     |                                       |            | NA  | NA         |  |  |  |  |
| Intermediate:   | NA     |                                       |            | NA  | NA         |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Final Cal:  | 3/7/06 | 1551                                  | <i>WPK</i> |   |            |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |        |                                       |            |   |            |  |  |  |  |
| Upper Shell: N/A  |        | Lower Shell: N/A                      |            |   |            |  |  |  |  |
| Weld CL: N/A  |        | At Indication: N/A                    |            |   |            |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |            |   |            |  |  |  |  |
| Sweep Position  |        | 5.6                                   |            |   |            |  |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |            |   |            |  |  |  |  |
| Gain in dB  |        | 73.2 dB                               |            |   |            |  |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen   |        |                                       |            |   |            |  |  |  |  |
| Examiner: Mike W. Kleinjan  |        | Level: II                             |            | Date: 3/7/06                                    |            | Examiner: N/A                          |  |  |  |
| Sign: <i>Mike W. Kleinjan</i>   |        |                                       |            |   |            | Level: N/A                             |  |  |  |
| Reviewed: Adam A. Conti   |        | Level: III                            |            | Date: 3/22/2006                                 |            | ANII Review: <i>Paul F. Hurl</i>       |  |  |  |
| Sign: <i>Adam A. Conti</i>  |        |                                       |            |   |            | Date: 3/25/06                          |  |  |  |



C00059 R-083



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |        |                                       |     |   |          |  |  |  |  |
|---|--------|---------------------------------------|-----|---|----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/7/06                     |     | Summary No.: U3C12-N3B-NV                       |          | Calibration No.: N3B-CS04              |  |  |  |
| Nozzle ID: RPV N3B  |        |                                       |     |   |          |  |  |  |  |
| Component ID: RPV N3B   |        |                                       |     |   |          |  |  |  |  |
| Exam Description: 26" Main Steam Nozzle to Vessel Weld                              |        |                                       |     | ASME Section XI: 2001 Edition with 2003 Addenda |          |  |  |  |  |
| Drawing No.: 3-ISI-0329-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |     | Figure No.: IWB 2500-7                          |          |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |     | Nozzle Diameter: 26"                            |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |     | <b>CALIBRATION STANDARD</b>                     |          |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |     | Model: Benchmark                                |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 0101/F3                   |     |   |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: REP1200G081455  |        | Size: .5X1.0"                         |     |   |          | Temp. Block: 83°F Comp.: 88°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |     | Shape: Rectangle                                |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 6.35"  |        | Mode: Shear                           |     | Config.: Single                                 |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/psec.   |        | Nominal Refracted Angle: 40°          |     |   |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 42°         |     |   |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq: 2.25 MHz  |        | Pulse: 222 ns                         |     | Nominal Skew Angle (If Applicable): 115° +      |          | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |     | Measured Skew Angle (If Applicable): 115°       |          | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2  |        | Reject: Off                           |     | Wedge Radius (If Applicable): 4.75"             |          | Sweep Div.: 2 5                        |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |     |   |          | Amp. %: 100 100                        |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |     |   |          | Gain dB: 57.8 57.8                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |     |   |          |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |        |                                       |     |   |          |  |  |  |  |
| Scan Sensitivity: 54.0 dB   |        |                                       |     |   |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |     |   |          |  |  |  |  |
|   | Date   |                                       |     | Time  | Initials |  |  |  |  |
| Initial Cal:  | 3/7/06 |                                       |     | 1240  | LMK      |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Final Cal:  | 3/7/06 | 1540                                  | LMK |   |          |  |  |  |  |
|   |        | <b>0° THICKNESS DATA</b>              |     |   |          |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |     |   |          | Upper Shell: N/A Lower Shell: N/A      |  |  |  |
| Sweep Position  |        | 3.1                                   |     |   |          | Weld CL: N/A At Indication: N/A        |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |     |   |          |  |  |  |  |
| Gain in dB  |        | 52.4 dB                               |     |   |          |  |  |  |  |
| Notes: Nozzle to Shell 5" delay on screen   |        |                                       |     |   |          |  |  |  |  |
| Examiner: Mike W Klairjan   |        | Level: II                             |     | Date: 3/7/2006                                  |          | Examiner: N/A                          |  |  |  |
| Sign:   |        |                                       |     |   |          | Level: N/A                             |  |  |  |
| Reviewed: Adam A Conti  |        | Level: III                            |     | Date: 3/22/2006                                 |          | ANII Review:                           |  |  |  |
| Sign:   |        |                                       |     |   |          | Date: 3/24/06                          |  |  |  |



000000 R-083



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

Site: Browns Ferry Unit 3

Exam Date: 3/7/06

Summary No.: U3C12-N3B-NV

Calibration No.: N3B-CS05

Nozzle ID: RPV N3B

Component ID: RPV N3B

Exam Description: 26" Main Steam Nozzle to Vessel Weld

ASME Section XI: 2001 Edition with 2003 Addenda

Drawing No.: 3-ISI-0329-C

Procedure No. / Rev.: 54-ISI-850 / 03

Figure No.: IWB 2500-7

Material: CS Clad

Thickness: 6.1"

Nozzle Diameter: 26"

## INSTRUMENT SETTINGS

## SEARCH UNIT

## CALIBRATION STANDARD

Mfg.: Staveley

Mfg.: KBA

Model: Benchmark

Cal. Block ID: BF-18

Model: Sonic 106

Serial No.: 00WJ17

Cal. Block Thickness: 6.12" Dia.: Flat

Serial No.: 136P1200G081455

Size: 5X1.0"

Temp. Block: 83°F Comp.: 88°F

Range: 10"

Freq: 2.25 MHz

Shape: Rectangle

Thermometer VH: 9571

Delay: 6.26"

Mode: Shear

Config.: Single

Couplant Type: Ultragel II

Velocity: 129 in/us

Nominal Refracted Angle: 40°

Couplant Batch #: 05325

Each Major Screen Div.: 1.0"

Measured Refracted Angle: 42°

## CALIBRATION VERIFICATION BLOCK

Freq: 2.25 MHz

Pulse: 222 ns

Nominal Skew Angle (If Applicable): 115° -

Serial No.: 037405

Type: Rompas

Damping: 500 Ω

Rep. Rate: 2 KHz

Measured Skew Angle (If Applicable): 115°

Reflector:

7

10

Filter: Filter 2

Reject: Off

Wedge Radius (If Applicable): 4.75"

Sweep Div.:

2

5

Pulse Amplitude: Fixed

Cable Type: RG-174 Length: 12'

Amp. %:

100

90

Mode: ☐ Dual ☒ Pulse Echo

No. of Intermediate Connectors: 0

Gain dB:

50

50

Jack: ☒ Transmit ☐ Receive

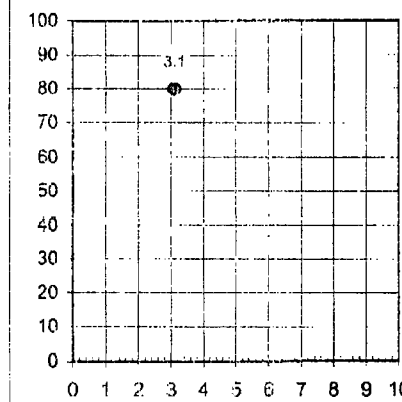
## DAC PLOT

Ref. Sensitivity: 53.8 dB

Scan Sensitivity: 54.0 dB

## CALIBRATION / VERIFICATION TIMES

|               | Date   | Time | Initials   |
|---------------|--------|------|------------|
| Initial Cal:  | 3/7/06 | 1244 | <i>WKL</i> |
| Intermediate: | NA     | NA   | NA         |
| Intermediate: | NA     | NA   | NA         |
| Intermediate: | NA     | NA   | NA         |
| Intermediate: | NA     | NA   | NA         |
| Intermediate: | NA     | NA   | NA         |
| Intermediate: | NA     | NA   | NA         |
| Final Cal:    | 3/7/06 | 1554 | <i>WKL</i> |



## 0" THICKNESS DATA

Upper Shell: N/A

Lower Shell: N/A

Weld CL: N/A

At Indication: N/A

Calibration Reflector(s)

Notch

Sweep Position

3.1

Amplitude in % FSH

80%

Gain in dB

53.8 dB

Notes: Nozzle to Shell 5" delay on screen

Examiner: Mike W Kleinian

Level: II

Date: 3/7/2006

Examiner: N/A

Level: N/A

Date: N/A

Sign: *Mike W Kleinian*

Sign:

Reviewed: Arjan A. Contino

Level: III

Date: 3/22/2006

ANII Review

Sign: *Arjan A. Contino*

Date: 4/25/06



**Weld Examination Report R-085**

**N4B-N/V**

**Feedwater Nozzle**



030131 R-085



## EXAMINATION SUMMARY

| Summary No.: U3C12-N4B-NV   |             | Examination Data Sheet : N4B-DS01, N4B-DS02 |   | Exam Date: 3/9/2006                   |  |  |  |  |       |            |              |           |             |        |           |      |       |
|---|-------------|---|---|---------------------------------------|--|--|--|--|-------|------------|--------------|-----------|-------------|--------|-----------|------|-------|
| Customer: Browns Ferry Unit 3 U3C12   |             |   | Examination Methods: Ultrasonic   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| System / Component ID: BFN3-N4B-NV  |             |   | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Component Description: Nozzle to Vessel Weld  |             |   | Modeling Number: IR-2003-18 Section 4   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Examination Category: B-D   |             |   | Calibration Sheets No(s):<br>N4B-CS01      N4B-CS04<br>N4B-CS02      N4B-CS05<br>N4B-CS03   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| ISO / Drawing: N4/3-ISI-0327-C  |             |   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00   |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Summary: <i>Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/9/06</i><br>Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.<br>In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.<br>In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications. |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| <table border="1"> <thead> <tr> <th colspan="3">Feed Water (N4) Nozzle Modeling Parameters</th> </tr> <tr> <th>Probe</th> <th>Probe Skew</th> <th>Scan Surface</th> </tr> </thead> <tbody> <tr> <td>60° Shear</td> <td>±(35 to 67)</td> <td>Vessel</td> </tr> <tr> <td>40° Shear</td> <td>±120</td> <td>Blend</td> </tr> </tbody> </table>  |             |   |   |                                       |  | Feed Water (N4) Nozzle Modeling Parameters |  |  | Probe | Probe Skew | Scan Surface | 60° Shear | ±(35 to 67) | Vessel | 40° Shear | ±120 | Blend |
| Feed Water (N4) Nozzle Modeling Parameters  |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Probe   | Probe Skew  | Scan Surface                                |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| 60° Shear   | ±(35 to 67) | Vessel                                      |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| 40° Shear   | ±120        | Blend                                       |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| 39% coverage of the required examination volume was obtained.   |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.  |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| <b>Note 1:</b> This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 48.13% volumetric coverage due to nozzle blend radius interference.   |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| <b>Note 2:</b> See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.  |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7 (a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.  |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Prepared By: Wade Holloway LVII   |             | Date: 3/09/2006                             |   | Reviewed By: Adam A. Conti LVIII      |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Sign: <i>Wade Holloway</i>  |             | Sign: <i>Adam A. Conti</i>                  |   | Date: 3/23/2006                       |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Customer: Matt Welch  |             | Date: 5/9/06                                |   | ANII Review: <i>Sal Flavel</i> 6/6/06 |  |  |  |  |       |            |              |           |             |        |           |      |       |
| Sign: <i>Matt Welch</i>   |             |   |   |                                       |  |  |  |  |       |            |              |           |             |        |           |      |       |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/09/2006 02:25

Examination Data Sheet No.: N4B-DS01

Iso / Drawing: N4/3-ISI-0327-C

Calibration Sheet: N4B-CS01, N4B-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N4B

Lo: TDC

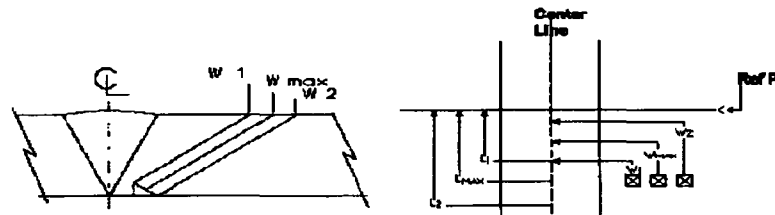
Procedure No.: N-UT-78-03

Component Description: 12 Feedwater Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  | None     |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientation: radial and circumferential. Circumferential scans performed with  $\pm 10^\circ$  tangential skew.
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Wade Holloway

Level: II

Date: 03/09/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/23/06

ANII Review:

Date:

51-9015478-000

Section 5 Tab M

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# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/9/06 11:10

Examination Data Sheet No: N4B-DS02

Iso / Drawing: N4/3-ISI-0327-C

Calibration Sheet: N4B-CS03, N4B-CS04  
N4B-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N4B

Lo: TDC

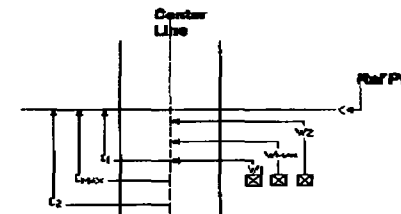
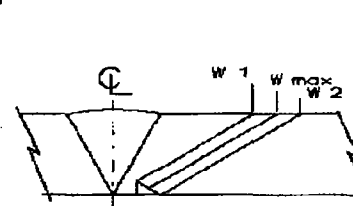
Procedure No.: 54-ISI-850-03

Component Description: 12 Feedwater Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
HMA = Half Max Amplitude  
Lmax = Dist From Ref Pt at Max. Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    | Comments |  |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|----------|--|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |          |  |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |          |  |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |          |  |  |  |

Notes:

1. Search unit orientations: Tangential

2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Mike W. Kleinjan Level: II Date: 3/9/06

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/23/06

ANII Review:

Date:

*John F. ...* 6/6/06

*Adam Conti*

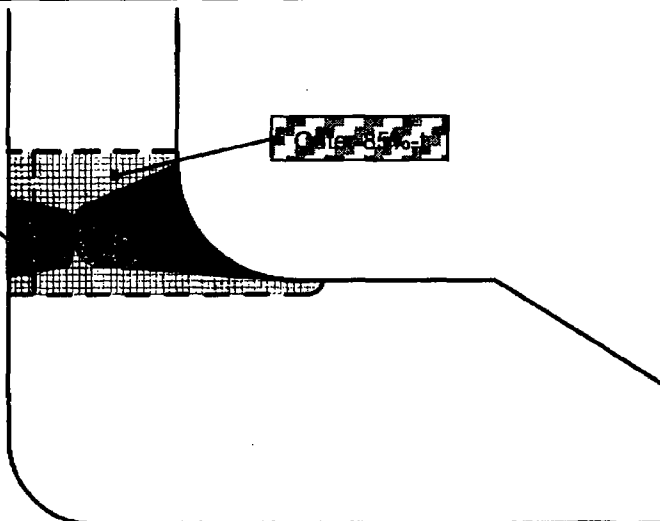
030703 R-085





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N4B | Date: 03/23/06 | Summary No: U3C12-N4B-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   |  | Circumferential Scans   |   |
|---|--|---|---|
| 100%-t  |  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   |  | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 45.019 <sup>2</sup> inches                          |  | <sup>B</sup> Inner 15%-t Examination Volume: 4.6675 <sup>2</sup> inches                       | <sup>C</sup> Outer 85%-t Examination Volume: 40.3524 <sup>2</sup> inches.                           |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |  | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  |  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 24.0885 <sup>2</sup> inches                         |  | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 6.812 <sup>2</sup> inches                                 |
|   |  | <sup>F</sup> Inner 15%-t Volume Achieved: 4.6675 <sup>2</sup> inches                          |   |
| <sup>C</sup> Percentage of Axial Coverage: 53%  |  | <sup>J</sup> Total Circumferential Examination Coverage: 25%                                  |   |
| $B + A \times 100 = C$  |  | $(F + H) + A = J$   |   |

### Combined Axial and Circumferential Weld Coverage

**<sup>L</sup>Total Examination Coverage: 39%**

$$(C + J) + 2 = L$$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/23/06 | Reviewed by: Adam Conti | Date: 03/23/06 | ANII Review: | Date: |
|                           |                |                         |                | 6/6/06       |       |

030604 R-085





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

Utility: TVA

Plant: BFN3

Unit: 3

Weld ID: N4B

Date: 03/23/06

Summary No: U3C12-N4B-NV

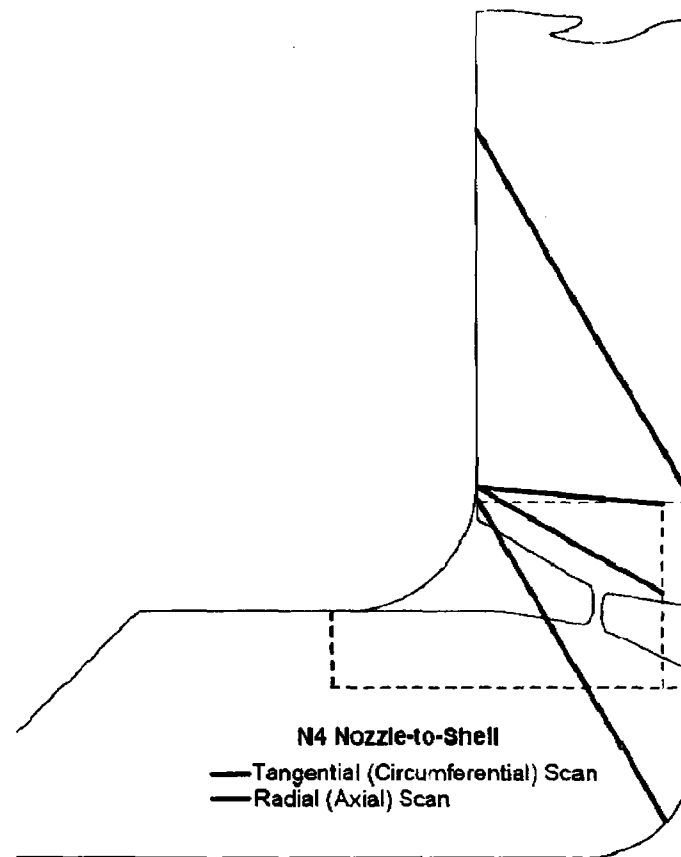
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 39% coverage.



Prepared by: Bret Flesner

Date: 03/23/06

Reviewed by: Adam Conti

Date: 03/23/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Adam Conti* 6/6/06



030106 R-085



## UT CALIBRATION DATA SHEET

|   |                    |                                   |                    |   |                     |
|---|--------------------|-----------------------------------|--------------------|---|---------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/09/2006             |                    | Calibration No.: N4B-CS01   |                     |
| System / Component I.D.: RPV Nozzle N4B   |                    |                                   |                    |   |                     |
| Component Description: 12" Feedwater Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                    |   |                     |
| ISO / Drawing No.: 3-ISI-0327-C   |                    | Procedure No. / Rev.: N-UT-78 / 3 |                    |   |                     |
| Material: Clad CS   |                    | Diameter: 12" Nozzle              |                    | Thickness: 6.1" Nominal   |                     |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT                       |                    | CALIBRATION STANDARD  |                     |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD           | Calibration Block No: BF-18   |                     |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4 | Thickness (in): 6.12"   | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 In/Micro Seconds                                    |                    | Shape: Rectangle                  | Freq: 2.0 MHz      | Temp (F) Block: 70°   | Temp (F) Comp.: 83° |
| Delay: 14.000 $\mu$ S   | Range: 8.0         | Config.: Dual                     | Mode: Long.        | Thermometer No.: VH-9571  |                     |
| Each Major Screen Div. #: 0.8   |                    | Nominal Angle: 60°                | Measured: 61°      | Couplant: Ultragel II   | Batch No.: 05325    |
| Cal In Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral          |                    | CALIBRATION STANDARD SIMULATOR  |                     |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                    | Serial No.: NA  |                     |
| Damping: 1 K  | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                    | Description: NA   |                     |
| Rep. Rate: Auto High  |                    | DAC PLOT                          |                    | Reflectors  | NA NA               |
| Pulse Amp: Fixed  | Pulsar: High       |                                   |                    | Sweep Position  | NA N/A              |
| Reference Sensitivity: 59.0 dB  |                    |                                   |                    | Signal Amp (%)  | NA N/A              |
| Scan Sensitivity: 75.0 dB   |                    |                                   |                    | Gain DB (dB):   | NA N/A              |
|   |                    |                                   |                    | Probe Squint Angle 3°   |                     |
| CALIBRATION CHECK   |                    |                                   |                    | Probe Focus: FD ~2.70"  |                     |
|   | Date/Time          | OK                                | Initials           | 0 DEGREE WELD THICKNESS ONLY  |                     |
| Initial Cal:  | 3/9/06 02:20       | X                                 | W.H.               | Component: N/A  |                     |
| Init. Sim. Cal:   | N/A                |                                   | N/A                | BM: N/A HAZ: N/A  |                     |
| Intermediate:   | N/A                |                                   | N/A                | C/L Weld: N/A   |                     |
| Intermediate:   | N/A                |                                   | N/A                | Component: N/A  |                     |
| Intermediate:   | N/A                |                                   | N/A                | BM: N/A HAZ: N/A  |                     |
| Intermediate:   | N/A                |                                   | N/A                | Crown HT: N/A Weld Width: N/A   |                     |
| Intermediate:   | N/A                |                                   | N/A                |   |                     |
| Final Cal:  | 3/9/06 04:15       | X                                 | W.H.               | Circ Scan Exam Angle is $\leq$ the inverse sine of the Nominal ID/OD ratio? |                     |
| Beam Direction on Calibration Block   |                    | 0 Deg.                            | Axial              | Circ  |                     |
| (Yes / No)  |                    | NO                                | YES                | NO  |                     |
| Reflector   | 1/4T SDH           |                                   |                    |   |                     |
| Sweep Position / Depth in Inches  | 3.6                |                                   |                    |   |                     |
| Amplitude in %  | 80%                |                                   |                    |   |                     |
| Gain in dB  | 59.0 dB            |                                   |                    |   |                     |
| Notes: The 60° Zone-1 ultrasonic examination.                                   |                    |                                   |                    |   |                     |
| Examiner: Wade Holloway<br>Sign: <i>Wade Holloway</i>                           |                    | Level: II                         | Date: 3/09/06      | Examiner: N/A<br>Sign: <i>Paul F. Hall</i>                                  | Level: NA Date: N/A |
| Reviewed: Adam A. Cont<br>Sign: <i>Adam A. Cont</i>                             |                    | Level: III                        | Date: 3/23/06      | ANII Review<br>Sign: <i>Paul F. Hall</i>                                    | Date: 3/24/06       |



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## UT CALIBRATION DATA SHEET

|   |                       |                                   |                                |                             |                     |
|---|-----------------------|-----------------------------------|--------------------------------|-----------------------------|---------------------|
| Customer: Browns Ferry Unit 3   |                       | Exam Date: 03/09/2006             |                                | Calibration No.: N4B-CS02   |                     |
| System / Component I.D.: RPV Nozzle N4B   |                       |                                   |                                |                             |                     |
| Component Description: 12" Feedwater Nozzle to Vessel Weld (Zone-2 Examination) |                       |                                   |                                |                             |                     |
| ISO / Drawing No.: 3-ISI-0327-C   |                       | Procedure No. / Rev.: N-UT-78 / 3 |                                |                             |                     |
| Material: Clad CS   |                       | Diameter: 12" Nozzle              |                                | Thickness: 6.1" Nominal     |                     |
| INSTRUMENT SETTINGS   |                       | SEARCH UNIT                       |                                | CALIBRATION STANDARD        |                     |
| Mfg: Krautkramer  | Model: USN58L         | Serial No: 03-848                 | Mfg: RTD                       | Calibration Block No: BF-18 |                     |
| Serial / MT&E #: 0100D0   |                       | Model: TRL2-AUST                  | Size: 2(24x42) 1/4A            | Thickness (in): 6.12"       | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds                                    |                       | Shape: Rectangle                  | Freq: 2.0 MHz                  | Temp (F) Block: 70°         | Temp (F) Comp: 83°  |
| Delay: 14.000 µS  | Range: 20.0           | Config.: Dual                     | Mode: Long.                    | Thermometer No.: VH-9571    |                     |
| Each Major Screen Div. #: 2.0   |                       | Nominal Angle: 60°                | Measured: 61°                  | Couplant: Ultragel II       | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path  |                       | Fixture / Size: Integral          | CALIBRATION STANDARD SIMULATOR |                             |                     |
| Filter: Full Wave   | Reject: 0%            | Cable Type & Length: RG-174 / 25' |                                | Serial No.: NA              |                     |
| Damping: 1 K  | Freq (MHz): 2 - 25    | No. of Connectors: 0              |                                | Description: NA             |                     |
| Rep. Rate: Auto High  |                       | DAC PLOT                          |                                | Reflectors                  | N/A                 |
| Pulse Amp: Fixed  | Pulsar: High          |                                   |                                | Sweep Position              | N/A                 |
| Reference Sensitivity: 72.0 dB  | Signal Amp (%)        |                                   |                                | N/A                         |                     |
| Scan Sensitivity: 80.0 dB   | Gain DB (dB):         |                                   |                                | N/A                         |                     |
|   | Probe Squint Angle 3° |                                   |                                |                             |                     |
| CALIBRATION CHECK   |                       |                                   |                                | Probe Focus: FD ~2.70"      |                     |
|   | Date/Time             | OK                                | Initials                       |                             |                     |
| Initial Cal:  | 3/9/06 02:25          | X                                 | W.H.                           |                             |                     |
| Init. Sim. Cal:   | N/A                   |                                   | N/A                            |                             |                     |
| Intermediate:   | N/A                   |                                   | N/A                            |                             |                     |
| Intermediate:   | N/A                   |                                   | N/A                            |                             |                     |
| Intermediate:   | N/A                   |                                   | N/A                            |                             |                     |
| Intermediate:   | N/A                   |                                   | N/A                            |                             |                     |
| Intermediate:   | N/A                   |                                   | N/A                            |                             |                     |
| Final Cal:  | 3/9/06 04:20          | X                                 | W.H.                           |                             |                     |
| Beam Direction on Calibration Block   |                       | 0 Deg.                            |                                | Axial                       | Circ                |
| (Yes / No)  |                       | NO                                |                                | YES                         | NO                  |
| Reflector   | ID NOTCH              |                                   |                                |                             |                     |
| Sweep Position / Depth in Inches  | 6.0                   |                                   |                                |                             |                     |
| Amplitude in %  | 80%                   |                                   |                                |                             |                     |
| Gain in dB  | 72.0 dB               |                                   |                                |                             |                     |
| Notes: The 60° Zone-2 ultrasonic examination.                                   |                       |                                   |                                |                             |                     |
| Examiner: Wade Holloway   | Level: II             | Date: 3/09/06                     | Examiner: N/A                  | Level: NA                   | Date: N/A           |
| Sign: <i>Wade Holloway</i>  |                       |                                   | Sign: <i>[Signature]</i>       |                             |                     |
| Reviewed: Adam A. Conti   | Level: III            | Date: 3/23/06                     | ANII Review:                   |                             | Date: 3/30/06       |
| Sign: <i>Adam A. Conti</i>  |                       |                                   | Sign: <i>[Signature]</i>       |                             |                     |



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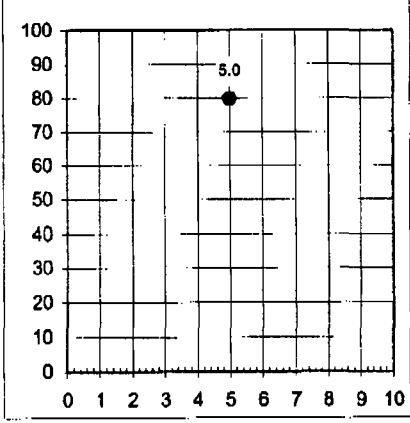
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## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |        |                                       |     |   |          |  |  |  |  |
|---|--------|---------------------------------------|-----|---|----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/9/06                     |     | Summary No.: U3C12-N4B-NV                       |          | Calibration No.: N4B-CS03              |  |  |  |
| Nozzle ID.: RPV N4B   |        |                                       |     |   |          |  |  |  |  |
| Component ID: RPV N4B   |        |                                       |     |   |          |  |  |  |  |
| Exam Description: 12" Feedwater Nozzle to Vessel Weld                               |        |                                       |     | ASME Section XI: 2001 Edition with 2003 Addenda |          |  |  |  |  |
| Drawing No.: 3-ISI-0327-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |     | Figure No.: IWB 2500-7                          |          |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |     | Nozzle Diameter: 12"                            |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |     | <b>CALIBRATION STANDARD</b>                     |          |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |     | Model: Benchmark                                |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 00X1XJ                    |     |   |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |        | Size: .5X1.0"                         |     |   |          | Temp: Block: 70°F Comp.: 83°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |     | Shape: Rectangle                                |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 7.92"  |        | Mode: Shear                           |     | Config.: Single                                 |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/μsec.   |        | Nominal Refracted Angle: 60°          |     |   |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 59°         |     |   |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq: 2.25 MHz  |        | Pulse: 222 ns                         |     | Nominal Skew Angle (If Applicable): 35-67       |          | Serial No.: 037405                     |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |     | Measured Skew Angle (If Applicable): 35-67      |          | Type: Rompas                           |  |  |  |
| Filter: Filter 2  |        | Reject: 0%                            |     | Wedge Radius (If Applicable): Flat              |          | Reflector: 10 13                       |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |     |   |          | Sweep Div.: 4 7                        |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |     |   |          | Amp. %: 100 40                         |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |     |   |          | Gain dB: 56.8 56.8                     |  |  |  |
| Ref. Sensitivity: 73.2 dB   |        |                                       |     |   |          |  |  |  |  |
| Scan Sensitivity: 76.0 dB   |        |                                       |     |   |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |     |   |          |  |  |  |  |
|   | Date   |                                       |     | Time  | Initials |  |  |  |  |
| Initial Cal:  | 3/9/06 |                                       |     | 0835  | LMK      |  |  |  |  |
| Intermediate:   | NA     |                                       |     | NA  | NA       |  |  |  |  |
| Intermediate:   | NA     |                                       |     | NA  | NA       |  |  |  |  |
| Intermediate:   | NA     |                                       |     | NA  | NA       |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA  |   |          |  |  |  |  |
| Final Cal.:   | 3/9/06 | 1325                                  | LMK |   |          |  |  |  |  |
|   |        | <b>0" THICKNESS DATA</b>              |     |   |          |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |     |   |          | Upper Shell: N/A                       |  |  |  |
| Sweep Position  |        | 5.6                                   |     |   |          | Lower Shell: N/A                       |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |     |   |          | Weld CL: N/A                           |  |  |  |
| Gain in dB  |        | 73.2 dB                               |     |   |          | At Indication: N/A                     |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen.  |        |                                       |     |   |          |  |  |  |  |
| Examiner: Mike W Kleinjan   |        | Level: II                             |     | Date: 3/9/06                                    |          | Examiner: N/A                          |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |        |                                       |     |   |          | Level: N/A                             |  |  |  |
| Reviewed: Adam A Conti  |        | Level: III                            |     | Date: 3/23/06                                   |          | Date: N/A                              |  |  |  |
| Sign: <i>Adam A Conti</i>   |        |                                       |     |   |          | ANII Review: <i>Paul Ford</i>          |  |  |  |
|   |        |                                       |     |   |          | Sign: <i>Paul Ford</i>                 |  |  |  |
|   |        |                                       |     |   |          | Date: 5/30/06                          |  |  |  |



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| <div style="text-align: center;">  <b>RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET</b> </div> |  |   |   |  |             |
|--|--|---|---|--|-------------|
| Site: Browns Ferry Unit 3  |  | Exam Date: 3/9/06                               | Summary No.: U3C12-N4B-NV                 |  |             |
| Nozzle ID.: RPV N4B  |  | Calibration No.: N4B-CS04                       |   |  |             |
| Component ID: RPV N4B  |  |   |   |  |             |
| Exam Description: 12" Feed Water Nozzle to Vessel Weld   |  | ASME Section XI: 2001 Edition with 2003 Addenda |   |  |             |
| Drawing No.: 3-ISI-0327-C  | Procedure No. / Rev.: 54-ISI-850 / 03  | Figure No.: IWB 2500-7                          |   |  |             |
| Material: CS Clad  | Thickness: 6.1"  | Nozzle Diameter: 12"                            |   |  |             |
| INSTRUMENT SETTINGS  |  | SEARCH UNIT                                     |   |  |             |
| Mfg.: Staveley   | Mfg.: KBA  | Model: Benchmark                                |   |  |             |
| Model: Sonic 136   | Serial No.: 01BV5J   |   | Cal. Block ID: BF-18                      |  |             |
| Serial No.: 136P1200G081455  | Size: .5X1.0"  |   | Cal. Block Thickness: 6.12"    Dia.: Flat |  |             |
| Range: 10"   | Freq: 2.25 MHz   | Shape: Rectangle                                | Temp: Block: 70°F    Comp.: 83°F          |  |             |
| Delay: 4.52"   | Mode: Shear  | Config: Single                                  | Thermometer VH: 9571                      |  |             |
| Velocity: .129 in/psec.  | Nominal Refracted Angle: 40°   |   | Couplant Type: Ultragel II                |  |             |
| Each Major Screen Div.: 1.0"   | Measured Refracted Angle: 42°  |   | Couplant Batch #: 05325                   |  |             |
| Freq.: 2.25 MHz  | Pulse: 222 ns  | Nominal Skew Angle (If Applicable): 120° +      | CALIBRATION VERIFICATION BLOCK            |  |             |
| Damping: 500 Ω   | Rep. Rate: 2 KHz   | Measured Skew Angle (If Applicable): 120°       | Serial No.: 037405                        | Type: Rompas   |             |
| Filter: Filter 2   | Reject: Off  | Wedge Radius (If Applicable): 3.75"             | Reflector:                                | 7    10  |             |
| Pulse Amplitude: Fixed   | Cable Type: RG-174    Length: 12'  | Sweep Div.: 4    7                              | Amp. %:                                   | 100    30  |             |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo   | No. of Intermediate Connectors: 0  | Gain dB:  | 52.4    52.4                              |  |             |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive  | DAC PLOT   |   |   |  |             |
| Ref. Sensitivity: 52.4 dB  |  |   |   |  |             |
| Scan Sensitivity: 69.0 dB  |  |   |   |  |             |
| CALIBRATION / VERIFICATION TIMES   |  |   |   |  |             |
|  |  |   | Date                                      | Time   | Initials    |
| Initial Cal:   |  |   | 3/9/06                                    | 0830   | <i>Mike</i> |
| Intermediate:  |  |   | NA  | NA   | NA          |
| Intermediate:  |  |   | NA  | NA   | NA          |
| Intermediate:  |  |   | NA  | NA   | NA          |
| Intermediate:  | NA   | NA  | NA  |  |             |
| Intermediate:  | NA   | NA  | NA  |  |             |
| Intermediate:  | NA   | NA  | NA  |  |             |
| Final Cal.:  | 3/9/06   | 1320  | <i>Mike</i>                               |  |             |
| Calibration Reflector(s)   |  | Notch   |   |  |             |
| Sweep Position   |  | 5.0   |   |  |             |
| Amplitude in % FSH   |  | 80%   |   |  |             |
| Gain in dB   |  | 52.4 dB   |   |  |             |
| Notes: Nozzle to Shell 3" delay on screen  |  |   |   |  |             |
| Examiner: Mike W Kleinjan<br>Sign: <i>Mike W Kleinjan</i>  |  | Level: II                                       | Date: 3/9/06                              | Examiner: NA<br>Sign: <i>NA</i>                        |             |
| Reviewed: Adam A. Conti<br>Sign: <i>Adam A. Conti</i>  |  | Level: III                                      | Date: 3/23/06                             | ANII Review<br>Sign: <i>Adam A. Conti</i> Date: 5/3/06 |             |



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## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |        |                                       |           |   |                        |  |  |  |  |
|---|--------|---------------------------------------|-----------|---|------------------------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/9/06                     |           | Summary No.: U3C12-N4B-NV                       |                        | Calibration No.: N4B-CS05                  |  |  |  |
| Nozzle ID.: RPV N4B   |        |                                       |           |   |                        |  |  |  |  |
| Component ID: RPV N4B   |        |                                       |           |   |                        |  |  |  |  |
| Exam Description: 12" Feed Water Nozzle to Vessel Weld                              |        |                                       |           | ASME Section XI: 2001 Edition with 2003 Addenda |                        |  |  |  |  |
| Drawing No.: 3-ISI-0327-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                          |                        |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |           | Nozzle Diameter: 12"                            |                        |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>                     |                        |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |           | Model: Benchmark                                |                        | Cal. Block ID: BF-18                       |  |  |  |
| Model: Sonic 136  |        | Serial No.: 0111PP                    |           |   |                        | Cal. Block Thickness: 6.12" Dia.: Flat     |  |  |  |
| Serial No.: 136P1200G081455   |        | Size: .5X1.0"                         |           |   |                        | Temp: Block: 70°F Comp.: 83°F              |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |           | Shape: Rectangle                                |                        | Thermometer VH: 9571                       |  |  |  |
| Delay: 4.52"  |        | Mode: Shear                           |           | Config.: Single                                 |                        | Couplant Type: Ultragel II                 |  |  |  |
| Velocity: .129 in/μsec.   |        | Nominal Refracted Angle: 40°          |           |   |                        | Couplant Batch #: 05325                    |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 42°         |           |   |                        | <b>CALIBRATION VERIFICATION BLOCK</b>      |  |  |  |
| Freq.: 2.25 MHz   |        | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): 120° -      |                        | Serial No.: 037405 Type: Rompas            |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): 120°       |                        | Reflector: 7 10                            |  |  |  |
| Filter: Filter 2  |        | Reject: Off                           |           | Wedge Radius (If Applicable): 3.75"             |                        | Sweep Div.: 4 7                            |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |           |   |                        | Amp. %: 100 30                             |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |           |   |                        | Gain dB: 52.4 52.4                         |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |           |   |                        |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |        |                                       |           |   |                        |  |  |  |  |
| Scan Sensitivity: 69.0 dB   |        |                                       |           |   |                        |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |           |   |                        |  |  |  |  |
|   | Date   |                                       |           | Time  | Initials               |  |  |  |  |
| Initial Cal:  | 3/9/06 |                                       |           | 0825  | <i>Mike W Kleinjan</i> |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA                     |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA                     |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA                     |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |                        |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |                        |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |                        |  |  |  |  |
| Final Cal.:   | 3/9/06 | 1318                                  | <i>OK</i> |   |                        |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |           |   |                        |  |  |  |  |
| Sweep Position  |        | 5.0                                   |           |   |                        |  |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |           |   |                        |  |  |  |  |
| Gain in dB  |        | 52.4dB                                |           |   |                        |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen   |        |                                       |           |   |                        |  |  |  |  |
| Examiner: Mike W Kleinjan   |        | Level: II                             |           | Date: 3/9/06                                    |                        | Examiner: _____                            |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |        |                                       |           |   |                        | Level: _____                               |  |  |  |
| Reviewed: Adam A Conti  |        | Level: III                            |           | Date: 3/23/06                                   |                        | ANII Review: _____                         |  |  |  |
| Sign: <i>Adam A Conti</i>   |        |                                       |           |   |                        | Sign: <i>Sal Hale</i> Date: <i>3/30/06</i> |  |  |  |



Weld Examination Report R-087

N4C-N/V

Feedwater Nozzle



000300 R-087



## EXAMINATION SUMMARY

|   |   |                                 |
|---|---|---------------------------------|
| Summary No.: U3C12-N4C-NV   | Examination Data Sheet : N4C-DS01, N4C-DS02   | Exam Date: 3/8/2006<br>3/9/2006 |
| Customer: Browns Ferry Unit 3 U3C12   | Examination Methods: Ultrasonic   |                                 |
| System / Component ID: BFN3-N4C-NV  | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                                 |
| Component Description: Nozzle to Vessel Weld  | Modeling Number: IR-2003-18 Section 4   |                                 |
| Examination Category: B-D   | Calibration Sheets No(s):<br>N4C-CS01      N4C-CS04<br>N4C-CS02      N4C-CS05<br>N4C-CS03   |                                 |
| ISO / Drawing: N4/3-ISI-0327-C  | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                                 |
| Framatome ANP Safety Document Change Notices:<br>*SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 |   |                                 |

Summary: *Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/4/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Feed Water (N4) Nozzle Modeling Parameters |             |              |
|--|-------------|--------------|
| Probe                                      | Probe Skew  | Scan Surface |
| 60° Shear                                  | ±(35 to 67) | Vessel       |
| 40° Shear                                  | ±120        | Blend        |

39% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 48.13% volumetric coverage due to nozzle blend radius interference.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a ½" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7 (a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                                  |                     |                                   |                 |
|----------------------------------|---------------------|-----------------------------------|-----------------|
| Prepared By: George Chapman LVII | Date: 3/09/2006     | Reviewed By: Adam A. Contri LVIII | Date: 3/23/2006 |
| Sign: <i>[Signature]</i>         |                     | Sign: <i>[Signature]</i>          |                 |
| Customer: Matt Welch             | Date: <i>5/4/06</i> | ANII Review: <i>[Signature]</i>   | <i>6/6/06</i>   |
| Sign: <i>[Signature]</i>         |                     |                                   |                 |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/08/2006 15:50

Examination Data Sheet No.: N4C-DS01

Iso / Drawing: N4/3-ISI-0327-C

Calibration Sheet: N4C-CS01, N4C-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N4C

Lo: TDC

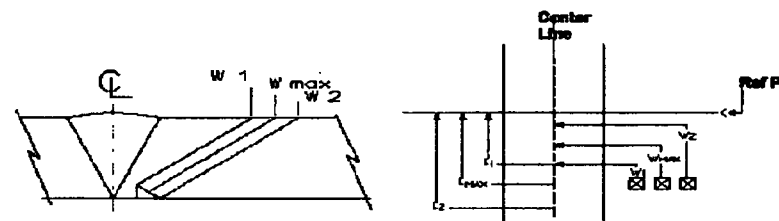
Procedure No.: N-UT-78-03

Component Description: 12 Feedwater Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 DS = Half Max Amplitude  
 HMA = Dist From Ref Pt at Max.  
 Lmax = Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  | None     |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientation: radial and circumferential. Circumferential scans performed with  $\pm 10^\circ$  tangential skew.
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: George G. Chapman

Level: II

Date: 03/08/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/23/06

ANII Review:

Date:





# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/9/06 09:25

Examination Data Sheet No: N4C-DS02

Iso / Drawing: N4/3-ISI-0327-C

Calibration Sheet: N4C-CS03, N4C-CS04  
N4C-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 40°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N4C

Lo: TDC

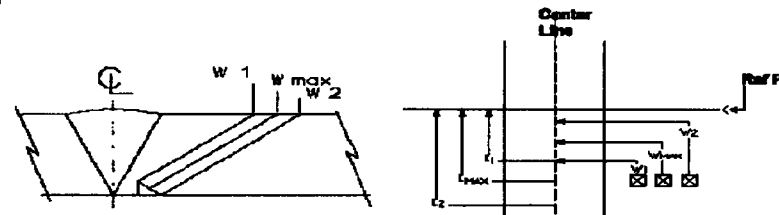
Procedure No.: 54-ISI-850-03

Component Description: 12 Feedwater Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
DS = Half Max Amplitude  
HMA = Dist From Ref Pt at Max.  
Lmax = Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientations: Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Mike W. Kleinjan

Level: II

Date: 3/9/06

Examiner: N/A

Level:

Date:

Reviewed: Adam Conti

Level: III

Date: 3/23/06

ANII Review:

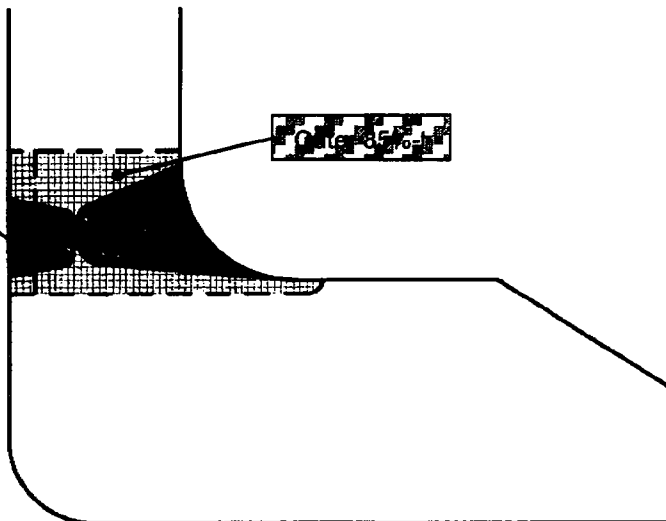
Date:





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N4C | Date: 03/23/06 | Summary No: U3C12-N4C-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans   | Circumferential Scans   |   |
|---|---|---|
| 100%-t  | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 45.019 <sup>2</sup> inches                          | <sup>D</sup> Inner 15%-t Examination Volume: 4.6675 <sup>2</sup> inches                       | <sup>G</sup> Outer 85%-t Examination Volume: 40.3524 <sup>2</sup> inches.                           |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 24.0885 <sup>2</sup> inches                         | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 6.812 <sup>2</sup> inches                                 |
|   | <sup>F</sup> Inner 15%-t Volume Achieved: 4.6675 <sup>2</sup> inches                          |   |
| <sup>C</sup> Percentage of Axial Coverage: 53%<br>$B + A \times 100 = C$                      | <sup>I</sup> Total Circumferential Examination Coverage: 25%<br>$(F + H) + A = J$             |   |

### Combined Axial and Circumferential Weld Coverage

<sup>L</sup>Total Examination Coverage: 39%  
 $(C + J) + 2 = L$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/23/06 | Reviewed by: Adam Conti | Date: 03/23/06 | ANII Review: | Date: |
|                           |                |                         |                | 6/6/06       |       |





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N4C | Date: 03/23/06 | Summary No: U3C12-N4C-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

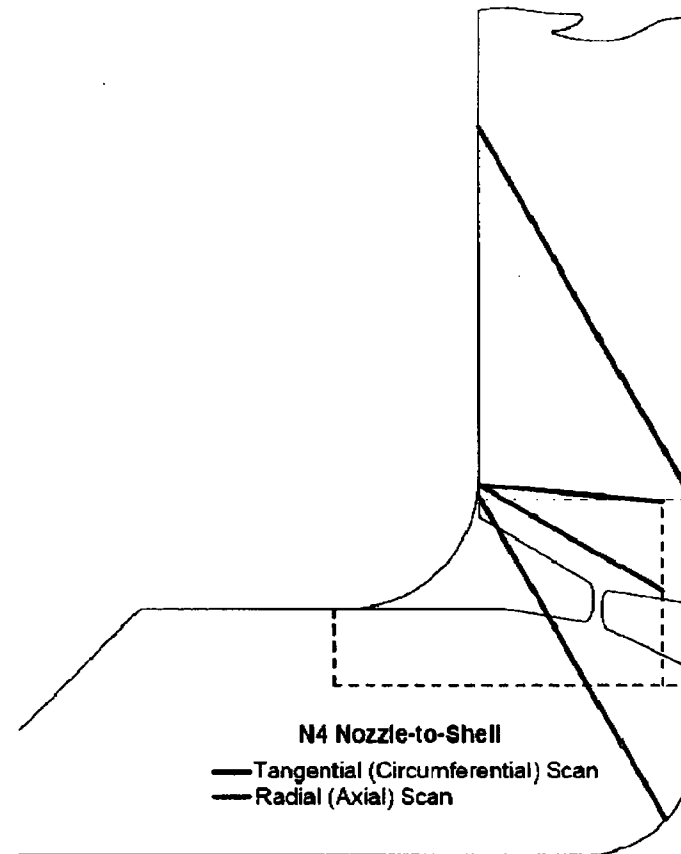
Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 39% coverage.



Prepared by: Bret Flesner

Date: 03/23/06

Reviewed by: Adam Conti

Date: 03/23/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Sal Flesner 6/6/06*

000304

R-087



000305 R-087



## UT CALIBRATION DATA SHEET

|   |                    |  |                    |                                |                     |
|---|--------------------|--|--------------------|--------------------------------|---------------------|
| Customer: Browns Ferry Unit 3   |                    | Exam Date: 03/08/2006  |                    | Calibration No.: N4C-CS01      |                     |
| System / Component I.D.: RPV Nozzle N4C   |                    |  |                    |                                |                     |
| Component Description: 12" Feedwater Nozzle to Vessel Weld (Zone-1 Examination) |                    |  |                    |                                |                     |
| ISO / Drawing No.: 3-ISI-0327-C   |                    | Procedure No. / Rev.: N-UT-78 / 3  |                    |                                |                     |
| Material: Clad CS   |                    | Diameter: 12" Nozzle   |                    | Thickness: 6.1" Nominal        |                     |
| INSTRUMENT SETTINGS   |                    | SEARCH UNIT  |                    | CALIBRATION STANDARD           |                     |
| Mfg: Krautkramer  | Model: USN58L      | Serial No: 03-848  | Mfg: RTD           | Calibration Block No: BF-18    |                     |
| Serial / MT&E #: 0100D0   |                    | Model: TRL2-AUST   | Size: 2(24x42) 1/4 | Thickness (in): 6.12"          | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 In/Micro Seconds                                    |                    | Shape: Rectangle   | Freq: 2.0 MHz      | Temp (F) Block: 70°            | Temp (F) Comp.: 83° |
| Delay: 14.000 µs  | Range: 8.0         | Config.: Dual  | Mode: Long.        | Thermometer No.: VH-9571       |                     |
| Each Major Screen Div. #: 0.8   |                    | Nominal Angle: 60°   | Measured: 61°      | Couplant: Ultragel II          | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path  |                    | Fixture / Size: Integral   |                    | CALIBRATION STANDARD SIMULATOR |                     |
| Filter: Full Wave   | Reject: 0%         | Cable Type & Length: RG-174 / 25'  |                    | Serial No.: NA                 |                     |
| Damping: 1 K  | Freq (MHz): 2 - 25 | No. of Connectors: 0   |                    | Description: NA                |                     |
| Rep. Rate: Auto High  |                    | DAC PLOT   |                    | Reflectors                     | NA NA               |
| Pulse Amp: Fixed  | Pulsar: High       |  |                    | Sweep Position                 | NA N/A              |
| Reference Sensitivity: 59.0 dB  |                    |  |                    | Signal Amp (%)                 | NA N/A              |
| Scan Sensitivity: 75.0 dB   |                    |  |                    | Gain DB (dB):                  | NA N/A              |
|   |                    |  |                    |                                |                     |
| CALIBRATION CHECK   |                    |  |                    | Probe Squint Angle 3°          |                     |
|   | Date/Time          | OK   | Initials           | Probe Focus: FD ~2.70"         |                     |
| Initial Cal:  | 3/8/06 15:40       | X  | ABC                |                                |                     |
| Init. Sim. Cal:   | N/A                |  | N/A                |                                |                     |
| Intermediate:   | N/A                |  | N/A                |                                |                     |
| Intermediate:   | N/A                |  | N/A                |                                |                     |
| Intermediate:   | N/A                |  | N/A                |                                |                     |
| Intermediate:   | N/A                |  | N/A                |                                |                     |
| Intermediate:   | N/A                |  | N/A                |                                |                     |
| Final Cal:  | 3/8/06 17:40       | X  | ABC                | 0 DEGREE WELD THICKNESS ONLY   |                     |
| Beam Direction on Calibration Block   |                    | Circ Scan Exam Angle is ≤ the inverse sine of the Nominal ID/OD ratio?                           |                    | Component: N/A                 |                     |
| (Yes / No)  |                    | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                    | BM: N/A HAZ: N/A               |                     |
|   |                    | 0 Deg.   | Axial              | Circ                           | C/L Weld: N/A       |
|   |                    | NO   | YES                | NO                             | Component: N/A      |
|   |                    |  |                    | BM: N/A HAZ: N/A               |                     |
|   |                    |  |                    | Crown HT: N/A                  | Weld Width: N/A     |
| Reflector   | 1/4T SDH           |  |                    |                                |                     |
| Sweep Position / Depth in Inches  | 3.6                |  |                    |                                |                     |
| Amplitude in %  | 80%                |  |                    |                                |                     |
| Gain in dB  | 59.0 dB            |  |                    |                                |                     |
| Notes: The 60° Zone-1 ultrasonic examination.                                   |                    |  |                    |                                |                     |
| Examiner: George G Chapman  |                    | Level: II  | Date: 3/08/06      | Examiner: N/A                  | Date: N/A           |
| Sign:   |                    |  |                    | Level: NA                      |                     |
| Reviewed: Adam A Conti  |                    | Level: III   | Date: 3/23/06      | ANII Review                    | Date: 3/1/06        |
| Sign:   |                    |  |                    | Sign:                          |                     |



000306 R-087



## UT CALIBRATION DATA SHEET

|   |                         |  |                                 |                                |                     |
|---|-------------------------|--|---------------------------------|--------------------------------|---------------------|
| Customer: Browns Ferry Unit 3   |                         | Exam Date: 03/08/2006  |                                 | Calibration No.: N4C-CS02      |                     |
| System / Component I.D.: RPV Nozzle N4C   |                         |  |                                 |                                |                     |
| Component Description: 12" Feedwater Nozzle to Vessel Weld (Zone-2 Examination) |                         |  |                                 |                                |                     |
| ISO / Drawing No.: 3-ISI-0327-C   |                         | Procedure No. / Rev.: N-UT-78 / 3  |                                 |                                |                     |
| Material: Clad CS   |                         | Diameter: 12" Nozzle   |                                 | Thickness: 6.1" Nominal        |                     |
| INSTRUMENT SETTINGS   |                         | SEARCH UNIT  |                                 | CALIBRATION STANDARD           |                     |
| Mfg: Krautkramer  | Model: USN58L           | Serial No: 03-848  | Mfg: RTD                        | Calibration Block No: BF-18    |                     |
| Serial / MT&E #: 0100D0   |                         | Model: TRL2-AUST   | Size: 2(24x42) 1/4"             | Thickness (in): 6.12"          | Diameter (in): Flat |
| Mat. Cal. / Velocity: 2320 In/Micro Seconds                                     |                         | Shape: Rectangle   | Freq: 2.0 MHz                   | Temp (F) Block: 70°            | Temp (F) Comp: 83°  |
| Delay: 14.000 µS  | Range: 20.0             | Config.: Dual  | Mode: Long.                     | Thermometer No.: VH-9571       |                     |
| Each Major Screen Div. #: 2.0   |                         | Nominal Angle: 60°   | Measured: 61°                   | Couplant: Ultragel II          | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path  |                         | Fixture / Size: Integral   |                                 | CALIBRATION STANDARD SIMULATOR |                     |
| Filter: Full Wave   | Reject: 0%              | Cable Type & Length: RG-174 / 25'  |                                 | Serial No.: NA                 |                     |
| Damping: 1 K  | Freq (MHz): 2 - 25      | No. of Connectors: 0   |                                 | Description: NA                |                     |
| Rep. Rate: Auto High  |                         | DAC PLOT   |                                 | Reflectors                     | N/A                 |
| Pulse Amp: Fixed  | Pulsar: High            |  |                                 | Sweep Position                 | N/A                 |
| Reference Sensitivity: 72.0 dB  |                         |  |                                 | Signal Amp (%)                 | N/A                 |
| Scan Sensitivity: 80.0 dB   |                         |  |                                 | Gain DB (dB):                  | N/A                 |
|   |                         |  |                                 |                                |                     |
| CALIBRATION CHECK   |                         |  |                                 | Probe Squint Angle 3°          |                     |
| Initial Cal:  | Date/Time: 3/8/06 15:50 | OK: X  | Initials: <i>AKC</i>            | Probe Focus: FD ~2.70"         |                     |
| Init. Sim. Cal:   | N/A                     |  | N/A                             |                                |                     |
| Intermediate:   | N/A                     |  | N/A                             |                                |                     |
| Intermediate:   | N/A                     |  | N/A                             |                                |                     |
| Intermediate:   | N/A                     |  | N/A                             |                                |                     |
| Intermediate:   | N/A                     |  | N/A                             |                                |                     |
| Final Cal:  | 3/8/06 17:50            | X  | <i>AKC</i>                      | 0 DEGREE WELD THICKNESS ONLY   |                     |
| Beam Direction on Calibration Block   |                         | Circ Scan Exam Angle is =< the inverse sine of the Nominal ID/OD ratio?                          |                                 | Component: N/A                 |                     |
| (Yes / No)  |                         | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                                 | BM: N/A HAZ: N/A               |                     |
|   |                         |  |                                 | C/L Weld: N/A                  |                     |
|   |                         |  |                                 | Component: N/A                 |                     |
|   |                         |  |                                 | BM: N/A HAZ: N/A               |                     |
|   |                         |  |                                 | Crown HT: N/A Weld Width: N/A  |                     |
| Reflector   | ID NOTCH                |  |                                 |                                |                     |
| Sweep Position / Depth in Inches  | 6.0                     |  |                                 |                                |                     |
| Amplitude in %  | 80%                     |  |                                 |                                |                     |
| Gain in dB  | 72.0 dB                 |  |                                 |                                |                     |
| Notes: The 60° Zone-2 ultrasonic examination.                                   |                         |  |                                 |                                |                     |
| Examiner: George G Chapman  | Level: II               | Date: 3/08/06  | Examiner: N/A                   | Level: NA                      | Date: N/A           |
| Reviewed: <i>Adam A. Conti</i>  | Level: III              | Date: 3/23/06  | ANII Review: <i>Sam F. F...</i> |                                | Date: 8/1/06        |



000307

R-087

**A****AREVA****RPV ULTRASONIC CALIBRATION & EXAM DATA SHEET**

|   |        |                                       |           |   |           |  |  |  |  |
|---|--------|---------------------------------------|-----------|---|-----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/9/06                     |           | Summary No.: U3C12-N4C-NV                         |           | Calibration No.: N4C-CS03              |  |  |  |
| Nozzle ID.: RPV N4C   |        |                                       |           |   |           |  |  |  |  |
| Component ID: RPV N4C   |        |                                       |           |   |           |  |  |  |  |
| Exam Description: 12" Feedwater Nozzle to Vessel Weld                               |        |                                       |           | ASME Section XI: 2001 Edition with 2003 Addenda   |           |  |  |  |  |
| Drawing No.: 3-ISI-0327-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                            |           |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |           | Nozzle Diameter: 12"                              |           |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>                       |           |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |           | Model: Benchmark                                  |           | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 00X1XJ                    |           |   |           | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |        | Size: .5X1.0"                         |           |   |           | Temp: Block: 70°F Comp.: 83°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |           | Shape: Rectangle                                  |           | Thermometer VH: 9571                   |  |  |  |
| Delay: 7.92"  |        | Mode: Shear                           |           | Config.: Single                                   |           | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/us.   |        | Nominal Refracted Angle: 60°          |           |   |           | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 59°         |           |   |           | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz   |        | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): 35-67         |           | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): 35-67        |           | Reflector: 10 13                       |  |  |  |
| Filter: Filter 2  |        | Reject: 0%                            |           | Wedge Radius (If Applicable): Flat                |           | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |           |   |           | Amp. %: 100 40                         |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |           |   |           | Gain dB: 56.8 56.8                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |           |   |           |  |  |  |  |
| Ref. Sensitivity: 73.2 dB   |        |                                       |           |   |           |  |  |  |  |
| Scan Sensitivity: 76.0 dB   |        |                                       |           |   |           |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |           |   |           |  |  |  |  |
|   | Date   |                                       |           | Time  | Initials  |  |  |  |  |
| Initial Cal:  | 3/9/06 |                                       |           | 0835  | <i>mk</i> |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Final Cal.:   | 3/9/06 | 1325                                  | <i>mk</i> |   |           |  |  |  |  |
|   |        | <b>0° THICKNESS DATA</b>              |           |   |           |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |           |   |           | Upper Shell: N/A Lower Shell: N/A      |  |  |  |
| Sweep Position  |        | 5.6                                   |           |   |           | Weld CL: N/A At Indication: N/A        |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |           |   |           |  |  |  |  |
| Gain in dB  |        | 73.2 dB                               |           |   |           |  |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen.  |        |                                       |           |   |           |  |  |  |  |
| Examiner: Mike W Kleinjan<br>Sign: <i>Mike W Kleinjan</i> Level: II Date: 3/9/06    |        |                                       |           | Examiner: N/A<br>Sign: _____ Level: N/A Date: N/A |           |  |  |  |  |
| Reviewed: Adam A. Bond<br>Sign: <i>Adam A. Bond</i> Level: III Date: 3/23/06        |        |                                       |           | ANII Review: <i>Paul F. Bond</i> Date: 6/11/06    |           |  |  |  |  |



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AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |        |                                       |            |   |            |  |  |  |  |
|---|--------|---------------------------------------|------------|---|------------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/9/06                     |            | Summary No.: U3C12-N4C-NV                       |            | Calibration No.: N4C-CS04              |  |  |  |
| Nozzle ID.: RPV N4C   |        |                                       |            |   |            |  |  |  |  |
| Component ID: RPV N4C   |        |                                       |            |   |            |  |  |  |  |
| Exam Description: 12" Feed Water Nozzle to Vessel Weld                              |        |                                       |            | ASME Section XI: 2001 Edition with 2003 Addenda |            |  |  |  |  |
| Drawing No.: 3-ISI-0327-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |            | Figure No.: IWB 2500-7                          |            |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |            | Nozzle Diameter: 12"                            |            |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |            | <b>CALIBRATION STANDARD</b>                     |            |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |            | Model: Benchmark                                |            | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 01BV5J                    |            |   |            | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |        | Size: .5X1.0"                         |            |   |            | Temp: Block: 70°F Comp.: 83°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |            | Shape: Rectangle                                |            | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"  |        | Mode: Shear                           |            | Config.: Single                                 |            | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/us.   |        | Nominal Refracted Angle: 40°          |            |   |            | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 42°         |            | <b>CALIBRATION VERIFICATION BLOCK</b>           |            |  |  |  |  |
| Freq.: 2.25 MHz   |        | Pulse: 222 ns                         |            | Nominal Skew Angle (If Applicable): 120° +      |            | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |            | Measured Skew Angle (If Applicable): 120°       |            | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2  |        | Reject: Off                           |            | Wedge Radius (If Applicable): 3.75"             |            | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |            |   |            | Amp. %: 100 30                         |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |            |   |            | Gain dB: 52.4 52.4                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |            |   |            |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |        |                                       |            |   |            |  |  |  |  |
| Scan Sensitivity: 69.0 dB   |        |                                       |            |   |            |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |            |   |            |  |  |  |  |
|   | Date   |                                       |            | Time  | Initials   |  |  |  |  |
| Initial Cal:  | 3/9/06 |                                       |            | 0830  | <i>WIK</i> |  |  |  |  |
| Intermediate:   | NA     |                                       |            | NA  | NA         |  |  |  |  |
| Intermediate:   | NA     |                                       |            | NA  | NA         |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA         |   |            |  |  |  |  |
| Final Cal.:   | 3/9/06 | 1320                                  | <i>WIK</i> |   |            |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |        |                                       |            |   |            |  |  |  |  |
| Upper Shell: N/A  |        | Lower Shell: N/A                      |            |   |            |  |  |  |  |
| Weld CL: N/A  |        | At Indication: N/A                    |            |   |            |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |            |   |            |  |  |  |  |
| Sweep Position  |        | 5.0                                   |            |   |            |  |  |  |  |
| Amplitude In % FSH  |        | 80%                                   |            |   |            |  |  |  |  |
| Gain In dB  |        | 52.4 dB                               |            |   |            |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen   |        |                                       |            |   |            |  |  |  |  |
| Examiner: Mike W Kleinjan   |        | Level: II                             |            | Date: 3/9/06                                    |            | Examiner: NA                           |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |        |                                       |            |   |            | Level:                                 |  |  |  |
| Reviewed: Adam A. Conner  |        | Level: III                            |            | Date: 3/23/06                                   |            | ANII Review: <i>Paul F. Paul</i>       |  |  |  |
| Sign: <i>Adam A. Conner</i>   |        |                                       |            |   |            | Date: <i>3/11/06</i>                   |  |  |  |



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**A****AREVA****RPV ULTRASONIC CALIBRATION & EXAM DATA SHEET**

|   |        |                                       |           |   |           |  |  |  |  |
|---|--------|---------------------------------------|-----------|---|-----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |        | Exam Date: 3/9/06                     |           | Summary No.: U3C12-N4C-NV                       |           | Calibration No.: N4C-CS05              |  |  |  |
| Nozzle ID.: RPV N4C   |        |                                       |           |   |           |  |  |  |  |
| Component ID: RPV N4C   |        |                                       |           |   |           |  |  |  |  |
| Exam Description: 12" Feed Water Nozzle to Vessel Weld                              |        |                                       |           | ASME Section XI: 2001 Edition with 2003 Addenda |           |  |  |  |  |
| Drawing No.: 3-ISI-0327-C   |        | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                          |           |  |  |  |  |
| Material: CS Clad   |        | Thickness: 6.1"                       |           | Nozzle Diameter: 12"                            |           |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |        | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>                     |           |  |  |  |  |
| Mfg.: Staveley  |        | Mfg.: KBA                             |           | Model: Benchmark                                |           | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136  |        | Serial No.: 0111PP                    |           |   |           | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455   |        | Size: .5X1.0"                         |           |   |           | Temp. Block: 70°F Comp.: 83°F          |  |  |  |
| Range: 10"  |        | Freq: 2.25 MHz                        |           | Shape: Rectangle                                |           | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.52"  |        | Mode: Shear                           |           | Config.: Single                                 |           | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/μsec.   |        | Nominal Refracted Angle: 40°          |           |   |           | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"  |        | Measured Refracted Angle: 42°         |           |   |           | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz   |        | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): 120° -      |           | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω  |        | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): 120°       |           | Reflector: 7 10                        |  |  |  |
| Filter: Filter 2  |        | Reject: Off                           |           | Wedge Radius (If Applicable): 3.75"             |           | Sweep Div.: 4 7                        |  |  |  |
| Pulse Amplitude: Fixed  |        | Cable Type: RG-174 Length: 12'        |           |   |           | Amp. %: 100 30                         |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |        | No. of Intermediate Connectors: 0     |           |   |           | Gain dB: 52.4 52.4                     |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |        | <b>DAC PLOT</b>                       |           |   |           |  |  |  |  |
| Ref. Sensitivity: 52.4 dB   |        |                                       |           |   |           |  |  |  |  |
| Scan Sensitivity: 69.0 dB   |        |                                       |           |   |           |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |        |                                       |           |   |           |  |  |  |  |
|   | Date   |                                       |           | Time  | Initials  |  |  |  |  |
| Initial Cal:  | 3/9/06 |                                       |           | 0825  | <i>mt</i> |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA     |                                       |           | NA  | NA        |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA     | NA                                    | NA        |   |           |  |  |  |  |
| Final Cal.:   | 3/9/06 | 1318                                  | <i>mt</i> |   |           |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |        |                                       |           |   |           |  |  |  |  |
| Upper Shell: N/A  |        | Lower Shell: N/A                      |           |   |           |  |  |  |  |
| Weld CL: N/A  |        | At Indication: N/A                    |           |   |           |  |  |  |  |
| Calibration Reflector(s)  |        | Notch                                 |           |   |           |  |  |  |  |
| Sweep Position  |        | 5.0                                   |           |   |           |  |  |  |  |
| Amplitude in % FSH  |        | 80%                                   |           |   |           |  |  |  |  |
| Gain in dB  |        | 52.4dB                                |           |   |           |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen   |        |                                       |           |   |           |  |  |  |  |
| Examiner: Mike W Kleinjan   |        | Level: II                             |           | Date: 3/9/06                                    |           | Examiner: _____                        |  |  |  |
| Sign: <i>Mike W Kleinjan</i>  |        |                                       |           |   |           | Level: _____                           |  |  |  |
| Reviewed: Adam A. Conti   |        | Level: III                            |           | Date: 3/23/06                                   |           | ANII Review: _____                     |  |  |  |
| Sign: <i>Adam A. Conti</i>  |        |                                       |           |   |           | Date: <i>6/11/06</i>                   |  |  |  |



Weld Examination Report R-088

N5A-N/V

Core Spray Nozzle





## EXAMINATION SUMMARY

|  |  |                                 |
|--|--|---------------------------------|
| Summary No.: U3C12-N5A-NV  | Examination Data Sheet : N5A-DS01, N5A-DS02  | Exam Date: 3/7/2006<br>3/8/2006 |
| Customer: Browns Ferry Unit 3 U3C12                              | Examination Methods: Ultrasonic  |                                 |
| System / Component ID: BFN-N5A-NV                                | Examination Procedures: 54-ISI-850-03* N-UT-78-03                                  |                                 |
| Component Description: Nozzle to Vessel Weld                     | Modeling Number: IR-2003-19 Section 6  |                                 |
| Examination Category: B-D  | Calibration Sheets No(s):<br>N5A-CS01 N5A-CS04<br>N5A-CS02 N5A-CS05<br>N5A-CS03    |                                 |
| ISO / Drawing: N5A/3-ISI-0331C                                   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications |                                 |
| Framatome ANP Safety Document Change Notices:                    | <input type="checkbox"/> Reportable Indications                                    |                                 |
| *SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 | <input type="checkbox"/> Geometric   |                                 |

Summary: *Ref: TVA PER numbers 99373 and 99581. Matt Welch 3/9/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Jet Pump Instrumentation (N8) Nozzle Modeling Parameters |             |              |
|--|-------------|--------------|
| Probe  | Probe Skew  | Scan Surface |
| 35° Shear  | ± 68        | Blend        |
| 60° Shear  | ±(30 to 64) | Vessel       |

38% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketches for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to ~ 43% volumetric coverage due to nozzle blend radius and insulation support ring interferences.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|  |                |  |                 |
|--|----------------|--|-----------------|
| Prepared By: Wade Holloway<br>Sign: <i>Wade Holloway</i> | Date: 3/8/2006 | Reviewed By: Adam A. Conner LVIII<br><i>Adam A. Conner</i> | Date: 3/25/2006 |
| Customer: Matt Welch<br>Sign: <i>Matt Welch</i>          | Date: 5/9/06   | ANII Review: <i>Paul F. [Signature]</i>                    | 6/6/06          |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/07/2006 21:00

Examination Data Sheet No.: N5A-DS01

Iso / Drawing: N5A/3-ISI-0331-C

Calibration Sheet: N5A-CS01, N5A-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N5A

Lo: TDC

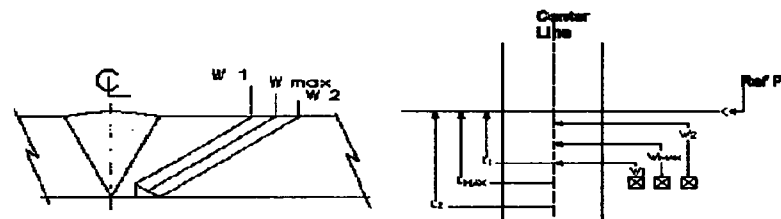
Procedure No.: N-UT-78-03

Component Description: 10 Core Spray Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

- Search unit orientation: radial and circumferential.
- Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

|                         |           |                |               |        |       |                         |            |                |
|-------------------------|-----------|----------------|---------------|--------|-------|-------------------------|------------|----------------|
| Examiner: Wade Holloway | Level: II | Date: 03/07/06 | Examiner: N/A | Level: | Date: | Reviewed: Adam A. Conti | Level: III | Date: 03/25/06 |
|                         |           |                |               |        |       |                         |            |                |
| ANII Review:            | Date:     |                |               |        |       |                         |            |                |
|                         | 6/6/06    |                |               |        |       |                         |            |                |

000330

R-088





# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/08/06 09:00

Examination Data Sheet No.: N5A-DS02

Iso / Drawing: N5A/3-ISI-0331-C

Calibration Sheet: N5A-CS03, N5A-CS04  
N5A-CS05

Wo: Nozzle Boss To Blend Radius

Exam Angle: 35°S, 60°S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N5A

Lo: TDC

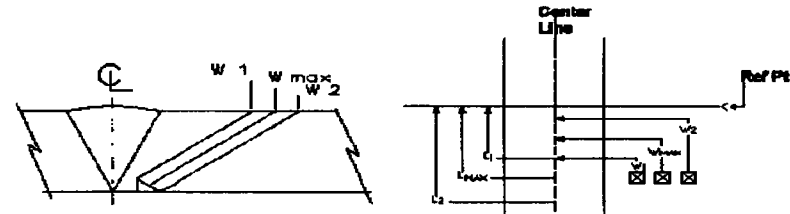
Procedure No.: 54-ISI-850-03

Component Description: 10" Core Spray Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
CW = Clockwise  
D = Depth  
DS = Downstream  
HMA = Half Max Amplitude  
Lmax = Dist From Ref Pt at Max Amplitude  
L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
US = Up Stream  
TWD = Through Wall Dimension  
Wmax = Dist From CL at Max Amplitude  
W1 = Dist From CL at Specified % of Dac (Forward)  
W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientations: Circumferential and Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Mike W. Kleinjan

Level: II

Date: 3/08/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/25/06

ANII Review:

Date:

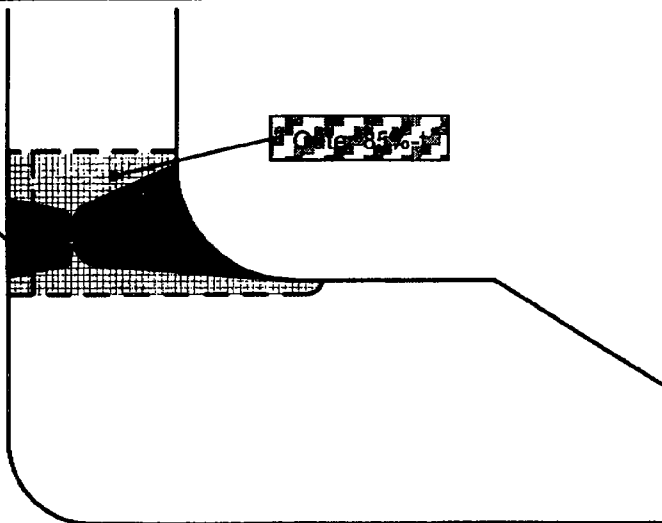
6/6/06





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N5A | Date: 03/25/06 | Summary No: U3C12-N5A-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans<br>100%-t   | Circumferential Scans   |   |
|---|---|---|
|   | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>A</sup> Required Examination Volume: 42.85086 <sup>2</sup> inches                        | <sup>B</sup> Inner 15%-t Examination Volume: 4.85743 <sup>2</sup> inches                      | <sup>C</sup> Outer 85%-t Examination Volume: 37.99343 <sup>2</sup> inches.                          |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>E</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius and Insulation Support Ring                    | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>B</sup> Total Axial Volume Achieved: 20.77319 <sup>2</sup> inches                        | Description of Limitation: N/A  | <sup>H</sup> Outer 85%-t Volume Achieved: 7.1100 <sup>2</sup> inches                                |
|   | <sup>I</sup> Inner 15%-t Volume Achieved: 4.85743 <sup>2</sup> inches                         |   |
| <sup>C</sup> Percentage of Axial Coverage: 48.48%<br>$B + A \times 100 = C$                   | <sup>J</sup> Total Circumferential Examination Coverage: 28%<br>$(F + H) + A = J$             |   |
| <b>Combined Axial and Circumferential Weld Coverage</b>                                       |   |   |
| <b><sup>L</sup>Total Examination Coverage: 38%</b><br>$(C + J) + 2 = L$                       |   |   |
| Prepared by: Bret Flesner   | Date: 03/25/06  | Reviewed by: Adam Conti   |
|   |   | Date: 03/25/06  |
| ANII Review:  |   | Date:   |





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N5A | Date: 03/25/06 | Summary No: U3C12-N5A-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

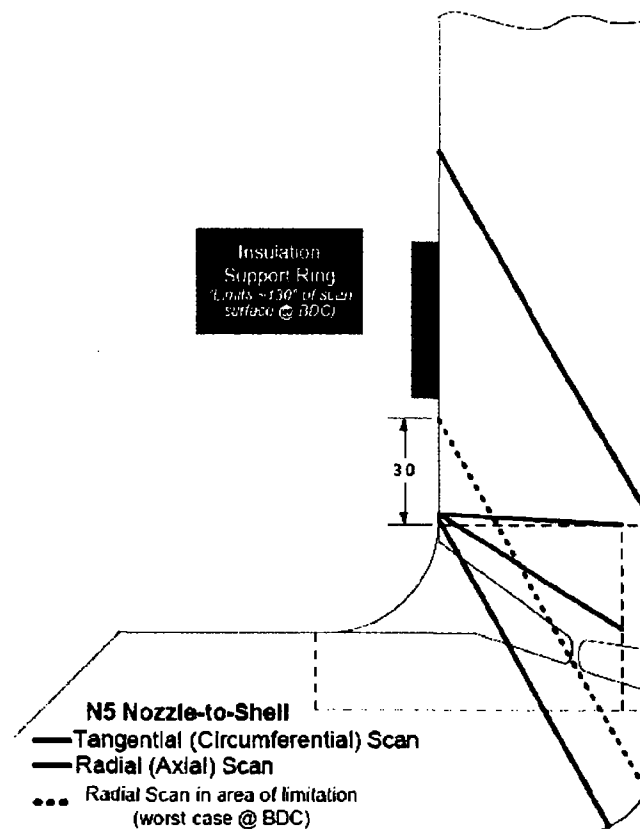
Radial scans are additionally limited for 22" of the circumference due to an insulation support ring. This limitation was from 3.0" (Wo) to the maximum required Wo (11.55") at the point of worst case scenario (bottom dead center). The worst case limitation value incrementally improves as the scanning progressed around the circumference. Refer to the N5A Limitation Sketch for additional detail.

60°RL radial and tangential scans were performed from the shell surface.

The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the blend radius. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 38% coverage.



Prepared by: Bret Flesner

Date: 03/25/06

Reviewed by: Adam Conti

Date: 03/25/06

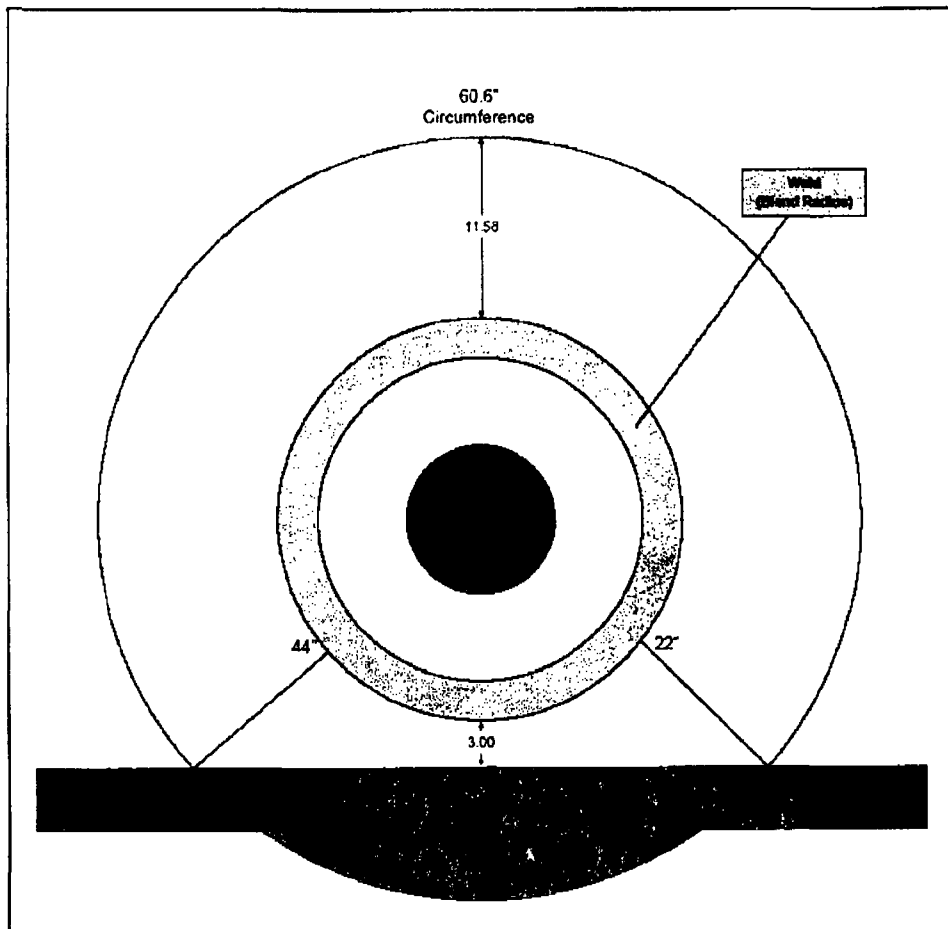
ANII Review:

Date:



## N5A Limitation Sketch

|                           |            |   |  |
|---------------------------|------------|---|--|
| Total Exam Volume         | 42.85086   | Square inches   |  |
| Obtainable Exam Volume    | 23.9964816 | Square inches (without consideration of insulation ring limitation) |  |
| Obtainable Exam Volume    | 56%        | % (without consideration of insulation ring limitation)             |  |
| Total Available           | A1         | Circumference   | 60.60 Inches   |
|                           | A2         | Circumference   | 360.00 degrees   |
|                           | A3         | Circumference   | 56.00 obtainable volume %  |
| Limitation Area           | B1         | Circumference   | 22.00 Inches (length of limitation)                                |
|                           | B2         | Circumference   | 130.89 Degrees of limitation $(B1/A1) \times A2$                   |
|                           | B3         | Circumference   | 20.33 obtainable volume % $(B2/A2) \times A3$                      |
|                           | B4         |   | 63% % of limited volume obtained $B5/B3$                           |
|                           | B5         |   | 12.81 amount of volume obtained (%) in limited area $B3 \times B4$ |
| Unlimited Area            | C1         | Circumference   | 38.60 Inches $A1 - B1$   |
|                           | C2         | Circumference   | 229.31 degrees $A2 - B2$   |
|                           | C3         | Circumference   | 35.67 amount of volume (%) obtained in unlimited area $A3 - B3$    |
| Total Coverage (%)        | D1         | 100%  | 48.48% $B5 + C3$   |
| Total Coverage Sq. Inches | D2         | 100%  | 20.773192 $D1 \times \text{Total Exam Volume}$                     |





000335 R-088



## UT CALIBRATION DATA SHEET

|  |                    |                                   |                    |                                |                     |
|--|--------------------|-----------------------------------|--------------------|--------------------------------|---------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/07/2006             |                    | Calibration No.: N5A-CS01      |                     |
| System / Component I.D.: RPV Nozzle N5A                                      |                    |                                   |                    |                                |                     |
| Component Description: Core Spray Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                    |                                |                     |
| ISO / Drawing No.: N5A/3-ISI-0331C   |                    | Procedure No. / Rev.: N-UT-78 / 3 |                    |                                |                     |
| Material: Clad CS  |                    | Diameter: 10" Nozzle              |                    | Thickness: 6.1" Nominal        |                     |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT                       |                    | CALIBRATION STANDARD           |                     |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD           | Calibration Block No: BF-18    |                     |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4 | Thickness (in): 6.12"          | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds                                 |                    | Shape: Rectangle                  | Freq: 2.0 MHz      | Temp (F) Block: 83°            | Temp (F) Comp.: 78° |
| Delay: 14.000 µS   | Range: 8.0         | Config.: Dual                     | Mode: Long.        | Thermometer No.: VH-9571       |                     |
| Each Major Screen Div. #: 0.8  |                    | Nominal Angle: 60°                | Measured: 61°      | Couplant: Ultragel II          | Batch No.: 05325    |
| Cal In Depth or Sound Path: Sound Path                                       |                    | Fixture / Size: Integral          |                    | CALIBRATION STANDARD SIMULATOR |                     |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                    | Serial No.: NA                 |                     |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                    | Description: NA                |                     |
| Rep. Rate: Auto High   |                    | DAC PLOT                          |                    | Reflectors                     | NA NA               |
| Pulse Amp: Fixed   | Pulsar: High       |                                   |                    | Sweep Position                 | NA N/A              |
| Reference Sensitivity: 59.0 dB   |                    |                                   |                    | Signal Amp (%)                 | NA N/A              |
| Scan Sensitivity: 75.0 dB  |                    |                                   |                    | Gain DB (dB):                  | NA N/A              |
|  |                    |                                   |                    | Probe Squint Angle 3°          |                     |
| CALIBRATION CHECK  |                    |                                   |                    | Probe Focus: FD ~2.70"         |                     |
|  | Date/Time          | OK                                | Initials           |                                |                     |
| Initial Cal:   | 3/07/06 20:45      | X                                 | W.H.               |                                |                     |
| Init. Sim. Cal:  | N/A                |                                   | N/A                |                                |                     |
| Intermediate:  | N/A                |                                   | N/A                |                                |                     |
| Intermediate:  | N/A                |                                   | N/A                |                                |                     |
| Intermediate:  | N/A                |                                   | N/A                |                                |                     |
| Intermediate:  | N/A                |                                   | N/A                |                                |                     |
| Final Cal:   | 3/07/06 22:15      | X                                 | W.H.               |                                |                     |
| Beam Direction on Calibration Block  |                    | 0 Deg. Axial Circ                 |                    | Component: N/A                 |                     |
| (Yes / No)   |                    | NO YES NO                         |                    | BM: N/A HAZ: N/A               |                     |
|  |                    |                                   |                    | C/L Weld: N/A                  |                     |
|  |                    |                                   |                    | Component: N/A                 |                     |
|  |                    |                                   |                    | BM: N/A HAZ: N/A               |                     |
|  |                    |                                   |                    | Crown HT: N/A Weld Width: N/A  |                     |
| Reflector  | 1/4T SDH           |                                   |                    |                                |                     |
| Sweep Position / Depth in Inches   | 3.6                |                                   |                    |                                |                     |
| Amplitude in %   | 80%                |                                   |                    |                                |                     |
| Gain in dB   | 59.0 dB            |                                   |                    |                                |                     |
| Notes: The 60° Zone-1 ultrasonic examination.                                |                    |                                   |                    |                                |                     |
| Examiner: Wade Holloway  |                    | Level: II                         | Date: 3/07/06      | Examiner: N/A                  | Level: NA           |
| Sign:  |                    |                                   |                    | Sign:                          | Date: N/A           |
| Reviewed: Adam A. Corn   |                    | Level: III                        | Date: 3/25/06      | ANII Review:                   |                     |
| Sign:  |                    |                                   |                    | Date: 6/1/06                   |                     |



000336 R-088



## UT CALIBRATION DATA SHEET

|  |                    |  |                    |                                |                     |
|--|--------------------|--|--------------------|--------------------------------|---------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/07/2006  |                    | Calibration No.: N5A-CS02      |                     |
| System / Component I.D.: RPV Nozzle N5A                                      |                    |  |                    |                                |                     |
| Component Description: Core Spray Nozzle to Vessel Weld (Zone-2 Examination) |                    |  |                    |                                |                     |
| ISO / Drawing No.: N5A/3-ISI-0331C   |                    | Procedure No. / Rev.: N-UT-78 / 3  |                    |                                |                     |
| Material: Clad CS  |                    | Diameter: 10" Nozzle   |                    | Thickness: 6.1" Nominal        |                     |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT  |                    | CALIBRATION STANDARD           |                     |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848  | Mfg: RTD           | Calibration Block No: BF-18    |                     |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST   | Size: 2(24x42) 1/4 | Thickness (in): 6.12"          | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 In/Micro Seconds                                 |                    | Shape: Rectangle   | Freq: 2.0 MHz      | Temp (F) Block: 83°            | Temp (F) Comp: 78°  |
| Delay: 14.000 µs   | Range: 20.0        | Config.: Dual  | Mode: Long.        | Thermometer No.: VH-9571       |                     |
| Each Major Screen Div. #: 2.0  |                    | Nominal Angle: 60°   | Measured: 61°      | Couplant: Ultragel II          | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path                                       |                    | Fixture / Size: Integral   |                    | CALIBRATION STANDARD SIMULATOR |                     |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25'  |                    | Serial No.: NA                 |                     |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0   |                    | Description: NA                |                     |
| Rep. Rate: Auto High   |                    | DAC PLOT   |                    | Reflectors                     | N/A                 |
| Pulse Amp: Fixed   | Pulsar: High       |  |                    | Sweep Position                 | N/A                 |
| Reference Sensitivity: 72.0 dB   |                    |  |                    | Signal Amp (%)                 | N/A                 |
| Scan Sensitivity: 80.0 dB  |                    |  |                    | Gain DB (dB):                  | N/A                 |
|  |                    |  |                    | Probe Squint Angle 3°          |                     |
| CALIBRATION CHECK  |                    |  |                    | Probe Focus: FD ~2.70"         |                     |
|  | Date/Time          | OK   | Initials           | 0 DEGREE WELD THICKNESS ONLY   |                     |
| Initial Cal:   | 3/07/06 20:40      | X  | W.H.               | Component: N/A                 |                     |
| Init. Sim. Cal:  | N/A                |  | N/A                | BM: N/A                        |                     |
| Intermediate:  | N/A                |  | N/A                | HAZ: N/A                       |                     |
| Intermediate:  | N/A                |  | N/A                | C/L Weld: N/A                  |                     |
| Intermediate:  | N/A                |  | N/A                | Component: N/A                 |                     |
| Intermediate:  | N/A                |  | N/A                | BM: N/A                        |                     |
| Intermediate:  | N/A                |  | N/A                | HAZ: N/A                       |                     |
| Intermediate:  | N/A                |  | N/A                | C/L Weld: N/A                  |                     |
| Final Cal:   | 3/07/06 22:20      | X  | W.H.               | Component: N/A                 |                     |
| Beam Direction on Calibration Block  |                    | 0 Deg.   | Axial              | Circ                           | BM: N/A             |
| (Yes / No)   |                    | NO   | YES                | NO                             | HAZ: N/A            |
|  |                    | Circ Scan Exam Angle is ≤ the inverse sine of the Nominal ID/OD ratio?                           |                    | Crown HT: N/A                  |                     |
|  |                    | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                    | Weld Width: N/A                |                     |
| Reflector  | ID NOTCH           |  |                    |                                |                     |
| Sweep Position / Depth in inches   | 6.0                |  |                    |                                |                     |
| Amplitude in %   | 80%                |  |                    |                                |                     |
| Gain in dB   | 72.0 dB            |  |                    |                                |                     |
| Notes: The 60° Zone-2 ultrasonic examination.                                |                    |  |                    |                                |                     |
| Examiner: Wade Holloway  | Level: II          | Date: 3/07/06  | Examiner: N/A      | Level: NA                      | Date: N/A           |
| Sign:  |                    |  | Sign:              |                                |                     |
| Reviewed: Adam A. Comp   | Level: III         | Date: 3/25/06  | ANII Review:       |                                | Date: 6/1/06        |
| Sign:  |                    |  |                    |                                |                     |



000337 R-088

**A****AREVA****RPV ULTRASONIC CALIBRATION & EXAM DATA SHEET**

|   |          |                                       |           |   |           |  |  |  |  |
|---|----------|---------------------------------------|-----------|---|-----------|--|--|--|--|
| Site: Browns Ferry Unit 3   |          | Exam Date: 03/08/06                   |           | Summary No.: U3C12-N5A-NV                       |           | Calibration No.: N5A-CS05                      |  |  |  |
| Nozzle ID.: RPV N5A   |          |                                       |           |   |           |  |  |  |  |
| Component ID: RPV N5A   |          |                                       |           |   |           |  |  |  |  |
| Exam Description: 10" Core Spray Nozzle to Vessel Weld                              |          |                                       |           | ASME Section XI: 2001 Edition with 2003 Addenda |           |  |  |  |  |
| Drawing No.: 3-ISI-0331-C   |          | Procedure No. / Rev.: 54-ISI-850 / 03 |           | Figure No.: IWB 2500-7                          |           |  |  |  |  |
| Material: CS Clad   |          | Thickness: 6.1"                       |           | Nozzle Diameter: 10"                            |           |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |          | <b>SEARCH UNIT</b>                    |           | <b>CALIBRATION STANDARD</b>                     |           |  |  |  |  |
| Mfg.: Staveley  |          | Mfg.: KBA                             |           | Model: Benchmark                                |           | Cal. Block ID: BF-18                           |  |  |  |
| Model: Sonic 136  |          | Serial No.: 00X1XJ                    |           |   |           | Cal. Block Thickness: 6.12" Dia.: Flat         |  |  |  |
| Serial No.: 136P1200G081455   |          | Size: 5X1.0"                          |           |   |           | Temp: Block: 83°F Comp.: 78°F                  |  |  |  |
| Range: 10"  |          | Freq: 2.25 MHz                        |           | Shape: Rectangle                                |           | Thermometer VH: 9571                           |  |  |  |
| Delay: 7.92"  |          | Mode: Shear                           |           | Config.: Single                                 |           | Couplant Type: Ultragel II                     |  |  |  |
| Velocity: .129 in/μsec.   |          | Nominal Refracted Angle: 60°          |           |   |           | Couplant Batch #: 05325                        |  |  |  |
| Each Major Screen Div.: 1.0"  |          | Measured Refracted Angle: 59°         |           |   |           | <b>CALIBRATION VERIFICATION BLOCK</b>          |  |  |  |
| Freq.: 2.25 MHz   |          | Pulse: 222 ns                         |           | Nominal Skew Angle (If Applicable): NA          |           | Serial No.: 037405 Type: Rompas                |  |  |  |
| Damping: 500 Ω  |          | Rep. Rate: 2 KHz                      |           | Measured Skew Angle (If Applicable): NA         |           | Reflector: 10 13                               |  |  |  |
| Filter: Filter 2  |          | Reject: Off                           |           | Wedge Radius (If Applicable): Flat              |           | Sweep Div.: 4 7                                |  |  |  |
| Pulse Amplitude: Fixed  |          | Cable Type: RG-174 Length: 12'        |           | Amp. %: 100 40                                  |           |  |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |          | No. of Intermediate Connectors: 0     |           | Gain dB: 56.8 56.8                              |           |  |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |          | <b>DAC PLOT</b>                       |           |   |           |  |  |  |  |
| Ref. Sensitivity: 73.2 dB   |          |                                       |           |   |           |  |  |  |  |
| Scan Sensitivity: 82.0 dB   |          |                                       |           |   |           |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |          |                                       |           |   |           |  |  |  |  |
|   | Date     |                                       |           | Time  | Initials  |  |  |  |  |
| Initial Cal:  | 03/08/06 |                                       |           | 08:15   | <i>mk</i> |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Intermediate:   | NA       | NA                                    | NA        |   |           |  |  |  |  |
| Final Cal.:   | 03/08/06 | 10:50                                 | <i>mk</i> |   |           |  |  |  |  |
| <b>0° THICKNESS DATA</b>  |          |                                       |           |   |           |  |  |  |  |
| Upper Shell: N/A  |          | Lower Shell: N/A                      |           |   |           |  |  |  |  |
| Weld CL: N/A  |          | At Indication: N/A                    |           |   |           |  |  |  |  |
| Calibration Reflector(s)  |          | Notch                                 |           |   |           |  |  |  |  |
| Sweep Position  |          | 5.6                                   |           |   |           |  |  |  |  |
| Amplitude in % FSH  |          | 80%                                   |           |   |           |  |  |  |  |
| Gain in dB  |          | 73.2 dB                               |           |   |           |  |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen.  |          |                                       |           |   |           |  |  |  |  |
| Examiner: Mike Kleinjan<br>Sign: <i>Mike Kleinjan</i>                               |          | Level: II                             |           | Date: 03/08/06                                  |           | Examiner: N/A<br>Sign: <i>Sam Fluke</i>        |  |  |  |
| Reviewed: Adam A. Copt<br>Sign: <i>Adam A. Copt</i>                                 |          | Level: III                            |           | Date: 3/25/2006                                 |           | ANII Review: <i>Sam Fluke</i><br>Date: 6/11/06 |  |  |  |





AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

Site: Browns Ferry Unit 3

Exam Date: 03/08/06

Summary No.: U3C12-N5A-NV

Calibration No.: N5A-CS03

Nozzle ID.: RPV N5A

Component ID: RPV N5A

Exam Description: 10" Core Spray Nozzle to Vessel Weld

ASME Section XI: 2001 Edition with 2003 Addenda

Drawing No.: 3-ISI-0331-C

Procedure No. / Rev.: 54-ISI-850 / 03

Figure No.: IWB 2500-7

Material: CS Clad

Thickness: 6.1"

Nozzle Diameter: 10"

## INSTRUMENT SETTINGS

## SEARCH UNIT

## CALIBRATION STANDARD

Mfg.: Staveley

Mfg.: KBA

Model: Benchmark

Cal. Block ID: BF-18

Model: Sonic 136

Serial No.: 01BV5J

Cal. Block Thickness: 6.12" Dia.: Flat

Serial No.: 136P1200G081455

Size: .5X1.0"

Temp: Block: 83°F Comp.: 78°F

Range: 10"

Freq: 2.25 MHz

Shape: Rectangle

Thermometer VH: 9571

Delay: 4.37"

Mode: Shear

Config.: Single

Couplant Type: Ultragel II

Velocity: .129 in/μsec.

Nominal Refracted Angle: 35°

Couplant Batch #: 05325

Each Major Screen Div.: 1.0"

Measured Refracted Angle: 37°

## CALIBRATION VERIFICATION BLOCK

Freq.: 2.25 MHz

Pulse: 222 ns

Nominal Skew Angle (If Applicable): 68°+

Serial No.: 037405

Type: Rompas

Damping: 500 Ω

Rep. Rate: 2 KHz

Measured Skew Angle (If Applicable): 68°

Reflector:

4

7

Filter: Filter 2

Reject: Off

Wedge Radius (If Applicable): 3.25"

Sweep Div.:

1

4

Pulse Amplitude: Fixed

Cable Type: RG-174 Length: 12'

Amp. %:

100

50

Mode: ☐ Dual ☒ Pulse Echo

No. of Intermediate Connectors: 0

Gain dB:

51.8

51.8

Jack: ☒ Transmit ☐ Receive

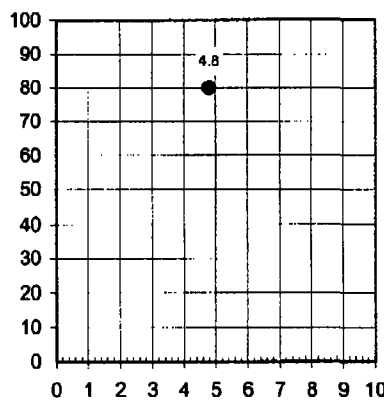
## DAC PLOT

Ref. Sensitivity: 63.6 dB

Scan Sensitivity: 67.0 dB

## CALIBRATION / VERIFICATION TIMES

|               | Date     | Time  | Initials |
|---------------|----------|-------|----------|
| Initial Cal:  | 03/08/06 | 08:20 | mk       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Intermediate: | NA       | NA    | NA       |
| Final Cal.:   | 03/08/06 | 10:45 | mk       |



## 0° THICKNESS DATA

Upper Shell: N/A

Lower Shell: N/A

Weld CL: N/A

At Indication: N/A

Calibration Reflector(s)

Notch

Sweep Position

4.8

Amplitude in % FSH

80%

Gain in dB

63.6 dB

Notes: Nozzle to Shell 3" delay on screen. Metal path for notch response equates to -- full cal block thickness (including cladding).

Examiner: Mike Kleinjan

Level: II

Date: 03/08/06

Examiner: N/A

Level: N/A

Date: N/A

Sign: *Mike Kleinjan*

Reviewed: Adam Conti

Level: III

Date: 3/25/2006

ANII Review: *Sal F. Finkel*Sign: *Sal F. Finkel*

Date: 6/1/06



000339 R-088



AREVA

## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|  |          |                                       |    |   |          |  |  |  |  |
|--|----------|---------------------------------------|----|---|----------|--|--|--|--|
| Site: Browns Ferry Unit 3  |          | Exam Date: 03/08/06                   |    | Summary No.: U3C12-N5A-NV                       |          | Calibration No.: N5A-CS04              |  |  |  |
| Nozzle ID.: RPV N5A  |          |                                       |    |   |          |  |  |  |  |
| Component ID: RPV N5A  |          |                                       |    |   |          |  |  |  |  |
| Exam Description: 10" Core Spray Nozzle to Vessel Weld   |          |                                       |    | ASME Section XI: 2001 Edition with 2003 Addenda |          |  |  |  |  |
| Drawing No.: 3-ISI-0331-C  |          | Procedure No. / Rev.: 54-ISI-850 / 03 |    | Figure No.: IWB 2500-7                          |          |  |  |  |  |
| Material: CS Clad  |          | Thickness: 6.1"                       |    | Nozzle Diameter: 10"                            |          |  |  |  |  |
| <b>INSTRUMENT SETTINGS</b>   |          | <b>SEARCH UNIT</b>                    |    | <b>CALIBRATION STANDARD</b>                     |          |  |  |  |  |
| Mfg.: Staveley   |          | Mfg.: KBA                             |    | Model: Benchmark                                |          | Cal. Block ID: BF-18                   |  |  |  |
| Model: Sonic 136   |          | Serial No.: 0111PP                    |    |   |          | Cal. Block Thickness: 6.12" Dia.: Flat |  |  |  |
| Serial No.: 136P1200G081455  |          | Size: .5X1.0"                         |    |   |          | Temp: Block: 83°F Comp.: 78°F          |  |  |  |
| Range: 10"   |          | Freq: 2.25 MHz                        |    | Shape: Rectangle                                |          | Thermometer VH: 9571                   |  |  |  |
| Delay: 4.37"   |          | Mode: Shear                           |    | Config.: Single                                 |          | Couplant Type: Ultragel II             |  |  |  |
| Velocity: .129 in/psec.  |          | Nominal Refracted Angle: 35°          |    |   |          | Couplant Batch #: 05325                |  |  |  |
| Each Major Screen Div.: 1.0"   |          | Measured Refracted Angle: 37°         |    |   |          | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |  |  |
| Freq.: 2.25 MHz  |          | Pulse: 222 ns                         |    | Nominal Skew Angle (If Applicable): 68°-        |          | Serial No.: 037405 Type: Rompas        |  |  |  |
| Damping: 500 Ω   |          | Rep. Rate: 2 KHz                      |    | Measured Skew Angle (If Applicable): 68°        |          | Reflector: 4 7                         |  |  |  |
| Filter: Filter 2   |          | Reject: Off                           |    | Wedge Radius (If Applicable): 3.25"             |          | Sweep Div.: 1 4                        |  |  |  |
| Pulse Amplitude: Fixed   |          | Cable Type: RG-174 Length: 12'        |    | Amp. %: 100 50                                  |          |  |  |  |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo   |          | No. of Intermediate Connectors: 0     |    | Gain dB: 51.8 51.8                              |          |  |  |  |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive  |          | <b>DAC PLOT</b>                       |    |   |          |  |  |  |  |
| Ref. Sensitivity: 61.4 dB  |          |                                       |    |   |          |  |  |  |  |
| Scan Sensitivity: 67.0 dB  |          |                                       |    |   |          |  |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>  |          |                                       |    |   |          |  |  |  |  |
|  | Date     |                                       |    | Time  | Initials |  |  |  |  |
| Initial Cal:   | 03/08/06 |                                       |    | 08:18   | MK       |  |  |  |  |
| Intermediate:  | NA       |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:  | NA       |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:  | NA       |                                       |    | NA  | NA       |  |  |  |  |
| Intermediate:  | NA       | NA                                    | NA |   |          |  |  |  |  |
| Intermediate:  | NA       | NA                                    | NA |   |          |  |  |  |  |
| Intermediate:  | NA       | NA                                    | NA |   |          |  |  |  |  |
| Final Cal:   | 03/08/06 | 10:47                                 | MK |   |          |  |  |  |  |
| <b>0° THICKNESS DATA</b>   |          |                                       |    |   |          |  |  |  |  |
| Upper Shell: N/A   |          | Lower Shell: N/A                      |    |   |          |  |  |  |  |
| Weld CL: N/A   |          | At Indication: N/A                    |    |   |          |  |  |  |  |
| Calibration Reflector(s)   |          | Notch                                 |    |   |          |  |  |  |  |
| Sweep Position   |          | 4.8                                   |    |   |          |  |  |  |  |
| Amplitude In % FSH   |          | 80%                                   |    |   |          |  |  |  |  |
| Gain in dB   |          | 61.4 dB                               |    |   |          |  |  |  |  |
| Notes: Nozzle to Shell 3" delay on screen. Metal path for notch response equates to ~ full cal block thickness (including cladding). |          |                                       |    |   |          |  |  |  |  |
| Examiner: Mike Kleinjan  |          | Level: II                             |    | Date: 03/08/06                                  |          | Examiner: N/A                          |  |  |  |
| Sign: <i>Mike Kleinjan</i>   |          |                                       |    |   |          | Level: N/A                             |  |  |  |
| Reviewed: Adam A. Conti  |          | Level: III                            |    | Date: 3/25/2006                                 |          | Date: N/A                              |  |  |  |
| Sign: <i>Adam A. Conti</i>   |          |                                       |    |   |          | ANII Review: <i>[Signature]</i>        |  |  |  |
|  |          |                                       |    |   |          | Date: 6/1/06                           |  |  |  |



Weld Examination Report R-089

N8A-N/V

RECIRC Instrument Nozzle



000340

R-089



## EXAMINATION SUMMARY

|  |   |                      |
|--|---|----------------------|
| Summary No.: U3C12-N8A-NV  | Examination Data Sheet : N8A-DS01, N8A-DS02   | Exam Date: 3/11/2006 |
| Customer: Browns Ferry Unit 3 U3C12                              | Examination Methods: Ultrasonic   |                      |
| System / Component ID: BFN-N8A-NV                                | Examination Procedures: 54-ISI-850-03* N-UT-78-03   |                      |
| Component Description: Nozzle to Vessel Weld                     | Modeling Number: IR-2003-19 Section 7   |                      |
| Examination Category: B-D  | Calibration Sheets No(s):<br>N8A-CS01<br>N8A-CS02<br>N8A-CS03   |                      |
| ISO / Drawing: N8/3-ISI-0411-C                                   | Examination Results: <input checked="" type="checkbox"/> No Reportable Indications<br><input type="checkbox"/> Reportable Indications<br><input type="checkbox"/> Geometric |                      |
| Framatome ANP Safety Document Change Notices:                    |   |                      |
| *SDCN: 30-5037583-00 *SDCN:30-9011321-00<br>*SDCN: 30-9015396-00 |   |                      |

Summary: *Ref: TVA PER numbers 99373 and 99581. Matt Welch 5/6/06*

Manual ultrasonic examinations were performed on the referenced weld during Browns Ferry Unit 3 U3C12.

In accordance with UT Procedure N-UT-78-03, 60° Longitudinal wave examinations were performed from the vessel surface in both the radial and circumferential scan directions. These examinations resulted in no reportable indications.

In accordance with UT Procedure 54-ISI-850-03 and the referenced TVA/EPRI modeling the following additional examinations were performed. These examinations also resulted in no reportable indications.

| Jet Pump Instrumentation (N8) Nozzle Modeling Parameters |             |              |
|--|-------------|--------------|
| Probe  | Probe Skew  | Scan Surface |
| 50° Shear  | ±(15 to 45) | Vessel       |

64% coverage of the required examination volume was obtained.

Note: Refer to the nozzle coverage sketch for a description of the scanning volume, examination coverage and scan limitations.

**Note 1:** This ultrasonic examination was performed in accordance with the criteria of 10CFR 50.55a (b) (2) (xv) (G) and the minimum coverage requirements of 10CFR 50.55a (b) (2) (xv) (K) was achieved to the maximum extent possible. Radial examinations of the outer 85%t were limited to 69.92% volumetric coverage due to nozzle blend radius interference.

**Note 2:** See TVA Request for Relief PDI-1 and PDI-2. Dockets No. 50-261/296; 50-327/328; and 50-0390. This relief request changed the area to be examined per IWB-2500-7 (a) and (b) to the weld plus a 1/2" on each side.

This examination satisfies the requirements of ASME Sec. XI (2001 Edition with 2003 Addenda), Category B-D, for item number B3.90, figure number IWB 2500-7(a) exam volume, and was performed using ASME Sec XI, Appendix VIII qualified personnel, procedures, and equipment as amended by the Final Rule.

|                            |                 |                                  |                 |
|----------------------------|-----------------|----------------------------------|-----------------|
| Prepared By: Wade Holloway | Date: 3/11/2006 | Reviewed By: Adam A. Conti LVIII | Date: 3/25/2006 |
| Sign: <i>Wade Holloway</i> |                 | Sign: <i>Adam A. Conti</i>       |                 |
| Customer: Matt Welch       | Date: 5/4/06    | ANII Review: <i>Paul Flood</i>   | 6/6/06          |
| Sign: <i>Matt Welch</i>    |                 |                                  |                 |





# UT EXAMINATION DATA SHEET

Exam Date / Time: 03/11/2006 19:55

Examination Data Sheet No.: N8A-DS01

Iso / Drawing: N8/3-ISI-0411-C

Calibration Sheet: N8A-CS01, N8A-CS02

Wo: Nozzle Boss To Blend Radius

Exam Angle: 60RL

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N8A

Lo: TDC

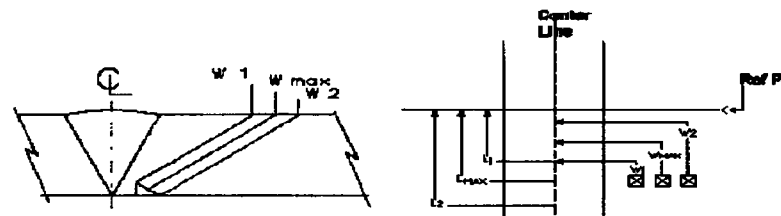
Procedure No.: N-UT-78-03

Component Description: 4 Jet Pump Instrumentation Nozzle to Vessel Weld

Exam Surface: OD Zone 1 2

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 HMA = Half Max Amplitude  
 Lmax = Dist From Ref Pt at Max. Amplitude  
 L1 - L2 = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientation: radial and circumferential.

2. Examination limitation and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Wade Holloway Level: II Date: 03/11/06

Examiner: N/A

Level:

Date:

Reviewed: Adam A. Conti

Level: III

Date: 03/25/06

ANII Review:

Date:

*Sal Flavel* 6/6/06

*Adam A. Conti*

000341

R-089





# UT EXAMINATION DATA SHEET

Exam Date / Time: 3/11/06 20:25

Examination Data Sheet No.: N8A-DS02

Iso / Drawing: N8/3-ISI-0411-C

Calibration Sheet: N8A-CS03

Wo: Nozzle Boss To Blend Radius

Exam Angle: 50° S

Customer: Browns Ferry Unit 3

System / Component I.D.: RPV Nozzle N8A

Lo: TDC

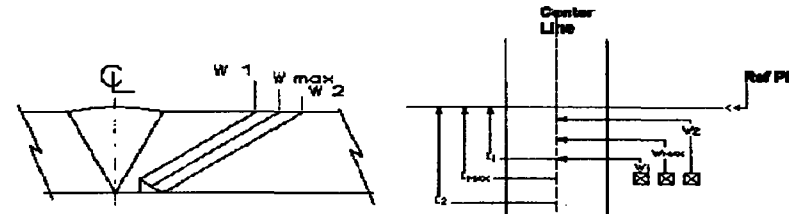
Procedure No.: 54-ISI-850-03

Component Description: 4 Jet Pump Instrumentation Nozzle to Vessel Weld

Exam Surface: OD Inner 15%

CCW = Counter Clockwise  
 CW = Clockwise  
 D = Depth  
 DS = Downstream  
 DS = Half Max Amplitude  
 HMA = Dist From Ref Pt at Max. Amplitude  
 Lmax = End Point 1&2 (Lateral Movement)

RBR = Remaining Back Reflection  
 US = Up Stream  
 TWD = Through Wall Dimension  
 Wmax = Dist From CL at Max Amplitude  
 W1 = Dist From CL at Specified % of Dac (Forward)  
 W2 = Dist From CL at Specified % of Dac (Backward)



| IND #                     | US DS<br>CW / CCW | MAXIMUM AMPLITUDE |   |       |       | TWD or WIDTH |    |          |    | Length Dimensions |    |    |    |  | Comments |  |  |
|---------------------------|-------------------|-------------------|---|-------|-------|--------------|----|----------|----|-------------------|----|----|----|--|----------|--|--|
|                           |                   | % DAC             | D | W Max | L Max | FORWARD      |    | BACKWARD |    | L1                | D1 | L2 | D2 |  |          |  |  |
|                           |                   |                   |   |       |       | W1           | D1 | W2       | D2 |                   |    |    |    |  |          |  |  |
| NO RECORDABLE INDICATIONS |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |
|                           |                   |                   |   |       |       |              |    |          |    |                   |    |    |    |  |          |  |  |

Notes:

1. Search unit orientations: Tangential
2. Examination limitations and ASME Code coverage is provided on the Ultrasonic Examination Limitation and Coverage Worksheets.

Examiner: Thomas Brown Level: II Date: 3/11/06

Examiner: N/A

Level: Date:

Reviewed: Adam A. Conti

Level: III

Date:

ANII Review: *Thomas Brown*

Date:

*Sal Flumel* 6/6/06

*Adam A. Conti*

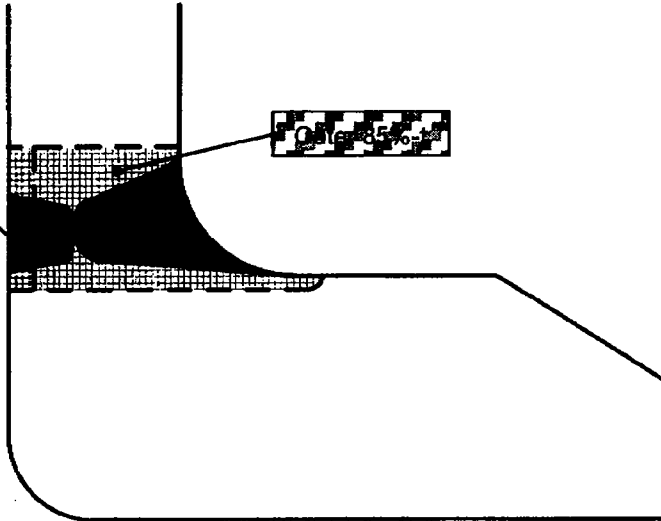
3/25/06





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N8A | Date: 03/25/06 | Summary No: U3C12-N8A-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|



Axial scans are performed with a procedure for the examination of vessel shell welds. This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during axial scans is typically limited due to nozzle configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as above and typically limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination is performed with a procedure demonstrated for nozzle inside-radius UT. This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle inside-radius technique provides additional coverage since the component is modeled and scanning is performed with several search units from the nozzle blend.

| Axial Scans<br>100%-t   | Circumferential Scans   |   |
|---|---|---|
|   | Inner 15%-t   | Outer 85%-t   |
| Examination Procedure: N-UT-78-03   | Examination Procedure: 54-ISI-850-03  | Examination Procedure: N-UT-78-03   |
| <sup>a</sup> Required Examination Volume: 16.605 <sup>2</sup> inches                          | <sup>d</sup> Inner 15%-t Examination Volume: 2.226 <sup>2</sup> inches                        | <sup>e</sup> Outer 85%-t Examination Volume: 14.3785 <sup>2</sup> inches.                           |
| 60°RL axial scan limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <sup>f</sup> Coverage Obtained by Modeling: 100%  | 60°RL Outer 85%-t Exam Limited: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Description of Limitation: Nozzle Blend Radius  | Inner 15%-t Exam Limited: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Description of Limitation: Nozzle Blend Radius  |
| <sup>b</sup> Total Axial Volume Achieved: 12.2213 <sup>2</sup> inches                         | Description of Limitation: N/A  | <sup>g</sup> Outer 85%-t Volume Achieved: 6.8265 <sup>2</sup> inches                                |
|   | <sup>h</sup> Inner 15%-t Volume Achieved: 2.226 <sup>2</sup> inches                           |   |
| <sup>c</sup> Percentage of Axial Coverage: 73%<br>$B + A \times 100 = C$                      | <sup>j</sup> Total Circumferential Examination Coverage: 54%<br>$(F + H) + A = J$             |   |

### Combined Axial and Circumferential Weld Coverage

**<sup>i</sup>Total Examination Coverage: 64%**

$$(C + J) + 2 = L$$

|                           |                |                         |                |              |       |
|---------------------------|----------------|-------------------------|----------------|--------------|-------|
| Prepared by: Bret Flesner | Date: 03/25/06 | Reviewed by: Adam Conti | Date: 03/25/06 | ANII Review: | Date: |
|                           |                |                         |                | 6/6/06       |       |





## RPV Nozzle-To-Shell Weld Ultrasonic Examination Limitation and Coverage Worksheet

|              |             |         |              |                |                          |
|--------------|-------------|---------|--------------|----------------|--------------------------|
| Utility: TVA | Plant: BFN3 | Unit: 3 | Weld ID: N8A | Date: 03/25/06 | Summary No: U3C12-N8A-NV |
|--------------|-------------|---------|--------------|----------------|--------------------------|

Tangential and radial scans are limited due to liftoff caused by the blend radius and transducer footprint.

60°RL radial and tangential scans were performed from the shell surface.

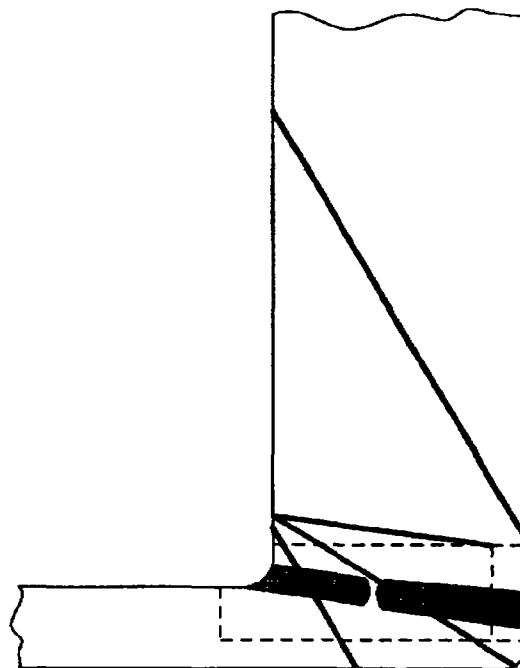
The tangential scans were performed with  $\pm 10^\circ$  skew towards the weld and at varying distances from the weld.

Circumferential scans with a second procedure were also performed from the vessel shell at various skews. This technique has been demonstrated for detection of axial flaws in the inner 15%-t only. These scans achieved 100% circumferential coverage of the inner 15%-t.

100% of accessible surface was scanned resulting in 64% coverage.

### N8 Nozzle to Shell

— Tangential (Circumferential) Scan  
— Radial (Axial) Scan



Prepared by: Bret Flesner

Date: 03/25/06

Reviewed by: Adam Conti

Date: 03/25/06

ANII Review:

Date:

*Bret Flesner*

*Adam Conti*

*Sal Flood 6/6/06*



000345

R-089



## UT CALIBRATION DATA SHEET

|  |                    |                                   |                                    |  |                     |
|--|--------------------|-----------------------------------|------------------------------------|--|---------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/11/2006             |                                    | Calibration No.: N8A-CS01  |                     |
| System / Component I.D.: RPV Nozzle N8A  |                    |                                   |                                    |  |                     |
| Component Description: Jet Pump Instrumentation Nozzle to Vessel Weld (Zone-1 Examination) |                    |                                   |                                    |  |                     |
| ISO / Drawing No.: 3-ISI-0411-C  |                    | Procedure No. / Rev.: N-UT-78 / 3 |                                    |  |                     |
| Material: Clad CS  |                    | Diameter: 4" Nozzle               |                                    | Thickness: 6.1" Nominal  |                     |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT                       |                                    | CALIBRATION STANDARD   |                     |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848                 | Mfg: RTD                           | Calibration Block No: BF-18  |                     |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST                  | Size: 2(24x42) 1/4                 | Thickness (in): 6.12"  | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds   |                    | Shape: Rectangle                  | Freq: 2.0 MHz                      | Temp (F) Block: 81°  | Temp (F) Comp.: 78° |
| Delay: 14.000 µS   | Range: 8.0         | Config.: Dual                     | Mode: Long.                        | Thermometer No.: VH-9571   |                     |
| Each Major Screen Div. #: 0.8  |                    | Nominal Angle: 60°                | Measured: 61°                      | Couplant: Ultragel II  | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path   |                    | Fixture / Size: Integral          |                                    | CALIBRATION STANDARD SIMULATOR   |                     |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25' |                                    | Serial No.: NA   |                     |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0              |                                    | Description: NA  |                     |
| Rep. Rate: Auto High   |                    | DAC PLOT                          |                                    | Reflectors   | NA NA               |
| Pulse Amp: Fixed   | Pulsar: High       |                                   |                                    | Sweep Position   | NA N/A              |
| Reference Sensitivity: 59.0 dB   |                    |                                   |                                    | Signal Amp (%)   | NA N/A              |
| Scan Sensitivity: 75.0 dB  |                    |                                   |                                    | Gain DB (dB):  | NA N/A              |
|  |                    |                                   |                                    | Probe Squint Angle 3°  |                     |
| CALIBRATION CHECK  |                    |                                   |                                    | Probe Focus: FD -2.70"   |                     |
|  | Date/Time          | OK                                | Initials                           | 0 DEGREE WELD THICKNESS ONLY   |                     |
| Initial Cal:   | 3/11/06 19:45      | X                                 | W.H.                               | Component: N/A   |                     |
| Init. Sim. Cal:  | N/A                |                                   | N/A                                | BM: N/A  | HAZ: N/A            |
| Intermediate:  | N/A                |                                   | N/A                                | C/L Weld: N/A  |                     |
| Intermediate:  | N/A                |                                   | N/A                                | Component: N/A   |                     |
| Intermediate:  | N/A                |                                   | N/A                                | BM: N/A  | HAZ: N/A            |
| Intermediate:  | N/A                |                                   | N/A                                | Crown HT: N/A Weld Width: N/A  |                     |
| Final Cal:   | 3/11/06 21:03      | X                                 | W.H.                               | Circ Scan Exam Angle is ≤ the inverse sine of the Nominal ID/OD ratio? |                     |
| Beam Direction on Calibration Block  |                    | 0 Deg.                            | Axial                              | Circ   |                     |
| (Yes / No)   |                    | NO                                | YES                                | NO   |                     |
| Reflector  | 1/4T SDH           |                                   |                                    |  |                     |
| Sweep Position / Depth in Inches   | 3.6                |                                   |                                    |  |                     |
| Amplitude in %   | 80%                |                                   |                                    |  |                     |
| Gain in dB   | 59.0 dB            |                                   |                                    |  |                     |
| Notes: The 60° Zone-1 ultrasonic examination.  |                    |                                   |                                    |  |                     |
| Examiner: Wade Holloway  | Level: II          | Date: 3/11/06                     | Examiner: N/A                      | Level: NA  | Date: N/A           |
| Sign: <i>Wade Holloway</i>   |                    |                                   | Sign: <i>Adam A. Conroy</i>        |  |                     |
| Reviewed: Adam A. Conroy   | Level: III         | Date: 3/25/06                     | ANII Review: <i>Adam A. Conroy</i> |  | Date: 3/1/06        |
| Sign: <i>Adam A. Conroy</i>  |                    |                                   | Sign: <i>Adam A. Conroy</i>        |  |                     |



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## UT CALIBRATION DATA SHEET

|  |                    |  |                    |                                |                     |
|--|--------------------|--|--------------------|--------------------------------|---------------------|
| Customer: Browns Ferry Unit 3  |                    | Exam Date: 03/11/2006  |                    | Calibration No.: N8A-CS02      |                     |
| System / Component I.D.: RPV Nozzle N8A  |                    |  |                    |                                |                     |
| Component Description: Jet Pump Instrumentation Nozzle to Vessel Weld (Zone-2 Examination) |                    |  |                    |                                |                     |
| ISO / Drawing No.: 3-4SI-0411-C  |                    | Procedure No. / Rev.: N-UT-78 / 3  |                    |                                |                     |
| Material: Clad CS  |                    | Diameter: 4" Nozzle  |                    | Thickness: 6.1" Nominal        |                     |
| INSTRUMENT SETTINGS  |                    | SEARCH UNIT  |                    | CALIBRATION STANDARD           |                     |
| Mfg: Krautkramer   | Model: USN58L      | Serial No: 03-848  | Mfg: RTD           | Calibration Block No: BF-18    |                     |
| Serial / MT&E #: 0100D0  |                    | Model: TRL2-AUST   | Size: 2(24x42) 1/4 | Thickness (in): 6.12"          | Diameter (in): Flat |
| Mat. Cal. / Velocity: .2320 in/Micro Seconds   |                    | Shape: Rectangle   | Freq: 2.0 MHz      | Temp (F) Block: 81°            | Temp (F) Comp: 78°  |
| Delay: 14.000 µs   | Range: 20.0        | Config.: Dual  | Mode: Long.        | Thermometer No.: VH- 9571      |                     |
| Each Major Screen Div. #: 2.0  |                    | Nominal Angle: 60°   | Measured: 61°      | Couplant: Ultragel II          | Batch No.: 05325    |
| Cal in Depth or Sound Path: Sound Path   |                    | Fixture / Size: Integral   |                    | CALIBRATION STANDARD SIMULATOR |                     |
| Filter: Full Wave  | Reject: 0%         | Cable Type & Length: RG-174 / 25'  |                    | Serial No.: NA                 |                     |
| Damping: 1 K   | Freq (MHz): 2 - 25 | No. of Connectors: 0   |                    | Description: NA                |                     |
| Rep. Rate: Auto High   |                    | DAC PLOT   |                    | Reflectors                     | N/A                 |
| Pulse Amp: Fixed   | Pulsar: High       |  |                    | Sweep Position                 | N/A                 |
| Reference Sensitivity: 72.0 dB   |                    |  |                    | Signal Amp (%)                 | N/A                 |
| Scan Sensitivity: 80.0 dB  |                    |  |                    | Gain DB (dB):                  | N/A                 |
|  |                    |  |                    |                                |                     |
| CALIBRATION CHECK  |                    |  |                    | Probe Squint Angle 3°          |                     |
|  | Date/Time          | OK   | Initials           | Probe Focus: FD ~2.70"         |                     |
| Initial Cal:   | 3/11/06 19:40      | X  | W.H.               |                                |                     |
| Init. Sim. Cal:  | N/A                |  | N/A                |                                |                     |
| Intermediate:  | N/A                |  | N/A                |                                |                     |
| Intermediate:  | N/A                |  | N/A                |                                |                     |
| Intermediate:  | N/A                |  | N/A                |                                |                     |
| Intermediate:  | N/A                |  | N/A                |                                |                     |
| Intermediate:  | N/A                |  | N/A                |                                |                     |
| Final Cal:   | 3/11/06 21:05      | X  | W.H.               | 0 DEGREE WELD THICKNESS ONLY   |                     |
| Beam Direction on Calibration Block  |                    | Circ Scan Exam Angle is <= the inverse sine of the Nominal ID/OD ratio?                          |                    | Component: N/A                 |                     |
| (Yes / No)   |                    | <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A |                    | BM: N/A HAZ: N/A               |                     |
|  |                    | 0 Deg.   | Axial              | Circ                           | C/L Weld: N/A       |
|  |                    | NO   | YES                | NO                             | Component: N/A      |
|  |                    |  |                    | BM: N/A                        | HAZ: N/A            |
|  |                    |  |                    | Crown HT: N/A                  | Weld Width: N/A     |
| Reflector  | ID NOTCH           |  |                    |                                |                     |
| Sweep Position / Depth in Inches   | 6.0                |  |                    |                                |                     |
| Amplitude in %   | 80%                |  |                    |                                |                     |
| Gain in dB   | 72.0 dB            |  |                    |                                |                     |
| Notes: The 60° Zone-2 ultrasonic examination.  |                    |  |                    |                                |                     |
| Examiner: Wade Holloway  | Level: II          | Date: 3/11/06  | Examiner: N/A      | Level: NA                      | Date: N/A           |
| Sign:  |                    |  | Sign:              |                                |                     |
| Reviewed: Adam A. Corni  | Level: III         | Date: 3/25/06  | ANII Review        |                                | Date: 3/11/06       |
| Sign:  |                    |  | Sign:              |                                |                     |



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## RPV ULTRASONIC CALIBRATION &amp; EXAM DATA SHEET

|   |          |                                       |          |   |  |  |  |
|---|----------|---------------------------------------|----------|---|--|--|--|
| Site: Browns Ferry Unit 3   |          | Exam Date: 03/11/06                   |          | Summary No.: U3C12-N8A-NV                       |  | Calibration No.: N8A-CS03              |  |
| Nozzle ID.: RPV N8A   |          |                                       |          |   |  |  |  |
| Component ID: RPV N8A   |          |                                       |          |   |  |  |  |
| Exam Description: 4" Jet Pump Instrumentation Nozzle to Vessel Weld                 |          |                                       |          | ASME Section XI: 2001 Edition with 2003 Addenda |  |  |  |
| Drawing No.: 3-ISI-0411-C   |          | Procedure No. / Rev.: 54-ISI-850 / 03 |          | Figure No.: IWB 2500-7                          |  |  |  |
| Material: CS Clad   |          | Thickness: 6.1"                       |          | Nozzle Diameter: 4"                             |  |  |  |
| <b>INSTRUMENT SETTINGS</b>  |          | <b>SEARCH UNIT</b>                    |          | <b>CALIBRATION STANDARD</b>                     |  |  |  |
| Mfg.: Staveley  |          | Mfg.: KBA                             |          | Model: Benchmark                                |  | Cal. Block ID: BF-18                   |  |
| Model: Sonic 136  |          | Serial No.: 00X1XJ                    |          |   |  | Cal. Block Thickness: 6.12" Dia.: Flat |  |
| Serial No.: 136P1200G081455   |          | Size: .5X1.0"                         |          |   |  | Temp: Block: 81°F Comp.: 78°F          |  |
| Range: 10"  |          | Freq: 2.25 MHz                        |          | Shape: Rectangle                                |  | Thermometer VH: 9571                   |  |
| Delay: 6.77"  |          | Mode: Shear                           |          | Config.: Single                                 |  | Couplant Type: Ultragel II             |  |
| Velocity: .129 in/μsec.   |          | Nominal Refracted Angle: 50°          |          |   |  | Couplant Batch #: 05325                |  |
| Each Major Screen Div.: 1.0"  |          | Measured Refracted Angle: 50°         |          |   |  | <b>CALIBRATION VERIFICATION BLOCK</b>  |  |
| Freq.: 2.25 MHz   |          | Pulse: 222 ns                         |          | Nominal Skew Angle (If Applicable): 15°-45°     |  | Serial No.: 037405                     |  |
| Damping: 500 Ω  |          | Rep. Rate: 2 KHz                      |          | Measured Skew Angle (If Applicable): NA         |  | Type: Rompas                           |  |
| Filter: Filter 2  |          | Reject: Off                           |          | Wedge Radius (If Applicable): Flat              |  | Reflector: 7 10                        |  |
| Pulse Amplitude: Fixed  |          | Cable Type: RG-174 Length: 12'        |          |   |  | Sweep Div.: 1 4                        |  |
| Mode: <input type="checkbox"/> Dual <input checked="" type="checkbox"/> Pulse Echo  |          | No. of Intermediate Connectors: 0     |          |   |  | Amp. %: 100 70                         |  |
| Jack: <input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive |          |                                       |          |   |  | Gain dB: 44.8 44.8                     |  |
| Ref. Sensitivity: 61.6 dB   |          |                                       |          |   |  |  |  |
| Scan Sensitivity: 70.0 dB   |          |                                       |          |   |  |  |  |
| <b>CALIBRATION / VERIFICATION TIMES</b>   |          |                                       |          | <b>DAC PLOT</b>                                 |  |  |  |
|   | Date     | Time                                  | Initials |   |  |  |  |
| Initial Cal:  | 03/11/06 | 1942                                  | TB       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Intermediate:   | NA       | NA                                    | NA       |   |  |  |  |
| Final Cal:  | 03/11/06 | 2101                                  | TB       |   |  |  |  |
| Calibration Reflector(s)  |          |                                       |          | Notch   |  |  |  |
| Sweep Position  |          |                                       |          | 3.4   |  |  |  |
| Amplitude in % FSH  |          |                                       |          | 80%   |  |  |  |
| Gain in dB  |          |                                       |          | 61.6 dB   |  |  |  |
| Notes: Nozzle to Shell 6" delay on screen   |          |                                       |          |   |  |  |  |
| Examiner: Thomas Brown  |          | Level: II                             |          | Date: 03/11/06                                  |  | Examiner: N/A                          |  |
| Sign:   |          |                                       |          |   |  | Level: N/A                             |  |
| Reviewed: Adam A. Conti   |          | Level: II                             |          | Date: 3/25/2006                                 |  | ANII Review:                           |  |
| Sign:   |          |                                       |          |   |  | Date: 6/1/26                           |  |