



Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, Tennessee 37402-2801

R. M. Krich
Vice President
Nuclear Licensing

March 21, 2011

10 CFR 50.4
10 CFR 50.55a

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

Browns Ferry Nuclear Plant, Unit 3
Facility Operating License No. DPR-68
NRC Docket No. 50-296

Subject: **American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Inservice Inspection Program, Third Ten-Year Inspection Interval, Request for Relief 3-ISI-26**

In accordance with 10 CFR 50.55a(g)(5)(iii), the Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 2001 Edition, 2003 Addenda as amended by 10 CFR 50.55a(b)(2)(xv)(A)(2), for one full penetration weld due to access limitations caused by design. This relief is requested for the Browns Ferry Nuclear Plant (BFN), Unit 3, third ten-year inspection interval which began November 19, 2005, and ends November 18, 2015.

Specifically, this request for relief addresses one reactor pressure vessel nozzle-to-vessel (head) full penetration weld. Ultrasonic examinations were performed on the accessible areas of this weld to the maximum extent practical for the design configuration of the weld.

The enclosure to this letter contains the BFN, Unit 3, Request for Relief 3-ISI-26, for NRC review and approval.

A047
NRK

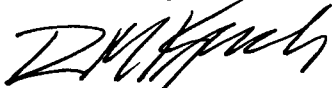
U.S. Nuclear Regulatory Commission
Page 2
March 21, 2011

This request for relief is consistent with the BFN, Unit 3, Request for Relief 3-ISI-23 submitted by TVA letters dated August 24, 2007 and April 9, 2008. The NRC approved this request by letter dated September 24, 2008.

TVA requests approval of this request for relief within one year from the date of this letter.

There are no new regulatory commitments in this letter. If you have any questions, please contact Tom Matthews at (423) 751-2687.

Respectfully,



R. M. Krich

Enclosure: American Society of Mechanical Engineers Boiler and Pressure Vessel
Code, Section XI, Inservice Inspection Program, Third Ten-Year Inspection
Interval, Request for Relief 3-ISI-26

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

Enclosure

**Tennessee Valley Authority
Browns Ferry Nuclear Plant
Unit 3**

**American Society of Mechanical Engineers Boiler and Pressure Vessel Code,
Section XI, Inservice Inspection Program,
Third Ten-Year Inspection Interval**

Request for Relief 3-ISI-26

Enclosure

Tennessee Valley Authority Browns Ferry Nuclear Plant Unit 3

American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Inservice Inspection Program, Third Ten-Year Inspection Interval

Request for Relief 3-ISI-26

Executive Summary: In accordance with 10 CFR 50.55a(g)(5)(iii), the Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI for one Reactor Pressure Vessel (RPV) nozzle-to-vessel (head) full penetration ultrasonic (UT) weld examination performed during the Browns Ferry Nuclear Plant (BFN), Unit 3, Cycle 13 Refueling Outage in the first period of the third ten-year interval.

The design configuration of the RPV Head nozzle-to-vessel (head) weld precludes a 100 percent UT examination of the required volume for the full penetration weld of the nozzle listed in Table 1 of this enclosure. 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 ASME Code requirements for examination access, to the 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 the accessible areas to the maximum extent practical given the physical limitations of the subject weld. The subject weld was examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, as required by 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(g)(6)(ii)(C).

TVA concludes that performance of a UT examination of essentially 100 percent of the RPV nozzle-to-vessel full penetration weld would be impractical. The performance of the UT 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 provides sufficient information to judge the overall integrity of the weld. Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN, Unit 3, third ten-year inspection interval.

This relief is requested for the BFN, Unit 3, third ten-year inspection interval which began November 19, 2005, and ends November 18, 2015.

This request for relief is consistent with the BFN, Unit 3, Request for Relief 3-ISI-23 submitted by TVA letters dated August 24, 2007 and April 9, 2008. The NRC approved this request by letter dated September 24, 2008.

Unit: Browns Ferry Nuclear Plant, Unit 3

System: Reactor Pressure Vessel Head Nozzle, System 329

ASME Code Components Affected: One RPV nozzle-to-vessel full penetration weld as listed in Table 1 of this enclosure

ASME Code Class: ASME Code Class 1 (Equivalent)

Section XI Edition: 2001 Edition, 2003 Addenda 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) PDI processes.

Code Table: IWB-2500-1

Code Examination Category: B-D, "Full Penetration Welds of Nozzles in Vessels"

Code Examination Item Number: B3.90, "Reactor Vessel Nozzle-to-Vessel Welds"

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).

Code Requirements from Which Relief Is Requested: Relief is requested from the requirement 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 the weld and adjacent base material.

List of Components Associated with this Request for Relief: RPV head, nozzle-to-vessel weld (N6A-NV)

Reason for Request: The design configuration of the RPV nozzle-to-vessel (N6A-NV) weld area precludes a UT examination of essentially 100 percent of the required volume. The component design configuration limits UT examination coverage of the weld to the percentage listed in Table 1.

Proposed Alternative and Basis for Use: In lieu of the Code require 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 configuration of the RPV nozzle-to-vessel weld.

Justification for Granting Relief: (1) The design configuration of the subject nozzle-to-vessel weld (N6A-NV), precludes UT examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the ASME Code requirements the RPV would require extensive design modifications. The physical arrangement of the nozzle-to-vessel weld precludes UT examination from the nozzle side. The limitations are inherent to the barrel-type nozzle-to-vessel weld design. Scanning from the nozzle surface is ineffective due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge. Experience from the automated UT examination performed from the inside surface has shown that the

nozzle-to-vessel weld coverage will not be greatly improved even if performed from the inside surface utilizing the current state-of-the-art techniques. 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 of the weld 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 weld was examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the 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 EPRI's PDI processes.

(2) Radiographic examination as an alternate volumetric examination method was determined to be impractical due to 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 ASME Code coverage gained by radiography is impractical when weighed against the radiological concerns.

Therefore, TVA concludes that performing a UT examination of essentially 100 percent of the nozzle-to-vessel full penetration weld 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 a UT examination performed to the maximum extent practical of the subject weld. As a result, reasonable assurance of operational readiness of the subject weld has been provided.

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.

Implementation Schedule:

This request for relief is applicable to the third ten-year ISI inspection interval for BFN, Unit 3, which began on November 19, 2005, and will end on November 18, 2015. The weld described above is listed in Table 1 of this enclosure. The weld was examined during the first period (Cycle 13 - spring 2008) of the third ten-year inspection interval.

Precedent:

This request for relief is consistent with BFN, Unit 3, Request for Relief 3-ISI-23 submitted by TVA letters dated August 24, 2007, and April 9, 2008. The NRC approved this request by letter dated September 24, 2008.

Attachments:

Attachment A (Inservice Inspection Drawings)

3-ISI-0295-A, Revision 001

Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3011, Attachments Map Top Head Assembly

Sketch SK-B3016, Weld Detail Head Spray / Instrumentation Nozzle N6

Attachment B (Weld Examination Data Report)

Weld Examination Report, R-054

Table 1

Weld Number / (System)	Nominal Pipe Size (NPS)	ISI Drawing Number	Examination Coverage Percent	Unit / Cycle	Comments
N6A-NV (RPV Instrumentation Head Nozzle)	6"	3-ISI-0295-A	58.9%	3 / 13 (Spring 2008)	Nozzle-to-vessel weld (RPV Head Nozzle) examined using a 26, 45, and 55 degree shear wave mode and a 60 degree refracted longitudinal wave mode. Scanning was restricted due to nozzle configuration. Exams were performed from the head shell side and outer blend radius. This weld was examined using PDI qualified personnel, procedures, and equipment. The coverage claimed is 58.9%.

Attachment A

Inservice Inspection Drawings

3-ISI-0295-A, Revision 001

Sketch SK-B3001, Reactor Pressure Vessel Assembly

Sketch SK-B3011, Attachments Map Top Head Assembly

Sketch SK-B3016, Weld Detail Head Spray / Instrumentation Nozzle N6

"Y" DIMENSIONS

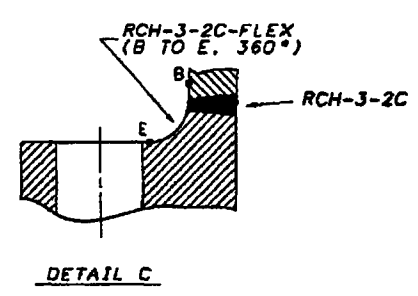
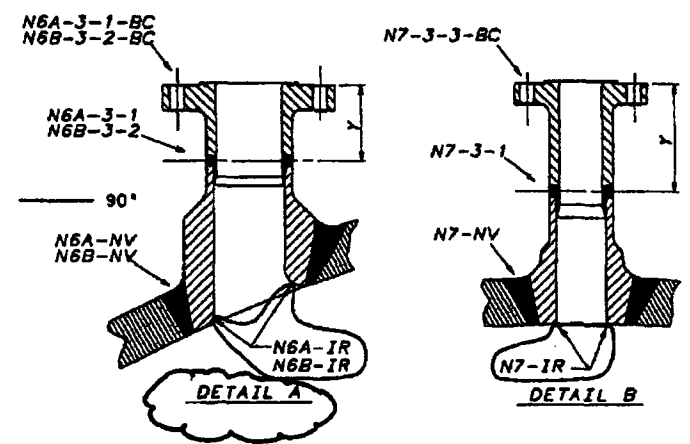
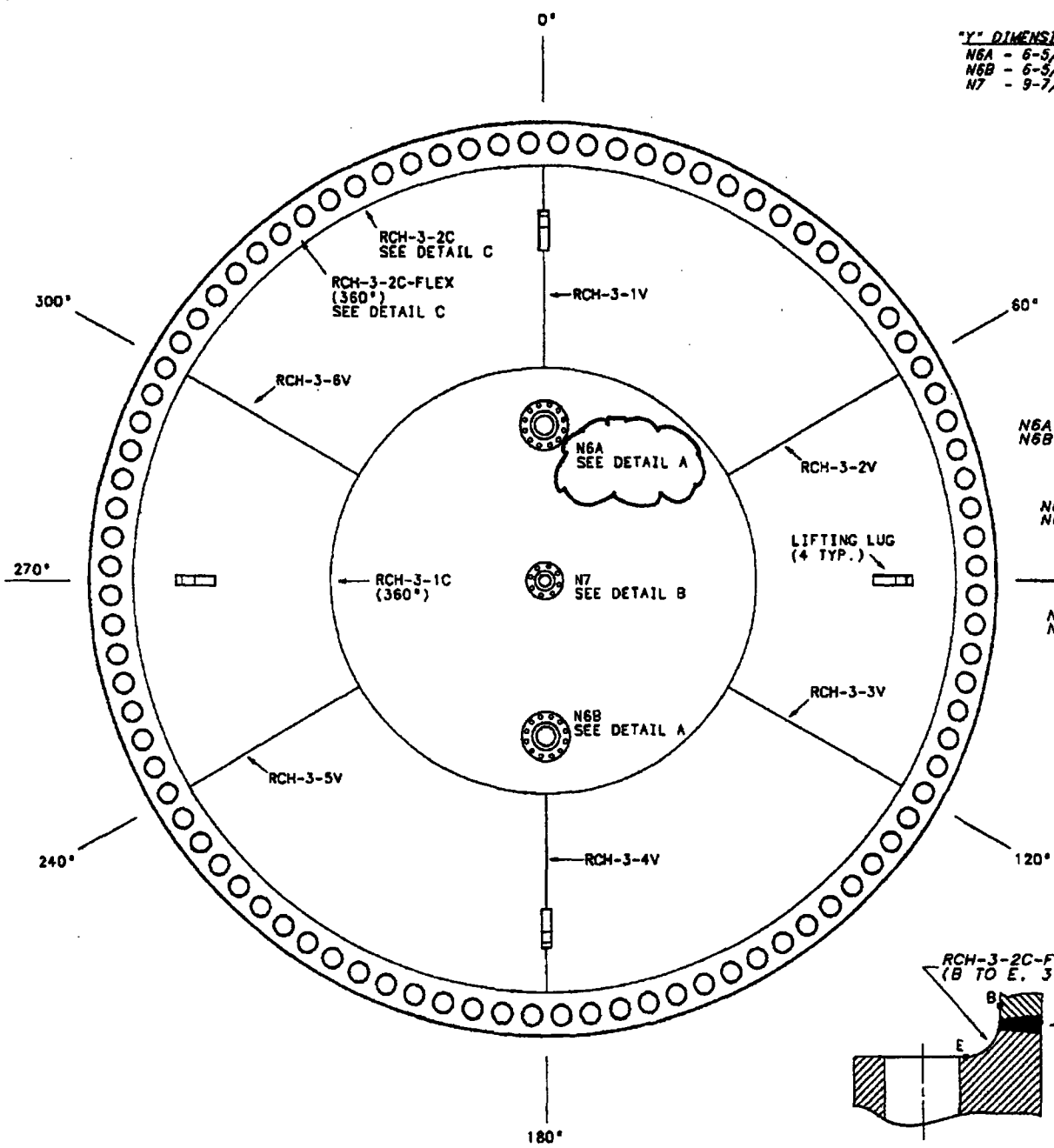
N6A - 6-5/8"
 N6B - 6-3/8"
 N7 - 9-7/16"

REFERENCE DRAWINGS:

BAW 122876
 BAW 122877
 NOTE: THIS DRAWING SUPERSEDES
 CHM-2102-A (UNIT 3 ONLY)

MATERIAL SPECIFICATIONS

CLOSURE HEAD DOME/SEGMENTS
 CS MN/MO
 N-7
 NOZZLE - A508 CL.2 (MN-MO)
 LONG WELD NECK - SA-105 GR.11 CS
 N6A, N6B
 NOZZLE - A508 CL.2 (MN-MO)
 LONG WELD NECK - SA-105 GR.11 CS
 ASME CC-1 (EQUIVALENT)



001	ADMT	J. HOFFLAND	W. HODGES	DP	10/1/88	6-4/2001
REVISED PER RDM MEMO R14 040128 101						
REV	CHKD	BY	PREPARED	CHECKED	APPROVED	DATE
TENNESSEE VALLEY AUTHORITY						
BROWNS FERRY NUCLEAR PLANT						
UNIT 3						
CLOSURE HEAD ASSEMBLY						
WELD LOCATIONS						
DRAWN: PMP	DESIGNED:	APPROVED:	SCALE: A1:1			
DATE: 12-28-88	DATE: 12-28-88	DATE: 1-1-89	SHEET 01 OF 01 SHEETS			
CHECKED: JES	EDC	CLB	PROJECT NO.			
DATE: 2-13-89			3-151-0295-A1001			

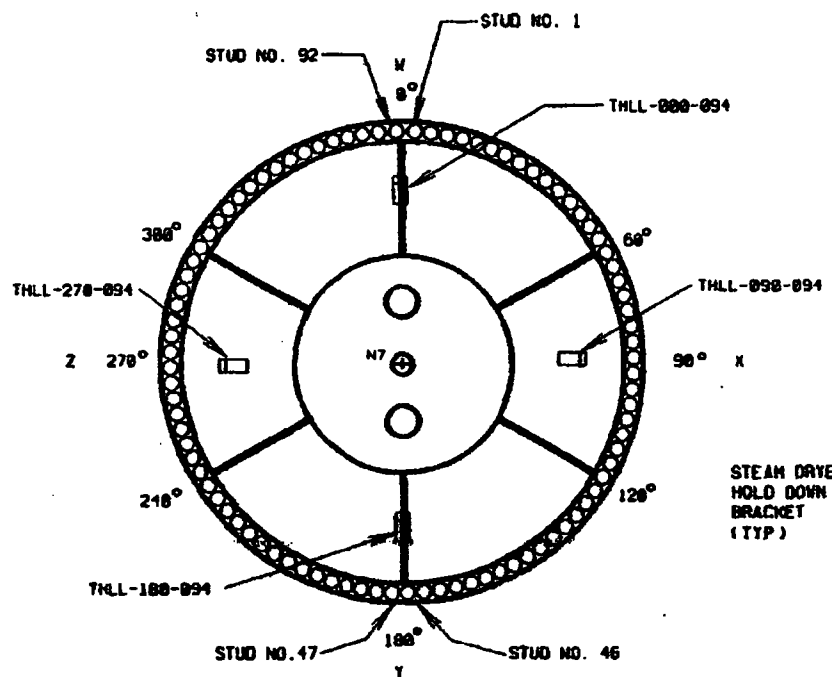
ALL A/D HISTORY RESEARCHED AT R000

CAD MAINTAINED DRAWING CCD

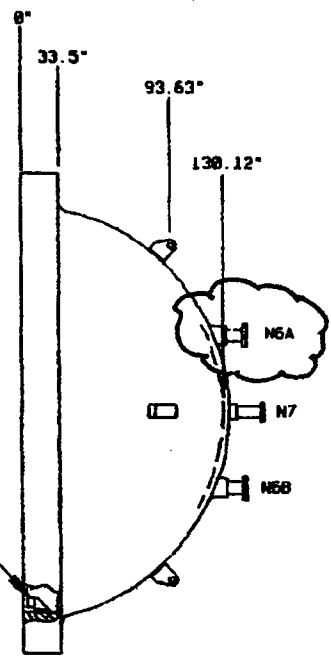
REV	DATE	PREPARED	REVIEWED	INITI	APPROVED	PURPOSE
0	11-24-92	H McLAVERTY	N. THOLTEN	R. MODER		

REFERENCE BAW DRAWING NO. 131855E-6

SKETCH RELEASE RECORD



TOP VIEW
OUTSIDE TOP HEAD ASSEMBLY

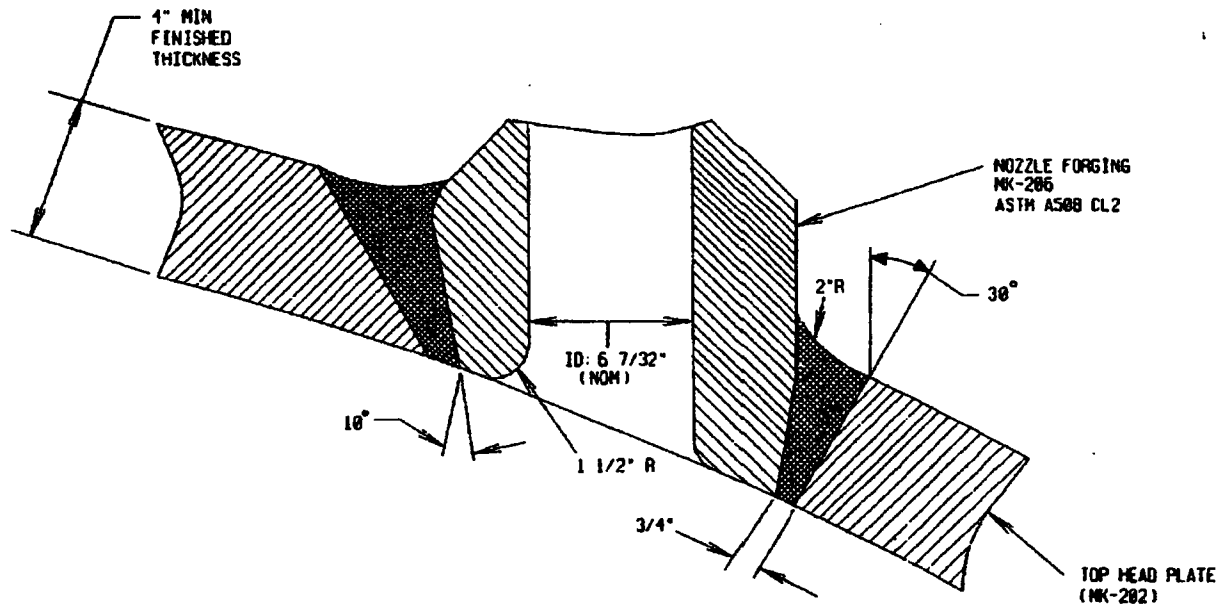


SIDE VIEW
OUTSIDE TOP HEAD ASSEMBLY

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

DE DWP NO.	PROJECT	TITLE	SKETCH NO.
A00-5306	BROWNS FERRY 3	ATTACHMENTS MAP TOP HEAD ASSEMBLY	SK-83011

REFERENCE BAW DRAWING NO. 131856-6 (DETAIL B)
AND NO. 131856-3



REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	PURPOSE
0	11-24-92	M. McLAVERY	K. PROTER	R. HOOPER		

SKETCH RELEASE RECORD

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

DEWID NO. A00-5306	PROJECT BROWNS FERRY 3	TITLE WELD DETAIL HEAD SPRAY/ INSTRUMENTATION NOZZLE MS	SKETCH NO. SK-B3016
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Attachment B

Weld Examination Data Report

Weld Examination Report, R054

000232

TENNESSEE VALLEY AUTHORITY		EXAMINATION SUMMARY AND RESOLUTION DATA SHEET		REPORT NUMBER: <i>R054</i>	
PROJECT: BFN UNIT: 3		CYCLE: 13		COMPONENT ID: N6A-NV	
EXAMINATION METHOD				SYSTEM: RPV ISI DWG. NO. 3-ISI-0295-A-01	
MT <input type="checkbox"/>	PT <input type="checkbox"/>	UT <input checked="" type="checkbox"/>	VT <input type="checkbox"/>	CODE CLASS: 1 CATEGORY: B-D	
PROCEDURE: N-UT-78		REV:4	TC:NA	COFIG.:	Nozzle TO Vessel
EXAMINER: <i>Thomas Brown</i> <i>Jay D Brown</i>		EXAMINER: <i>SAMUAL Alex Z. PEEEL</i> <i>[Signature]</i>		EXAMINER: N/A	EXAMINER: N/A
LEVEL: <i>II</i>		LEVEL: <i>III</i>		LEVEL:	LEVEL:

The package contains the ultrasonic examination data for N6A-NV.

This exam meets the requirements of ASME Section XI, 2001 edition, 2003 Addenda for category B-D, item B3.90, EXREQ 03E-03.

The examination was performed using ASME Section XI, Appendix VII and Appendix VIII personnel, equipment and techniques as ammended by the 10CFR50.55a Final Rule

The joint configuration is a 6" nominal diameter RPV Nozzle to Shell weld located on the RPV Head.

The examination was performed using TVA Procedure N-UT-78 for the Supplement 4/6 exam voloume and AREVA Procedure 54-ISI-850 for the Supplement 5 exam volume. The supplement 4/6 exam volume was examined using a 60 degree RL. The supplement 5 volume was examined using a 26, 45 and 55 degree shear wave as defined in EPRI modeling document IR-2003-17.

The achieved examination volumes are as follows:

Supplement 5 volume (inner 15%)=100%
 Supplement 4/6 volume (outer 85%)= 57.5%
 ASME Code Required Volume (Full volume)= 58.9%

RESOLUTION BY: <i>Thomas Brown</i> <i>Jay D Brown</i>	REVIEWED BY: <i>Mark Welch</i>	ANI: <i>[Signature]</i>
LEVEL: <i>II</i> DATE: <i>3/27/08</i>	LEVEL: <i>III</i> DATE: <i>4/4/08</i>	DATE: <i>4/22/08</i> <i>[Signature]</i>
		PG. <i>1</i> OF <i>10</i>

Tennessee Valley Authority

Ultrasonic Examination Data Sheet
Nozzle-to-Shell Weld Examination

Utility: TVA Site: Browns Ferry Unit/Outage: 3 / Cycle 13 RFO
 Examination Data Sheet Number: ISI Report Number: *R054*
 Component ID: N6A-NV Component Description: N6 Nozzle-to-Closure Head Weld

Examination Information

ISO / Drawing Number: 3-ISI-0295-A-01 W₀ Location: Nozzle Boss (Rnozzle) L₀ Location: Nozzle TDC
 Examination Limited: Yes No Coverage Sheet Number(s):

Scan Information

Examination Procedure: 54-ISI-850-06			Applicable SDCN's: 30-8069955-000, & 30-9044520-000						Scan Surface: OD Nozzle Blend		
Angle/ Mode	Skew	Calibration Sheet #	Date	Time	Temp	Thermometer S/N:	Scan Gain	Scan Limited	Recordable Indication(s)	Indication Data Sheet #	Examiner Initials
26°/s	+90°		3/27/08	0950	75°F	531993	74.0 dB	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
26°/s	-90°		3/27/08	0950	75°F	531993	74.0 dB	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
N/A/	N/A°	N/A	N/A	N/A	N/A °F	N/A	N/A dB	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	N/A	N/A
N/A/	N/A°	N/A	N/A	N/A	N/A °F	N/A	N/A dB	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	N/A	N/A

Examination Procedure: 54-ISI-850-06			Applicable SDCN's: 30-8069955-000, & 30-9044520-000						Scan Surface: OD Closure Head		
Angle/ Mode	Skew	Calibration Sheet #	Date	Time	Temp	Thermometer S/N:	Scan Gain	Scan Limited	Recordable Indication(s)	Indication Data Sheet #	Examiner Initials
45°/s	±25° to 80°		3/27/08	1006	75°F	531993	64.0dB	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
55°/s	±20° to 60°		3/27/08	1032	75°F	531993	68.0dB	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB

Examination Procedure: N-UT78 Rev 4				Applicable SDCN's: N/A						Scan Surface: OD Closure Head		
Angle/ Mode	Zone	Beam Direction	Calibration Sheet #	Date	Time	Temp	Thermometer S/N:	Scan Gain	Scan Limited	Recordable Indication(s)	Indication Data Sheet #	Examiner Initials
60°/RL	1	<input checked="" type="checkbox"/> Radial <input type="checkbox"/> Circ		3/27/08	1345	75°F	531993	95.0 dB	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
60°/RL	2	<input checked="" type="checkbox"/> Radial <input type="checkbox"/> Circ		3/27/08	1400	75°F	531993	95.0 dB	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
60°/RL	1	<input type="checkbox"/> Radial <input checked="" type="checkbox"/> Circ		3/27/08	1345	75°F	531993	95.0 dB	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB
60°/RL	2	<input type="checkbox"/> Radial <input checked="" type="checkbox"/> Circ		3/27/08	1400	75°F	531993	95.0 dB	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A	TB

Comments:

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: N/A Signature:	Level: N/A	Date: N/A
Examiner: Samuel Alex Zipperer Signature: <i>Samuel Zipperer</i>	Level: III	Date: 3/27/08	Examiner: N/A Signature:	Level: N/A	Date: N/A
TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: 4/4/08	ANZ: <i>[Signature]</i>	DATE: 4/22/08	

000233

Tennessee Valley
Authority

Reactor Pressure Vessel Manual Ultrasonic Calibration Data Sheet

Utility: TVA Site: Browns Ferry Nuclear Plant Unit: 3 Outage: Cycle 13 RFO

ISO / Drawing Number: ISI 0295-A-01 ISI Report Number: *R054*
 Component ID: N6A-NV Component Description: Nozzle - Closure Head
 Examination Procedure: 54-ISI-850 Rev.6 Applicable SDCN(s): 30-9069955-000 & 30-9044520-000

Ultrasonic Instrument	Transducer
Manufacture: Staveley	Manufacture: KBA
Model: Sonic 136	Model: Benchmark892-800 842-600 <i>4/2/08</i>
Serial Number: 136-881K <i>Due date: 8/27/08</i>	Serial Number: 01601R 01691R
Linearity Sheet No.:	Frequency: 2.25
	Measured Angle: 26°
	Mode: Shear
	Size: 0.5"X0.5"

Instrument Settings		Verification Block	
Range: <input checked="" type="checkbox"/> Sound Path <input type="checkbox"/> Depth	# of Elements: 1	Shape: Rect.	Configuration: Single
Delay: 0.342"	Cable Type: RG-174	Length: 12'	Intermediate Connectors: 0
Velocity: 127	Verification Block		

RCVR	Type: Rompas		S/N: 5100	
	Display: IP	Reflector:	0.7 SDH	1" Radius
Frequency: 2.25	Sweep:	0.8	1.6	
Reject: Off	Amplitude:	50%	65%	
Pulse Width: 222nS	Gain:	42.4	42.4	

PULSER	Basic Calibration Block			
	Mode: <input checked="" type="checkbox"/> Pulse Echo <input type="checkbox"/> Dual	Block ID: BF-18	Material: Clad/ CS	
	Rep Rate: 2kHz Filter: 2	Thickness: 6.0" with 0.125" Clad	Diameter: Flat	
	Pulser: <input type="checkbox"/> 150V <input type="checkbox"/> 300V (*Sonic 137 only)	Temperature: 72 °F	Therm. SN: 531993 <i>DID 12/17/2008</i>	
*Probe voltage is adjustable with the Sonic 137 instrument. The Sonic 136 has a fixed pulser voltage.		Couplant: Ultra Gel II	Batch No.: 05125 05325 <i>4/2/08</i>	

Reference Sensitivity Information

Reflector: 3/4T Hole	Sweep: 5.0 div.	Amplitude: 80 %FSH	Gain: 62.2 dB
Cal In: Date: 3/27/08 Time 0813	Check: Date: 3/27/08 Time 0950	Check: Date N/A Time N/A	Out: Date: 3/27/08 Time 1005

Comments

Used the longitudinal wave to hit the one inch radius, and the shear wave to hit the .7 side drilled hole. Reference EPRI Examination of Browns Ferry Closure Head Nozzle-to-Shell Welds Modeling # IR-2003-17.

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: Samuel Alex Zipperer Signature: <i>Samuel Zipperer</i>	Level: IIL	Date: 3/27/08
TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: 4/14/08	ANII: <i>[Signature]</i>	DATE: 4/22/08	Page 3 of 10

Tennessee Valley
Authority

Reactor Pressure Vessel Manual Ultrasonic Calibration Data Sheet

Utility: TVA	Site: Browns Ferry Nuclear Plant	Unit: 3	Outage: Cycle 13 RFO
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ISO / Drawing Number: 3-ISI-0295-A-01	ISI Report Number: <i>ROS4</i>
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Component ID: N6A-NV	Component Description: Nozzle - Closure Head
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Examination Procedure: 54-ISI-850 Rev.6	Applicable SDCN(s): 30-9069955-000 & 30-9044520-000
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Ultrasonic Instrument	Transducer
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Manufacture: Staveley	Manufacture: KBA	Model: Benchmark892-600
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Model: Sonic 136	Serial Number: 0111PK	Frequency: 2.25
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Serial Number: 136-861K <i>Due date: 3/27/08 or 4/12/08</i>	Angle: 45°	Measured Angle: 47°
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Linearity Sheet No.:	Mode: Shear	Size: 0.5"X1.0"
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Instrument Settings	Skew Angle: ±25° to 80°	Measured Skew Angle: N/A
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RANGE	Range: <input checked="" type="checkbox"/> Sound Path <input type="checkbox"/> Depth	# of Elements: 1	Shape: Rect.	Configuration: Single
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Delay: 0.609"	Cable Type: RG-174	Length: 12'	Intermediate Connectors: 0
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Velocity: 126	Verification Block		
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RCVR	Display: IP	Type: Rompas	S/N: 5100
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Frequency: 2.25	Reflector:	1" Radius	2" Radius
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Reject: Off	Sweep:	1.0	2.0
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Pulse Width: 222nS	Amplitude:	70%	80%
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Damping: 500Ω	Gain:	23.0	23.0
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Mode: <input checked="" type="checkbox"/> Pulse Echo <input type="checkbox"/> Dual	Basic Calibration Block		
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PRR: 2kHz Filter: 2	Block ID: BF-18	Material: Clad/ CS	
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Pulser: <input type="checkbox"/> 150V <input type="checkbox"/> 300V (*Sonic 137 only)	Thickness: 6.0" with 0.125" Clad	Diameter: Flat	
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<small>*Probe voltage is adjustable with the Sonic 137 instrument. The Sonic 136 has a fixed pulser voltage.</small>	Temperature: 72 °F	Therm. SN: 531993 <i>DD 12/17/2008</i>	
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	Couplant: UltraGel II	Batch No.: 06425 <i>05325</i> <i>4/12/08</i>	
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Reference Sensitivity Information

Reflector: 3/4T Hole	Sweep: 6.6 div.	Amplitude: 80%FSH	Gain: 52.2 dB
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Cal In: Date: 3/27/08 Time 0810	Check: Date: 3/27/08 Time 1005	Check: Date: N/A Time N/A	Out: Date: 3/27/08 Time 1028
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Comments

Reference EPRI Examination of Browns Ferry Closure Head Nozzle-to-Shell Welds Modeling # IR-2003-17.

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: Samuel Alex Zipperer Signature: <i>Samuel Zipperer</i>	Level: IIL	Date: 3/27/08
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TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: 4/4/08	ANIT: <i>[Signature]</i>	DATE: 4/12/08	Page 4 of 10
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Tennessee Valley
Authority

Reactor Pressure Vessel Manual Ultrasonic Calibration Data Sheet

Utility: TVA Site: Browns Ferry Nuclear Plant Unit: 3 Outage: Cycle 13 RFO

ISO / Drawing Number: 3-ISI-0295-A-01 ISI Report Number: *ROS4*
 Component ID: N6A-NV Component Description: Nozzle - Closure Head
 Examination Procedure: 54-ISI-850 Rev.6 Applicable SDCN(s): 30-9069955-000 & 30-9044520-000

Ultrasonic Instrument	Transducer	
Manufacture: Staveley	Manufacture: KBA	Model: Benchmark892-600
Model: Sonic 136	Serial Number: 00X08P	Frequency: 2.25
Serial Number: 136-861K <i>due date: 8/27/08</i>	Angle: 55°	Measured Angle: 55°
Linearity Sheet No.:	Mode: Shear	Size: 0.5"X1.0"

Instrument Settings		Verification Block	
Range: * <input checked="" type="checkbox"/> Sound Path <input type="checkbox"/> Depth	# of Elements: 1	Shape: Rect.	Configuration: Single
Delay: 0.790"	Cable Type: RG-174	Length: 12'	Intermediate Connectors: 0
Velocity: 126	Verification Block		

RCVR	Display: IP		Type: Rompas	S/N: 5100
	Frequency: 2.25	Reject: Off	Reflector:	1" Radius
Pulse Width: 222nS	Damping: 500Ω	Sweep:	1.0	2.0
Mode: <input checked="" type="checkbox"/> Pulse Echo <input type="checkbox"/> Dual	Gain:	Amplitude:	70%	80%

PULSER	Basic Calibration Block		
	PRR: 2kHz Filter: 2	Block ID: BF-18	Material: Clad/ CS
	Pulser: <input type="checkbox"/> 150V <input type="checkbox"/> 300V (*Sonic 137 only)	Thickness: 6.0" with 0.125" Clad	Diameter: Flat
	*Probe voltage is adjustable with the Sonic 137 instrument. The Sonic 138 has a fixed pulser voltage.	Temperature: 72 °F	Therm. SN: 531993 <i>DD 12/17/2008</i>
	Couplant: UltraGel II	Batch No.: 06425 <i>05325 4/12/08</i>	

Reference Sensitivity Information			
Reflector: 3/4T Hole	Sweep: 7.6 div.	Amplitude: 80 %FSH	Gain: 56.8 dB
Cal In: Date: 3/27/08 Time 0819	Check: Date: 3/27/08 Time 1031	Check: Date: N/A Time N/A	Out: Date: 3/27/08 Time 1045

Comments

Reference EPRI Examination of Browns Ferry Closure Head Nozzle-to-Shell Welds Modeling # IR-2003-17.

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: Samuel Alex Zipperer Signature: <i>Sam Zipperer</i>	Level: IIL	Date: 3/27/08
TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: 4/4/08	ANIS: <i>[Signature]</i>	DATE: 4/22/08	Page 5 of 10

Tennessee Valley
Authority

Reactor Pressure Vessel
Manual Ultrasonic Calibration Data Sheet

Utility: TVA	Site: Browns Ferry Nuclear Plant	Unit: 3	Outage: Cycle 13 RFO
ISO / Drawing Number: 3-ISI-0295-A-01		ISI Report Number: <i>R054</i>	
Component ID: N6A-NV		Component Description: Nozzle-to-Closure Head	
Examination Procedure: N-UT-78 Revision 4		Applicable SDCN(s): N/A	

Ultrasonic Instrument		Transducer		
Manufacture: GE		Manufacture: RTD		Model: TRL2-Aust
Model: Sonic USN 60		Serial Number: 01-887		Frequency: 2 MHz
Serial Number: E34054 <i>due date: 11/03/08 4/13/08</i>		Angle: 60°		Measured Angle: 60°
Linearity Sheet No.:		Mode: Refracted Longitudinal		Size: 2(24x42)mm
Instrument Settings		Focus: FS~125mm		Squint Angle: 3°
RANGE	Range: 5.0" <input checked="" type="checkbox"/> Sound Path <input type="checkbox"/> Depth	# of Elements: 2	Shape: Rect.	Configuration: Dual - SBS
	Probe Delay: 10.8012 uS	Cable Type: RG-174	Length: 6'	Intermediate Connectors: 0
	Velocity: 0.2127 uS	Verification Block		
RCVR	Display Delay: 0.000	Type: CS Rompas		S/N: 5100
	Frequency: 2 - 25 MHz	Reflector:	1" Radius	2" Radius
	Reject: Off	Sweep:	2.0 div.	4.0 div.
PULSER	Energy: High	Amplitude:	25 %FSH	80 %FSH
	Damping: 1KΩ	Gain:	52.0 dB	52.0 dB
	Mode: <input type="checkbox"/> Pulse Echo <input checked="" type="checkbox"/> Dual	Basic Calibration Block		
	PRR/PRF: Autohigh	Block ID: BF-19	Material: CS	
		Thickness: 4.2"	Diameter: Flat	
	Temperature: 72° F	Therm. SN: 531993 <i>DD 12/17/2008</i>		
	Couplant: UltraGel II	Batch No.: 06425 <i>05325 4/12/08</i>		

Reference Sensitivity Information

Reflector: 1/4T SDH	Sweep: 4.2 div.	Amplitude: 80% FSH	Gain: 79.5 dB
Cal In: Date 3/27/08 Time 0807	Check: Date 3/27/08 Time 1442	Check: Date 3/27/08 Time 1543	Out: Date 3/27/08 Time 1607

Comments

Zone 1: Near Surface Examination. Reference EPRI Examination of Browns Ferry Closure Head Nozzle-to-Shell Welds Modeling # IR-2003-17.

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: Samuel Alex Zipperer Signature: <i>SAMUEL ALEX ZIPPERER</i>	Level: IIL	Date: 3/27/08
TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: <i>4/14/08</i>	ANCI: <i>[Signature]</i> DATE: <i>4/22/08</i>	Page 6 of 10	

Tennessee Valley
Authority

Reactor Pressure Vessel
Manual Ultrasonic Calibration Data Sheet

Utility: TVA	Site: Browns Ferry Nuclear Plant	Unit: 3	Outage: Cycle 13 RFO
ISO / Drawing Number: 3-ISI-0295-A-01		ISI Report Number: <i>ROS4</i>	
Component ID: N6A-NV		Component Description: Nozzle-to-Closure Head	
Examination Procedure: N-UT-78 Revision 4		Applicable SDCN(s): N/A	

Ultrasonic Instrument		Transducer	
Manufacture: GE		Manufacture: RTD	Model: TRL2-Aust
Model: USN 60		Serial Number: 01-887	Frequency: 2 MHz
Serial Number: <i>84054</i> <i>due date: 11/3/08</i> <i>nr 4/13/08</i>		Angle: 60°	Measured Angle: 60°
Linearity Sheet No.:		Mode: Refracted Longitudinal	Size: 2(24x42)mm

Instrument Settings		Verification Block	
Range: 12.0" <input checked="" type="checkbox"/> Sound Path <input type="checkbox"/> Depth	# of Elements: 2	Shape: Rect.	Configuration: Dual - SBS
Probe Delay: 10.8012 uS	Cable Type: RG-174	Length: 6'	Intermediate Connectors: 0
Velocity: 0.2127 uS			

RANGE	Instrument Settings		Verification Block	
	Display Delay: 0.000	Type: CS Rompas	S/N: 5100	
Frequency: 2 - 25 MHz	Reflector:	1" Radius	2" Radius	
Reject: Off	Sweep:	0.8 div.	1.7 div.	
Energy: High	Amplitude:	25 %FSH	80 %FSH	
Damping: 1KΩ	Gain:	52.0 dB	52.0 dB	

PULSER	Basic Calibration Block		
	Mode: <input type="checkbox"/> Pulse Echo <input checked="" type="checkbox"/> Dual	Block ID: BF-19	Material: CS
	PRR/PRF: Autohigh	Thickness: 4.0"	Diameter: Flat
		Temperature: 72° F	Therm. SN: 531993 <i>DD 12/17/2008</i>
	Couplant: UltraGel II	Batch No.: 05425 <i>05325</i> <i>mm/1/08</i>	

Reference Sensitivity Information			
Reflector: ID Notch	Sweep: 6.5 div.	Amplitude: 80% FSH	Gain: 80.5 dB
Cal In: Date 3/27/08 Time 0810	Check: Date 3/27/08 Time 1410	N/A	Out: Date 3/27/08 Time 1605

Comments

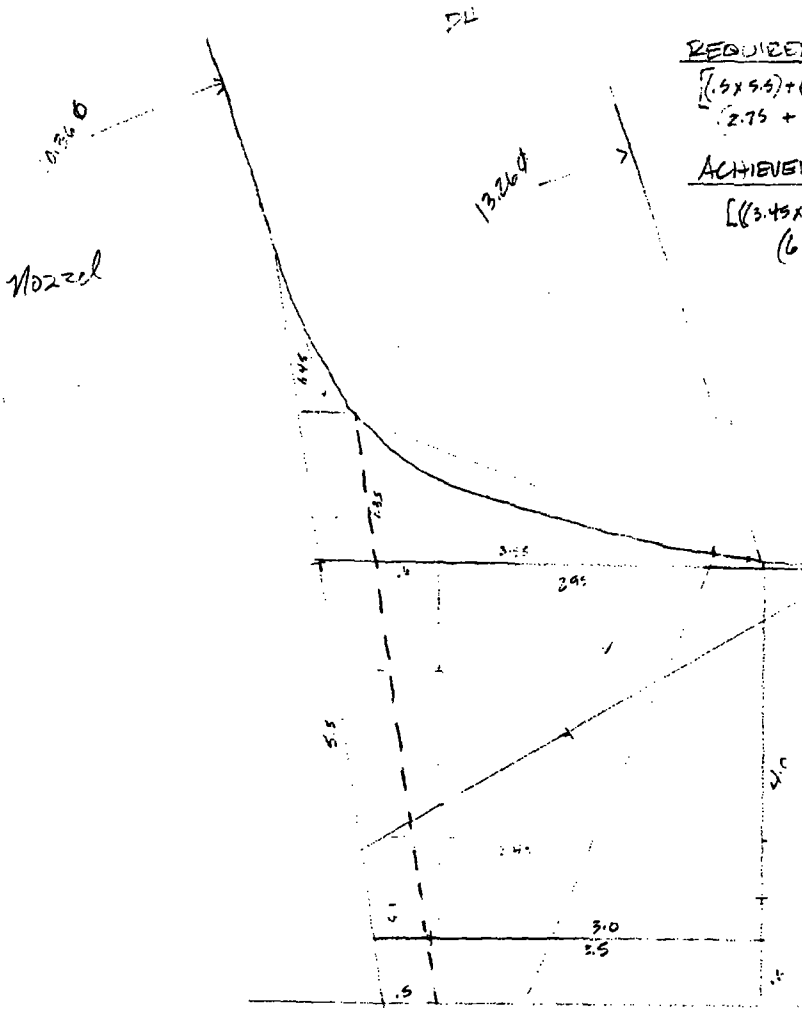
Zone 2: Full Volume Examination. Reference EPRI Examination of Browns Ferry Closure Head Nozzle-to-Shell Welds Modeling # IR-2003-17.

Examiner: Thomas Brown Signature: <i>Tom Brown</i>	Level: II	Date: 3/27/08	Examiner: Samuel Alex Zipperer Signature: <i>Samuel Zipperer</i>	Level: IIL	Date: 3/27/08
TVA Review: Matt Welch Signature: <i>Matt Welch</i>	Level: III	Date: <i>4/4/08</i>	ANZI: <i>[Signature]</i> DATE: <i>4/22/08</i>	Page <i>7</i> of <i>10</i>	

NGA-NV DOWN HILL

ROS4

000241



REQUIRED EXAM VOLUME ASME CODE

$$\left[\frac{(5 \times 5.5)}{2} + \frac{(1.45 \times 5)}{2} + (2.95 \times 4.0) + \frac{(2 \times 4.0)}{2} + \frac{(1.75 \times 3.55)}{2} \right] \times 10.41 = 192.7$$

ACHIEVED EXAM VOLUME ASME CODE

$$\left[\frac{(3.45 \times 4.95)}{2} + \frac{(1.5 \times 3.0)}{2} + \frac{(1.9 \times 2)}{2} \right] \times 10.41 = 120.23$$

$$\frac{120.23}{192.7} \times 100 = 62.4\%$$

UPPER 85% EXAM VOLUME

$$\text{REQUIRED} = 192.7 - (1.6 \times 3.5 \times 10.41) = 170.84$$

$$\text{ACHIEVED} = \frac{120.23 - 21.46}{170.84} \times 100 = 57.5\%$$

LOWER 15% EXAM VOLUME

$$\text{REQUIRED} = (6 \times 3.5) \times 10.41 = 21.861$$

$$\text{ACHIEVED} = 21.861 = 100\%$$

TOTAL WELD LENGTH 41.66 / DOWN HILL WELD LENGTH = 41.66 - 1 = 40.66

Welded 4/4/08

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NGA-NV UP HILL SIDE

ROS4

000240

REQUIRED EXAM VOLUME ASME CODE

$$[(4.0 \times 4.9) + (1.55 \times 4.0) \div 2 + (1.65 \times 3.0) \div 2] \times 10.41 = \\ (19.6 + 3.1 + 2.47) \times 10.41 = 262.1$$

ACHIEVED EXAM VOLUME ASME CODE

$$[(5.5 \times 3.0) \div 2 + (1.65 \times 4.0) + (1.6 \times 5.5) + (0.31 \times 7.5) \div 2] \times 10.41 = \\ (8.25 + 2.6 + 3.3 + .112) \times 10.41 = 148.46 \\ (148.46 \div 262.1) \times 100 = \underline{56.6\%}$$

UPPER 65% EXAM VOLUME

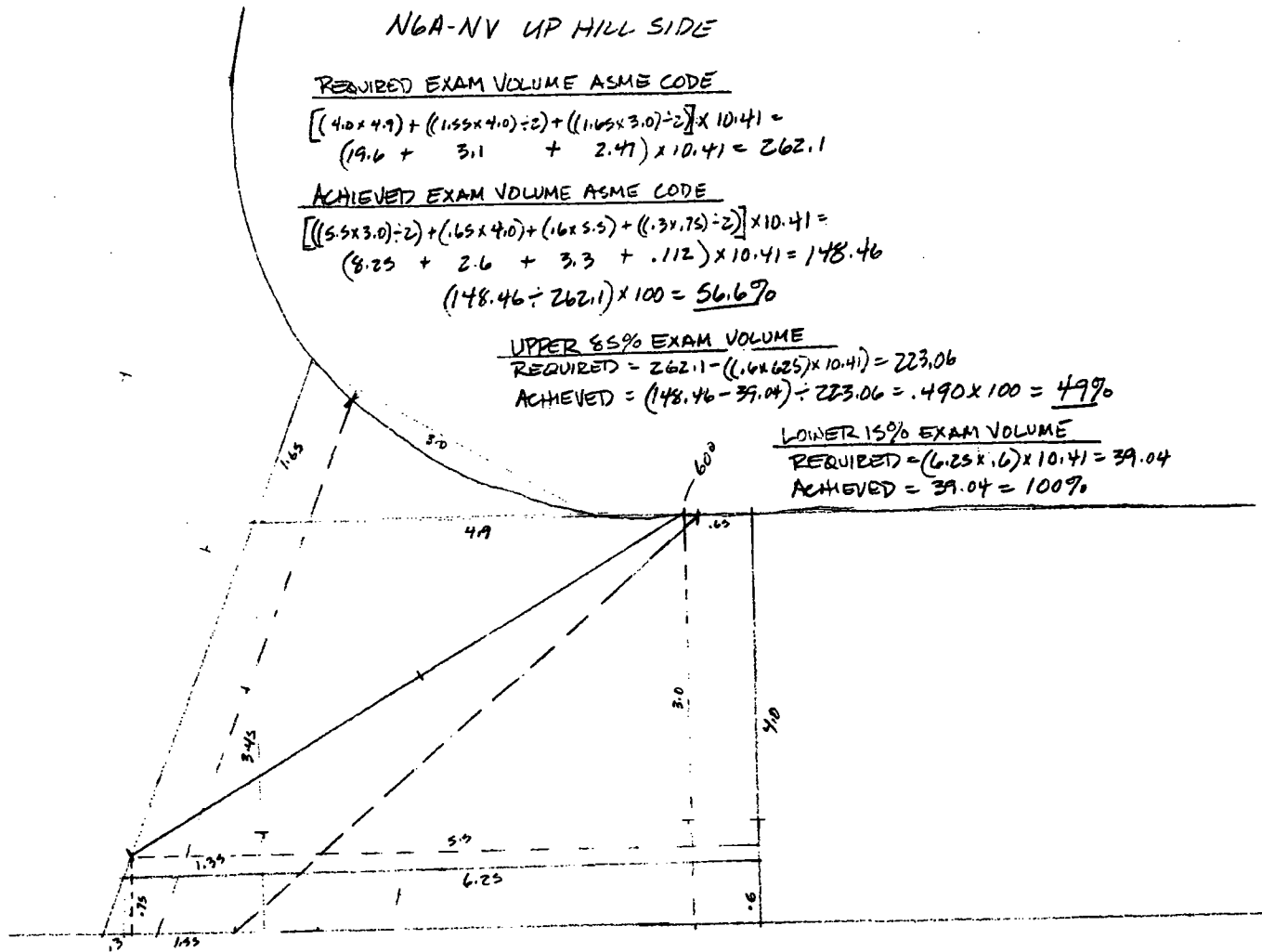
$$\text{REQUIRED} = 262.1 - (1.6 \times 6.25) \times 10.41 = 223.06$$

$$\text{ACHIEVED} = (148.46 - 39.04) \div 223.06 = .490 \times 100 = \underline{49\%}$$

LOWER 15% EXAM VOLUME

$$\text{REQUIRED} = (6.25 \times 1.6) \times 10.41 = 39.04$$

$$\text{ACHIEVED} = 39.04 = 100\%$$



TOTAL WELD LENGTH 41.66 / UP HILL WELD LENGTH = 41.66 - 4 = 10.41

Weld with 4/4/08 pg 9/10

NGA-NV SIDE HILL

ROS4

REQUIRED EXAM VOLUME ASME CODE

$$1) (0.5 \times 6.6) + (2.85 \times 4.0) + ((2.05 \times 2.4) \div 2) - (1.35 \times .5) = 3.3 + 11.2 + 2.225 - .675 = 15.875 \text{ in}^2$$

$$2) 15.875 \times 41.66 = 661.27 \text{ in}^3 \div 2 = 330.63 \text{ in}^3 \text{ side hill volume}$$

000239

ACHIEVED EXAM VOLUME ASME CODE

$$A = ((3.4 \times 2) - 2) \times 41.66 = 141.64$$

$$B = (3.4 \times 1.7) \times 41.66 = 240.8$$

$$(141.64 + 240.8) = 382.46 \div 2 = 191.23 \div 330.63 = .578 \times 100 = \underline{57.8\%}$$

UPPER 85% EXAM VOLUME

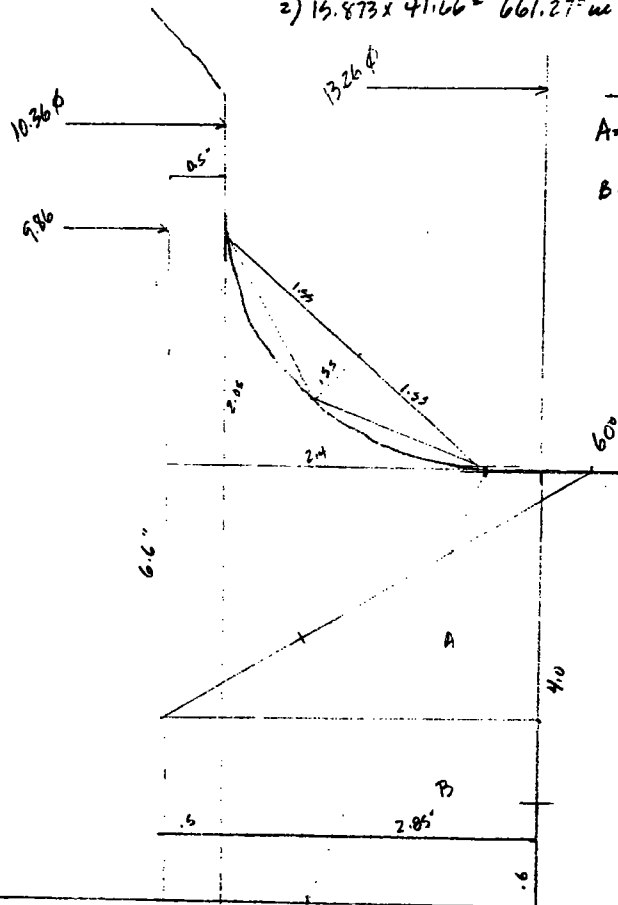
$$\text{REQUIRED} = 330.63 - ((.6 \times 3.4) \times 20.83) = 288.14 \text{ in}^3$$

$$\text{ACHIEVED} = (191.23 - 42.49) \div 288.14 = .516 \times 100 = \underline{51.6\%}$$

LOWER 15% EXAM VOLUME

$$\text{REQUIRED} = (3.4 \times .6) \times 20.83 = 42.49$$

$$\text{ACHIEVED} = 42.49 = 100\%$$



Total weld length 41.66" / Side Hill weld length = 20.83"

Mark Welch III 4/4/08

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