VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 21, 2018

10 CFR 50.55a

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

Serial No. 18-042
SPS-LIC/CGL R2
Docket No. 50-280
License No. DPR-32

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
ASME SECTION XI INSERVICE INSPECTION PROGRAM
RELIEF REQUESTS FOR LIMITED COVERAGE EXAMINATIONS PERFORMED IN THE FIRST PERIOD OF THE FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL

Virginia Electric and Power Company (Dominion Energy Virginia) performed inservice inspection (ISI) examinations at Surry Power Station Unit 1 for the first period of the fifth 10-year ISI interval, which began on December 14, 2013 and will end on October 13, 2023. Examinations of certain components conducted during the first period of the fifth interval received less than the required examination coverage.

Pursuant to 10 CFR 50.55a(g)(5)(iii), Dominion Energy Virginia requests relief for the limited examinations on the basis that the required examination coverage was impractical due to physical obstructions and limitations imposed by the design and geometry of the subject components. Attachments 1 and 2 contain the specific relief requests and the basis for each request. These relief requests have been reviewed and approved by the station's Facility Safety Review Committee.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,

Mark D. Sartain
Vice President – Nuclear Engineering and Fleet Support

Commitments made in this letter: None

Attachments:

1. Relief Request S1-I5-LMT-C01, Examination Category B-D, Pressurizer Nozzle Inner Radius Section
2. Relief Request S1-I5-LMT-P01, Examination Category R-A, Preservice Weld Examinations

A047
NRR

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Attachment 1

**Relief Request S1-I5-LMT-C01, Examination Category B-D,
Pressurizer Nozzle Inner Radius Section**

**Virginia Electric and Power Company
(Dominion Energy Virginia)
Surry Power Station Unit 1**

Dominion Energy Virginia

Surry Power Station Unit 1

5th 10-Year Interval

December 14, 2013 – October 13, 2023

Pressurizer Nozzle Inner Radius Section

Relief Request S1-I5-LMT-C01

In Accordance with 10 CFR 50.55a(g)(5)(iii)

1. ASME Code Components Affected

Weld No.:	18NIR
Drawing:	11448-WMKS-RC-E-2
ASME Class:	1
ASME Category:	B-D
ASME Item:	B3.120
Description:	Pressurizer Nozzle Inner Radius Section Material: SA-216 Grade WCC cast carbon steel Operating Pressure: 2235 psig Operating Temperature: 650 °F

2. Applicable Code Edition and Addenda

2004 Edition of ASME Section XI

3. Applicable Code Requirement

The 2004 Edition of ASME Section XI does not require examination of Class 1 Nozzle Inner Radius (NIR) Sections.

However, the Code of Federal Regulations, Part 50.55a(2)(xxi), conditions the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-D. The condition mandates that the 1998 Edition of Section XI be used which requires examination of the Class 1 NIRs by items B3.120 and B3.140. Either an ultrasonic or enhanced visual examination from the inner diameter (ID) shall be performed.

4. Impracticality of Compliance

The pressurizer is covered with an insulation support structure (Figure 1). As can be seen in the figure, the support structure interferes with completion of a full volumetric examination around the circumference of the 18NIR nozzle to pressurizer safety valve. The examination was further limited by the rough exterior surface on the pressurizer vessel head which restricted adequate UT probe contact in several areas. Figure 2 illustrates the areas of limitation.

5. Burden Caused by Compliance

Total removal of the support structure at the mechanical connections is considered impractical due to the extreme high dose rates in the pressurizer area. Furthermore, this is not a viable effort when considering consequential disturbance of interconnected cross supports and the welded connections to safety and power operated relief valve supports. Removal of the mechanical connections or forced spreading apart of components would create a risk of misalignment and possibly warp the structure. Civil engineering proposed that cutting the support could be necessary for removal; thus, destroying the support structure.

6. Proposed Alternative and Basis for Use

Component 18NIR was ultrasonically examined using an NDE procedure that incorporates EPRI modeling report IR-2012-485 specific to the Surry Unit 1 pressurizer safety/relief nozzles. This modeling report details the required ultrasonic scan parameters which should be applied to achieve full coverage of the examination volume. Modeling report IR-2012-485 requires a combination of ultrasonic scanning both from the nozzle blend region and the pressurizer vessel head. Different transducer angles, skews and wedge contours were used for the required scans. The prior ultrasonic examination performed during the fourth ISI interval consisted of only scanning from the nozzle blend region; scanning was not required from the vessel head. The majority of the documented limitations (98.0%) occurred in the region on the vessel head that was not previously scanned.

No additional ultrasonic examination techniques would provide meaningful additional data on this cladded material for the examination volume not attained. The pressurizer receives a visual (VT-2) examination every refueling outage as required by Section XI, Table IWB-2500-1, Category B-P for Class 1 components performed at normal operating pressure and temperature. Any effort to achieve greater coverage would be impractical due to creating risk of component damage or destruction and excessive personnel dose exposure.

The nozzle inner radius sections are not welds but actually cast material components. There have been no known through wall flaws in Class 1 nozzle inner radius section components. Similar pressurizer nozzle inner radius section 19NIR was examined on Unit 1 during the fifth interval October 26, 2016, and greater than 90% coverage was obtained with no indications.

It is proposed that the scanning percentage coverage obtained (81.67%) with no recordable indications be considered as meeting the Code requirements.

7. Duration of Proposed Alternative

This proposed alternative is requested to meet requirements for the fifth ten-year ISI interval for Surry Power Station Unit 1, which began December 14, 2013 and will end October 13, 2023.

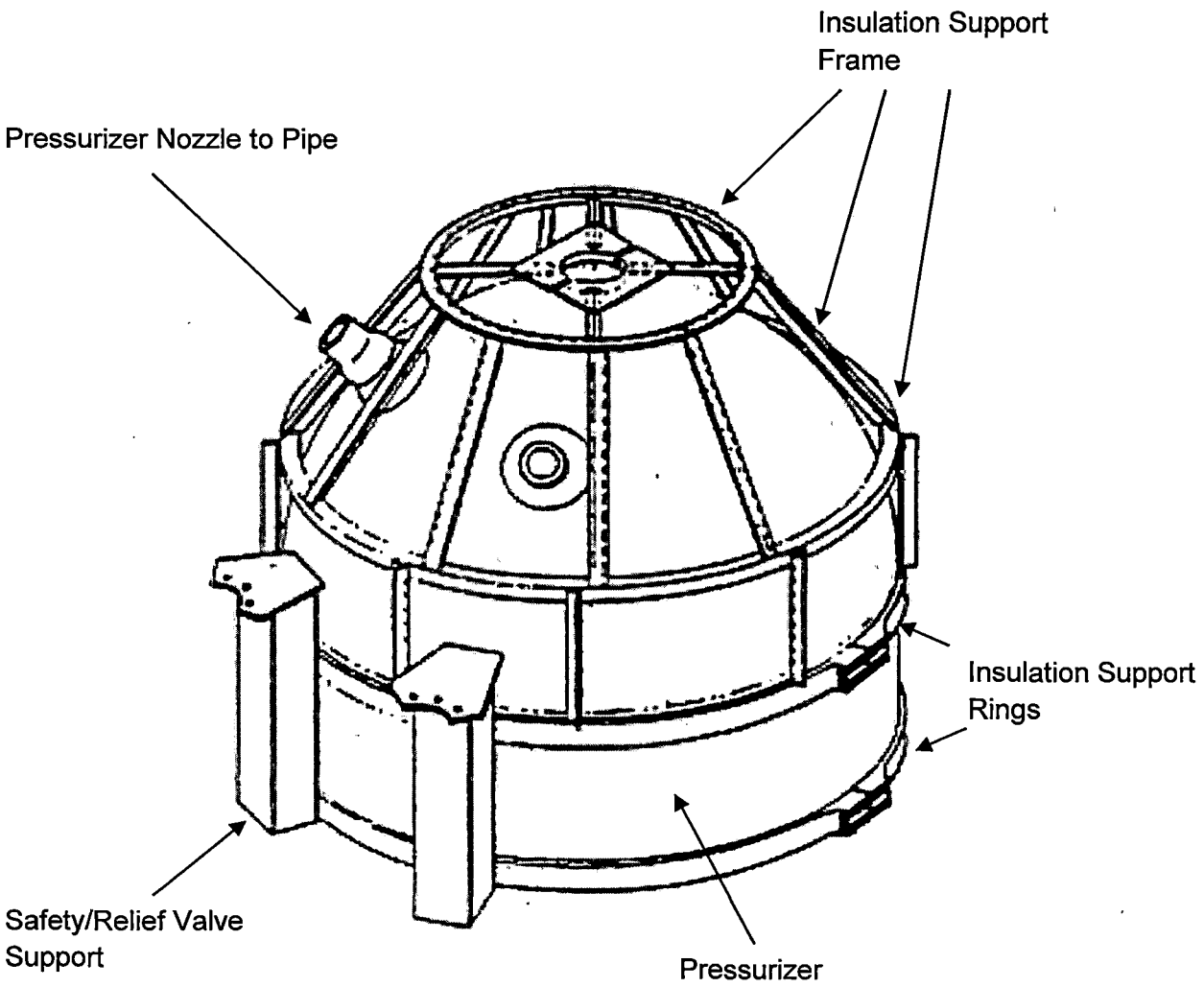
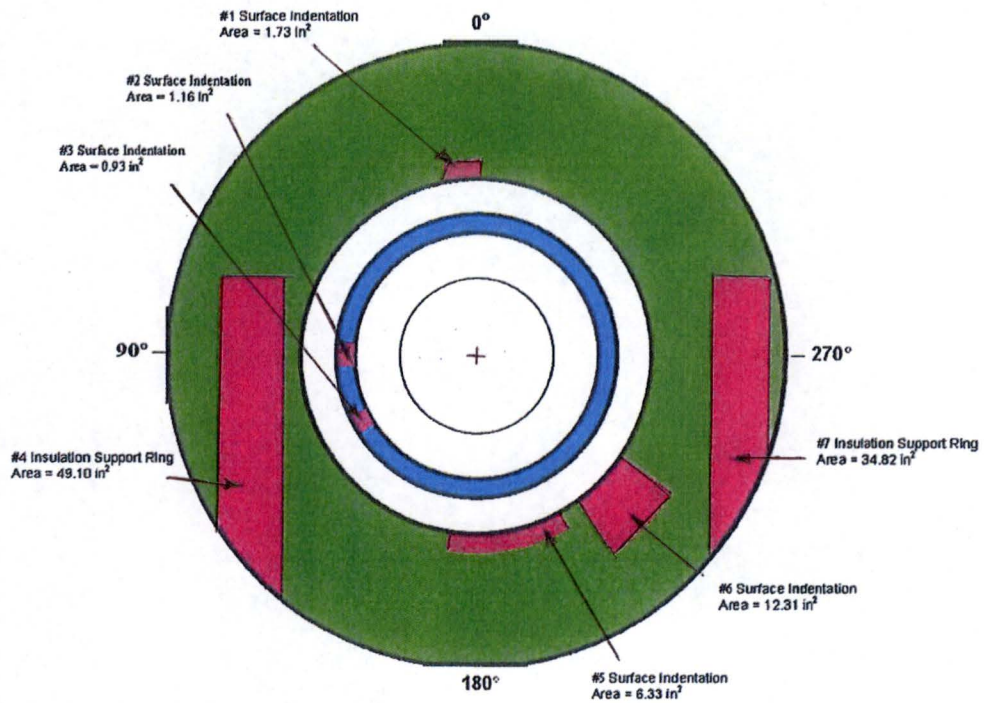


Figure 1 Pressurizer Insulation Support Structure

Report No: UT-16-050
Summary No: SI.B3.120.001
Pg. 2 of 2
Date: 10/26/2016

1-RC-18NIR

Limitation Sketch and Coverage of Scan Surface



The scan surfaces (blend and vessel) for 1-RC-18NIR were obstructed by the PZR Insulation Support Ring and also limited by surface indentations which did not allow for adequate probe contact.

The total area of scanning surface is 580.32 in.².
The total area of limited scanning is 106.38 in.².
Total percentage limited = (106.38/580.32) x 100 = 18.33%
Percentage of scan area scanned = 100% - 18.33% = 81.67%

Figure 2 Limitations Sketch for 18NIR

Attachment 2

Relief Request S1-I5-LMT-P01, Examination Category R-A, Preservice Weld Examinations

Virginia Electric and Power Company
(Dominion Energy Virginia)
Surry Power Station Unit 1

Dominion Energy Virginia

Surry Power Station Unit 1

5th 10-Year Interval

December 14, 2013 – October 13, 2023

ASME XI Preservice Pipe Welds

Relief Request # S1-I5-LMT- P01

Repetitive/Duplicate Relief Requests

In Accordance with 10 CFR 50.55a(g)(5)(iii)

1. ASME Code Components Affected

ASME Code Class:	Code Class 1
Examination Category:	R-A, Risk Informed Piping Examinations Stainless Steel Piping
Item Numbers:	R1.20, High Safety Significant not Subject to a Degradation Mechanism
Component Identification:	Refer to Specific Table
Material:	Refer to Specific Table

2. Applicable Code Edition and Addenda

2004 Edition of ASME Section XI

3. Applicable Code Requirement

Required Method: Surface and Volumetric for preservice requirements

The alternative requirements of ASME Section XI, Code Case N-460, approved for use in Regulatory Guide 1.147, Rev.17, allows credit for essentially 100% coverage of the weld provided greater than 90% of the required volume has been examined.

10 CFR 50.55a(b)(2)(xv)(A), requires the following examination coverage criteria when applying Supplement 2 to Appendix VIII:

(1) Piping must be examined in two axial directions, and when examination in the circumferential direction is required, the circumferential examination must be performed in two directions provided access is available.

(2) Where examination from both sides is not possible on austenitic welds or dissimilar metal welds, full coverage credit from a single side may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld.

10 CFR 50.55a(b)(2)(xvi)(B) requires that examinations performed from one side of a stainless steel pipe weld must be conducted with equipment, procedures, and personnel that have demonstrated proficiency with single side examinations. To demonstrate equivalency to two sided examinations, the demonstration must be performed in accordance with the requirements of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xvi)(B) and §50.55a(b)(2)(xv)(A).

4. Impracticality of Compliance

Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested from the volumetric examination coverage requirements for the subject welds due to the geometric configuration that limits the volumetric coverage that can be obtained.

For the austenitic weld, when the examination area is limited to one side of an austenitic weld, examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi)(B) and full coverage credit may not be claimed. There are currently no Performance Demonstration Initiative (PDI) qualified single-side examination procedures that demonstrate equivalency to two-sided examination procedures on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to U.S. nuclear applications. However, PDI Performance Demonstration Qualification Summary (PDQS) certificates for austenitic piping list the limitation that single-side examination is performed on a best effort basis. The best effort qualification is provided in place of a complete single-side qualification to demonstrate that the examiner's qualification and the subsequent weld examination is based on application of the best available technology.

The subject welds were examined with a manual ultrasonic technique (UT) using pulse echo UT instruments and search units to achieve the maximum examination coverage practical. Examinations were performed using personnel, equipment and procedures qualified in accordance with ASME Section XI, Appendix VIII as

implemented by the PDI. No alternative welds were considered since these are preservice examinations for each specific weld that was reconstructed.

Specific examination coverage and component details are provided in Table P01.

Weld 2-17B Summary# S1.R1.20.091

This is a stainless steel ASME XI, Category R-A weld, Item R1.20, High Safety Significant not subject to a degradation mechanism. The weld configuration is stainless steel (ASTM 376, Type 316) pipe to a stainless steel valve (ASTM 351). This new weld also received volumetric examination by radiography and a liquid penetrant surface examination for preservice with no unacceptable flaws or indications detected. When the system reached operating pressure and temperature, the weld was further inspected visually (VT-2) for through-wall leaks with none detected.

Weld 2-18B Summary# S1.R1.20.092

This is a stainless steel ASME XI, Category R-A weld, Item R1.20, High Safety Significant not subject to a degradation mechanism. The weld configuration is a stainless steel valve (ASTM 351) to stainless steel pipe (ASTM 376, Type 316). This new weld also received volumetric examination by radiography and a liquid penetrant surface examination for preservice with no unacceptable flaws or indications detected. When the system reached operating pressure and temperature, the weld was further inspected visually (VT-2) for through-wall leaks with none detected.

Weld 1-18A Summary# S1.R1.20.095

This is a stainless steel ASME XI, Category R-A weld, Item R1.20, High Safety Significant not subject to a degradation mechanism. The weld configuration is stainless steel (ASTM 376, Type 316) pipe to a stainless steel valve (ASTM 351). This new weld also received volumetric examination by radiography and a liquid penetrant surface examination for preservice with no unacceptable flaws or indications detected. When the system reached operating pressure and temperature, the weld was further inspected visually (VT-2) for through-wall leaks with none detected.

Weld 1-19A Summary# S1.R1.20.096

This is a stainless steel ASME XI, Category R-A weld, Item R1.20, High Safety Significant not subject to a degradation mechanism. The weld configuration is a stainless steel valve (ASTM 351) to stainless steel pipe (ASTM 376, Type 316). This new weld also received volumetric examination by radiography and a liquid penetrant surface examination for preservice with no unacceptable flaws or indications detected. When the system reached operating pressure and temperature, the weld was further inspected visually (VT-2) for through-wall leaks with none detected.

Table P01 Preservice Examinations

Drawing / Line# / ID System / Class/ ASME Category	Pipe Material	Op. Pressure / Op. Temperature	Pipe Dia.	Weld Thickness/ Material	Coverage Achieved	Limitation / Results	Fig.
11448-WMKS-0125A1-2 / 4-RC-15 / 2-17B Reactor Coolant/1 R-A	Stainless Steel ASTM 376 Type 316	2235 psi 543 °F	4"	0.440" Stainless Steel Type 316	50% 20.75% Best Effort	Single-sided, pipe to valve, NRI*	1
11448-WMKS-0125A1-2 / 4-RC-15 / 2-18B Reactor Coolant/1 R-A	Stainless Steel ASTM 376 Type 316	2235 psi 543 °F	4"	0.431" Stainless Steel Type 316	50% 20.75% Best Effort	Single-sided, valve to pipe, NRI*	2
11448-WMKS-0125A1-1 / 4-RC-14 / 1-18A Reactor Coolant/1 R-A	Stainless Steel ASTM 376 Type 316	2235 psi 543 °F	4"	0.422" Stainless Steel Type 316	50% 12.5% Best Effort	Single-sided, pipe to valve, NRI*	3
11448-WMKS-0125A1-1 / 4-RC-14 / 1-19A Reactor Coolant/1 R-A	Stainless Steel ASTM 376 Type 316	2235 psi 543 °F	4"	0.433" Stainless Steel Type 316	50% 20.75% Best Effort	Single-sided, valve to pipe, NRI*	4

*No recordable indications

5. Burden Caused by Compliance

Compliance with the Code requirements would require extensive modification or replacement of components with a design that would allow full examination from both sides of the weld. This option to rebuild components is considered impractical and would cause unnecessary personnel radiation exposure. Furthermore, plant equipment could be impacted in a detrimental manner.

6. Proposed Alternative and Basis for Use

The subject welds received a volumetric examination to the maximum extent practical utilizing the best available techniques. With the incorporation of the PDI for Supplement 2, demonstration for best effort coverage was made for single-sided examination from the accessible side of the austenitic steel welds. The best effort coverage achieved is provided in Table P01. No indications were noted for any of the areas volumetrically examined. The four welds were surface examined using the liquid penetrant test achieving 100% coverage of the welds with no indications. The welds were volumetrically examined by radiography with no unacceptable flaws detected. Upon return to service the welds received visual examinations (VT-2) with no through-wall leakage detected.

The components are monitored for through-wall leakage as part of the ASME XI System Pressure Test Program and receive visual (VT-2) examinations every refueling outage as required by Section XI, IWB-2500-1 Category B-P for Class 1 components.

None of the pipe or weld material is constructed with Alloy 600/82/182 materials; therefore, there are no primary stress corrosion cracking (PWSCC) concerns.

Based on the volumetric coverage obtained by ultrasonic examination, the visual (VT-2) examinations performed upon return to service, the surface examinations (liquid penetrant) and full volumetric examination (radiography) all with acceptable results, it is reasonable to conclude that no unacceptable flaws exist in the new welds. These proposed alternatives provide an acceptable level of quality and safety by providing reasonable assurance of structural integrity of the subject welds. Dominion Energy Virginia requests relief in accordance with 10 CFR 50.55a(g)(5)(iii).

7. Duration of Proposed Alternative

This proposed alternative is requested to meet requirements for the fifth ten-year inspection interval for Surry Power Station Unit 1, which began December 14, 2013 and ends October 13, 2023.

Report No: UT-15-002
Summary # S1.R1.091
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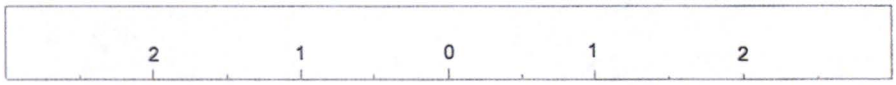
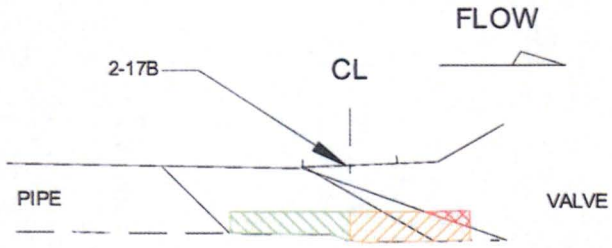
Date: 04/21/2015

Weld Number	2-17B	Weld Width	0.65"
Thickness	0.44"	Weld Length	14.25"





0.825" WIDTH X .147" HT =0.12 SQ. IN. = REQUIRED VOLUME BOTH SIDES OF WELD

EXAMINED 100% OF THE REQUIRED VOLUME US SIDE

BEST EFFORT DS SIDE AX DIRECTION FOR 0.10 SQ. IN.
.1/.12 = 0.83 X 100 = 83%

NO EXAM DS SIDE AX DIRECTION FOR 0.02 SQ. IN.

Examination Volume Dimensions - Height 0.147" Length 14.25" Width 1.65"

Coverage Summary				
	Required Scans (each has a weighing factor of 100 for complete coverage)			
ANGLE	UpSt-Ax	UpSt-Circ	DnSt-Ax	DnSt-Circ
45, 60	100%	100%		0%
70 2.25 MHz			*83%	
			Code Coverage Total	50%
100+100+83+0=283/4=70.75			*Best Effort Coverage (Max 25%) Total	20.75%

Notes:

1) Code Coverage refers to the maximum percentage of the required examination volume that is effectively examined with the qualified examination procedure.
2) Best Effort Coverage refers to the required examination volume past the weld centerline that is examined in the axial beam direction with an Appendix VIII demonstrated procedure for single sided coverage.

Figure 1 Weld 2-17B

Report No: UT-15-005
Summary # S1.R1.20.092
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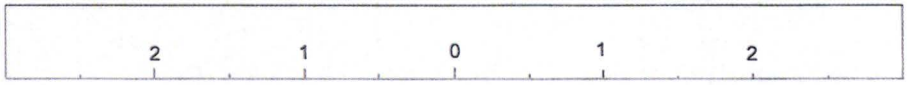
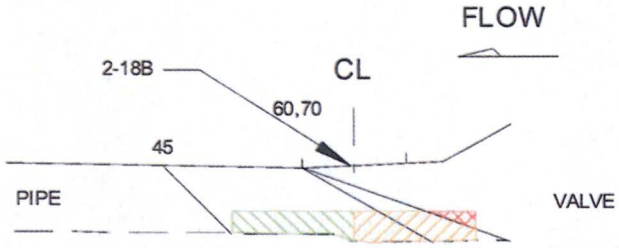
Date: 04/21/2015

Weld Number	2-18B	Weld Width	0.70"
Thickness	0.431"	Weld Length	14.25"





0.85" WIDTH X 0.144" HT = 0.12 SQ. IN. = REQUIRED VOLUME BOTH SIDES OF WELD

EXAMINED 100% OF THE REQUIRED VOLUME DS SIDE

BEST EFFORT US SIDE AX DIRECTION FOR 0.10 SQ. IN
.1/.12 = 0.83 X 100 = 83%

NO EXAM US SIDE AX DIRECTION FOR 0.02 SQ. INCHES

Examination Volume Dimensions - Height 0.144" Length 14.25" Width 1.7"

Coverage Summary					
	Required Scans (each has a weighing factor of 100 for complete coverage)				
ANGLE	UpSt-Ax	UpSt-Circ	DnSt-Ax	DnSt-Circ	
45 , 60	0%	0%	100%	100%	
70 2.25 MHZ	*83%				
				Code Coverage Total	50%
100+100+83+0=283/4=70.75			*Best Effort Coverage (Max 25%) Total		20.75%

Notes:

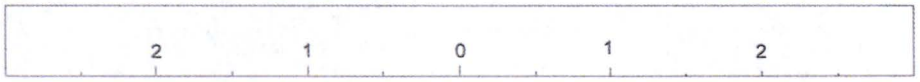
1) Code Coverage refers to the maximum percentage of the required examination volume that is effectively examined with the qualified examination procedure.
2) Best Effort Coverage refers to the required examination volume past the weld centerline that is examined in the axial beam direction with an Appendix VIII demonstrated procedure for single sided coverage.

Figure 2 Weld 2-18B

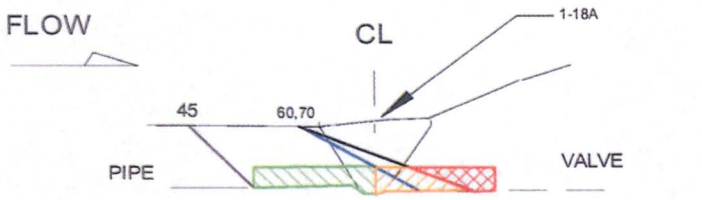
Report No: UT-15-127
Summary # S1.R1.20.095
Pg. 5 of 5

Date: 05/10/2015

Weld Number	1-18A	Weld Width	0.75"
Thickness	0.422"	Weld Length	14.25"



0.422" T / 3 = 0.141"



0.141" HT X .875 WIDTH = .12 SQ. IN = REQUIRED VOLUME BOTH SIDES OF WELD

EXAMINED 100% OF THE REQUIRED VOLUME US SIDE

EXAMINED 0.06 SQ. IN DS SIDE AX DIRECTION .06 / .12 = 0.5 X 100 = 50%

BEST EFFORT = 50%

NO EXAM DS SIDE AX DIRECTION FOR 50% OF THE REQUIRED VOLUME

Examination Volume Dimensions - Height 0.141" Length 14.25" Width 1.75"

Coverage Summary				
	Required Scans (each has a weighing factor of 100 for complete coverage)			
ANGLE	UpSt-Ax	UpSt-Circ	DnSt-Ax	DnSt-Circ
45,60	100%	100%		0%
70 2.25 Mhz			*50%	
			Code Coverage Total	50%
100+100+50+0=250/4=62.5			*Best Effort Coverage (Max 25%) Total	12.5%

Notes:

1) Code Coverage refers to the maximum percentage of the required examination volume that is effectively examined with the qualified examination procedure.
2) Best Effort Coverage refers to the required examination volume past the weld centerline that is examined in the axial beam direction with an Appendix VIII demonstrated procedure for single sided coverage.

Figure 3 Weld 1-18A

Report No: UT-15-006
Summary # S1.R1.20.096
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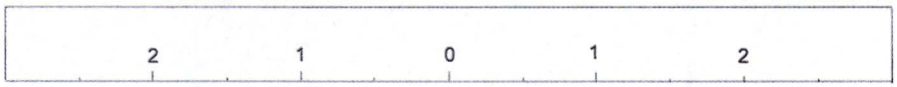
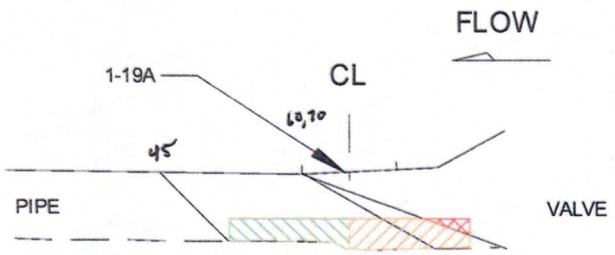
Date: 04/20/2015

Weld Number	1-19A	Weld Width	0.65"
Thickness	0.433"	Weld Length	14.25"





0.825" WDTH X 0.144" HT = 0.12 SQ. IN. = REQUIRED VOLUME BOTH SIDE OF WELD

EXAMINED 100% OF THE REQUIRED VOLUME DS SIDE

BEST EFFORT US SIDE AX DIRECTION FOR 0.10 SQ. IN.
.1/.12 = 0.83 X 100 = 83%

NO EXAM US SIDE AX DIRECTION FOR 0.02 SQ. INCHES

Examination Volume Dimensions - Height 0.144" Length 14.25" Width 1.65"

Coverage Summary				
	Required Scans (each has a weighing factor of 100 for complete coverage)			
ANGLE	UpSt-Ax	UpSt-Circ	DnSt-Ax	DnSt-Circ
45 , 60	0%	0%	100%	100%
70 2.25 MHZ	*83%			
			Code Coverage Total	50%
100+100+83+0=283/4=70.75			*Best Effort Coverage (Max 25%) Total	20.75%

Notes:

1) Code Coverage refers to the maximum percentage of the required examination volume that is effectively examined with the qualified examination procedure.
2) Best Effort Coverage refers to the required examination volume past the weld centerline that is examined in the axial beam direction with an Appendix VIII demonstrated procedure for single sided coverage.

Figure 4 Weld 1-19A