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APRIL 2011 INSPECTION OF BOILER HEADERS UNIT NO. 1 MITCHELL GENERATING STATION AMERICAN ELECTRIC POWER MOUNDSVILLE, WEST VIRGINIA

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EXECUTIVE SUMMARY

In April of 2011, Thielsch Engineering performed an inspection of the boiler headers in Unit No. 1 at the Mitchell Generating Station of American Electric Power (AEP) located in Moundsville, West Virginia. This represents the first inspection of these headers performed by Thielsch Engineering.

The table provided below identifies the headers included in the scope of inspection. It also identifies the various examination techniques used. Finally, it provides the results of the examinations as well as any recommendations arising from the inspection.

Component	Examination Type	Results	Recommendations	Remaining Useful Life
Platen Superheater Inlet Header	VT, MT, UTT, UTPA, Rep, HD	The magnetic particle ex- amination re- vealed multiple recordable sur- face indications in tube subs 5J, 9G, 9P, and 26L. The ultrasonic phased-array examination of the girth welds revealed a 3" long inclusion- type indication in girth weld No. GW-2. The inclusion is indicative of an original man- ufacturing de- fect.		The header material has con- sumed 20% of its re- maining useful life.

Component	Examination Type	Results	Recommendations	Remaining Useful Life	
Platen Superheater Inlet Header (cont.)	VT, MT, UTT, UTPA, Rep, HD	No evidence of wall thinning was noted. Operating in Class 1 creep range.	Perform a re- inspection after three years of continued operation (2014).	The header material has con- sumed 20% of its re- maining useful life.	
Platen Superheater Outlet Header	VT, MT, UTT, UTPA, Rep, HD	A 5" surface indication in saddle weld No. SW-1 was noted. The 5" indication was removed by plant personnel during the current outage.	Perform an inspection similar in scope after five to seven years of continued operation (2016 to 2018).	Header material has con- sumed less than 20% of its re- maining useful life.	
		No evidence of wall thinning was noted.			
		Operating in Class 1 creep range.			
Finishing Superheater Inlet Header	VT, MT, UTT, UTPA, Rep, HD	No recordable surface or sub- surface in- dications were noted. No evidence of wall thinning was noted.	Perform an in- spection similar in scope after five to seven years of continued service (2016 to 2018).	Header material has co- nsumed less than 20% of its remaining useful life.	
		Operating in Class 1 creep range.			

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Component	Examination Type	Results	Recommendations	Remaining Useful Life
Finishing Superheater Outlet Headers (Upper and Lower)	VT, Dim, MT, UTT, UTPA, Rep, HD	Multiple re- cordable surface in- dications in the header-to-tube stub welds were noted. These indications re- quire removal and repairs by welding. Operating in Class 1 creep range.	Plant personnel per- formed repairs by welding on the more severe tube stub indications. Monitor the remaining surface indications during future inspections. Reinspect the re- pairs on the tube stubs after one year of continued op- eration (2012).	Header material has con- sumed less than 20% of its remaining useful life.
			Perform a similar inspection after three years of continued service (2014).	
HP Reheat Outlet Header	VT, Dim, MT, UTT, UTPA, Rep, HD	Multiple re- cordable sur- face indications were noted.	Plant personnel per- formed weld repairs on some of the tube stub indications.	Header material has consumed
		Thinning was noted on a section of header at girth	Monitor the re- maining surface in- dications during future inspections.	less than 20% of its remaining useful life.
		weld Nos. GW-2 and GW-3.	Closely monitor the thinning of the header at girth weld Nos. GW-2 and GW-3 during future inspections.	
			Reinspect the re- pairs on the tube stubs after one year of continued service (2012).	

Component	Examination Type	R	esults	Recommendations	Remaining Useful Life	
HP Reheat Outlet Header (cont.)	VT, Dim, MT, UTT, UTPA, Rep, HD	Opera Class range	1 creep	Perform an in- spection of the thinned area after one to three years of continued service (2012 to 2014).	material has consumed less than 20% of its	
				Perform a similar inspection after five to seven years of additional service (2015 to 2017).	useful life.	
LP Reheat Outlet Header	VT, Dim, MT, UTT, UTPA, Rep, HD	Multiple record- able surface indications were noted. Operating in Class 1 creep		indications during future inspections. Reinspect the re-	material has con- sumed less than 20% of its re-	
		range		(2012). Reinspect after three years of continued service (2014).	maining useful life.	
		Exar	nination Ty			
VT - Visual Ex	amination		UTT - Ultrasonic Wall Thickness Examination			
	r Measurements		Rep - Replication			
MT - Magnetic	Particle Examir	nation	HD - Hardness Determinations			
			UTPA - Ul	trasonic Phased-Array	Examination	

INTRODUCTION

In April of 2011, Thielsch Engineering performed an inspection of the boiler headers in Unit No. 1 at the Mitchell Generating Station of AEP located in Moundsville, West Virginia. This represents the first inspection of these headers performed by Thielsch Engineering.

The results of the inspection were evaluated on an engineering basis to identify any service-related deterioration that may have occurred in these components and to confirm their suitability for continued service under the intended operating conditions.

BACKGROUND INFORMATION

The boiler in Unit No. 1 is a Foster Wheeler designed boiler. The design and erection of this boiler would have been carried out in accordance with the requirements of Section I of the ASME Boiler and Pressure Vessel Code. (This Section of the Code covers "Power Boilers".)

The boiler was originally placed into commercial service (along with the balance of Unit No. 1) in 1969. Since that time, it has been operated in a base-loaded manner. At the time of this inspection, the unit had accumulated approximately 224,256 hours of service.

APRIL 2011 INSPECTION

In April of 2011, Thielsch Engineering performed an inspection of the Platen Superheater Inlet and Outlet, Finishing Superheater Inlet and Outlet, and High Pressure (HP) and Low Pressure (LP) Reheat Outlet headers in Unit No. 1 at the Mitchell Generating Station of AEP located in Moundsville, West Virginia. In preparation for the inspection, the exposed welds along the headers were sandblasted to bare, gray metal. Thielsch Engineering then performed a variety of nondestructive examination techniques on the headers. These included detailed visual, wet fluorescent magnetic particle, and ultrasonic phased-array examinations as well as ultrasonic wall thickness measurements. A metallurgical evaluation was performed in the form of in-situ metallographic examination (replication), diameter measurements, and hardness determinations.

Where applicable, the nondestructive examinations were performed in accordance with procedures that conformed to the requirements of Section V of the ASME Boiler and Pressure Vessel Code. (This section of the Code covers "Nondestructive Examination".) Also where applicable, the nondestructive examinations were performed by personnel qualified to the requirements of ASNT SNT TC-1A as Level II or Level III examiners.

Identification System

For identification purposes, each location along each of the headers was assigned an identification number. To locate a particular position, the following system was used in all instances:

- <u>Horizontal Header Sections</u> The top of the header was identified at the 12:00 o'clock position. Other positions along the circumference were identified clockwise while facing north.
- <u>Horizontal Inlet Pipe Sections</u> The top of the pipe was identified at the 12:00 o'clock position. Other positions along the circumference were identified clockwise while looking downstream.

The Finishing Superheater Outlet headers in Unit No. 1 consist of two headers, labeled "Upper" and "Lower."

The results of the inspection performed on the headers are provided in separate sections of this report. Each section includes, where applicable, detailed sketches of the headers, photographs of the headers, and the various conditions revealed by the inspection.

Platen Superheater Inlet Header

The Platen Superheater Inlet header was reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-204, Grade A. (For reference purposes, this specification is for "Pressure Vessel Steels, Alloy Steel, Molybdenum". Grade A involves a C - 1/2 Mo low-alloy steel material.

The Platen Superheater Inlet header receives superheated steam from 26 elements, each containing 18 tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T12 (1Cr-1/2 Mo) which covers "Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes".

The following table lists the available data concerning the header/tube dimensions, header/tube material, and design conditions for the Platen Superheater Inlet header. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix A, were performed in accordance with the original 1968 ASME Code.)

	Pipe Dimensions			ASME	Design Conditions		
Component	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)	
Header	22.00	3.255"	2.928"	SA-204, Gr. A	850	4,075	

	Pipe Dimensions			ASME	Design Co	nditions
Component	OD (")	Specified MWT (")	Calculated MWT (")		Temperature (°F)	Pressure (psig)
Tube Stubs	2.25	0.336"	N/A	SA-213, Gr. T12	850	4,075

A sketch of the Platen Superheater Inlet header is provided in Fig. 1. Photographs of inspection locations on the header are provided in Figs. 2 through 6. All nondestructive examination reports for the Platen Superheater Inlet header are provided in Appendix A.

Visual Examination

The visual examination of the Platen Superheater Inlet header did not reveal any evidence of cracking, distortion, or other deterioration. No evidence of sagging or bowing was noted along the header.

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at all accessible welds on the Platen Superheater Inlet header as well as the tube stubs in every fifth row from the north end of the header. This examination was performed to identify any surface defects such as fissuring or cracking.

During the wet fluorescent magnetic particle examination, an AC yoke is placed parallel to the weld. The yoke is then energized and a water-based solution of fluorescent magnetic particles is sprayed onto the surface of the weld. The weld is then examined with the aid of an ultraviolet (black) light. Any discontinuities in the magnetic field (such as might be produced by a crack) will be effectively outlined by the fluorescent magnetic particles. The yoke is then rotated by 90° and this procedure is repeated.

Each accessible weld along the header and tube stubs were examined in this manner. The examination revealed 1/8" linear surface indications in tube stubs Nos. 5J, 9G, 9P, and 26L. These indications are considered minor, with no immediate repair actions required. It is recommended that these indications be monitored during future inspections. No other relevant indications were revealed during the examination.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were performed on the exposed girth welds on the Platen Superheater Inlet header. Measurements were recorded on either side of each girth weld at four locations around the circumference and at selected locations along the length of the piping.

The results of the ultrasonic wall thickness measurements are summarized in the following table:

Dimensions	Calculated	Field Re	adings
Specified MWT	MWT	Min.	Max.
3.255"	2.928"	3.263"	3.457"

All of the wall thickness measurements on the header were above the reported specified minimum and calculated minimum wall thicknesses. This confirms that the header has not experienced significant reductions in wall thickness in the areas included in the scope of inspection.

Ultrasonic Phased-Array Examination

As part of the inspection of the Platen Superheater Inlet header, selected circumferential girth and seam welds were also inspected volumetrically using the ultrasonic phased-array technique. This technique utilizes an array probe that contains multiple elements. The characteristics of the probe are modified by introducing time shifts in the signals sent to and received from the individual elements. The ultrasonic phased-array technique permits high-speed electronic scanning without moving parts, improved inspection capabilities through software control of beam characteristics, inspection with multiple angles with a single electronically

controlled probe, many configurations, and greater flexibility for inspection of complex geometries.

The phased-array system utilized during this examination incorporated a complete range of 30° to 80° shear waves, in 1° increments, during a single scan. The ultrasonic phased-array examination of the girth welds revealed a 3" long inclusion-type indication in girth weld No. GW-2 detected from 41" to 44" location around the weld. The indication did not exhibit any throughwall dimensions. The inclusion is indicative of a slag inclusion from the original manufacturing. Girth weld No. GW-2 should be monitored during future inspections.

The ultrasonic phased-array examination of the seam welds did not reveal any subsurface indications.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the Platen Superheater Inlet header was performed utilizing in-situ metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in this header as a result of the prior years of high-temperature service.

Eight replica foils were removed from the Platen Superheater Inlet header. These replica foils were sputtered with gold to provide contrast and then examined comprehensively by optical microscopy at magnifications of 100X to 500X. Photomicrographs were taken to document the typical conditions observed in these replica foils.

During the examination process, care was taken to identify and disregard irrelevant indications produced by the replication foil material, the replication technique, the environment in which the replication was performed, etc. For example, a replication foil may contain "bubbles" which are the result of moisture on the metal surface or air trapped beneath the replica foil as it solidifies. Dust on the metal surface may provide

irrelevant indications. Other indications may result from the dislodgement of inclusions during the polishing process, or etch pitting. Actual inclusions such as oxides, sulfides, carbides, etc., may appear as dark spots in the replica foils.

Photomicrographs were taken to document the typical conditions observed in the replica foils. The microstructures observed were compared with standards developed over the last 40 years. This comparison would allow the condition of the Platen Superheater Inlet header to be assessed.

The microstructures were also compared with the creep classification developed by EPRI. (For reference purposes, this classification contains five different stages of creep ranging from Class 1 to Class 5. Class 1 involves no damage. Class 5 involves the formation of macrocracking.)

The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of the replica foils with respect to the EPRI creep classification. Finally, this table identifies the figures in which photomicrographs of the replica foils are provided.

Replica	Location	Creep Classification	Fig.
PSIH-R1	Girth weld No. GW-1 and seam weld No. LS- 1A at the 11:00 o'clock position.	1	7
PSIH-R2	Girth weld No. GW-1 and seam weld No. LS-2A at the 11:00 o'clock position.	1	8
PSIH-R3	Girth weld No. GW-2 and seam weld No. LS- 2A at the 11:00 o'clock position.	1	9
PSIH-R4	Girth weld No. GW-2 and seam weld No. LS- 3A at the 11:00 o'clock position.	1	10
PSIH-R5	Girth weld No. GW-3 and seam weld No. LS- 3A at the 11:00 o'clock position.	1	11
PSIH-R6	Girth weld No. GW-3 and seam weld No. LS- 4A at the 11:00 o'clock position.	1	12
PSIH-R7	Girth weld No. GW-4 and seam weld No. LS- 4A at the 11:00 o'clock position.	1	13
PSIH-R8	Girth weld No. GW-4 and seam weld No. LS- 5A at the 11:00 o'clock position.	1	14

The replica foils removed from the tubes on the Platen Superheater Inlet header also exhibited similar microstructures. The microstructure exhibited by the welds consisted of tempered bainite with limited amount of ferrite. The microstructure exhibited by heat affected zone consisted of ferrite and spheroidized pearlite. The microstructure exhibited by the heat-affected zones consisted of spheroidized pearlite and ferrite. The microstructure exhibited by the base material also consisted of ferrite and pearlite matrix, but with a slightly different grain size. The microstructures observed in these replica foils are typical for C - 1/2 Mo alloy plate produced in accordance with ASME SA-204 Grade A and filler material of the equivalent chemical composition that has been subjected to high-temperature service for approximately 225,000 hours.

The base material did exhibit some microstructural transformations as a result of approximately 225,000 hours of high-temperature service. This included partial decomposition and spheroidization of pearlite. These microstructural transformations are not unexpected for carbon and low-alloy steel materials and subsequent to prolonged high-temperature service.

As noted previously, spheroidization of pearlite, along with carbide precipitation and agglomeration, are the early precursors to graphitization and /or creep deterioration. Despite this, none of the replica foils removed from the Platen Superheater Inlet header exhibited evidence of graphitization and/or creep deterioration. Specifically, the replica foils were free of void formation, void linkage, and microfissuring.

Hardness Determinations

As part of the inspection of the Platen Superheater Inlet header, hardness determinations were performed in the eight areas that were metallographically prepared for replication. The hardness determinations, which were performed using a portable hardness tester, included the base material and the weld deposit. Multiple readings were recorded in each area and averaged.

The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average

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hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness determinations performed on the Platen Superheater Inlet header can be used to evaluate the tensile strength of the header.)

Location	Aver Hardnes	•	Corresponding Tensile Strength (PSI)		
	Low	High	Low	High	
Base	133	155	64,000	74,000	
Weld	149	207	71,000	98,000	

Some of the base values fell slightly below the allowable tensile strength for C - 1/2 Mo low-alloy steel plate (which has a minimum required tensile strength of 65,000 psi).

The deviation is attributable to two factors. The first involves the fact that the outside diameter surface of the pipe and fittings would be decarburized during original manufacture. The decarburization will result in the "skin" of the pipe and fittings being softer than the remaining cross-sectional thickness. This condition is inherent to the manufacturing process and does not have a significant adverse effect on the integrity of the pipe or fittings.

The second factor involves the microstructural transformations that have occurred during the prior years of high-temperature service. These microstructural transformations, which include carbide precipitation and agglomeration, are expected to result in some softening of the pipe and fittings.

All of the values recorded on the weld deposits were greater than 65,000 psi, the minimum required tensile strength for the base material.

There was nothing about the results of the hardness determinations that would call into doubt the integrity of the header.

Although the hardness (and correlating tensile strength) of this header had probably decreased slightly during the prior years of high-temperature service, there was nothing about the results of the hardness determinations that would call into doubt the integrity of the Platen Superheater Inlet header.

Platen Superheater Outlet Header

The Platen Superheater Outlet header was reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-335, Grade P11. (For reference purposes, this specification covers "Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service". Grade P11 involves a 1-1/4 Cr - 1/2 Mo low-alloy steel material.) Grade T12 involves a 1 Cr - 1/2 Mo Low alloy steel material.

The Platen Superheater Outlet header receives superheated steam from 26 elements, each containing 18 tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T12.

The following table lists the available data concerning the pipe/tube dimensions, pipe/tube material, and design conditions for the Platen Superheater Outlet header. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix B, were performed in accordance with the original 1968 ASME Code.)

	Pipe Dimensions			ASME	Design Co	nditions
Component	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)
Header	20.50	3.375"	3.204"	SA-335, Gr. P11	944	4,020
Tube Stubs	2.50	0.396"	N/A	SA-213, Gr. T12	944	4,075

A sketch of the Platen Superheater Outlet header is provided in Fig. 15. Photographs of inspection locations on the header are provided in Figs. 16 through 21. All nondestructive examination reports for the Platen Superheater Outlet header are provided in Appendix B.

Visual Examination

The visual examination of the Platen Superheater Outlet header did not reveal any indications of cracking, distortion, or other deterioration. No evidence of sagging or bowing was noted along the header.

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at all accessible welds on the Platen Superheater Outlet header as well as the tube stubs in every fifth row from the north end of the header. The magnetic particle examination revealed a 5" long, 1/8" deep surface indication in saddle weld No. SW-1. Photographs of the indication are provided in Fig. 22. The indication was removed by light surface grinding by plant personnel. No further action is required. No other indications were revealed during the examination.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were recorded at the girth welds included in the scope of inspection. The ultrasonic wall thickness values were recorded on either side of each weld at four locations around the pipe circumference. The results of the ultrasonic wall thickness measurements are summarized in the following table:

	Dimensions	Calculated Field R		eadings
Component	Specified MWT	MWT	Min.	Max.
Link Piping	N/A	N/A	2.105"	3.040"
Header	3.375"	3.204"	3.488"	3.697"

All of the wall thickness measurements on the header were above the reported specified minimum and calculated minimum wall thickness. This confirms that the header has not experienced significant reductions in wall thickness in the areas included in the scope of inspection.

Ultrasonic Phased-Array Examination

An ultrasonic phased-array examination was performed at each accessible girth weld on the Platen Superheater Outlet header. The ultrasonic phased-array examination did not reveal any subsurface indications.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the Platen Superheater Outlet header was performed utilizing in-situ metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in this header as a result of the prior years of high-temperature service. Eight replica foils were removed from the Platen Superheater Outlet header. The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of each replica foil with respect to the EPRI creep classification. Finally, this table identifies the figure in which photomicrographs of a particular replica foil are provided.

Replica	Location	Creep Classification	Fig.
PSOH- R1	Girth weld No. GW-1 at the 11:00 o'clock position.	1	23
PSOH- R2	Girth weld No. GW-2 at the 11:00 o'clock position.	1	24
PSOH- R3	Girth weld No. GW-3 at the 11:00 o'clock position	1	25
PSOH- R4	Girth weld No. GW-5 at the 11:00 o'clock position.	1	26
PSOH- R5	Girth weld No. GW-6 at the 11:00 o'clock position.	1	27
PSOH- R6-1	Girth weld No. GW-8 on the west side of the header.	1	28A
PSOH- R6-2	Girth weld No. GW-8 on the west side of the header.	1	28B
PSOH- R7	Girth weld No. GW-11 on the west side of the header.	1	29
PSOH- R8	Saddle weld No. SW-1 on the west side of the header.	1	30

The replica foils removed from the tubes on the Platen Superheater Outlet header also exhibited similar microstructures. Specifically, the microstructure exhibited by the welds consisted of bainite with limited amount of ferrite. The microstructure exhibited by the heat-affected zones consisted of tempered bainite, carbides and ferrite. The microstructure exhibited by the base material also consisted of ferrite and partially decomposed bainite, but with a slightly different grain size. The microstructures observed in these replica foils are typical for 1-1/4 Cr - 1/2 Mo low-alloy, pipe produced in accordance with ASME SA-335 Grade P11 and filler material of the equivalent chemical composition that has been subjected to high-temperature service for approximately 225,000 hours.

The base material did exhibit some microstructural transformations as a result of approximately 225,000 hours of high-temperature service. This included partial decomposition of bainite and carbide precipitation and agglomeration at the grain boundaries. These microstructural transformations are not unexpected for pipe materials and subsequent to prolonged high-temperature service.

As noted previously, bainite decomposition, along with carbide precipitation and agglomeration, are the early precursors to creep deterioration. Despite this, none of the replica foils removed from the Platen Superheater Outlet header exhibited evidence of creep deterioration. Specifically, the replica foils were free of void formation, void linkage and microfissuring.

Hardness Determinations

As part of the inspection of the Platen Superheater Outlet header, hardness determinations were performed in the eight areas that were metallographically prepared for replication. The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness determinations performed on the Platen Superheater Outlet header can be used to evaluate the tensile strength of the header.)

Location	Average tion Hardness (BHN) Ter			Corresponding Fensile Strength (PSI)		
	Low	High	Low	High		
Base	123	177	60,000	84,000		
Weld	144	163	69,000	78,000		

All of these values are above the allowable tensile strength for SA-335 P11 Mo lowalloy steel pipe (which has a minimum required tensile strength of 60,000 psi).

Finishing Superheater Inlet Header

The Finishing Superheater Inlet header was reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-335, Grade P11.

The Finishing Superheater Inlet header receives superheated steam from 56 elements, each containing 10 tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T2.

The following table lists the available data concerning the pipe/tube dimensions, pipe/tube material, and design conditions for the Finishing Superheater Inlet header. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix C, were performed in accordance with the original 1968 ASME Code.)

	Pi	ipe Dimen	sions	ASME	Design Cor	nditions
Component	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)
Header	19.25	2.845"	2.619"	SA-335, Gr. P11	000	4 000
Tube Stubs	2.00	0.475"	N/A	SA-213, Gr. T2	900	4,000

A sketch of the Finishing Superheater Inlet header is provided in Fig. 31. Photographs of inspection locations on the header are provided in Figs. 32 through 39. All nondestructive examination reports for the Finishing Superheater Inlet header are provided in Appendix C.

Visual Examination

The visual examination of the Finishing Superheater Inlet header did not reveal any indications of cracking, distortion, or other deterioration. No evidence of sagging or bowing was noted along the header.

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at the 14 girth welds and three penetration welds on the Finishing Superheater Inlet header. The magnetic particle examination did not reveal any recordable surface indications.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were recorded at the girth welds included in the scope of inspection. The ultrasonic wall thickness values were recorded on either side of each weld at four locations around the pipe circumference.

The results of the ultrasonic wall thickness measurements are summarized in the following table:

Dimensions	Calculated	Field Re	eadings
Specified MWT	MWT	Min.	Max.
2.845"	2.619"	2.675"	3.066"

All of the wall thickness measurements on the header were above the calculated minimum wall thickness. This confirms that the header has not experienced significant reductions in wall thickness in the areas included in the scope of inspection.

Ultrasonic Phased-Array Examination

An ultrasonic phased-array examination was performed at each accessible girth weld on the Finishing Superheater Inlet header. The ultrasonic phased-array examination did not reveal any subsurface indications.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the Finishing Superheater Inlet header was performed utilizing in-situ metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in this header as a result of the prior years of high-temperature service. Eight replica foils were removed from the Finishing Superheater Inlet header.

The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of each replica foil with respect to the EPRI creep classification. Finally, this table identifies the figure in which photomicrographs of a particular replica foil are provided.

Replica	Location	Creep Classification	Fig.
FSIH-R1	Girth weld No. GW-1 at the 10:00 o'clock position	1	40
FSIH-R2	Girth weld No. GW-2 at the 10:00 o'clock position	1	41
FSIH-R3	Girth weld No. GW-3 at the 10:00 o'clock position	1	42
FSIH-R4	Girth weld No. GW-4 at the 10:00 o'clock position	1	43
FSIH-R5	Girth weld No. GW-5 at the 10:00 o'clock position	1	44
FSIH-R6	Girth weld No. GW-6 at the 10:00 o'clock position	1	45
FSIH-R7	Girth weld No. GW-7 at the 10:00 o'clock position	1	46
FSIH-R8	Girth weld No. GW-11 on the west side of the header	1	47

The replica foils removed from the tubes on the Finishing Superheater Inlet header also exhibited similar microstructures. Specifically, the microstructure exhibited by the welds consisted of bainite with limited amount of ferrite. The microstructure exhibited by the heat-affected zones consisted of tempered bainite, carbides and ferrite. The microstructure exhibited by the base material also consisted of ferrite and partially decomposed bainite, but with a slightly different grain size. The microstructures observed in these replica foils are typical for 1-1/4 Cr - 1/2 Mo low-alloy, pipe produced in accordance with ASME SA-335 Grade P11 and filler material of the equivalent chemical composition that has been subjected to high temperature service for approximately 225,000 hours. The base material did exhibit some microstructural transformations as a result of approximately 225,000 hours of high-temperature service. This included partial decomposition of bainite and carbide precipitation and agglomeration at the grain boundaries. These microstructural transformations are not unexpected for carbon and low-alloy steel materials and subsequent to prolonged high-temperature service.

As noted previously, bainite decomposition, along with carbide precipitation and agglomeration, are the early precursors to creep deterioration. Despite this, none of the replica foils removed from the Finishing Superheater Inlet header exhibited evidence of creep deterioration. Specifically, the replica foils were free of void formation, void linkage, and microfissuring.

Hardness Determinations

As part of the inspection of the Finishing Superheater Inlet header, hardness determinations were performed in the eight areas that were metallographically prepared for replication. The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness determinations performed on the Finishing Superheater Inlet header can be used to evaluate the tensile strength of the header.)

Location		Average Correspondin dness (BHN) Tensile Strength		
	Low	High	Low	High
Base	133	185	64,000	88,000
Weld	148	185	70,000	88,000

All of these values are above the allowable tensile strength for 1-1/4 Cr - 1/2 Mo lowalloy steel pipe (which has a minimum required tensile strength of 60,000 psi).

Upper and Lower Finishing Superheater Outlet Headers

The Upper and Lower Finishing Superheater Outlet headers were reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-335, Grade P22. (For reference purposes, Grade P22 involves a 2-1/4 Cr - 1 Mo low-alloy steel material.)

The Upper and Lower Finishing Superheater Outlet headers receive superheated steam from 56 elements, each containing five tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T22.

The following table lists the available data concerning the pipe/tube dimensions, pipe/tube material, and design conditions for the Finishing Superheater Outlet headers. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix D, were performed in accordance with the original 1968 ASME Code.)

	Pi	Pipe Dimensions ASME Design Condition			nditions	
Component	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)
Headers	28.00	6.00"	5.692"	SA-335, Gr. P22	1025	3,865
Tube Stubs	2.00	0.475"	N/A	SA-213, Gr. T22	1030	4,000

Sketches of the Upper and Lower Finishing Superheater Outlet headers are provided in Figs. 48 and 49. Photographs of the inspection locations on the headers are provided in Figs. 50 through 56. All nondestructive examination reports for the Finishing Superheater Outlet headers are provided in Appendix D.

Visual Examination

The visual examination of the Upper and Lower Finishing Superheater Outlet headers did not reveal any indications of distortion or other deterioration. No evidence of sagging or bowing was noted along the headers. The visual examination of the upper and lower Finishing Superheater Outlet tube stubs revealed multiple 1/16" to 1/4" recordable surface indications.

The following tube stubs require repair by welding:

- Upper header: 31D, 40A, 42D, 51B, 52B, 53B, 54B and C, and 55C.
- Lower header: 1E, 17E, 18A and E, 22A, 25A, 27A, 34D, 47E, 48E, and 55D, 56A, B, C, D, and E.

The remaining indications should be monitored during future inspections. The repairs were to be performed by plant personnel during the current outage.

Diameter Measurements

As part of the inspection of the Upper Finishing Superheater Outlet header, diameter measurements were recorded upstream and downstream of each girth weld. The diameter measurements would confirm whether the Upper Finishing Superheater Outlet header had been fabricated using pipe of the specified outside diameter (OD). These diameter measurements would also confirm whether the header had experienced dimensional changes, i.e., swelling, during the prior years of service.

The diameter measurements recorded on the Upper Finishing Superheater Outlet header are summarized in the following table:

Header	OD	ASME SA-335 Manufacturing Tolerances		Field R	eadings
neuder	Under Over		Min.	Max.	
Upper	28.00"	27.27"	28.280"	28.185"	28.344"

The diameter measurements were compared to the manufacturing tolerances for pipe set forth in ASTM Specification A-335. This specification covers "General Requirements for Specialized Carbon and Alloy Steel Pipe".

Given that all of the diameter measurements were well above those specified for 28" OD pipe, it is not likely the pipe was made to 28.250" OD material, given that there were no signs of creep damage in the metallurgical evaluation.

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at all accessible welds on the Finishing Superheater Outlet headers. The magnetic particle examination did not reveal any recordable surface indications on the upper or lower header.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were recorded at the girth welds included in the scope of inspection. The ultrasonic wall thickness values were recorded on either side of each weld at four locations around the pipe circumference.

The results of the ultrasonic wall thickness measurements are summarized in the following table:

Header	Dimensions	Calculated	Field Re	adings
nedder	Specified MWT	MWT	Min.	Max.
Upper	6.00"	E 602"	5.983"	6.285"
Lower	0.00	5.692"	5.995"	6.267"

All of the wall thickness measurements on the headers were above the calculated minimum wall thickness. This confirms that the headers have not experienced significant reductions in wall thickness in the areas included in the scope of inspection.

Ultrasonic Phased-Array Examination

An ultrasonic phased-array examination was performed at each accessible girth weld on the Upper and Lower Finishing Superheater Outlet headers. The ultrasonic phased-array examination did not reveal any subsurface indications.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the Upper and Lower Finishing Superheater Outlet headers was performed utilizing in-situ metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in these headers as a result of the prior years of high-temperature service.

Fifteen replica foils were removed from the Finishing Superheater Outlet headers. (seven from the Upper header and eight from the Lower header.) These replica foils were sputtered with gold to provide contrast. They were then examined comprehensively by optical microscopy at magnifications of 100X to 500X. The examination included the base material, the weld deposit, and the associated heat-affected zones.

The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of each replica foil with respect to the EPRI creep classification. Finally, this table identifies the figure in which photomicrographs of a particular replica foil are provided.

Replica	Location	Creep Classification	Fig.
FSOH- UPR-R1	Girth weld No. GW-1 at the 10:00 o'clock position	1	57
FSOH- UPR-R2	Girth weld No. GW-2 at the 10:00 o'clock position	1	58
FSOH- UPR-R3	Girth weld No. GW-3 at the 10:00 o'clock position	1	59
FSOH- UPR-R4	Girth weld No. GW-4 at the 10:00 o'clock position	1	60
FSOH- UPR-R5	Girth weld No. GW-5 at the 10:00 o'clock position	1	61

Replica	Location	Creep Classification	Fig.
FSOH- UPR-R6	Girth weld No. GW-6 at the 10:00 o'clock position	1	62
FSOH- UPR-R7	Girth weld No. GW-7 at the 10:00 o'clock position	1	63
FSOH- LWR-R1	Girth weld No. GW-1 at the 11:00 o'clock position	1	64
FSOH- LWR-R2	Girth weld No. GW-2 at the 11:00 o'clock position	1	65
FSOH- LWR-R3	Girth weld No. GW-3 at the 11:00 o'clock position	1	66
FSOH- LWR-R4	Girth weld No. GW-4 at the 11:00 o'clock position	1	67
FSOH- LWR-R5	Girth weld No. GW-5 at the 11:00 o'clock position	1	68
FSOH- LWR-R6	Girth weld No. GW-6 at the 11:00 o'clock position	1	69
FSOH- LWR-R7	Girth weld No. GW-7 at the 11:00 o'clock position	1	70
FSOH- LWR-R8	Girth weld No. GW-8 at the 11:00 o'clock position	1	71

The replica foils removed from the tubes on the Upper and Lower Finishing Superheater Outlet headers exhibited similar microstructures. Specifically, the microstructure exhibited by the welds consisted of bainite with limited amount of ferrite. The microstructure exhibited by the heat-affected zones consisted of tempered bainite, carbides and ferrite. The microstructure exhibited by the base material also consisted of ferrite and partially decomposed bainite, but with a slightly different grain size. The microstructures observed in these replica foils are typical for 2-1/4Cr - 1Mo low-alloy, pipe produced in accordance with ASME SA-335 Grade P22 and filler material of the equivalent chemical composition that has been subjected to high temperature service for approximately 225,000 hours.

The base material did exhibit some microstructural transformations as a result of approximately 225,000 hours of high-temperature service. This included partial decomposition of bainite and carbide precipitation and agglomeration at the grain boundaries. These microstructural transformations are not unexpected for low-alloy steel materials and subsequent to prolonged high-temperature service.

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As noted previously, bainite decomposition, along with carbide precipitation and agglomeration, are the early precursors to creep deterioration. Despite this, none of the replica foils removed from the Upper and Lower Finishing Superheater Outlet headers exhibited evidence of creep deterioration. Specifically, the replica foils were free of void formation, void linkage and microfissuring.

Hardness Determinations

As part of the inspection of the Upper and Lower Finishing Superheater Outlet headers, hardness determinations were performed in the fifteen areas that were metallographically prepared for replication. The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness determinations performed on the Upper and Lower Finishing Superheater Outlet headers can be used to evaluate the tensile strength of the header.)

Location	Average Hardness (BHN)		Corresponding Tensile Strength (PSI)	
	Low	High	Low	High
Upper Base	145	164	69,000	78,000
Upper Weld	146	180	70,000	86,000
Lower Base	144	172	69,000	82,000
Lower Weld	146	178	70,000	85,000

All of these values are above the allowable tensile strength for 2-1/4 Cr - 1 Mo lowalloy steel pipe (which has a minimum required tensile strength of 60,000 psi).

High-Pressure Reheat Outlet Header

The HP Reheat Outlet header was reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-387, Grade D. (For reference purposes, this specification covers "Pressure Vessel, Plates, Alloy Steel, Chromium-Molybdenum". Grade D involves a 2-1/4 Cr - 1 Mo low-alloy steel material.)

The HP Reheat Outlet header receives superheated steam from 112 elements, each containing 10 tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T22.

The following table lists the available data concerning the pipe/tube dimensions, pipe/tube material, and design conditions for the HP Reheat Outlet header. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix E, were performed in accordance with the original 1968 ASME Code.)

	Pi	pe Dimens	sions	ASME	Design Co	nditions
Component	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)
Header	35.25 (ID)	4.598"	4.502"	SA-387, Gr. D	1040	1,200
Tube Stubs	2.25	0.261"	N/A	SA-213, Gr. T22	1080	1,200

A sketch of the High-Pressure Reheat Outlet header is provided in Fig. 72. Photographs of inspection locations on the header are provided in Figs. 73 through 75. All nondestructive examination reports for the HP Reheat Outlet header are provided in Appendix E.

Visual Examination

The visual examination of the HP Reheat Outlet header did not reveal any indications of cracking, distortion, or other deterioration. No evidence of sagging or bowing was noted along the header.

Diameter Measurements

Diameter measurements were recorded at selected locations along the length of the HP Reheat Outlet header. The results of the diameter measurements are summarized in the following table:

OD	ASME Manufacturin	Field Re	eadings	
	Under	Over	Min.	Max.
44.45"	44.00"	44.894"	44.904"	

The diameter measurements were compared to the manufacturing tolerances for pipe set forth in ASTM Specification A-530. This specification covers "General Requirements for Specialized Carbon and Alloy Steel Pipe". For piping over 12" OD the tolerances are +/-% of the specified outside diameter.

The diameter measurements performed on the HP Reheat Outlet header fell beyond the permissible manufacturing tolerances. The discrepancy is believed to be the result in inherent limitations in the measurement technique. There was no evidence of general swelling such as would be produced by creep deterioration. (This conclusion is further corroborated by the results of the metallurgical evaluation, which did not reveal any evidence of creep deterioration in the header.)

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at all accessible welds on the HP Reheat Outlet header as well as the tube stubs in every fifth row from the north end of the header. The magnetic particle examination on the header revealed a 1/4" longitudinal surface indication on girth weld No. GW-3 and a 3"

indication in the toe of the weld on attachment weld No. AW-3. The indications require removal and, if necessary, repair. All repairs were to be performed by plant personnel during the current outage.

Multiple 1/8" to 1" surface indications were revealed in the tube stubs. The indications on tube stubs 80J, 88J (1/2" x 2), and 96J were removed by light surface grinding by plant personnel. The remaining indications should be monitored during future inspections. No other recordable surface indications were revealed during the examination.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were recorded at the girth welds included in the scope of inspection. The ultrasonic wall thickness values were recorded either side of each weld at four locations around the pipe circumference.

The results of the ultrasonic wall thickness measurements are summarized in the following table:

Dimensions	Calculated	Field Re	eadings
Specified MWT	MWT	Min.	Max.
4.598"	4.502"	4.345"	4.865"

Some of the wall thickness measurements were slightly below the calculated minimum wall thickness for the header. The thinned section of the header should be closely monitored during future inspections.

Ultrasonic Phased-Array Examination

An ultrasonic phased-array examination was performed at each accessible girth and seam welds on the HP Reheat Outlet header. The ultrasonic phased-array examination did not reveal any subsurface indications.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the HP Reheat Outlet header was performed utilizing insitu metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in this header as a result of the prior years of high-temperature service.

Eight replica foils were removed from the HP Reheat Outlet header. These replica foils were sputtered with gold to provide contrast. They were then examined comprehensively by optical microscopy at magnifications of 100X to 500X. The examination included the base material, the weld deposit, and the associated heat-affected zones.

The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of each replica foil with respect to the EPRI creep classification. Finally, this table identifies the figure in which photomicrographs of a particular replica foil are provided.

Replica	Location	Creep Classification	Fig.
HPROH- R1	Girth weld No. GW-2 and seam weld No. LS- 1E at the 3:00 o'clock position, north east.	1	76
HPROH- R2	Girth weld No. GW-2 and seam weld No. LS- 2E at the 3:00 o'clock position, south east.	1	77
HPROH- R3	Girth weld No. GW-3 and seam weld No. LS- 2E at the 3:00 o'clock position, north east.	1	78
HPROH- R4	Girth weld No. GW-3 and seam weld No. LS- 3E at the 3:00 o'clock position, north east.	1	79
HPROH- R5	Girth weld No. GW-2 and seam weld No. LS- 1W at the 9:00 o'clock position, north west.	1	80
HPROH- R6	Girth weld No. GW-2 and seam weld No. LS- 2W at the 9:00 o'clock position, south west.	1	81
HPROH- R7	Girth weld No. GW-3 and seam weld No. LS- 2W at the 9:00 o'clock position, north west.	1	82
HPROH- R8	Girth weld No. GW-3 and seam weld No. LS- 3W at the 9:00 o'clock position, south west.	1	83

All of the replica foils removed from the HP Reheat Outlet header exhibited similar microstructures. Specifically, the microstructure exhibited by the welds consisted of acicular bainite and ferrite with limited carbides. The microstructure exhibited by the heat-affected zones consisted of tempered bainite and ferrite. The microstructure exhibited by the base material also consisted of ferrite and tempered bainite, but with a slightly different grain size. The microstructures observed in these replica foils are typical for 2-1/4 Cr - 1 Mo low-alloy steel plate material, manufactured in accordance with the requirements of ASME Specification SA-387, Grade D covering "Chromium-Molybdenum Alloy Steel Plates for Pressure Vessels" and filler material of the equivalent chemical composition. There was no evidence of microstructural anomalies relating to the original manufacture of the pipe or the subsequent fabrication of the Superheater Outlet header.

The base material did exhibit some microstructural transformations as a result of the previous years of high-temperature service. This included partial decomposition of the bainite. It also included carbide precipitation and agglomeration at the grain boundaries. These microstructural transformations are not unexpected for low-alloy steel subsequent to prolonged high-temperature service.

As noted previously, bainite decomposition, along with carbide precipitation and agglomeration, are the early precursors to creep deterioration. Despite this, none of the replica foils removed from the HP Reheat Outlet header exhibited evidence of creep deterioration. Specifically, these replica foils were free of void formation, void linkage and microfissuring.

Hardness Determinations

As part of the inspection of the HP Reheat Outlet header, hardness determinations were performed in the eight areas that were metallographically prepared for replication. The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness

determinations performed on the HP Reheat Outlet header can be used to evaluate the tensile strength of the header.)

Location	Average Hardness (BHN)		Corresponding Tensile Strength (PSI)	
	Low	High	Low	High
Base	131	161	64,000	77,000
Weld	147	193	70,000	91,000

All of these values are above the allowable tensile strength for 2-1/4 Cr - 1 Mo lowalloy steel pipe (which has a minimum required tensile strength of 60,000 psi).

Low-Pressure Reheat Outlet Header

The LP Reheat Outlet header was reportedly fabricated using pipe manufactured in accordance with the requirements of ASME Specification SA-387, Grade 91 Class 2. (For reference purposes, Grade 91 involves a 9 Cr - 1 Mo-V alloy steel material.)

The LP Reheat Outlet header receives superheated steam from 112 elements, each containing 10 tubes. All tube stubs were reportedly fabricated using tube manufactured in accordance with the requirements of ASME Specification SA-213, Grade T91.

The following table lists the available data concerning the pipe/tube dimensions, pipe/tube material, and design conditions for the LP Reheat Outlet header. This table also includes the results of the minimum wall thickness calculations performed by Thielsch Engineering. (These minimum wall thickness calculations, which are provided in Appendix F, were performed in accordance with the 2010 ASME Code.)

Component	Pipe Dimensions			ASME	Design Conditions	
	OD (")	Specified MWT (")	Calculated MWT (")	Specification	Temperature (°F)	Pressure (psig)
Header	50.625	1.875"	1.103"	SA-387, Gr. 91 Class 2	1005	475
Tube Stubs	2.25	0.180"	N/A	SA-213, Gr. T91	1065	

A sketch of the LP Reheat Outlet header is provided in Fig. 84. Photographs of the inspection locations are provided in Figs. 85 through 89. All nondestructive examination reports for the LP Reheat Outlet header are provided in Appendix F.

Visual Examination

The visual examination of the LP Reheat Outlet header did not reveal any indications of cracking, distortion, or other deterioration. No evidence of sagging or bowing was noted along the header.

Diameter Measurements

Diameter measurements were recorded at selected locations along the length of the LP Reheat Outlet header. The results of the diameter measurements are summarized in the following table:

OD	ASME S Manufacturin	Field Readings		
05	Under	Over	Min.	Max.
50.625"	50.594"	50.812"	50.637"	51.035"

The diameter measurements were compared to the manufacturing tolerances for pipe set forth in ASTM Specification A-530. This specification covers "General Requirements for Specialized Carbon and Alloy Steel Pipe". For pipe over 12" OD the tolerance are +/-% of the specified outside diameter.

For the most part, the diameter measurements performed on the LP Reheat Outlet header fell within the permissible manufacturing tolerances. However, in some cases, the recorded diameters fell beyond these tolerances. Some of these discrepancies are explained by the fact that the diameter measurements were recorded on fittings rather than pipe. (Fittings do not have to conform to the same dimensional tolerances as pipe.) The remaining discrepancies are believed to be the result in inherent limitations in the measurement technique. There was no evidence of general swelling such as would be produced by creep deterioration. (This conclusion is further corroborated by the results of the metallurgical evaluation, which did not reveal any evidence of creep deterioration in the header.)

Magnetic Particle Examination

A wet fluorescent magnetic particle examination was performed at all accessible welds on the LP Reheat Outlet header as well as the tube stubs in every fourth row from the north end of the header. The magnetic particle examination on the header revealed a 1/8" surface indication on girth weld No. GW-3. The indication was removed by light surface grinding by plant personnel. No further action is required. A 1" and a 1/2" surface indication was revealed in seam weld No. LS-07, a 10" linear and a 3/4" transverse indication was revealed on attachment weld No. AW-1, and two 10" indications were revealed on attachment weld No. AW-3. The indications require removal and, if necessary, repair by welding. The repairs were to be performed by plant personnel during the current outage.

Multiple 1/8" to 1" surface indications were revealed in the tube stubs. Selected indications were removed by grinding by plant personnel during the current outage. These indications are indicative of manufacturing defects and should be monitored during future inspections. No other recordable surface indications were revealed during the examination. Photographs of the indications are provided in Figs. 90 through 92.

Ultrasonic Wall Thickness Measurements

Ultrasonic wall thickness measurements were recorded at the girth welds included in the scope of inspection. The ultrasonic wall thickness values were recorded upstream and downstream of each weld at four locations around the pipe circumference.

The results of the ultrasonic wall thickness measurements summarized in the following table:

Dimensions	Calculated	Field Readings		
Specified MWT	MWT	Min.	Max.	
1.875"	1.172"	1.869"	1.964"	

All of the wall thickness measurements on the header were above the calculated minimum wall thickness. This confirms that the header has not experienced significant reductions in wall thickness in the areas included in the scope of inspection.

Ultrasonic Phased-Array Examination

An ultrasonic phased-array examination was performed at each accessible girth and seam weld on the LP Reheat Outlet header.

The ultrasonic phased-array examination of the girth welds did not reveal any subsurface indications.

The ultrasonic phased-array examination of the seam welds did not reveal any relevant subsurface indications. The results of the ultrasonic phased-array examination are provided in Appendix F.

Metallurgical Evaluation - Replication

A metallurgical evaluation of the LP Reheat Outlet header was performed utilizing insitu metallographic examination (replication). This evaluation was performed to identify any microstructural changes that may have occurred in this header as a result of the prior years of high-temperature service.

Eight replica foils were removed from the LP Reheat Outlet header. These replica foils were sputtered with gold to provide contrast. They were then examined comprehensively by optical microscopy at magnifications of 100X to 500X. The examination included the base material, the weld deposit, and the associated heat-affected zones.

The following table identifies the locations from which the replica foils were removed. This table also identifies the microstructural condition of each replica foil with respect to the EPRI creep classification. Finally, this table identifies the figure in which photomicrographs of a particular replica foil are provided.

Replica	Location	Creep Classification	Fig.
LPROH- R1	Girth weld No. GW-1 and seam weld No. LS- 1 at the 4:00 o'clock position.	1	93
LPROH- R2	Girth weld No. GW-2 and seam weld No. LS-2 at the 7:00 o'clock position.	1	94
LPROH- R3	Girth weld No. GW-4 and seam weld No. LS- 3 at the 4:00 o'clock position.	1	95
LPROH- R4	Girth weld No. GW-4 and seam weld No. LS- 4 at the 7:00 o'clock position.	1	96
LPROH- R5	Girth weld No. GW-5 and seam weld No. LS- 5 at the 4:00 o'clock position.	1	97
LPROH- R6	Girth weld No. GW-6 and seam weld No. LS- 6 at the 7:00 o'clock position.	1	98
LPROH- R7	Girth weld No. GW-7 and seam weld No. LS- 7 at the 4:00 o'clock position.	1	99
LPROH- R8	Girth weld No. GW-8 and seam weld No. LS-8 at the 7:00 o'clock position.	1	100

All of the replica foils removed from the Low-Pressure Reheat Outlet header exhibited similar microstructures. Specifically, the microstructure exhibited by the welds and the heat affected zones consisted of martensite and free ferrite. The microstructure exhibited by the base material consisted of ferrite and tempered martensite. The microstructures observed in these replica foils are typical for 9 Cr - 1 Mo low-alloy steel pipe, manufactured in accordance with the requirements of ASME Specification SA-335, Grade P9 covering "Seamless Ferritic Alloy-Steel Pipe for High Temperature Service" and filler material of the equivalent chemical composition that has been subjected to high temperature service for approximately 225,000 hours. There was no evidence of microstructural anomalies relating to the original manufacture of the pipe or the subsequent fabrication of the Low-Pressure Reheat Outlet header.

None of the replica foils removed from the Low-Pressure Reheat Outlet header exhibited evidence of creep deterioration. Specifically, these replica foils were free of void formation, void linkage and microfissuring.

Hardness Determinations

As part of the inspection of the LP Reheat Outlet header, hardness determinations were performed in the eight areas that were metallographically prepared for replication. The results of the hardness determinations are provided in the following table. The table also includes the corresponding tensile strength for each of the average hardness values. (For low-alloy steels, there is a distinct relationship between hardness and tensile strength. As such, the results of the hardness determinations performed on the LP Reheat Outlet header can be used to evaluate the tensile strength of the header.)

Location	Aver Hardnes	•	Corresponding Tensile Strength (PSI)		
	Low	High	Low	High	
Base	160	190	77,000	90,000	
Weld	153	218	73,000	102,000	

Some of the average hardness values recorded in the base material fell below the allowable tensile strength for 9 Cr - 1 Mo low-alloy steel pipe (which has a minimum required tensile strength of 85,000 psi).

Some of the values recorded on the weld deposits fell below 85,000 psi, the minimum required tensile strength for the base material.

Although the hardness (and correlating tensile strength) of this header had probably decreased slightly during the prior years of high-temperature service, there was nothing about the results of the hardness determinations that would call into doubt the integrity of the LP Reheat Outlet header.

CONCLUSIONS AND RECOMMENDATIONS

In April of 2011, Thielsch Engineering performed an inspection of selected headers in Unit No. 1 at the Mitchell Generating Station of American Electric Power located in Moundville, West Virginia. Based upon the results of this inspection and subsequent engineering evaluation, the following conclusions and recommendations are offered:

Platen Superheater Inlet Header

- The magnetic particle examination revealed multiple recordable surface indications in tube subs 5J, 9G, 9P, and 26L. These indications should be monitored during future inspections.
- The ultrasonic phased-array examination of the girth welds revealed a 3" long inclusion type indication in girth weld No. GW-2. The inclusion is indicative of an original manufacturing defect. Girth weld No. GW-2 should be monitored during future inspections.
- The header material has consumed 20% of its remaining useful life.
- Operating in Class 1 creep range.

- The Platen Superheater Inlet header is considered suitable for continued service under the intended operating conditions.
- Reinspect after three years of continued service (2014).

Platen Superheater Outlet Header

- The magnetic particle examination revealed a 5" surface indication in saddle weld No. SW-1. The indication was removed by light surface grinding by plant personnel. No further action is required. No other indications were revealed during the examination.
- Operating in Class 1 creep range.
- The header material has consumed less than 20% of its remaining useful life.
- The Platen Superheater Outlet header is considered suitable for continued service under the intended operating conditions.
- Perform an inspection similar in nature after five to seven years of continued operation (2016 to 2018).

Finishing Superheater Inlet Header

- Operating in Class 1 creep range.
- The header material has consumed less than 20% of its remaining useful life.
- The Finishing Superheater Inlet header is considered suitable for continued service under the intended operating conditions.
- Perform an inspection similar in nature after five to seven years of continued operation (2016 to 2018).

Finishing Superheater Outlet Headers (Upper and Lower)

- The visual examination of the upper and lower Finishing Superheater Outlet headers revealed multiple recordable surface indications in the tube stubs. The following tube stubs require repair: Upper header: 31D, 40A, 42D, 51B, 52B, 53B, 54B and C, and 55C. Lower header: 1E, 17E, 18A and E, 22A, 25A, 27A, 34D, 47E, 48E, and 55C. The repairs were to be performed on the more severe indications by plant personnel during the current outage. The remaining indications should be monitored during future inspections.
- Operating in Class 1 creep range.
- Subsequent to the recommended repairs by welding, the Upper and Lower Finishing Superheater Outlet headers are considered suitable for continued service under the intended operating conditions.
- The header has consumed less than 20% of its remaining useful life.
- Reinspect the repairs on the tube stubs after one year of continued operation (2012).
- Reinspect after three years of continued operation (2014).

HP Reheat Outlet Header

- The magnetic particle examination revealed a ¼" surface indication on girth weld No. GW-3 and a 3" indication on attachment weld No. AW-3. The indications require removal and, if necessary, repair. All repairs were to be performed by plant personnel during the current outage. Multiple surface indications were revealed in the tube stubs. The indications on tube stubs 80J, 88J (1/2" x 2), and 96J were removed by light surface grinding by plant personnel. The remaining indications should be monitored during future inspections.
- The ultrasonic wall thickness measurements revealed evidence of wall thinning in the section of the header at girth weld Nos. GW-2 and GW-3. The thinned section should be monitored closely during future inspections.

- Operating in Class 1 creep range.
- Subsequent to the recommended repairs by welding, the HP Reheat Outlet header is considered suitable for continued service under the intended operating conditions.
- The header material has consumed less than 20% of its remaining useful life.
- Reinspect the repairs on the tube stubs after one year of continued operation (2012).
- Perform an inspection of the thinned area after one to three years of continued operation (2012 to 2014).
- Perform a similar inspection after five to seven years of additional service (2015 to 2017).

LP Reheat Outlet Header

- The magnetic particle examination revealed a 1/8" surface indication on girth weld No. GW-3. The indication was removed by light surface grinding by plant personnel. No further action is required. Surface indications were revealed in seam weld No. LS-07, attachment weld Nos. AW-1, and AW-3. The indications require removal and, if necessary, repair by welding. The repairs were to be performed by plant personnel during the current outage. Multiple 1/8" to 1" surface indications were revealed in the tube stubs. Selected indications were removed by grinding by plant personnel during the current outage. The indications are indicative of manufacturing defects and should be monitored during future inspections.
- The ultrasonic wall thickness measurements did not reveal any evidence of wall thinning.
- The ultrasonic phased-array examination of the girth and seam welds did not reveal any subsurface indications.

- The header material has consumed less than 20% of its remaining useful life.
- Operating in Class 1 creep range.
- Subsequent to the recommended repairs by welding, the LP Reheat Outlet header is considered suitable for continued service under the intended operating conditions.
- Reinspect the repairs after one year of continued operation (2012).
- Reinspect after three years of continued operation (2014).

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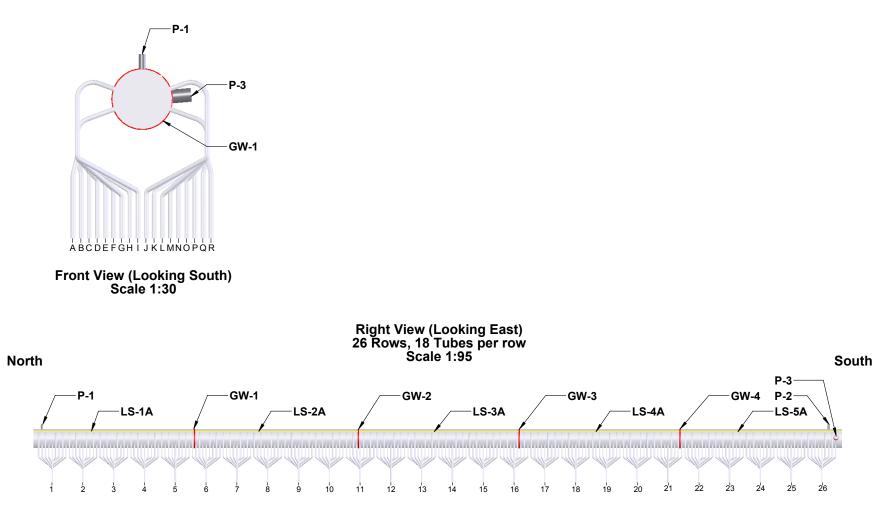


Fig. 1. An overall sketch of the Platen Superheater Inlet header

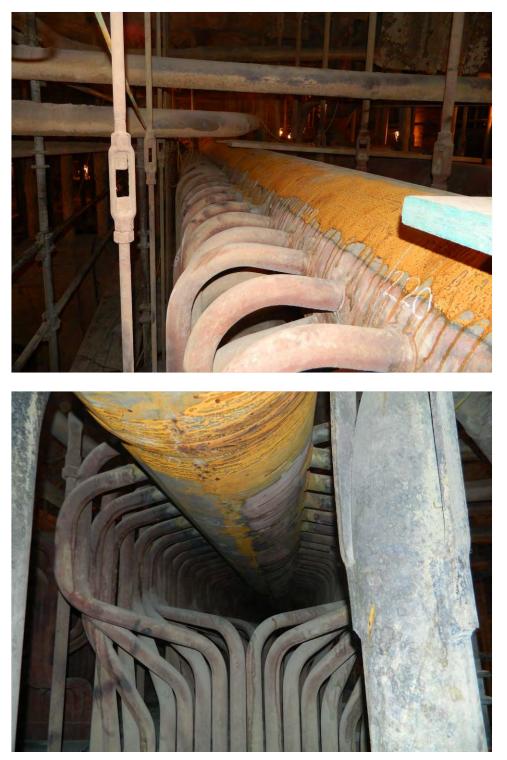


Fig. 2. Photographs of the Platen Superheater Inlet header and tubing.

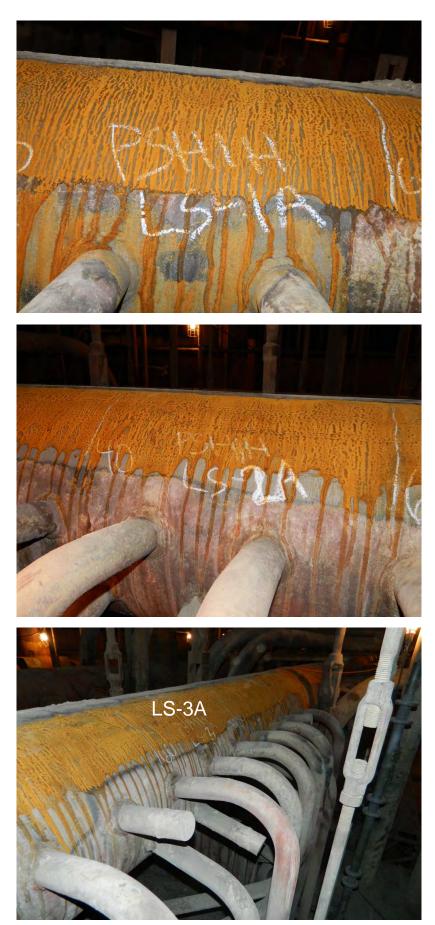


Fig. 3.

Photographs of seam weld Nos. LS-1A, LS-2A, and LS-3A on the Platen Superheater Inlet header.



Fig. 4. Photographs of seam weld Nos. LS-4A and LS-5A on the Platen Superheater Inlet header.

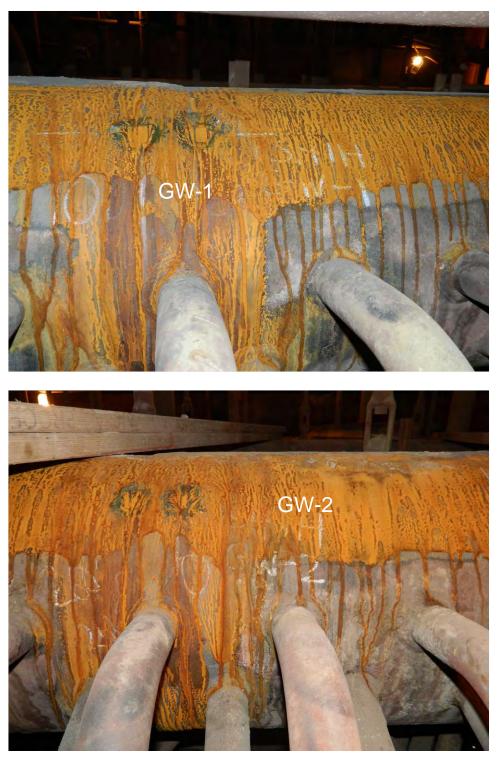


Fig. 5. Photographs of girth weld Nos. GW-1 and GW-2 on the Platen Superheater Inlet header.

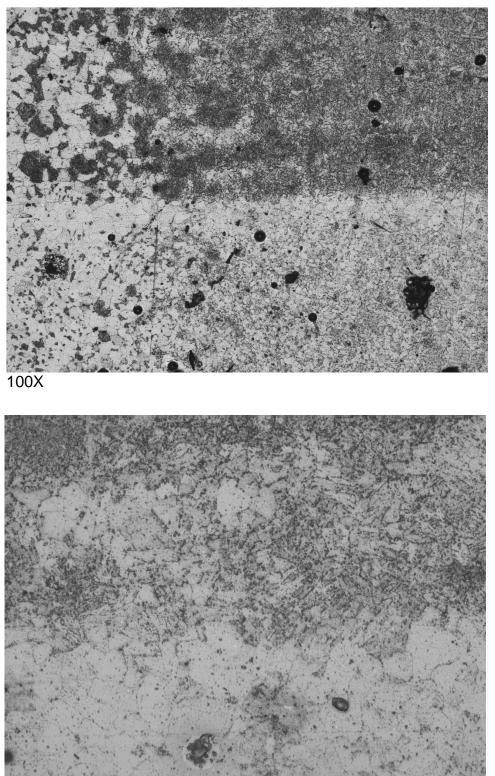


Fig. 6.

Photographs of girth weld Nos. GW-3, GW-4, and penetration No. P-3 on the Platen Superheater Inlet header.

Thielsch Engineering, Inc.

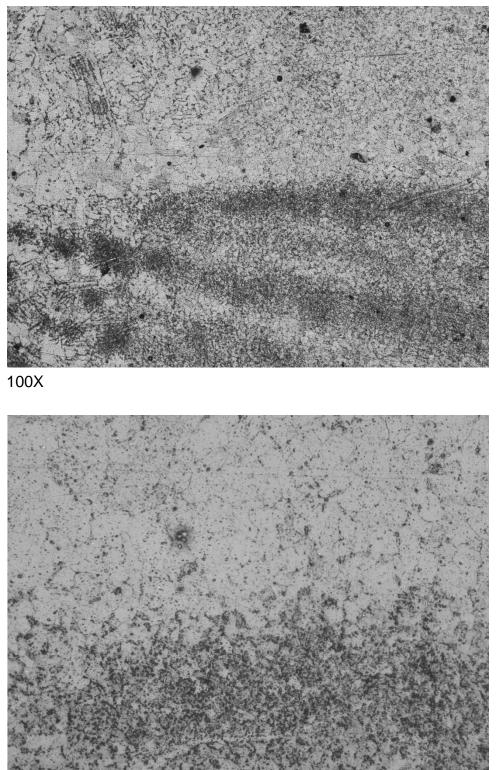
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500X

Fig. 7. Replica No. PSIH-R1.

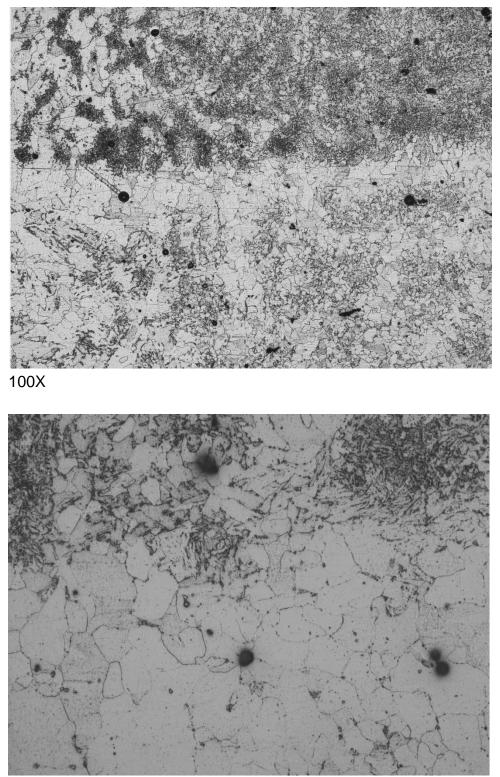
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Fig. 8. Replica No. PSIH-R2.

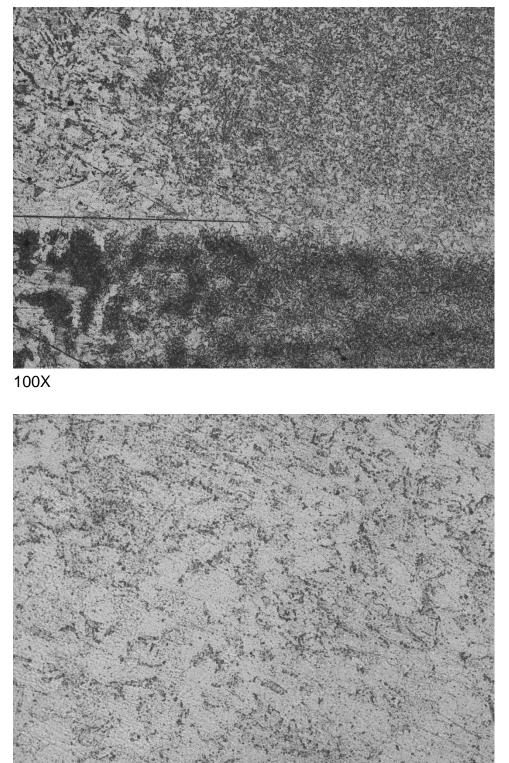
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Fig. 10. Replica No. PSIH-R4.

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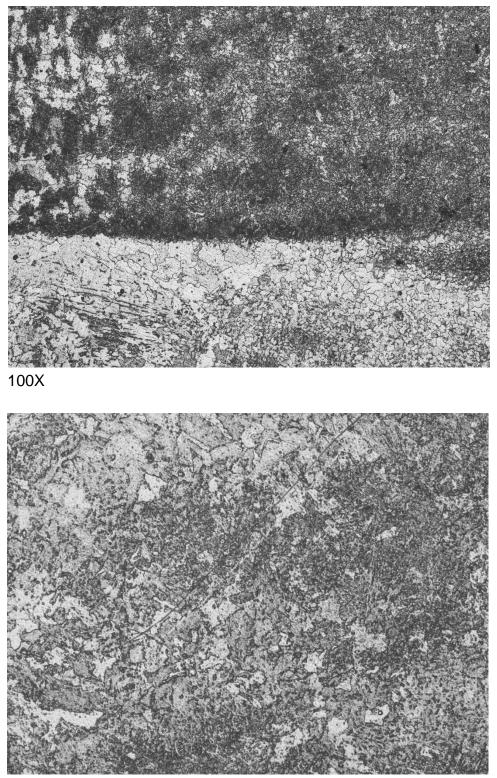




Fig. 11. Replica No. PSIH-R5.

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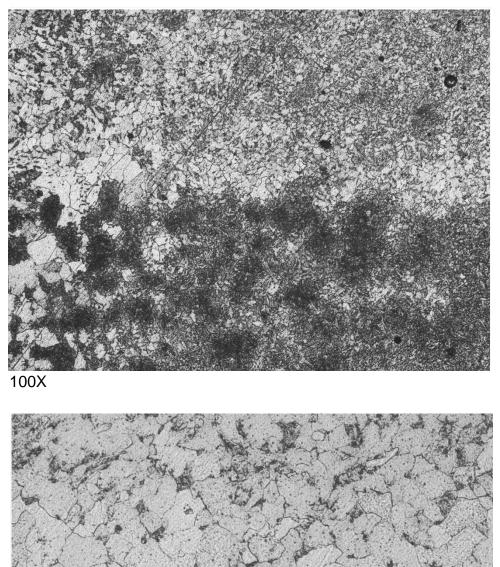




Fig. 12. Replica No. PSIH-R6.

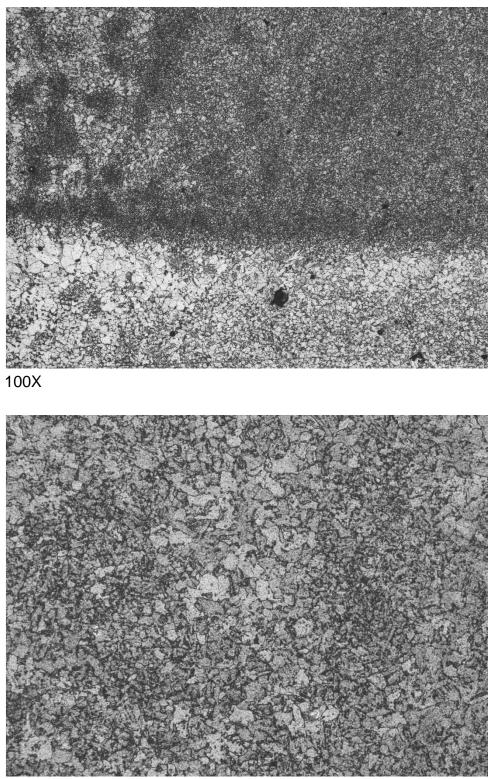
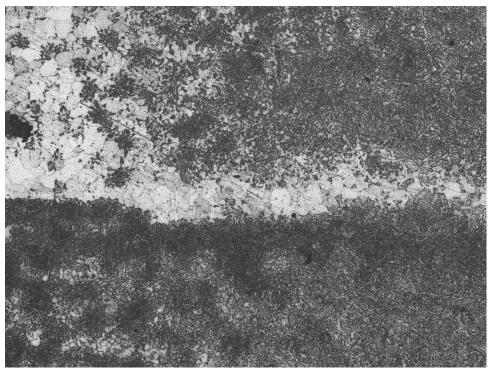




Fig. 13. Replica No. PSIH-R7.

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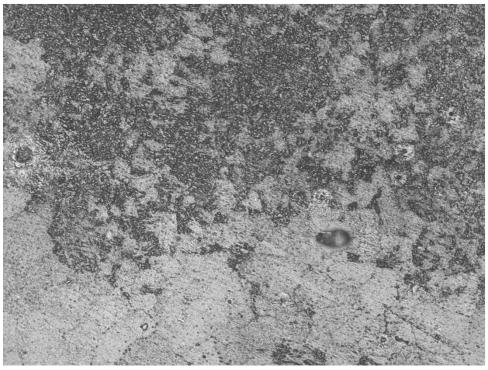




Fig. 14. Replica No. PSIH-R8.

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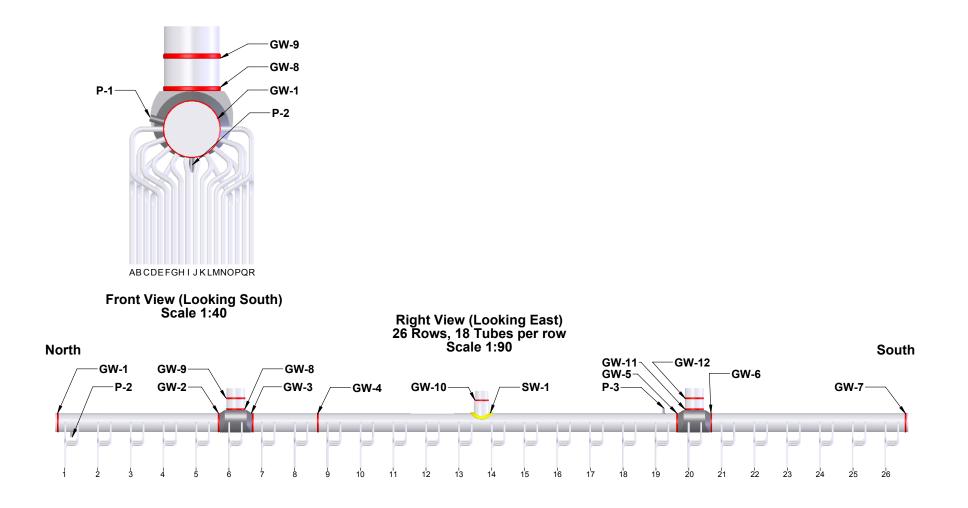


Fig. 15. An overall sketch of the Platen Superheater Outlet header

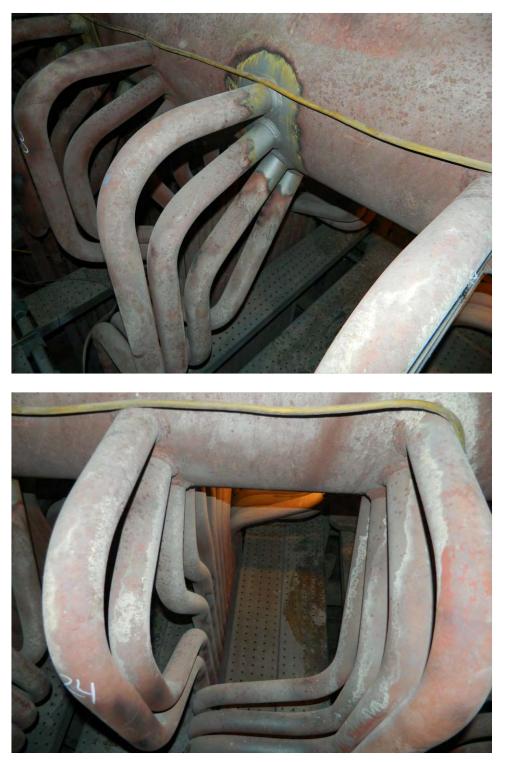


Fig. 16. Photographs of the Platen Superheater Outlet header tubing.



Fig. 17. Photographs of girth weld Nos. GW-1 and GW-2 on the Platen Superheater Outlet header.



Fig. 18. Photographs of girth weld Nos. GW-4 and GW-5 on the Platen Superheater Outlet header.

Thielsch Engineering, Inc.



Fig. 19. Photographs of girth weld Nos. GW-6 and GW-7 on the Platen Superheater Outlet header.



Fig. 20. Photographs of girth weld Nos. GW-8 and GW-10 on the Platen Superheater Outlet header.



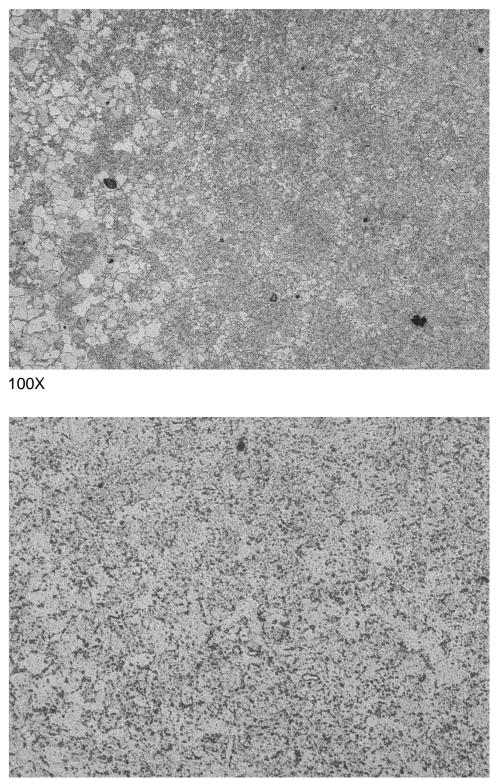
Fig. 21. Photographs of girth weld Nos. GW-11 and GW-12 on the Platen Superheater Outlet header

Thielsch Engineering, Inc.



Fig. 22. Photographs of the indication on saddle weld No. SW-1 of the Platen Superheater Outlet header.

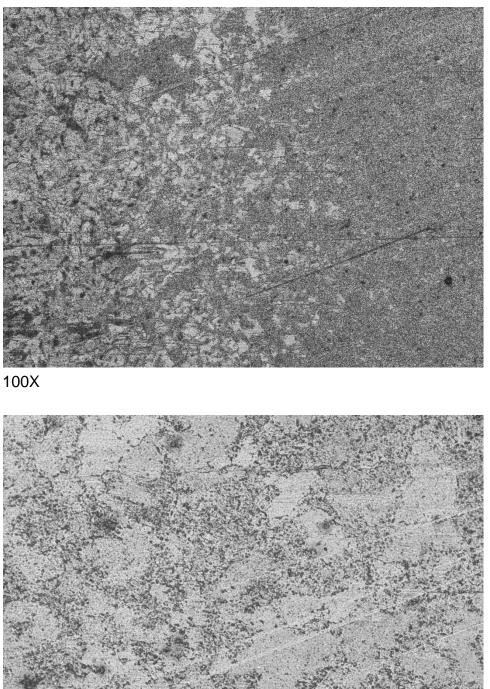
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Fig. 23. Replica No. PSOH-R1.

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Fig. 24. Replica No. PSOH-R2.

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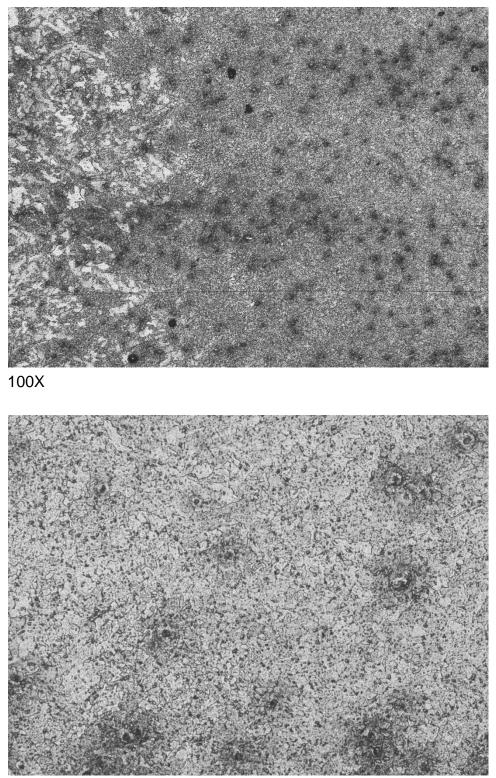
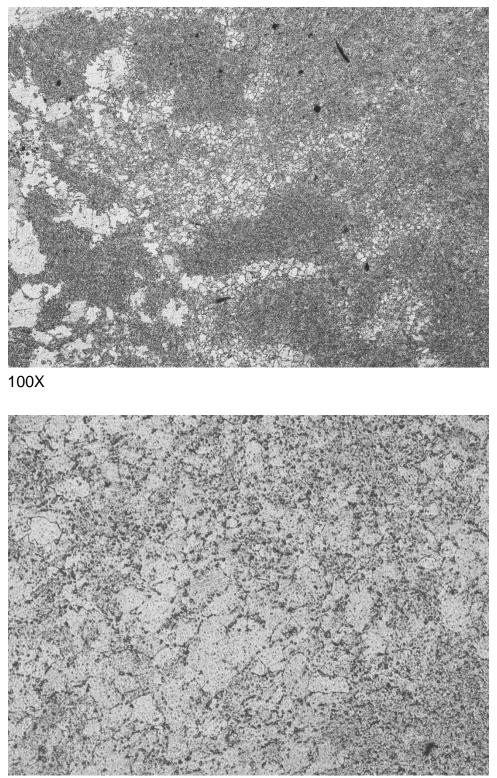




Fig. 25. Replica No. PSOH-R3.

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Fig. 26. Replica No. PSOH-R4.

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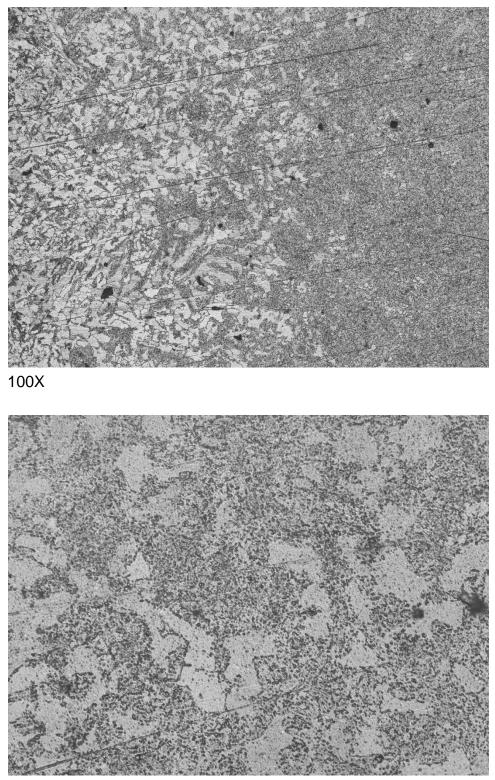
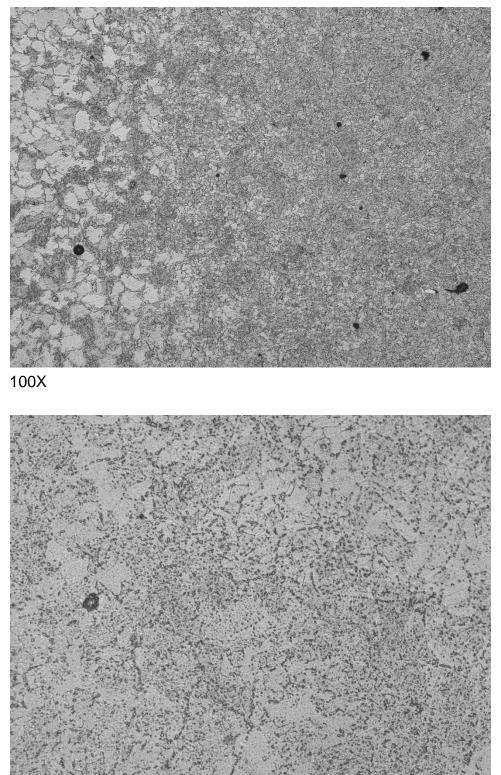




Fig. 27. Replica No. PSOH-R5.

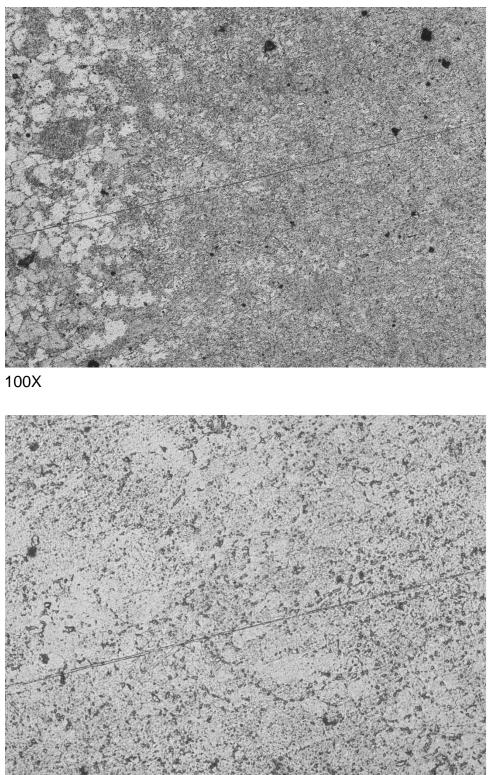
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Fig. 28A. Replica No. PSOH-R6-1.

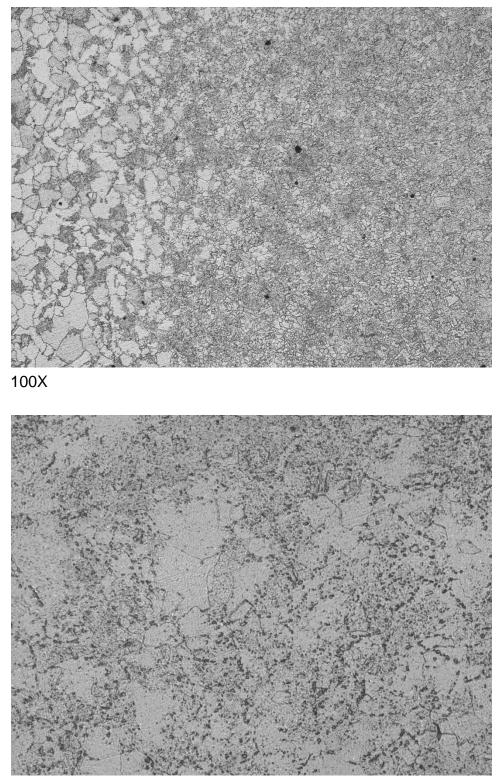
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Fig. 28B. Replica No. PSOH-R6-2.

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Fig. 29. Replica No. PSOH-R7.

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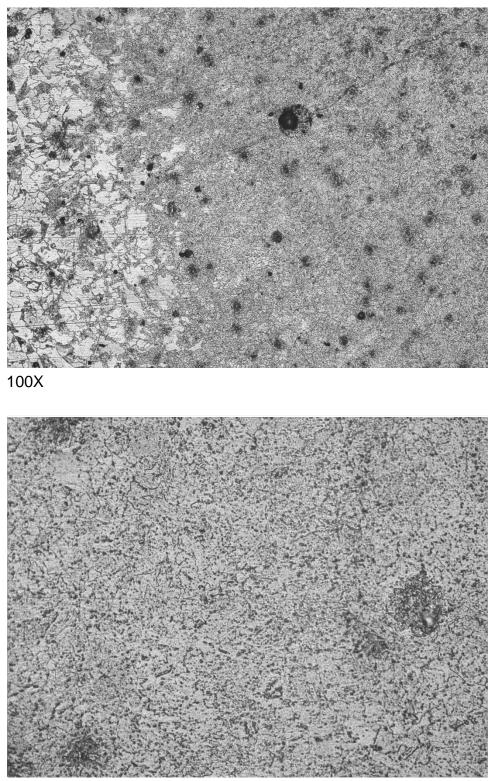




Fig. 30. Replica No. PSOH-R7.

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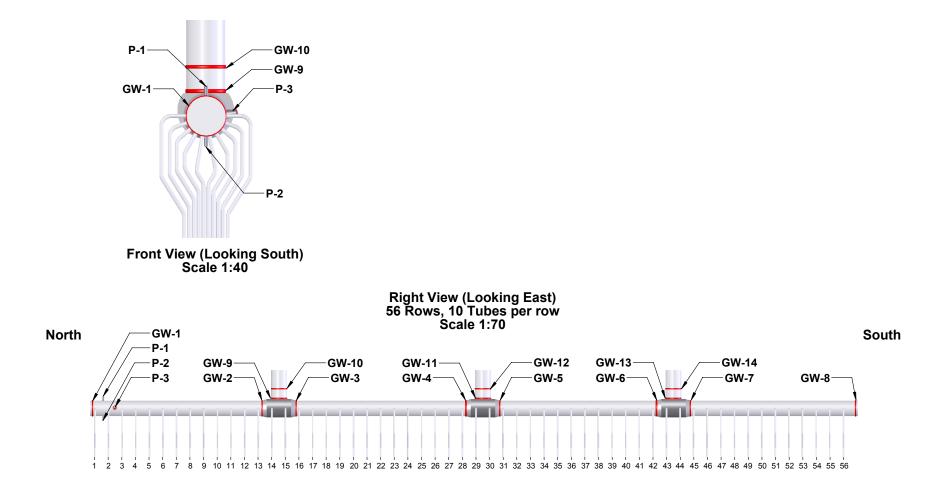


Fig. 31. A sketch of the Finishing Superheater Inlet header



Fig. 32. Photographs of the Finishing Superheater Inlet header and tubing.

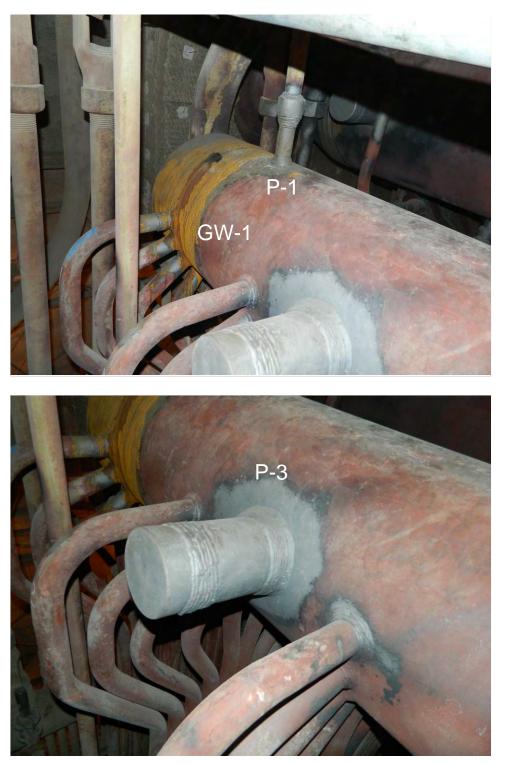


Fig. 33. Photographs of girth weld No. GW-1 and penetration Nos. P-1 and P-3 on the Finishing Superheater Inlet header.

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Fig. 34.

Photographs of girth weld Nos. GW-2, GW-3, and GW-4 on the Finishing Superheater Inlet header.



Fig. 35. Photographs of girth weld Nos. GW-5 and GW-6 on the Finishing Superheater Inlet header.



Fig. 36. Photographs of girth weld Nos. GW-7 and GW-8 on the Finishing Superheater Inlet header.



Fig. 37. Photographs of girth weld Nos.GW-9 and GW-10 on the Finishing Superheater Inlet header.

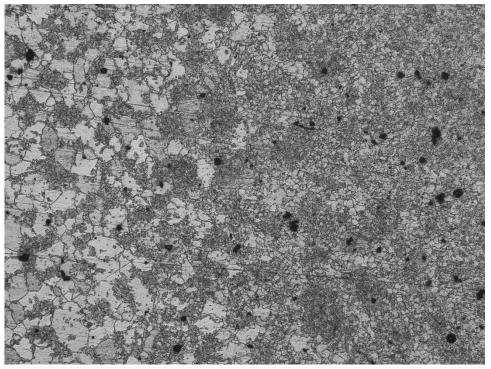


Fig. 38. Photographs of girth weld Nos.GW-11 and GW-12 on the Finishing Superheater Inlet header.

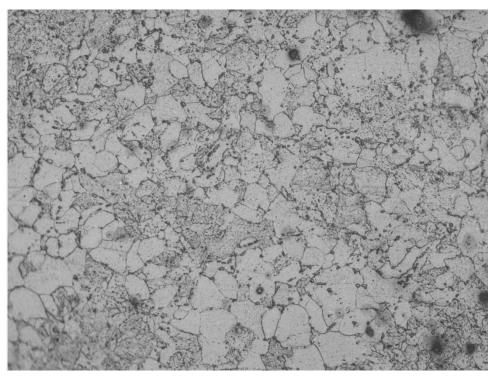


Fig. 39. Photographs of girth weld Nos. GW-13 and GW-14 on the Finishing Superheater Inlet header

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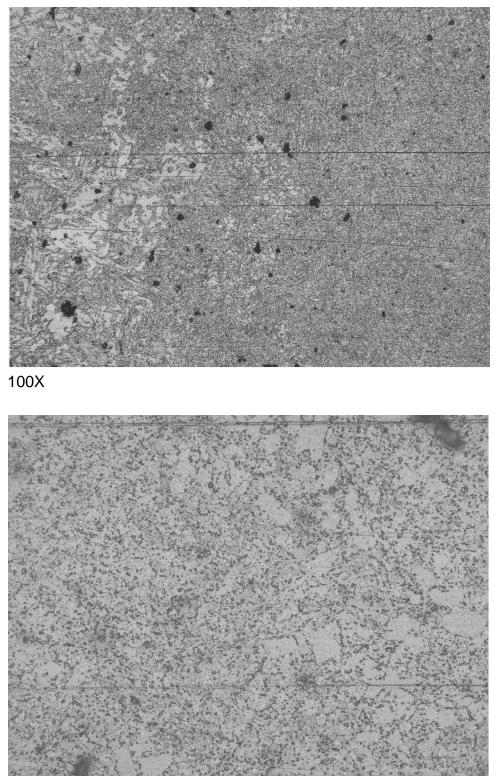
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Fig. 40. Replica No. FSIH-R1.

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Fig. 41. Replica No. FSIH-R2.

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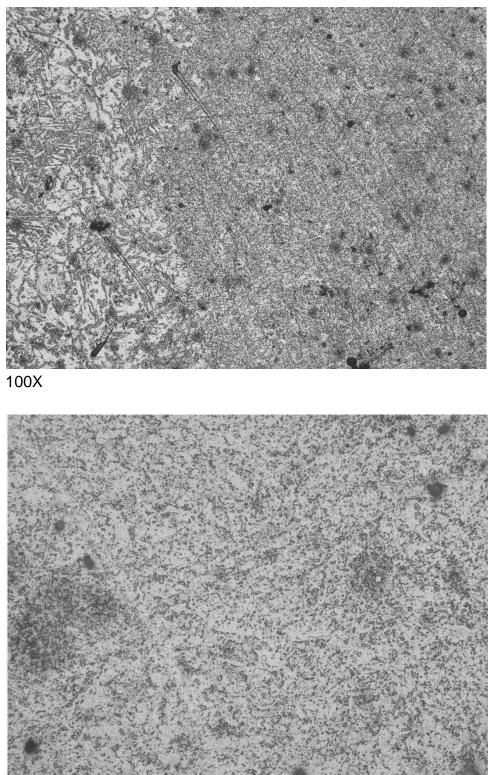




Fig. 42. Replica No. FSIH-R3.

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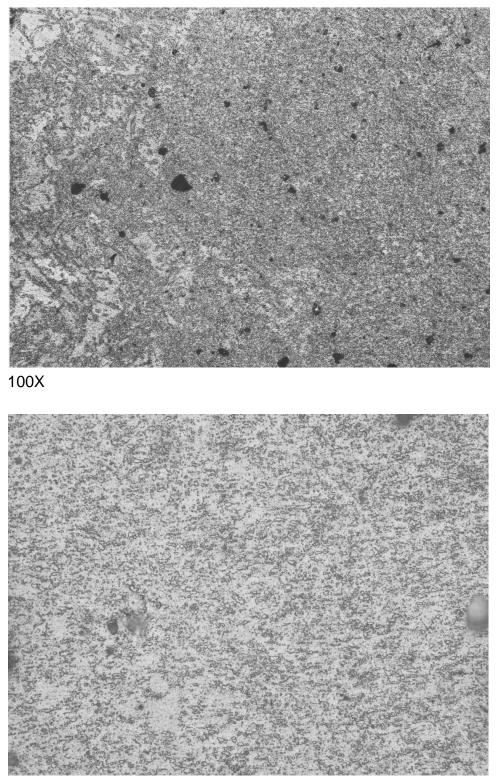




Fig. 43. Replica No. FSIH-R4.

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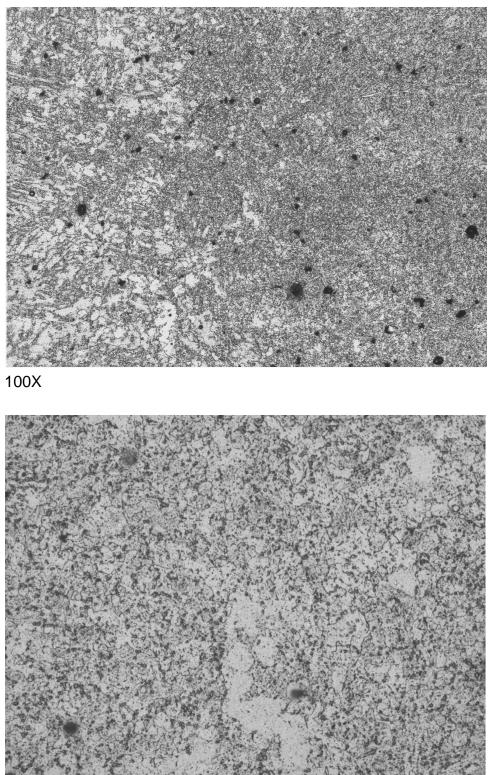




Fig. 44. Replica No. FSIH-R5.

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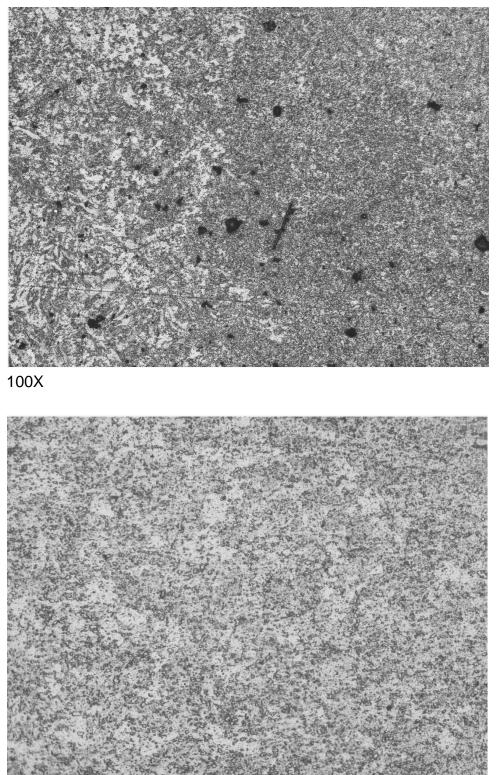
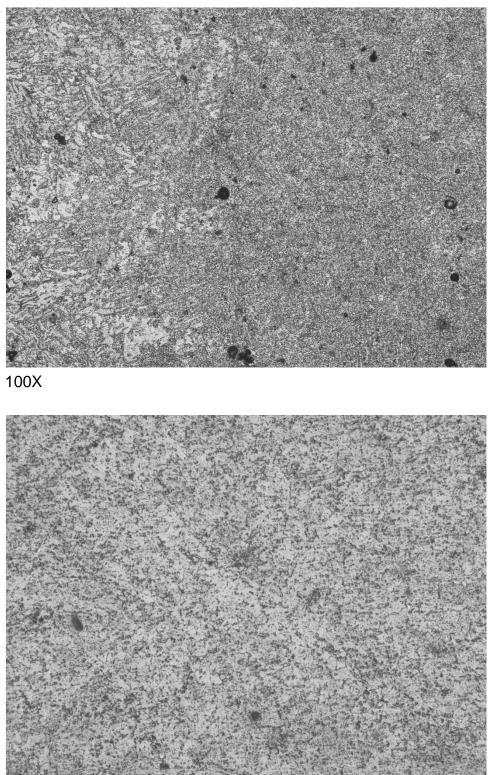




Fig. 45. Replica No. FSIH-R6.

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500X

Fig. 46. Replica No. FSIH-R7.

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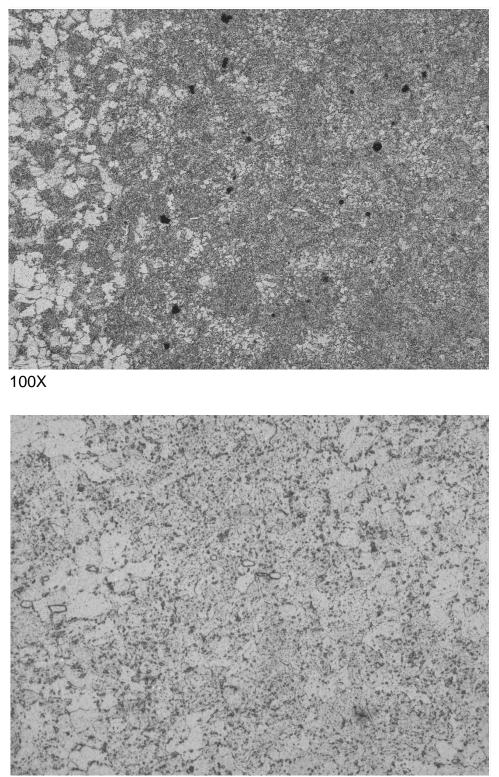




Fig. 47. Replica No. FSIH-R8.

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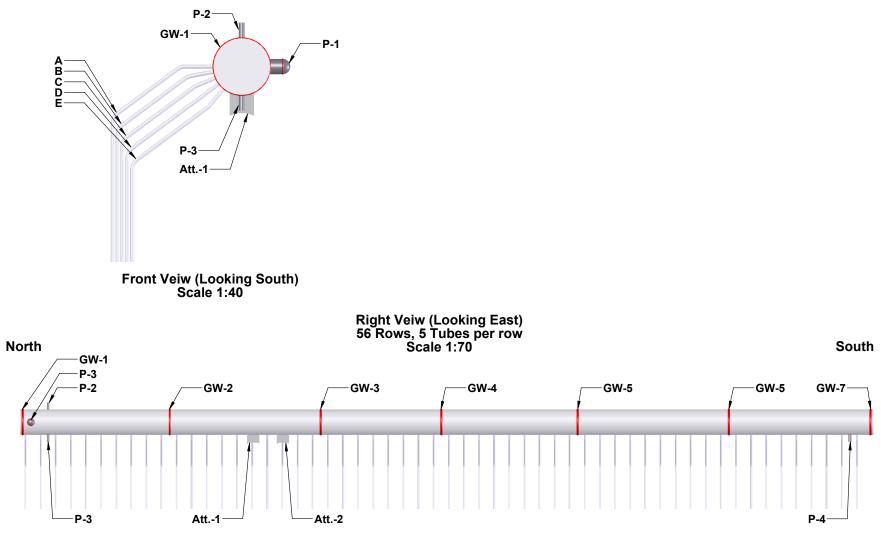


Fig. 48. An overall sketch of the Upper Finishing Superheater Outlet

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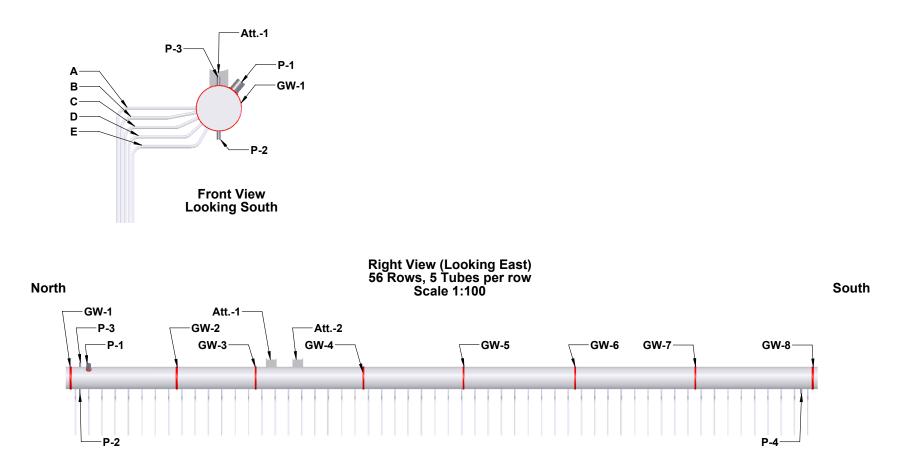


Fig. 49. An overall sketch of the Lower Finishing Superheater Outlet



Fig. 50.

Photographs of penetration No. P-1 and girth weld Nos. GW-1, GW-2, and GW-3 on the Upper Finishing Superheater Outlet header.



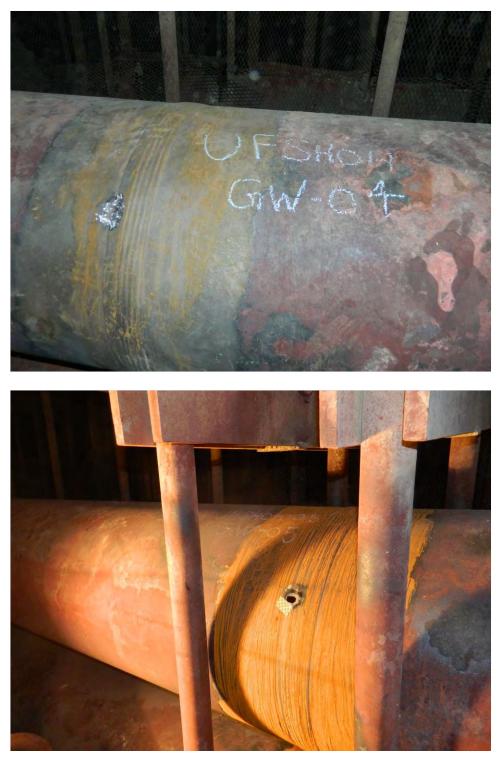


Fig. 51. Photographs of girth weld Nos. GW-4 and GW-5 on the Upper Finishing Superheater Outlet header.



Fig. 52. Photographs of girth weld Nos. GW-6 and GW-7 on the Upper Finishing Superheater Outlet header.



Fig. 53. Photographs of penetration Nos. P-1, P-2, and girth weld Nos. GW-1 and GW-2 on the Lower Finishing Superheater Outlet header.



Fig. 54. Photographs of girth weld Nos. GW-3 and GW-4 on the Lower Finishing Superheater Outlet header.



Fig. 55. Photographs of girth weld Nos. GW-5 and GW-6 on the Lower Finishing Superheater Outlet header.

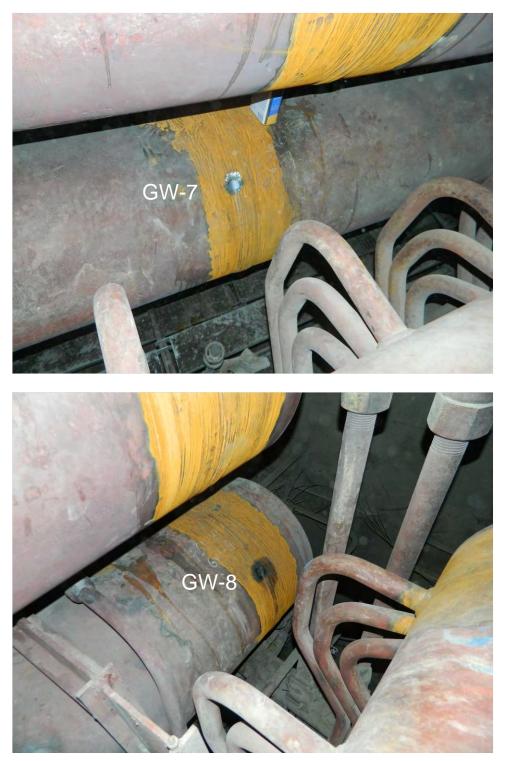
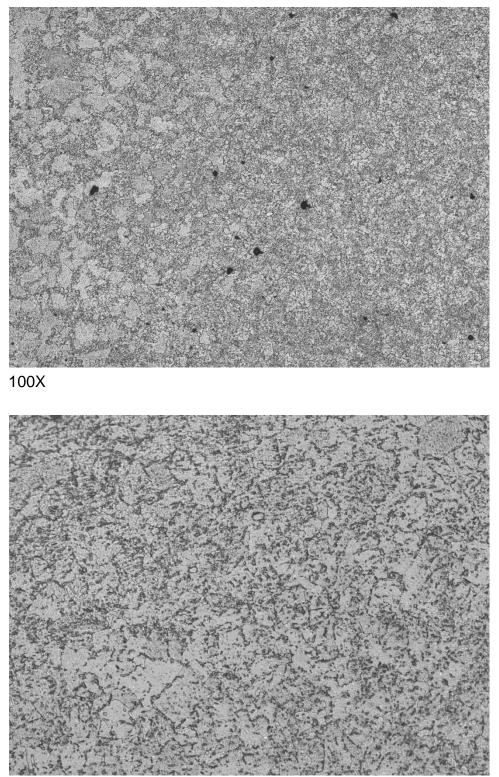


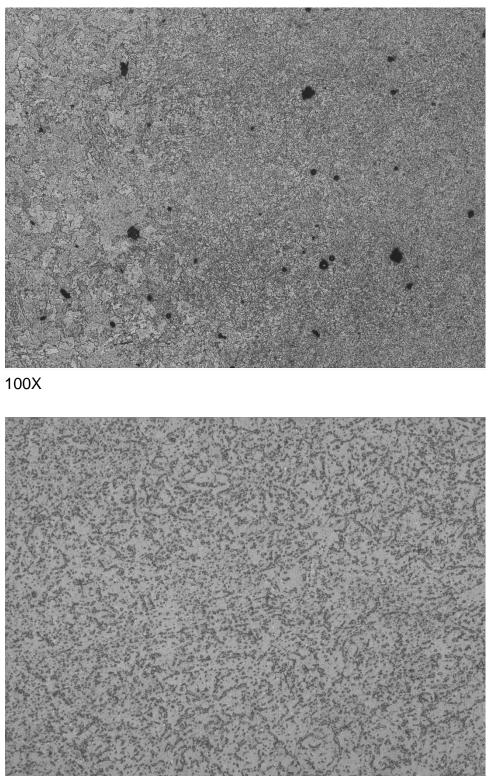
Fig. 56. Photographs of girth weld Nos. GW-7 and GW-8 on the Lower Finishing Superheater Outlet header.

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500X

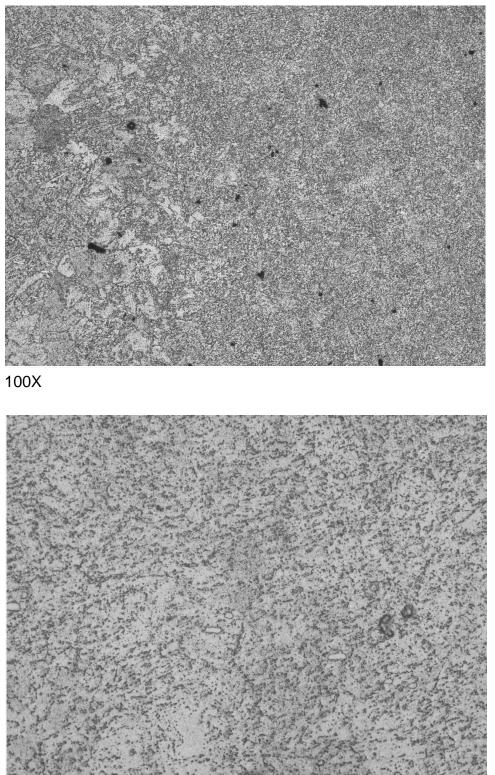
Fig. 57. Replica No. FSOH-UPR-R1.



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Fig. 58. Replica No. FSOH-UPR-R2.

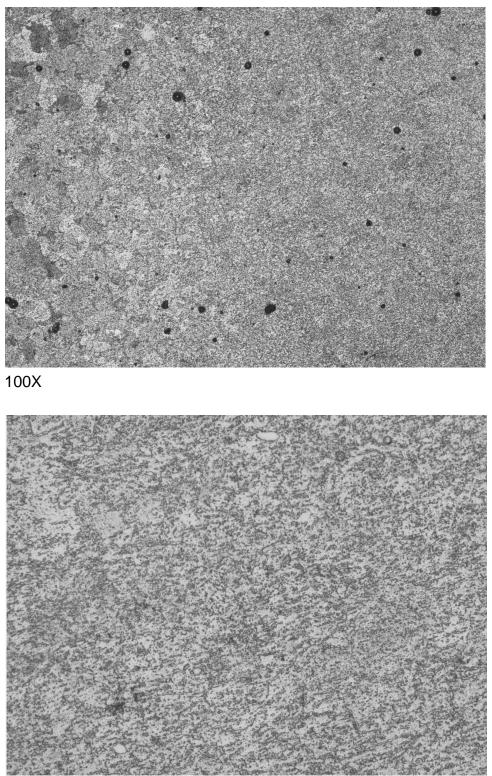
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500X

Fig. 59. Replica No. FSOH-UPR-R3.

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500X

Fig. 60. Replica No. FSOH-UPR-R4.

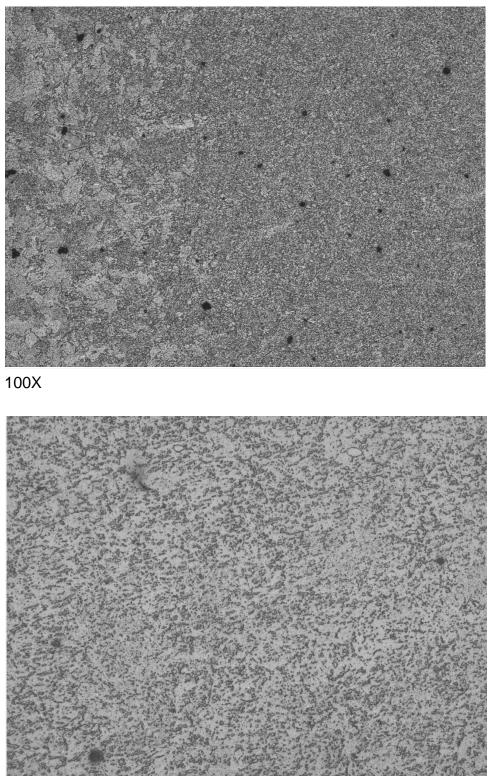
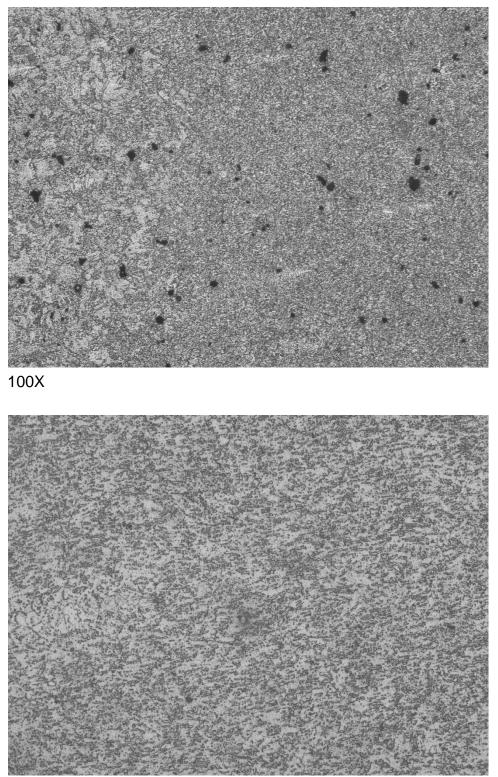




Fig. 61. Replica No. FSOH-UPR-R5.

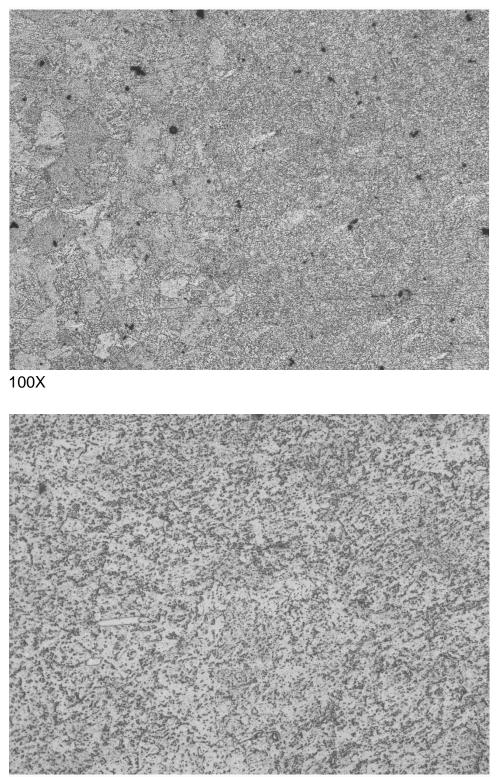
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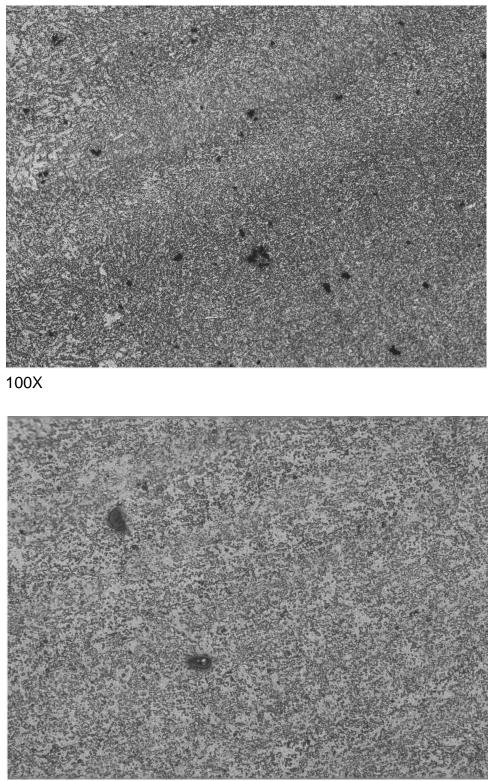
Fig. 62. Replica No. FSOH-UPR-R6.

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500X

Fig. 63. Replica No. FSOH-UPR-R7.



500X

Fig. 64. Replica No. FSOH-LWR-R1.

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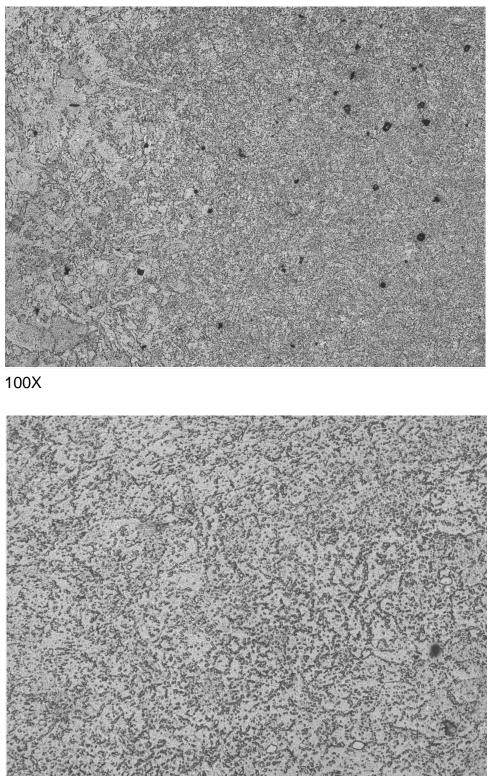
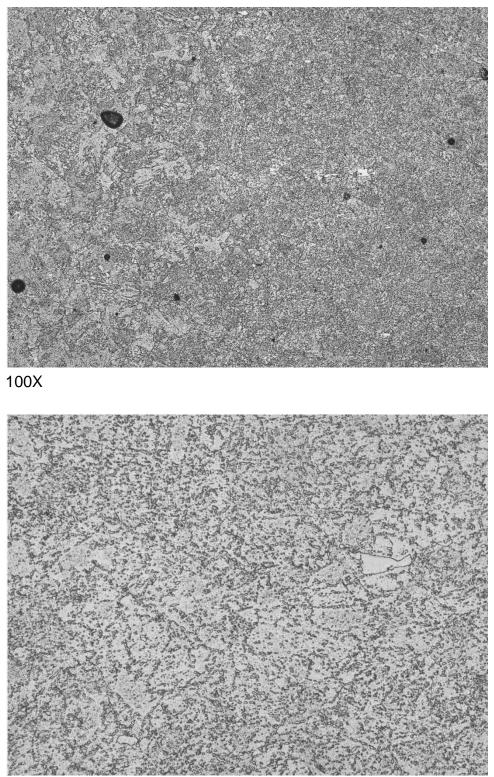




Fig. 65. Replica No. FSOH-LWR-R2.

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Fig. 66. Replica No. FSOH-LWR-R3.

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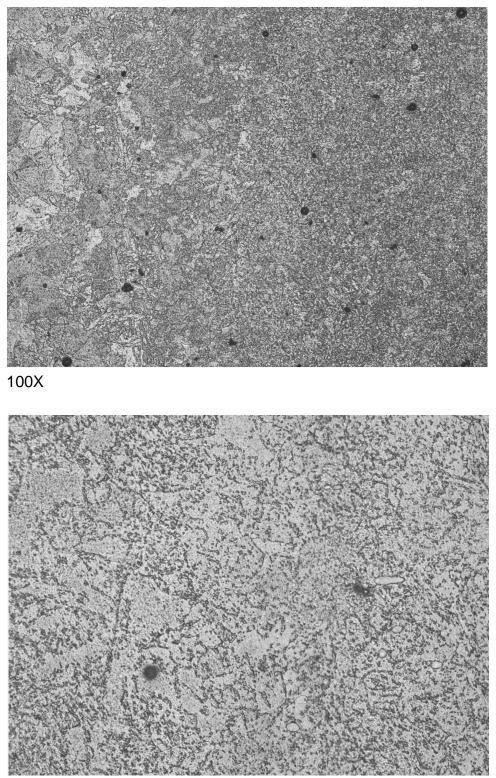
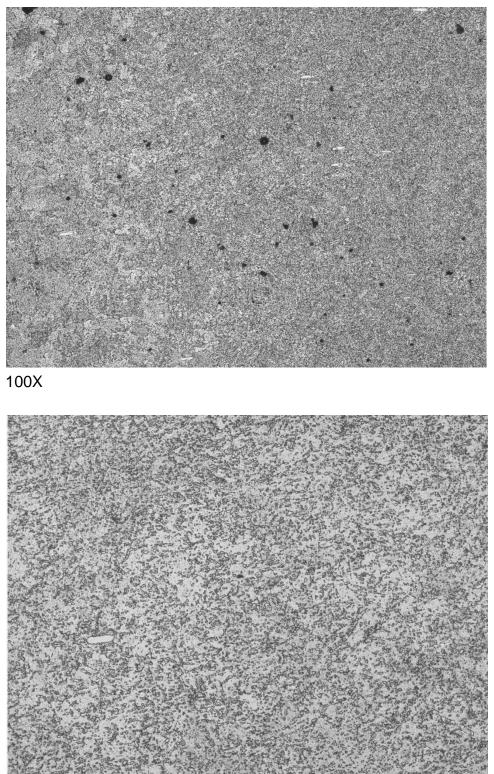




Fig. 67. Replica No. FSOH-LWR-R4.

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500X

Fig. 68. Replica No. FSOH-LWR-R5.

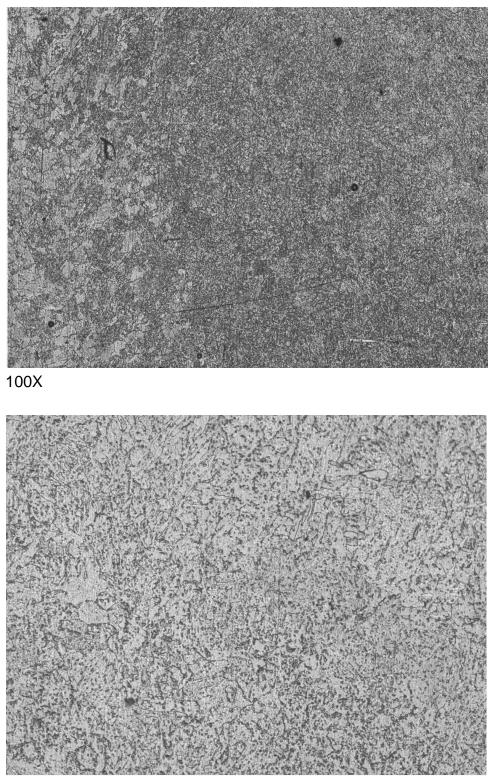




Fig. 69. Replica No. FSOH-LWR-R6.

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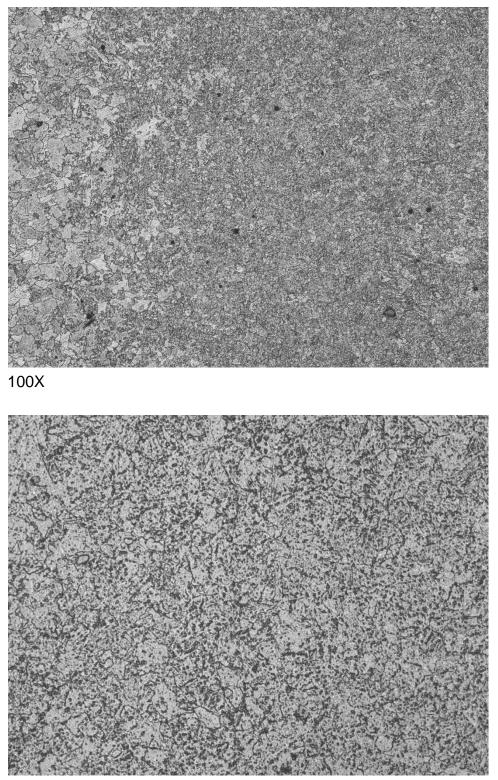




Fig. 70. Replica No. FSOH-LWR-R7.

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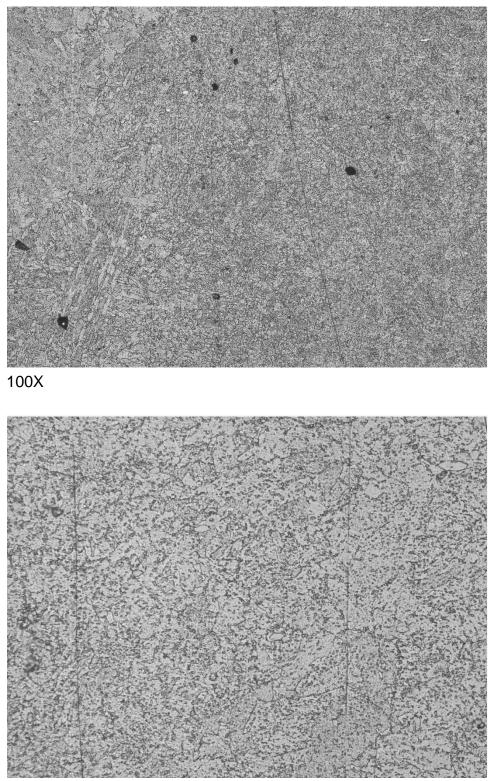




Fig. 71. Replica No. FSOH-LWR-R8.

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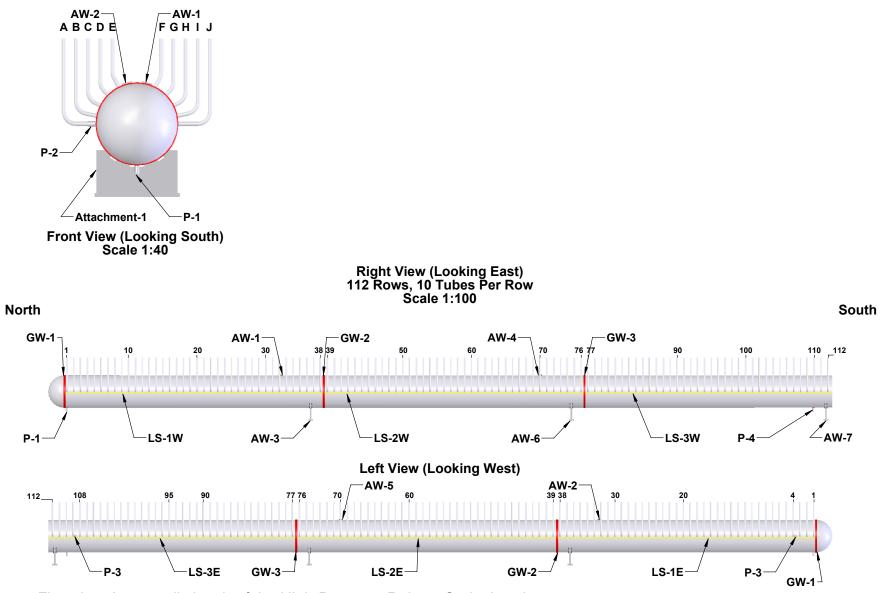


Fig. 72. An overall sketch of the High-Pressure Reheat Outlet header



Fig. 73. Photographs of the HP Reheat Outlet header and tubing.

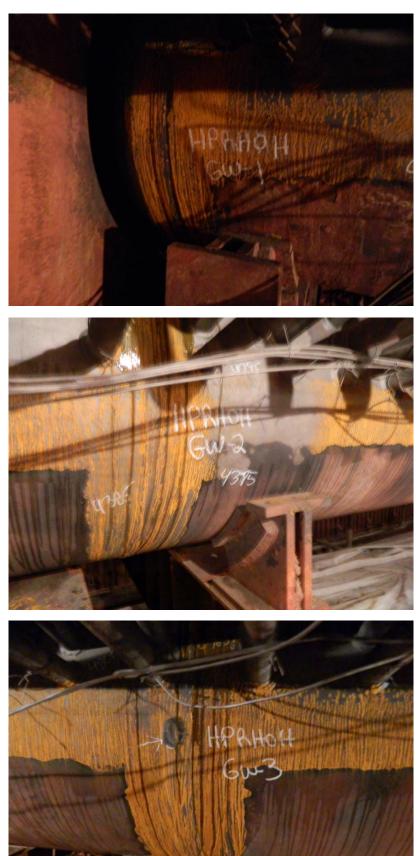


Fig. 74.

Photographs of girth weld Nos. GW-1, GW-2, and GW-3 on the HP Reheat Outlet header.

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Photographs of seam weld Nos. LS-1W, LS-2W, and LS-2E on the HP Reheat Outlet header.

Fig. 75.



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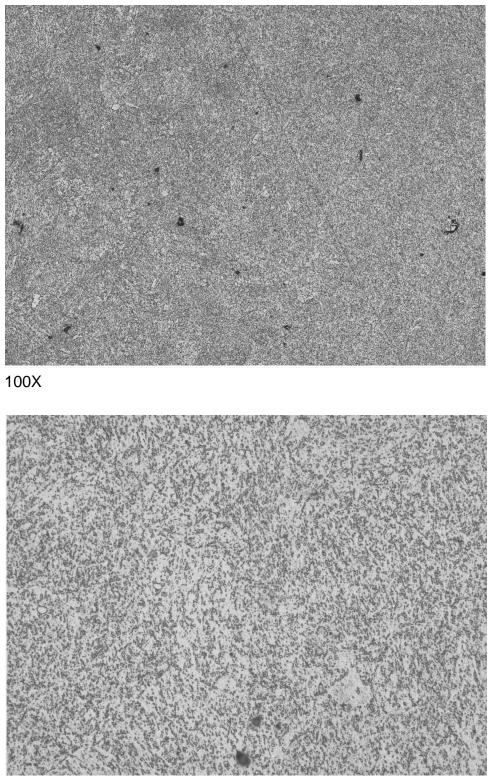
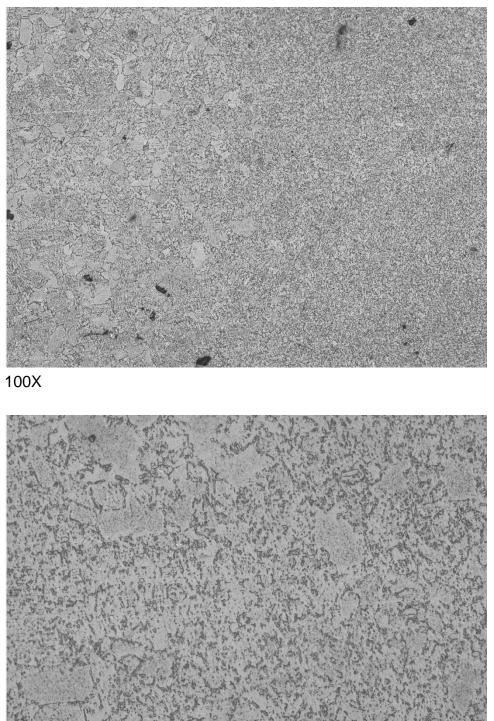




Fig. 76. Replica No. HPROH-R1.

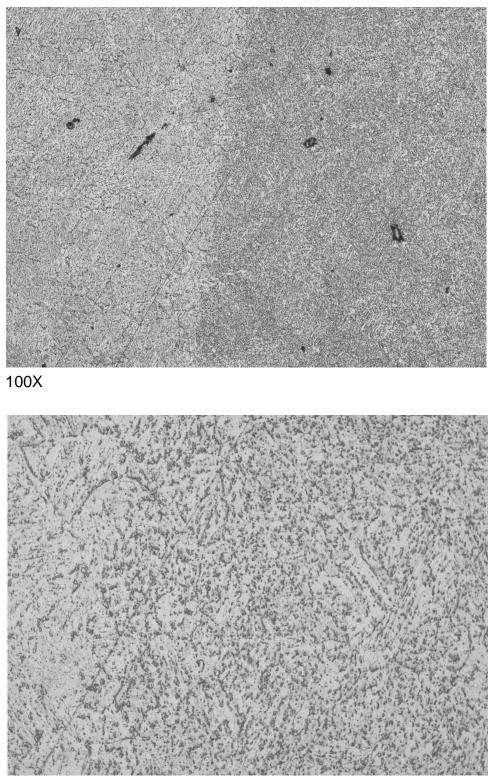
KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 124 of 256



500X

Fig. 77. Replica No. HPROH-R2.

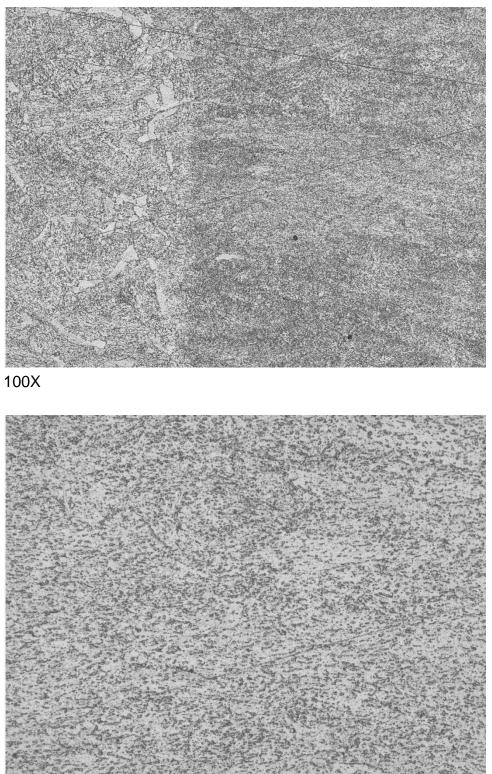
KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 125 of 256



500X

Fig. 78. Replica No. HPROH-R3.

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500X

Fig. 79. Replica No. HPROH-R4.

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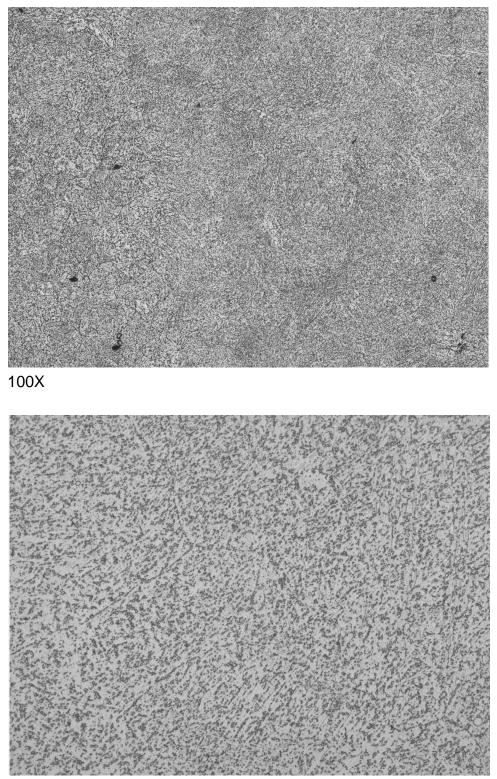




Fig. 80. Replica No. HPROH-R5.

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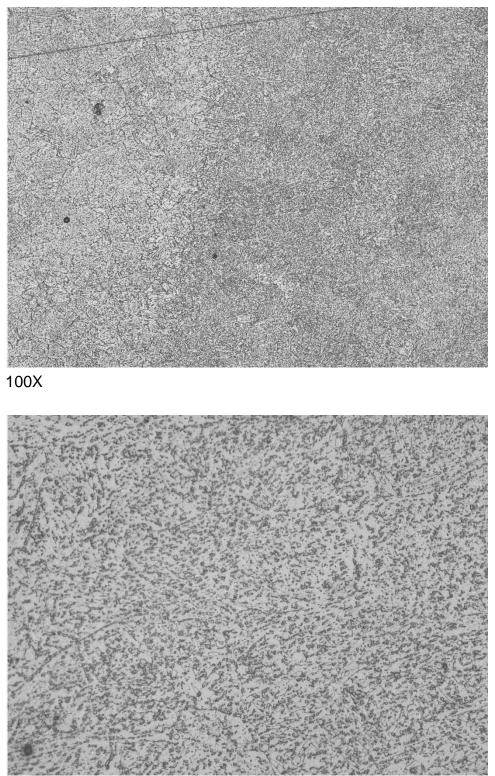




Fig. 81. Replica No. HPROH-R6.

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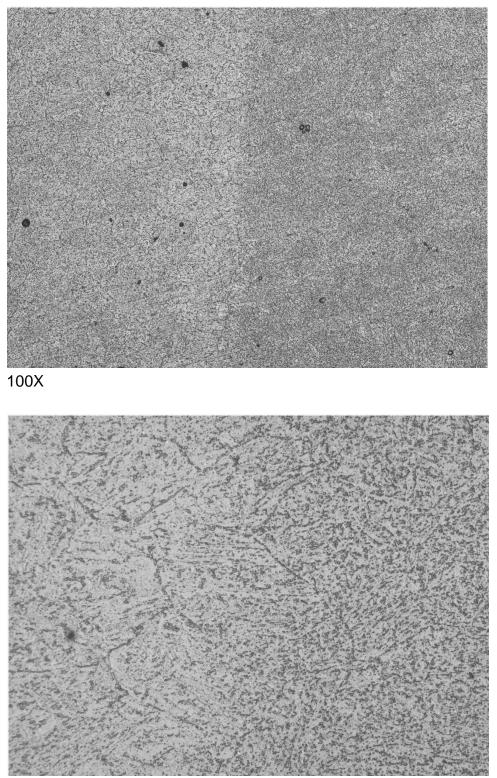
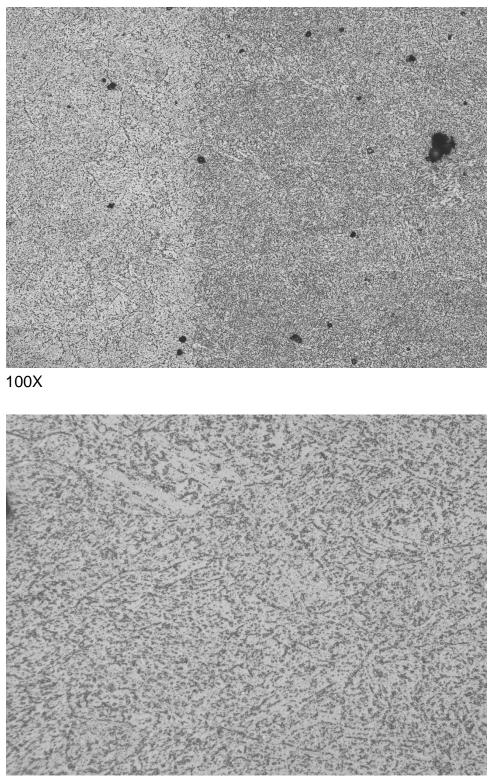




Fig. 82. Replica No. HPROH-R7.

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500X

Fig. 83. Replica No. HPROH-R8.

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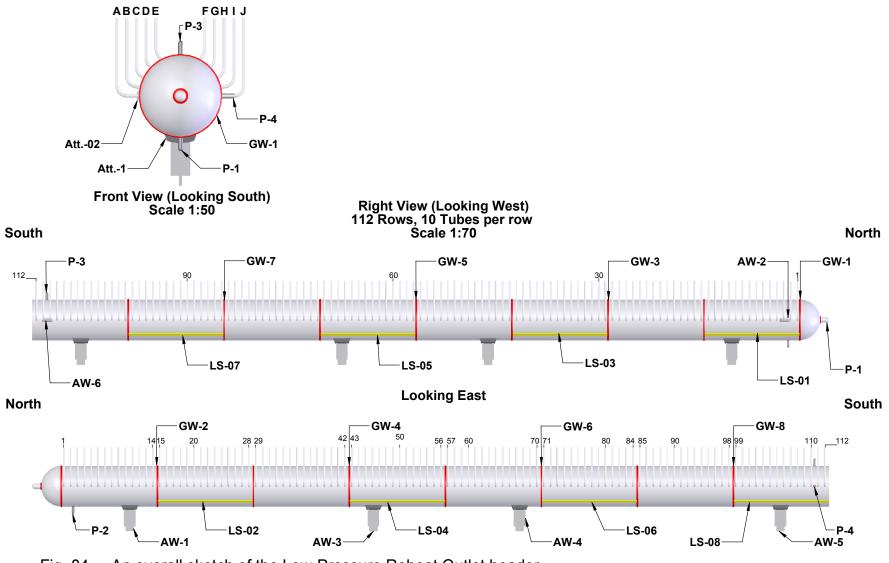
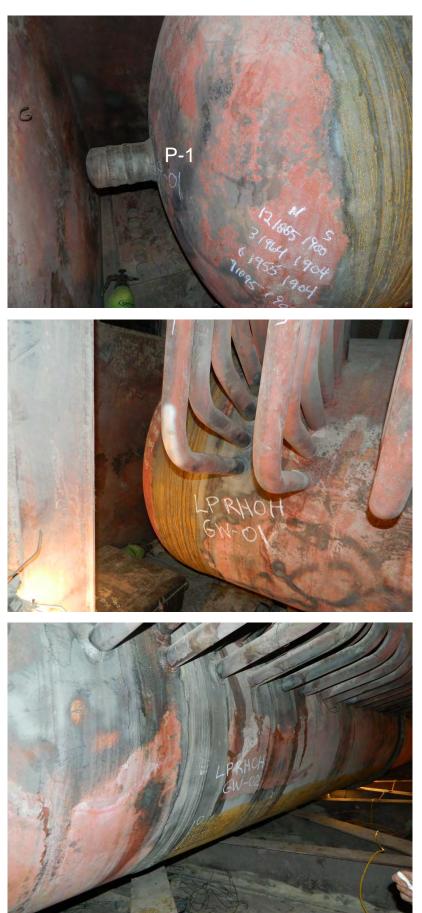


Fig. 84. An overall sketch of the Low-Pressure Reheat Outlet header



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Fig. 85.

Photographs of penetration No. P-1 and girth weld Nos. GW-1 and GW-2 on the LP Reheat Outlet header.



Fig. 86. Photographs of girth weld Nos. GW-5 and GW-6 on the LP Reheat Outlet header



Fig. 87. Photographs of girth weld Nos. GW-7 and GW-8 on the LP Reheat Outlet header.



Fig. 88. Photographs of seam weld Nos.LS-01 and LS-02 on the LP Reheat Outlet header.



Fig. 89. Photographs of seam weld Nos.LS-04 and LS-06 on the LP Reheat Outlet header.



Fig. 90. Photographs of the indications on girth weld No. GW-3 of the LP Reheat Outlet header.



Fig. 91. Photographs of the indications on the tube stubs of the LP Reheat Outlet header.

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Fig. 92.

Photographs of indications on attachment weld Nos. AW-1 and AW-3 of the LP Reheat Outlet header.

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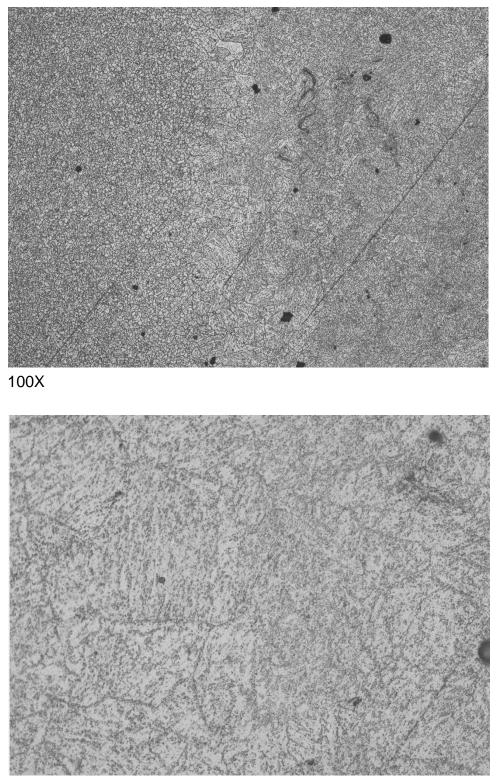




Fig. 93. Replica No. LPROH-R1.

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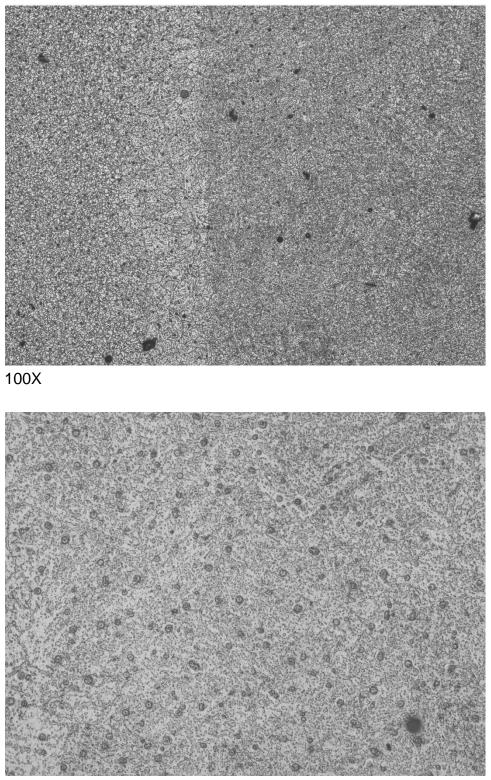
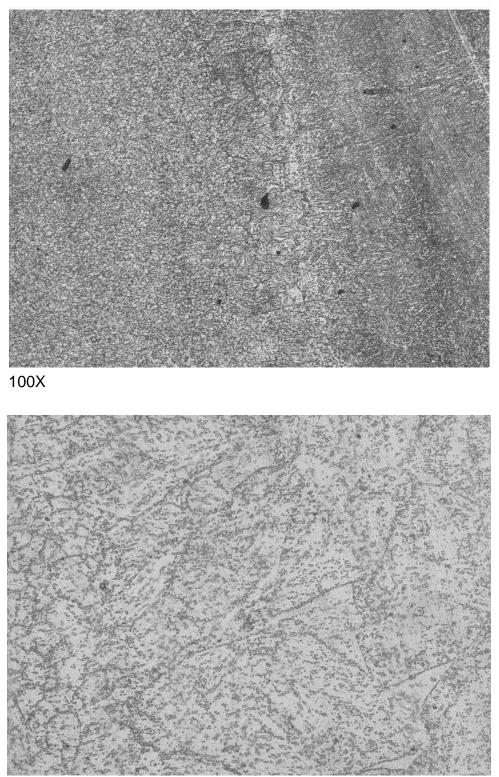




Fig. 94. Replica No. LPROH-R2.

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500X

Fig. 95. Replica No. LPROH-R3.

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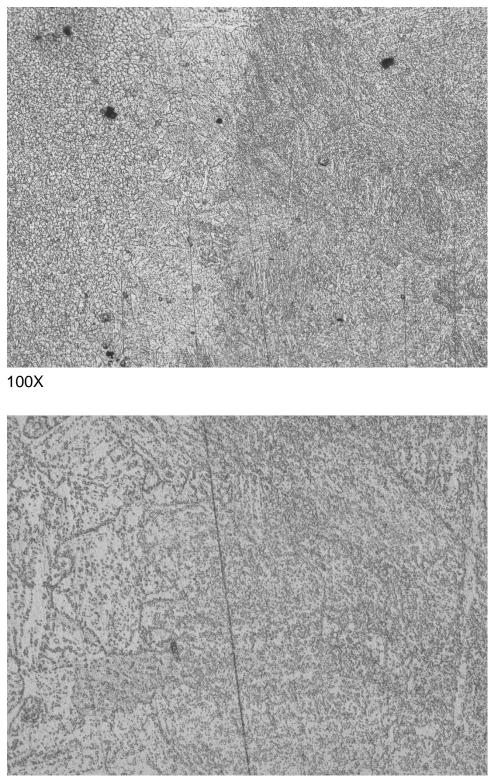
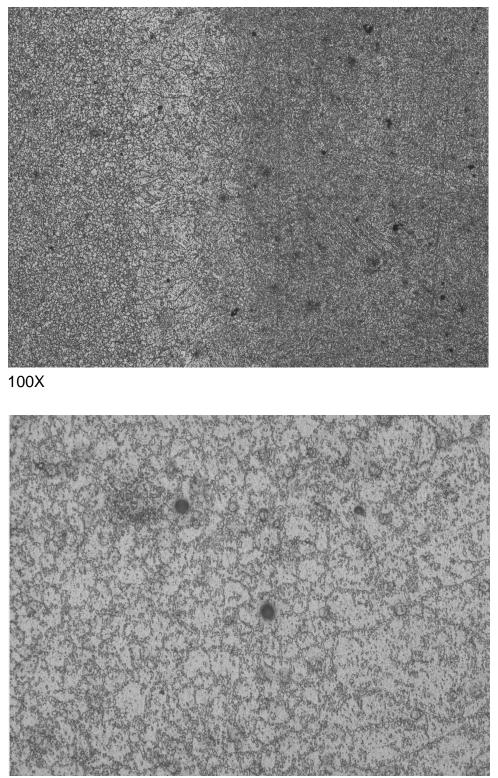




Fig. 96. Replica No. LPROH-R4.

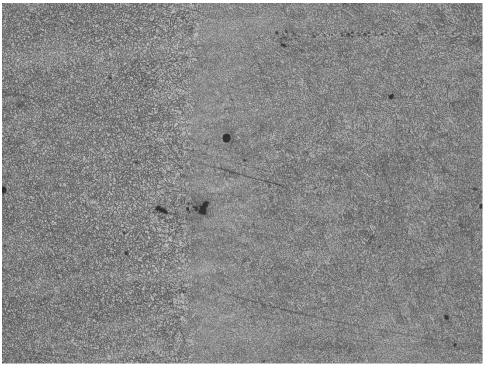
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500X

Fig. 97. Replica No. LPROH-R5.

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100X



500X

Fig. 98. Replica No. LPROH-R6.

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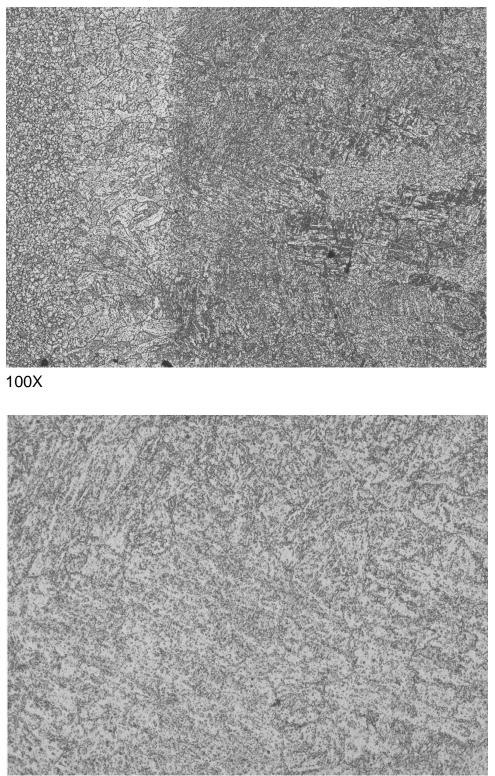
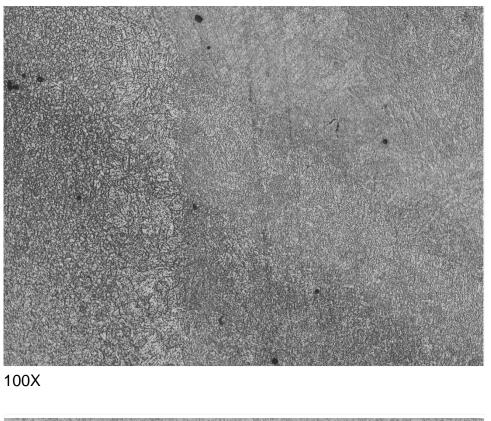
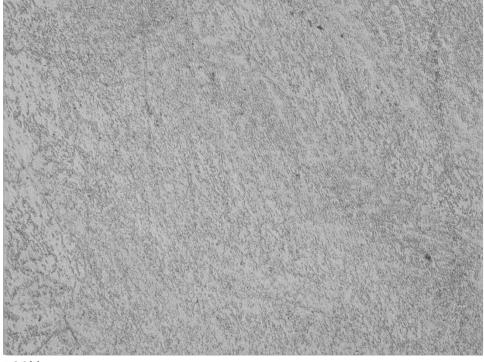




Fig. 99. Replica No. LPROH-R7.

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500X

Fig. 100. Replica No. LPROH-R8.

APPENDIX A

NONDESTRUCTIVE EXAMINATION REPORTS PLATEN SUPERHEATER INLET HEADER

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 149 of 256

Header Minimum Wall Calculation AEP - Mitchell Generating Station Unit No. 1 - Platen Superheater Inlet Header Seam Welded

The minimum wall thickness requirements were calculated for the Platen Superheater Inlet header. These calculations are based on the Original 1968 ASME Code for Boiler and Pressure Vessels.

ASTM Material Specifications for:

SA-204, Gr. A

Where:

T- Design Temperature P- Maximum Allowable Pressure D- Outside Diameter SE- Maximum Stress Value W-Weld Strength Reduction Factor y-Temperature Coefficient A- Additional Thickness

	-
850	°F
4,075	psig
22.00	in
14,400	psi
0.95	
0.40	
0.000	in
	-

The following equation applies: Per. Sect I, PG 27.2.2

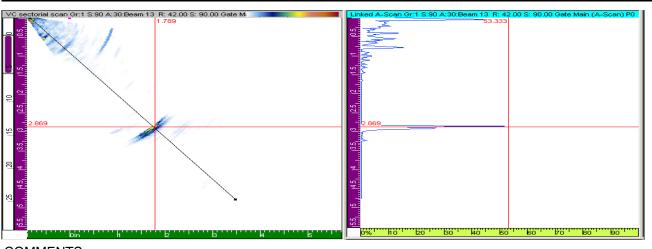
 $t_m = (PD/(2(SEW+PY))+A$

2.928	in
	1

THIELSCH ENGINEERING, INC.								
	195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
	MAGNETIC P	ARTICLE E	XAMINATION R	EPORT				
Job Name: AEP - Mitche	ell Generating Station	Job Date: /	April 2011	Job Number: 43-	11-0066			
Component: Platen Sup Header - Unit No. 1	Component: Platen Superheater Inlet Material: SA-204, Gr. A Procedure: NDT-					. 8		
EXAMINATION METHO	DD		TECHNIQUE					
Continuous	Circular		√ Yoke	Headshot	Co	il		
			Prods	Central Cond.	Ot	her		
CURRENT			WET	DRY				
AC	AMP Turns		14AM	Red				
DC	Amperage ——		✓ 20B	Gray				
L	_ Other		Other	Black	1			
IDENTIFICATION	INDICATION SIZE		COMMENTS ON R	ESULTS	ACCEPT	REJECT		
Girth Welds								
GW-1	N/A	١	No recordable ind	ications.	х			
GW-2	N/A	١	No recordable ind	ications.	х			
GW-3	N/A	No recordable indications.			х			
GW-4	N/A	١	No recordable ind	ications.	х			
Seam Welds								
LS-1A	N/A	١	No recordable ind	ications.	х			
LS-2A	N/A	١	No recordable ind	ications.	х			
LS-3A	N/A	1	No recordable ind	ications.	х			
LS-4A	N/A	1	No recordable ind	ications.	х			
LS-5A	N/A	1	No recordable ind	ications.	х			
Penetrations								
P-1	N/A	١	No recordable ind	ications.	х			
P-2	N/A	١	No recordable ind	ications.	х			
P-3	N/A	1	No recordable ind	ications.	x			
Tube Stubs								
Row 5, Tube J	1/8"		Indication on w	veld.	Monitor			
Row 9, Tube G	1/8"	Indication on weld. Mor			Monitor			
Row 9, Tube P	1/8"	Indication on weld.			Monitor			
Row 26, Tube L	1/8"		Indication on w	veld.	Monitor			
Note: Tube stubs in every 5th row from the north end were examined. No other recordable indications						ations		
were revealed.								
INSPECTOR: Manny G	iracie, J. McCarthv		LEVEL: II	DATE: 05/02/20	11			
	,							

THIELSCH ENGINEERING, INC.								
			ie - Cranst					
			HICKNES	S EXAMIN	IATION R	EPORT		
Job Name: AEP - Mitche Station		-	Job Date: April 2011		Job Numbe		-	
Component: Platen Superheater Inlet Header - Unit No. 1		Material: S A	A-204, Gr.	Nominal W 3.249"	all:	Minimum 2.928"	Wall:	
EQUIPMENT NorthED:					KEY:			
✓ D-Meter	🗌 Рі-Тар	e	Other			North - Up	stream	
Micrometer	Calipe	rs				South -Do	wnstream	
		DIAMETE	ER MEASUR (IN.)	REMENTS	THICKN	IESS MEAS	SUREMEN	ITS (IN.)
IDENTIFICATION		Pi-TAPE	CAL	PERS	12:00	3:00	6:00	9:00
		FFTAFL	12 to 6	3 to 9	12.00	5.00	0.00	3.00
GW-1	North				3.332	3.338	3.358	3.375
	South				3.316	3.317	3.432	3.328
GW-2	North				3.360	3.331	3.457	3.310
977-2	South				3.415	3.403	3.369	3.378
GW-3	North				3.422	3.263	3.318	3.291
	South				3.263	3.332	3.369	3.289
GW-4	North				3.296	3.300	3.395	3.282
GW-4	South				3.370	3.341	3.351	3.335
					1			
INSPECTOR: M. Gracio	e, J. McC	Carthy	•	LEVEL: II		DATE: 05	/02/2011	

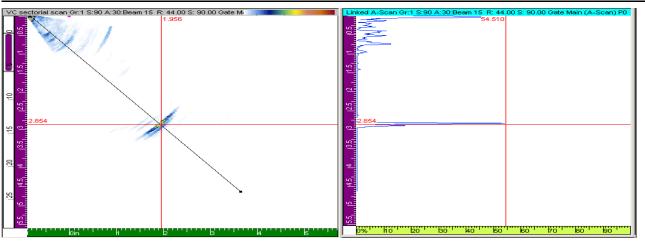
Customer:	AEP - Mitchell Gene	erating	Compo	nent:	Platen Sup	berheater Inlet
	Station				Header	
Unit Number:	1		Weld N	umber:	PSHIH-GV	V1
Project Number:	43-11-0066		Weld C	onfiguratior	Header to	Header
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.35"	
Machine Informatior						
Model #	Serial #	Software Versi	on	Calibration D	ue	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0F	20	8/11		A-Scan
		TomoView-2.4R	15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequen	су	Wedge Angle		Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF		Туре
10.454us	0.000in	6.456in		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification		Band Pass Filter
Compression	32	On		FW(Full Wave)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Echo)		Shear		100ns
Transducer Calculator						
Element Quantity	1st Element	Last Element		Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resoluti	on	Focus Depth		Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS:

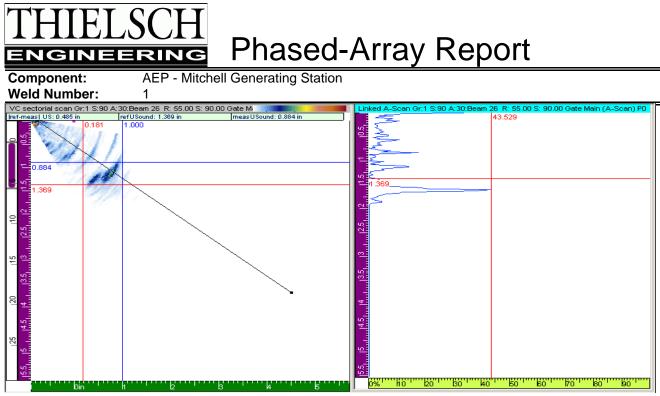
Image of typical 360° non-relevant root signal / Root geometry. No relevant indications were detected.

Customer:	AEP - Mitchell Gene	rating	Compon	ent:	Platen Sup	perheater Inlet
	Station				Header	
Unit Number:	1		Weld Nu	mber:	PSHIH-GV	V2
Project Number:	43-11-0066		Weld Co	nfiguration:	Header to	Header
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thic	kness:	3.35"	
Machine Informatior						
Model #	Serial #	Software	Version	Calibration Du	le	Save Mode
Omni Scan MX	Omni- 1179	Scan:Om	ni-2.0R20	8/11		A-Scan
		TomoView	v-2.4R15			
Probe Characterization						
Probe Model	Probe Serial	Probe Fre	equency	Wedge Angle		Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/	2 path)	PRF		Туре
10.454us	0.000in	6.456in		4		PA(Phased Array)
Scale Type	Scale Factor	Video Fil	ter	Rectification		Band Pass Filter
Compression	32	On		FW(Full Wave)	1	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse	Echo)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elen	nent	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Re	solution	Focus Depth		Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	3	3.5in		0.126 in/us



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry An inclusion-type indication indicative of original manufacturing was detected from 41" to 44" / Image of indication attached.



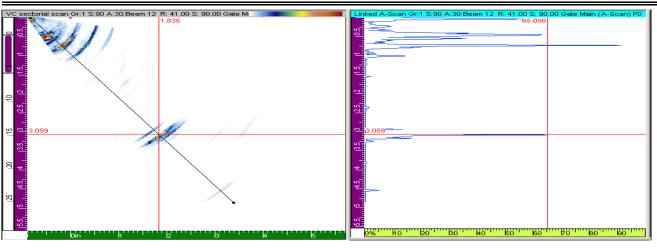
Indication Comments and Location:

3" long inclusion-type indication detected from 41" to 44" around weld / Inclusion approximately 1" in depth indication is indicative of original manufacturing and not service related.

Component:	
Weld Number:	

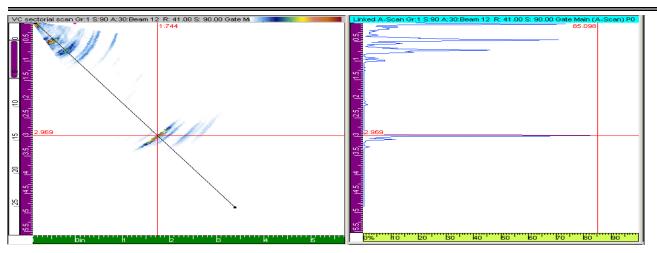
Indication Comments and Location:

Customer:	AEP - Mitchell Generating		Component:		Platen Superheater Inlet	
	Station				Header	
Unit Number:	1		Weld N	umber:	PSHIH-(GW3
Project Number:	43-11-0066		Weld C	onfiguration	:Header	to Header
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.35"	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2		8/11		A-Scan
		TomoView-2.	4R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	e	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	S	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456in		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	32	On		FW(Full Wav	ve)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ech	סו)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry. No relevant indications were detected.

Customer:	AEP - Mitchell Gene	erating	Compo	nent:	Platen Superheater Inlet
	Station				Header
Unit Number:	1		Weld N	umber:	PSHIH-GW4
Project Number:	43-11-0066		Weld C	onfiguration:	Header to Header
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.35"
Machine Informatior					
Model #	Serial #	Software V	ersion	Calibration Du	ue Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-	-2.0R20	8/11	A-Scan
		TomoView-	2.4R15		
Probe Characterizatior					
Probe Model	Probe Serial	Probe Free	uency	Wedge Angle	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	0.378 in
Setup					
Beam Delay	Start(1/2 path)	Range(1/2	path)	PRF	Туре
10.454us	0.000in	6.456in		4	PA(Phased Array)
Scale Type	Scale Factor	Video Filte	r	Rectification	Band Pass Filter
Compression	32	On		FW(Full Wave)	5MHz
Voltage	Gain	Mode		Wave Type	Pulse Width
80(volts)	40dB	PE(Pulse E	cho)	Shear	100ns
Transducer Calculato					
Element Quantity	1st Element	Last Eleme	ent	Resolution	Scan Type
16	1	16		1.0	Sectoral
Start Angle	Stop Angle	Angle Res	olution	Focus Depth	Sound Velocity



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No relevant indication detected.

THIEL	SCH IRING Pha	ased-Arra	iv Cal	librat	ion
Customer:	AEP - Mitchell Gen Station				berheater Inlet
Unit Number:	1	Weld Nur	nher:		ned Report
Project Number:	43-11-0066		figuration:		•
Procedure:	TEI NDT 55 FS-PA			3.4"	ai Sealli
Machine Informatior	TEINDT 55 FS-PA	Rev 0 Part mic	kness:	3.4	
	Carial #	Coffinana Manajan	Calibratian D		Calibratian ID#
Model # Omni Scan MX	Serial # Omni-1179	Software Version Scan:Omni-2.0R5 Analysis:TomoView-2.4R1	Calibration D	Jue	Calibration ID# 43011-3.0"
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	9	Probe Aperture
5L16-A10/A1	G1745/C0055	5MHz	55.0 Degrees		0.378 in
Setup			005		T
Beam Delay	Start(1/2 path) 0.000in	Range(1/2 path)	PRF 32/32		Type PA(Phased Array)
5.690/10.464us Scale Type	Scale Factor	6.327/6.327in Video Filter	32/32 Rectification		PA(Phased Array) Band Pass Filter
Compression	31/31	On	FW(Full Wave		5MHz
Voltage	Gain	Mode	Wave Type	-,	Pulse Width
80(High)	33/35dB	PE(Pulse Echo)	Shear		100ns
Transducer Calculato		× ,			
Element Quantity	1st Element	Last Element	Resolution		Scan Type
16	1	16	1.0		Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth		Sound Velocity
Encoder / Scan Area	Serial #	Type	Resolution		Polarity
USDigital	USD3127	Quadrature	220.0step/in		Normal
Scan Resolution	Max Scan Speed 9.842in/sec	Couplant Sonatech	PCS 2.5"		Cal. Block Reflector NAV-0.040"SDH
2.9 2.9 Linked A-Scan Gr.1 S:90 A:35:Beam 2 Unked I-Scan Gr.1 S:90 A:35:Beam 2	2 R: 38.00 S: 90.00 Gate Main (A-Scan) 2.9		2 S:270 A:35:Beam 5 F	112	b Main (A-Scan) PD
Date / Time	2010-0251-04-01 Date / Time		Date	/ Time	Date / Time
4/30 - 7AM	Manusal Or 1	<u> </u>	<u> </u>	Det	4/20/2244
Inspector:	Manuel Gracie	Level:	111	Date:	4/30/2011

THIE	LSCH	d-Array R	eport
Customer:	AEP - Mitchell Generating	Component:	Platen Superheater Inlet
	Station		Header

Unit Number: Project Number: Procedure: Calibration ID #:

1 43-11-0066 TEI NDT 55 FS-PA Rev 0 43011-3.0" Header Weld Configuration: Longitudinal Seam

Part Thickness:

Part Diameter:

a: Longitudinal S 3.35" 22"

Weld #	Indication	Scan Location	Range of Depth	Comments / Obstructions		
LS-1A	No Relevant	Indications Detected				
LS-1B	No Relevant	Indications Detected				
LS-2A	No Relevant	Indications Detected				
LS-2B	No Relevant	Indications Detected				
LS-3A	No Relevant	Indications Detected				
LS-3B	No Relevant	Indications Detected				
LS-4A	No Relevant	Indications Detected				
LS-4B	No Relevant Indications Detected					
LS-5A	No Relevant	Indications Detected				
LS-5B	No Relevant	Indications Detected				

Notes and Comments

III

THIELSCH ENGINEERING, INC.								
1	95 France	s Avenı	ue - Cran	ston, RI	02910 ·	- (401) 46	67-6454	
			NESS ME					
Job Name: AEP - Mitch Station		0		e: April 20		Job Nun	nber: 43-11-	0066
Component: Platen Sup Header - Unit No. 1	berheater In	let	Material:	SA-204,	Gr. A	Hardnes	s Scale: BH	IN
Logation:			Ha	ardness N	leasurer	nents		Corresponding
Location:		1	2	3	4	5	Average	Tensile Strength
	Seam	193	208	207	183	206	199	94,000
PSIH-R1	Girth	208	206	204	210	207	207	98,000
	Base	156	158	144	161	156	155	74,000
	Seam	173	175	173	176	169	173	83,000
PSIH-R2	Girth	188	193	208	183	213	197	93,000
	Base	142	148	146	145	145	145	69,000
	Seam	164	163	165	190	168	170	81,000
PSIH-R3	Girth	167	213	209	237	196	204	96,000
	Base	137	138	135	146	132	138	66,000
	Seam	185	179	180	187	178	182	86,000
PSIH-R4	Girth	207	185	173	181	151	179	86,000
			-					
	Base	136	143	134	142	143	140	67,000
PSIH-R5	Seam	208	180	189	209	186	194	92,000
P3IN-K3	Girth	150	140	135	154	166	149	71,000
	Base	145	125	135	131	129	133	64,000
	Seam	158	160	178	162	148	161	77,000
PSIH-R6	Girth	151	202	186	209	184	186	90,000
	Base	141	131	136	134	139	136	66,000
	Seam	177	155	184	160	162	168	80,000
PSIH-R7	Girth	204	230	187	197	195	203	95,000
	Base	151	143	142	134	161	146	70,000
	Seam	153	142	148	162	149	151	72,000
PSIH-R8	Girth	196	182	213	187	180	192	90,000
	Base	166	148	150	154	148	153	73,000
nspector: Manny Gracie	e, John McC	Carthy				Date: 05	/04/2011	

APPENDIX B

NONDESTRUCTIVE EXAMINATION REPORTS PLATEN SUPERHEATER OUTLET HEADER

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 161 of 256

Header Minimum Wall Calculation **AEP - Mitchell Generating Station** Unit No. 1 - Platen Superheater Oulet header

The minimum wall thickness requirements were calculated for the Platen Superheater Outlet header. These calculations are based on the Original 1968 ASME Code for Boiler and Pressure Vessels.

ASME Material Specifications for:

SA-335, Gr. P11

Where:

T- [Design	Temperature
	- 00.g.i	1 01110 01 01 01 01 0

- P- Maximum Allowable Pressure
- D- Outside Diameter
- S- Maximum Stress Value
- E- Efficency
- y-Temperature Coefficient

944	°F
4,020	psig
20.50	in
11,252	psi Per. Sect II D,
1.000	Per. Sect I, PG
0.400	Per. Sect I, PG

Table 1A G 27.4 Note 1 G 27.4 Note 6

The following equation applies: Per. Sect I, PG 27.2.2

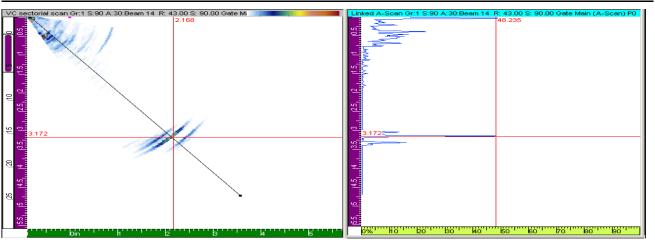
 $t_m = (PD/(2(SE)+2(yP)))$

3.204 in

	THIELSC	H ENGI	NEERING,	INC.		
	195 Frances Avenue					
	MAGNETIC P	ARTICLE E	XAMINATION RE	PORT		
Job Name: AEP - Mitch	ell Generating Station	Job Date: A	April 2011	Job Number: 43-	11-0066	
Component: Platen Su	perheater Outlet	Material: S	SA-335, P11	Procedure: NDT	-21FS, Re	v. 8
Header - Unit No. 1	_					
	סכ			—		
Continuous	Circular		✓ Yoke	Headshot		oil
Residual	Longitudinal		Prods	Central Cond.	∐o	ther
CURRENT			WET	DRY		
✓ AC	AMP Turns			Red		
	_ Amperage		✓ 20B	Gray		
L	Other		Other	Black		
IDENTIFICATION	INDICATION SIZE	C	COMMENTS ON RE	ESULTS	ACCEPT	REJECT
Girth Welds						
GW-1	N/A	No recorda	ble indications.		x	
GW-2	N/A	No recorda	ble indications.		x	
GW-3	N/A	No recorda	ble indications.		x	
GW-4	N/A	No recorda	ble indications.		x	
GW-5	N/A	No recorda	ble indications.		х	
GW-6	N/A	No recorda	ble indications.		x	
GW-7	N/A	No recorda	ble indications.		x	
GW-8	N/A	No recorda	ble indications.		х	
GW-9	N/A	No recorda	ble indications.		х	
GW-10	N/A	No recorda	ble indications.		х	
GW-11	N/A	No recorda	ble indications.		x	
GW-12	N/A	No recorda	ble indications.		x	
Penetrations						
P-1	N/A	No recorda	ble indications.		x	
P-2	N/A	No recorda	ble indications.		x	
P-3	N/A	No recorda	ble indications.		x	
Saddle Weld						
SW-1	5"	Indication 1	I/8" deep. Remov	ed by grinding.	x	
Note: Tube stubs in ev revealed.	very 5th row from the	e north end	were examined.	No recordable in	ndications	s were
INSPECTOR: M. Graci	e, J. McCarthy		LEVEL: II	DATE: 05/02/20	11	

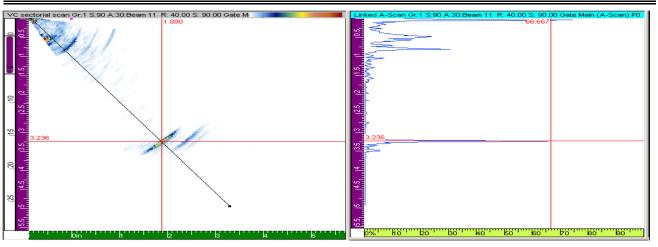
	Tŀ	HIELSC	H ENG	INEERII	NG, INC).		
	195 Fran	ices Avenu	e - Cransto	on, RI 02910	0 - (401)4	67-6454		
l	JLTRA	SONIC TH	ICKNESS	EXAMIN	ATION RI	EPORT		
Job Name: AEP - Mitche Station	ell Gener	ating	Job Date: A	pril 2011	Job Numbe	er: 43-11-0	066	
Component: Platen Su Header - Unit No. 1	perheater	[·] Outlet	Material: S	A-335, P11	Nominal W 3.375"	all:	Minimum 3.204"	Wall:
EQUIPMENT NorthED:					KEY:			
✓ D-Meter	🗌 Pi-Tap	Δ	Other			North - Up	stream	
						South -Do	wnstream	
				REMENTS	THICKN	ESS MEAS		ITS (IN.)
IDENTIFICATION			(IN.)	PERS				
		Pi-TAPE			12:00	3:00	6:00	9:00
			12 to 6	3 to 9				
GW-1	North				3.490	3.492	3.489	3.488
	South				3.665	3.660	3.623	3.643
GW-2	North				3.680	3.616	3.659	3.664
	South				N/A	N/A	N/A	N/A
GW-3	North				N/A	N/A	N/A	N/A
	South				3.628	3.620	3.641	3.665
GW-4	North				3.662	3.622	3.588	3.620
	South				3.613	3.572	3.650	3.599
GW-5	North				3.592	3.605	3.565	3.616
	South				N/A	N/A	N/A	N/A
GW-6	North				N/A	N/A	N/A	N/A
	South				3.600	3.639	3.684	3.624
GW-7	North				3.587	3.613	3.697	3.620
	South				3.488	3.565	3.492	3.495
GW-8	US				N/A	N/A	N/A	N/A
	DS				3.003	3.016	3.003	3.002
GW-9	US				2.992	3.009	2.992	3.004
	DS				2.992	2.987	3.003	2.995
GW-10	US				N/A	N/A	N/A	N/A
00-10	DS				2.225	2.185	2.105	2.152
GW-12	US				2.998	3.000	3.012	3.000
600-12	DS				3.026	3.034	3.038	3.040
INSPECTOR: M. Graci	e, J. McC	arthy		LEVEL: II		DATE: 05	/02/2011	

Customer: American Electric Po		ower Component:		onent:	Platen Superheater Outlet	
Unit Number:	1			umber:	Header PSHOH-	
Project Number: Procedure:	43-11-0066 TEI NDT 55 FS-PA	Rev 0		onfiguration	: Header to 3.6"	o End Cap
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration I	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angl	e	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	5	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	1	Band Pass Filter
Compression	32	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ecl	סר)	Shear		100ns
Transducer Calculator						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	1 I	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	American Electric Po	ower	Compo	nent:		uperheater Outlet
Unit Number: Project Number:	1 43-11-0066		Weld N		Header PSHOH-(Header to	GW2 Tee Connection
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0		ickness:	3.6"	
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angl	e	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	5	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	1	Band Pass Filter
Compression	32	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ecl	no)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	ı	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us

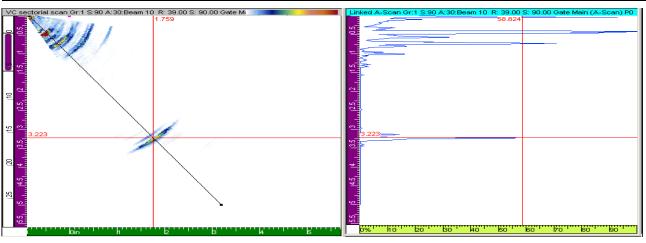


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the north side of weld was accessible for scanning due to the outside configuration

Customer:	American Electric Po	ower	Compo	nent:		uperheater Outlet
Unit Number: Project Number: Procedure: Machine Informatior	1 43-11-0066 TEI NDT 55 FS-PA	Rev 0			Header PSHOH-(Header to 3.6"	GW3 o Tee Connection
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Ang	le	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degree	S	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectificatio	n	Band Pass Filter
Compression	32	On		FW(Full Way	/e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ec	ho)	Shear		100ns
Transducer Calculator						
Element Quantity	1st Element	Last Elemen	nt	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us

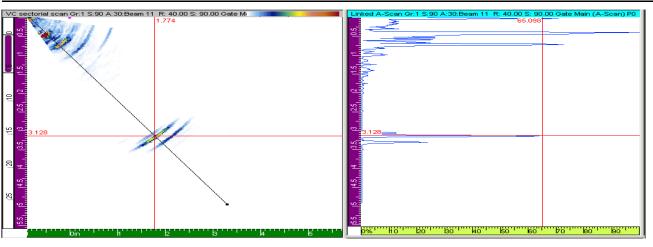


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

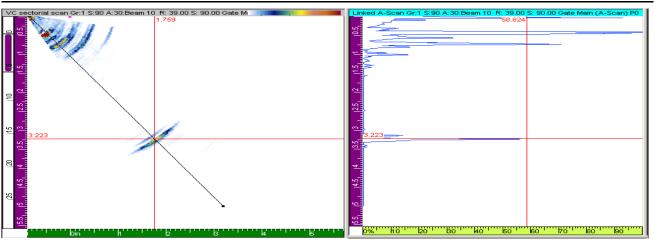
Only the south side of weld was accessible for scanning due to the outside configuration.

Customer:	American Electric Po	ower	Compor	nent:		uperheater Outlet
Unit Number: Project Number:	1 43-11-0066		Weld Nu Weld Co	umber: onfiguration	Header PSHOH- Header t	
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0		ckness:	3.6"	
Model # Omni Scan MX	Serial # Omni- 1179	Software Ver Scan:Omni-2. TomoView-2.4	.0R20	Calibration I 8/11	Due	Save Mode A-Scan
Probe Characterization	Duck a Ocuial	Duck a Francis		14/2 Jack Ave 201		Duck a American
Probe Model 5L16-A1	Probe Serial C0055	Probe Frequ 5MHz	ency	Wedge Angl 55.0 Degrees		Probe Aperture 0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification		Band Pass Filter
Compression	32	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ech	10)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Element	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resolu	ution	Focus Depth	n	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	American Electric P	ower C	omponent:	Platen Superheater	Outlet
Unit Number:	1	v	/eld Number:	Header PSHOH-GW5	
Project Number:	43-11-0066	•		n: Header to Tee Conr	nection
Procedure:	TEI NDT 55 FS-PA		art Thickness:	3.6"	
Machine Informatior				5.0	
Model #	Serial #	Software Versio	on Calibration	Due Save Mode	9
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R		A-Scan	
ennin ooan mix		TomoView-2.4R		/ Obah	
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequen	cy Wedge Ang	gle Probe Ape	erture
5L16-A1	C0055	5MHz	55.0 Degree	es 0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)) PRF	Туре	
10.454us	0.000in	6.456	4	PA(Phased	d Array)
Scale Type	Scale Factor	Video Filter	Rectificatio	on Band Pass	s Filter
Compression	32	On	FW(Full Wa	ive) 5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Wid	th
80(volts)	40dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	•
16	1	16	1.0	Sectoral	
10					
Start Angle	Stop Angle	Angle Resolution	on Focus Dept	th Sound Vel	ocity

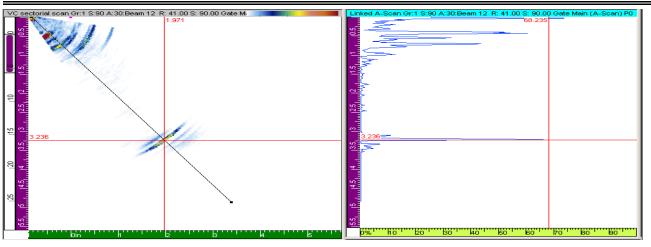


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the north side of weld was accessible for scanning due to the outside configuration

Customer:	American Electric Po	ower	Compon	ent:	Platen Su	perheater Outlet
				_	Header	
Unit Number:	1		Weld Nu	mber:	PSHOH-G	iW6
Project Number:	43-11-0066		Weld Co	nfiguration	:Header to	Tee Connection
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thic	kness:	3.6"	
Machine Informatior						
Model #	Serial #	Software Ve	sion	Calibration)ue	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan
		TomoView-2.	4R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angle	e	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification		Band Pass Filter
Compression	32	On		FW(Full Wave	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ech	10)	Shear		100ns
Transducer Calculator						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
•	1 Stop Angle	16 Angle Resol	ution	1.0 Focus Depth		Sectoral Sound Velocity

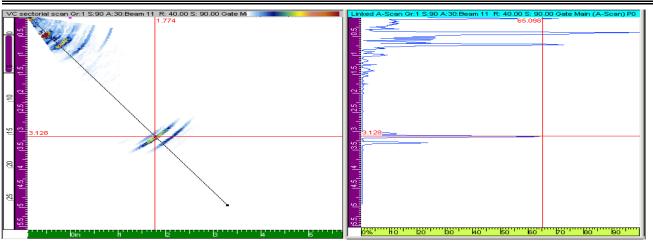


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the south side of weld was accessible for scanning due to the outside configuration

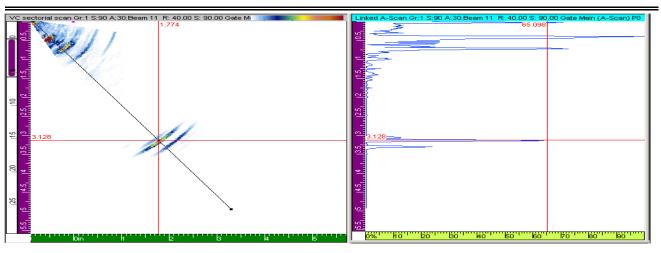
Customer:	ustomer: American Electric Power			laten Superheater Outlet
Unit Number:	1		Number: P	eader SHOH-GW7
Project Number: Procedure: Machine Informatior	43-11-0066 TEI NDT 55 FS-PA		•	eader to End Cap .6"
Model #	Serial #	Software Version	Calibration Due	e Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20 TomoView-2.4R15	8/11	A-Scan
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A1	C0055	5MHz	55.0 Degrees	0.378 in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
10.454us	0.000in	6.456	4	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	32	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	40dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculator				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	3.5in	0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

ELSCH HIELSCH NGINGERING Phased-Array Report

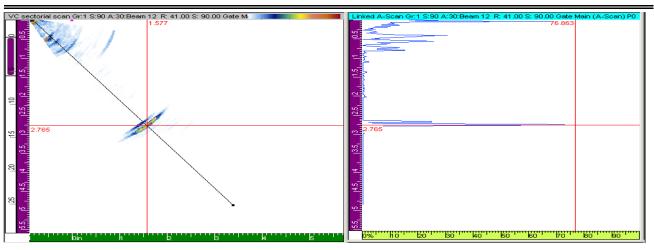
Customer:	American Electric Po	ower Comp		Platen Superheater Outlet	
Unit Number:	1	Weld Number:		Header PSHOH-GW8	
Project Number:	43-11-0066	Weld	Configuration: Pipe	e to Tee Connection	
Procedure:	TEI NDT 55 FS-PA	Rev 0 Part T	hickness: 3.6"		
Machine Informatior					
Model #	Serial #	Software Version	Calibration Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A1	C0055	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
10.454us	0.000in	6.456	4	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	32	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
80(volts)	40dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the downstream side of weld was accessible for scanning due to the outside configuratior

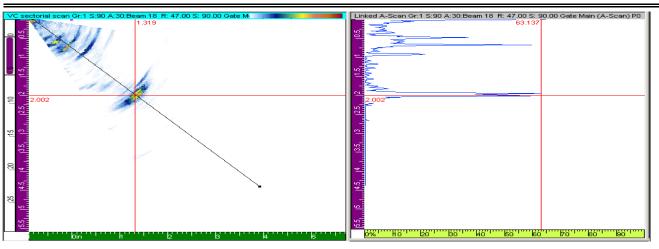
Customer:	American Electric Po	ower	Component:		Platen Superheater Outlet		
Unit Number: Project Number: Procedure: Machine Informatior	1 43-11-0066 TEI NDT 55 FS-PA	Rev 0		umber: onfiguratior ickness:	Header PSHOH- Pipe to P 3.6"		
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2		8/11		A-Scan	
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Ang	le	Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре	
10.454us	0.000in	6.456		4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectificatio	n	Band Pass Filter	
Compression	32	On		FW(Full Wave)		5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	40dB	PE(Pulse Ec	ho)	Shear		100ns	
Transducer Calculato							
Element Quantity	1st Element	Last Elemer	nt	Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Reso	lution	Focus Dept	h	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us	



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	American Electric Po	ower	Component:		Platen Superheater Outlet		
Unit Number: Project Number:	1 43-11-0066	Weld Number: Weld Configuration:		Header PSHOH-GW10 : Pipe to Reducer			
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	2.2"		
Model #	Serial #	Software Ve	rsion	Calibration I	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11		A-Scan	
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angl	е	Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees	3	0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре	
10.454us	0.000in	6.456		4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	ı	Band Pass Filter	
Compression	32	On		FW(Full Wav	e)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	40dB	PE(Pulse Ech	(סר	Shear		100ns	
Transducer Calculator							
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	ו	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us	

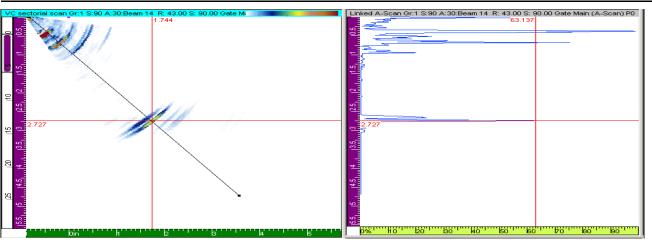


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the downstream side of weld was accessible for scanning due to the outside configuration

Customer:	American Electric Power		Compor	nent:	Platen Superheater Outlet	
Unit Number: Project Number: Procedure:	1 43-11-0066 TEI NDT 55 FS-PA	Roy 0			Header PSHOH- Pipe to 1 3.6"	GW11 ee Connection
Machine Informatior	TEINDT 55 FS-FA	Rev U	Fart III	CKIIESS.	3.0	
Model #	Serial #	Software Ver	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	e	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degree	S	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	32	On		FW(Full Way	ve)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ech	(סר	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us

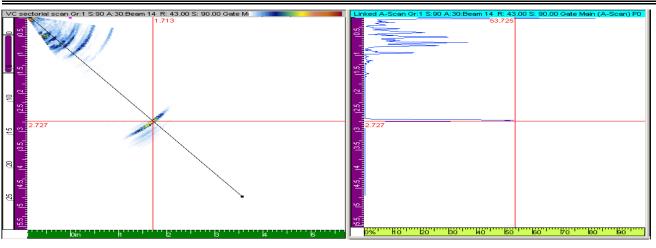


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the downstream side of weld was accessible for scanning due to the outside configuration

Customer:	American Electric P	ower	Compo	nent:	Platen Superheater Outlet		
Unit Number: Project Number:	1 43-11-0066	Weld Number:			Header PSHOH-GW12 Pipe to Pipe		
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	3.6"		
Model #	Serial #	Software Ve	rsion	Calibration Du	ie Save Mode		
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2		8/11	A-Scan		
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Angle	Probe Aperture		
5L16-A1	C0055	5MHz		55.0 Degrees	0.378 in		
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF	Туре		
10.454us	0.000in	6.456		4	PA(Phased Array)		
Scale Type	Scale Factor	Video Filter		Rectification	Band Pass Filter		
Compression	32	On		FW(Full Wave)	5MHz		
Voltage	Gain	Mode		Wave Type	Pulse Width		
80(volts)	40dB	PE(Pulse Ec	ho)	Shear	100ns		
Transducer Calculator							
Element Quantity	1st Element	Last Elemen	it	Resolution	Scan Type		
16	1	16		1.0	Sectoral		
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	Sound Velocity		
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in	0.126 in/us		



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

THIELSCH ENGINEERING, INC. 195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454								
1						· · ·	7-6454	
Job Name: AEP - Mitche			ESS MEA Job Date	SUREMI e: April 20			nber: 43-11-	0066
Station Component: Platen Superheater Outlet Header - Unit No. 1			Material:	SA-335,	P11	Hardnes	s Scale: HE	BN
Location:			Ha	ardness N	leasurer	nents		Corresponding
		1	2	3	4	5	Average	Tensile Strength
PSOH-R1	Weld	153	156	159	161	162	158	76,000
	Base	154	149	150	150	149	150	72,000
PSOH-R2	Weld	161	165	158	163	167	163	78,000
	Base	184	195	186	159	160	177	84,000
PSOH-R3	Weld	160	138	142	150	167	151	72,000
	Base	164	181	176	174	184	176	84,000
	Weld	139	131	138	139	134	136	66,000
PSOH-R4	Base	149	155	161	150	151	153	73,000
	Weld	160	162	161	155	162	160	77,000
PSOH-R5								
	Base	159	139	139	130	134	140	67,000
PSOH-R6	Weld	139	141	149	141	152	144	69,000
	Base	153	160	152	150	165	156	75,000
PSOH-R7	Weld	147	157	142	139	155	148	71,000
	Base	116	127	110	127	133	123	60,000
PSOH-R8	Weld	143	147	160	152	163	153	73,000
	Base	139	154	162	154	154	153	73,000
Inspector: Manny Gracie	e, John McC	Carthy	1	1	1	Date: 05	5/04/2011	1

APPENDIX C

NONDESTRUCTIVE EXAMINATION REPORTS FINISHING SUPERHEATER INLET HEADER

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 178 of 256

Header Minimum Wall Calculation AEP - Mitchell Generating Station Unit No. 1 - Finishing Superheater Inlet header

The minimum wall thickness requirements were calculated for the Finishing Superheater Inlet header. These calculations are based on the Original 1968 ASME Code for Boiler and Pressure Vessels.

ASME Material Specifications for:

SA-335, Gr. P11

Where:

T- Design Temperat	ure
--------------------	-----

- P- Maximum Allowable Pressure
- D- Outside Diameter
- S- Maximum Stress Value
- E- Efficency
- y-Temperature Coefficient

900	°F
4,000	psig
19.25	in
13,100	psi Pe
1.000	Pe
0.400	Pe
0.400	Pe

Per. Sect II D, Table 1A Per. Sect I, PG 27.4 Note 1 Per. Sect I, PG 27.4 Note 6

The following equation applies: Per. Sect I, PG 27.2.2

 $t_m = (PD/(2(SE)+2(yP)))$

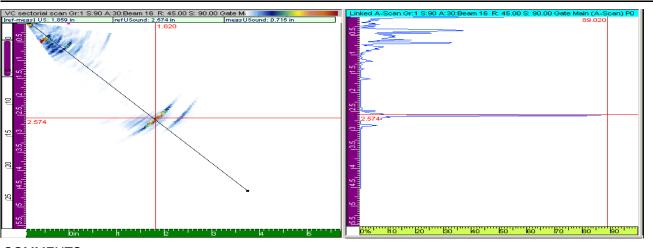
2.619 in

	THIELSC	H ENG	INEERING	i, INC.			
	195 Frances Avenue	e - Cranst	on, RI 02910 -	(401) 467-6454			
	MAGNETIC F	PARTICLE E	EXAMINATION F	REPORT			
Job Name: AEP - Mitch	nell Generating Station	Job Date: /	April 2011	Job Number: 43-11-0066			
Component:Finishing S Header - Unit No. 1	Component:Finishing Superheater Inlet Mate			Procedure: NDT	-21FS, Rev	7. 8	
EXAMINATION METH	OD		TECHNIQUE				
Continuous			Voke	Headshot		nil	
			Prods		ther		
CURRENT			WET	DRY			
✓ AC	AMP Turns		14AM	Red			
	Amperage ——		✓ 20B	🗌 Gray			
	Other		Other	Black			
IDENTIFICATION	INDICATION SIZE		COMMENTS ON R	ESULTS	ACCEPT	REJECT	
Girth Welds							
GW-1	N/A	No recorda	able indications		х		
GW-2	N/A	No recorda	able indications		х		
GW-3	N/A	No recorda	х				
GW-4	N/A	No recorda	able indications		х		
GW-5	N/A	No recorda	х				
GW-6	N/A	No recorda	able indications		х		
GW-7	N/A	No recorda	able indications		х		
GW-8	N/A	No recorda	able indications		х		
GW-9	N/A	No recorda	able indications		х		
GW-10	N/A	No recorda	able indications		х		
GW-11	N/A	No recorda	able indications		х		
GW-12	N/A	No recorda	able indications		х		
GW-13	N/A	No recorda	able indications		х		
GW-14	N/A	No recorda	able indications		х		
Penetrations							
P-1	N/A	No recorda	able indications		х		
P-2	N/A	No recorda	able indications		х		
P-3	N/A	No recorda	able indications		х		
			1				
INSPECTOR: Manny	Gracie, John McCarthy	/	LEVEL: II	DATE: 05/02/20	11		

THIELSCH ENGINEERING, INC.										
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454										
ULTRASONIC THICKNESS EXAMINATION REPORT										
Job Name: AEP - Mitche	ell Gener	ating	Job Date: A	April 2011	Job Numbe	er: 43-11-00	66			
Station Component: Finishing S	uperhea	ter Inlet	Material: S	SA-335.	Nominal W	/all: 2.845"	Minimum V	Vall: 2.619"		
Header - Unit No. 1			P11	,						
					KEY:					
D-Meter	Pi-Tap		Other			US - Upstro				
Micrometer		rs				DS -Downs	stream			
		DIAMETE	R MEASUR	REMENTS	тніск	NESS MEA	SUREMEN	TS (IN.)		
IDENTIFICATION	I		(IN.)	<u> </u>				. • ()		
		Pi-TAPE	12 to 6	PERS 3 to 9	12:00	3:00	6:00	9:00		
	North		12 10 0	0.000	2.967	2.954	2.971	2.968		
GW-1	South				2.924	2.922	2.935	2.926		
	North				2.933	2.938	2.937	2.930		
GW-2	South				2.933 N/A	2.930 N/A	2.937 N/A	2.930 N/A		
GW-3	North				N/A	N/A	N/A	N/A		
	South				2.901	2.923	2.918	2.900		
GW-4	North				2.899	2.900	2.900	2.900		
	South				N/A	N/A	N/A	N/A		
GW-5	North				N/A	N/A	N/A	N/A		
	South				2.899	2.892	2.900	2.895		
GW-6	North				2.928	2.875	2.914	2.912		
	South				N/A	N/A	N/A	N/A		
GW-7	North				N/A	N/A	N/A	N/A		
	South				2.923	2.918	2.912	2.937		
GW-8	North				2.931	2.923	2.923	2.921		
	South				2.982	2.964	2.967	2.970		
GW-9	US				2.994	3.005	3.010	3.002		
600 5	DS				N/A	N/A	N/A	N/A		
GW-10	US				3.042	3.044	3.043	3.039		
GW-10	DS				3.002	2.974	3.021	3.017		
GW-11	US				2.740	2.675	2.697	2.844		
Gvv-11	DS				N/A	N/A	N/A	N/A		
011/ 40	US				2.783	2.812	2.845	2.712		
GW-12	DS				2.719	2.680	2.705	2.836		
014/40	US				3.003	3.001	3.005	3.005		
GW-13	DS				N/A	N/A	N/A	N/A		
	US				3.065	3.056	3.064	3.066		
GW-14	DS				3.001	2.996	3.023	2.993		
INSPECTOR: Tom Blaz	zetic, Da	ve Jakubow	/ski	LEVEL: II		DATE: 05/	/02/2011			

THIELSCH ENGINEERING Phased-Array Report	_
ENGINEERING Phased-Array Report	

Customer:	AEP - Mitchell Gene	erating Component:		onent:	Finishing Superheater Inlet	
	Station				Header	
Unit Number:	1		Weld N	umber:	FSHIH-GW1	
Project Number:	43-11-0066		Weld C	onfiguration:	Header to End Cap	
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.0"	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration Du	Je Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11	A-Scan	
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angle	Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees	0.378 in	
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF	Туре	
10.454us	0.000in	6.456		4	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	Band Pass Filter	
Compression	32	On		FW(Full Wave)	5MHz	
Voltage	Gain	Mode		Wave Type	Pulse Width	
80(volts)	40dB	PE(Pulse Ech	סר)	Shear	100ns	
Transducer Calculator						
Element Quantity	1st Element	Last Elemen	t	Resolution	Scan Type	
16	1	16		1.0	Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in	0.126 in/us	

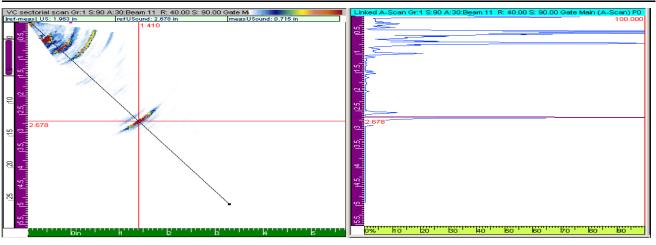


COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

THIEL	SCH ERING Pha	ased-A	rray Re	eport	
Customer:	AEP - Mitchell Gene	erating C	Component:	Finishi	ng Superheater Inlet
	Station			Heade	r
Unit Number:	1	V	Veld Number:	FSHIH	-GW2
Project Number:	43-11-0066	v	Veld Configurat	ion: Heade	r to Tee Connection
Procedure:	TEI NDT 55 FS-PA	Rev 0 F	Part Thickness:	3.0"	
Machine Informatior					
Model #	Serial #	Software Versi	on Calibrati	ion Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0	R20 8/11		A-Scan

		TomoView-2.4R15		
Probe Characterization	r			
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A1	C0055	5MHz	55.0 Degrees	0.378 in

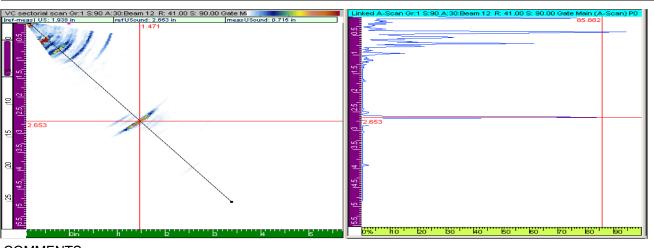
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
10.454us	0.000in	6.456	4	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	32	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	40dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculato				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	3.5in	0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the north side of weld was accessible for scanning due to the outside configuration

AEP - Mitchell Generating		Component:		Finishing Superheater Inlet	
Station				Header	
1		Weld Nu	ımber:	FSHIH-G	W3
43-11-0066		Weld Co	onfiguration	:Header to	Tee Connection
TEI NDT 55 FS-PA	Rev 0		-	3.0"	
Serial #	Software Ve	rsion	Calibration I	Due	Save Mode
Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan
	TomoView-2.	4R15			
Probe Serial	Probe Frequ	ency	Wedge Angl	e	Probe Aperture
C0055	5MHz		55.0 Degrees	6	0.378 in
Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
0.000in	6.456		4		PA(Phased Array)
Scale Factor	Video Filter		Rectification	1	Band Pass Filter
32	On		FW(Full Wav	e)	5MHz
Gain	Mode		Wave Type		Pulse Width
40dB	PE(Pulse Ech	(סר	Shear		100ns
1st Element	Last Elemen	t	Resolution		Scan Type
1	16		1.0		Sectoral
1 Stop Angle	16 Angle Resol	ution	1.0 Focus Depth	1	Sectoral Sound Velocity
	Station 1 43-11-0066 TEI NDT 55 FS-PA Serial # Omni- 1179 Probe Serial C0055 Start(1/2 path) 0.000in Scale Factor 32 Gain 40dB	Station143-11-0066TEI NDT 55 FS-PA Rev 0Serial #Software VerOmni- 1179Scan:Omni-2TomoView-2.Probe SerialProbe FrequeC00555MHzStart(1/2 path)Range(1/2 path)0.000in6.456Scale FactorVideo Filter32OnGainMode40dBPE(Pulse Ect	Station1Weld Nu43-11-0066Weld Colspan="2">Weld Colspan="2"Serial #Software VersionScan:Omni-2.0R20Coussian #Scan:Omni-2.0R20SMHz0.000in6.456Colspan="2"Scale FactorVideo FilterColspan="2"32OnMode40dBPE(Pulse Echo)	Station1Weld Number:43-11-0066Weld ConfigurationTEI NDT 55 FS-PARev 0Part Thickness:Serial #Software Version Scan:Omni-2.0R20 TomoView-2.4R15Calibration I 8/11Probe SerialProbe Frequency SMHzWedge Angl 55.0 DegreesC00555MHz55.0 DegreesStart(1/2 path)Range(1/2 path) 4.456PRF Rectification 320n6.4564Scale FactorVideo Filter Video FilterRectification FW(Full Wav Wave Type 40dB40dBPE(Pulse Echo)Shear	StationHeader1Weld Number:FSHIH-G43-11-0066Weld Configuration:Header toTEI NDT 55 FS-PA Rev 0Part Thickness:3.0"Serial #Software Version Scan:Omni-2.0R20 TomoView-2.4R15Calibration DueMobilityScan:Omni-2.0R20 TomoView-2.4R158/11Probe SerialProbe Frequency Start(1/2 path)Wedge Angle 55.0 DegreesStart(1/2 path)Range(1/2 path) Video FilterPRF0.000in6.4564Scale FactorVideo Filter ModeRectification Wave Type32OnFW(Full Wave)40dBPE(Pulse Echo)Shear

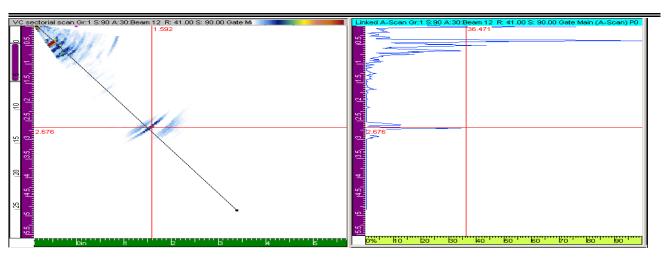


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the south side of weld was accessible for scanning due to the outside configuration

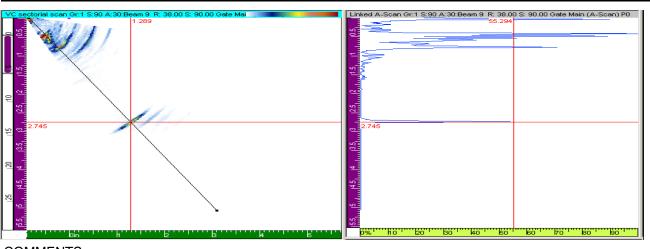
Customer:	AEP - Mitchell Gene	- Mitchell Generating		Component:		Superheater Inlet
	Station				Header	
Unit Number:	1		Weld Nu	imber:	FSHIH-G	N4
Project Number:	43-11-0066		Weld Co	onfiguration	:Header to	Tee Connection
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thie	ckness:	3.0"	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration I	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan
		TomoView-2.	.4R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Angl	е	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	6	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	32	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ecl	ho)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	it	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	า	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS:

Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	AEP - Mitchell Generating		Component:		Finishing Superheater Inlet		
	Station	-	-		Header		
Unit Number:	1		Weld N	lumber:	FSHIH-GW5	5	
Project Number:	43-11-0066		Weld C	onfiguration:	Header to T	ee Connection	
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.0"		
Machine Informatior							
Model #	Serial #	Software Ver	rsion	Calibration D	ue S	ave Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11	Ą	-Scan	
Probe Characterizatior		TOMOVIEW-2.	415				
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angle	F	robe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees	C	.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF	Т	уре	
10.454us	0.000in	6.456		4	F	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	E	and Pass Filter	
Compression	32	On		FW(Full Wave) 5	MHz	
Voltage	Gain	Mode		Wave Type	F	ulse Width	
80(volts)	40dB	PE(Pulse Ech	וס)	Shear	1	00ns	
Transducer Calculator							
Element Quantity	1st Element	Last Elemen	t	Resolution	S	can Type	
16	1	16		1.0	S	Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	S	ound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in	0	.126 in/us	

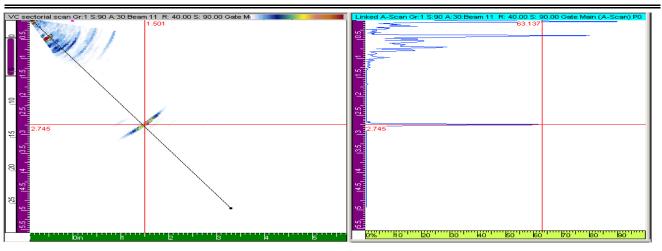


COMMENTS:

Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the south side of weld was accessible for scanning due to the outside configuration

Customer:	AEP - Mitchell Gene	Mitchell Generating		Component:		Superheater Inlet
	Station	Ũ	•		Header	•
Unit Number:	1		Weld Nu	ımber:	FSHIH-G	W6
Project Number:	43-11-0066		Weld Co	onfiguration	:Header to	Tee Connection
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	3.0"	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan
		TomoView-2.	4R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	le	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degree	S	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	32	On		FW(Full Way	ve)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ecl	no)	Shear		100ns
Transducer Calculator						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us

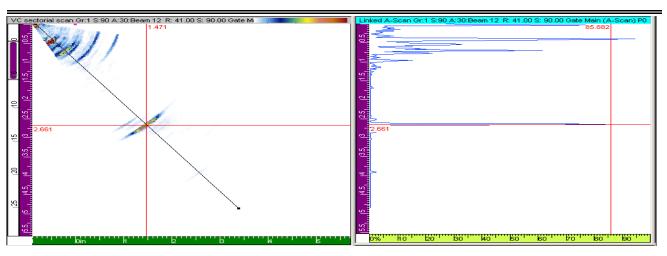


COMMENTS:

Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the north side of weld was accessible for scanning due to the outside configuration

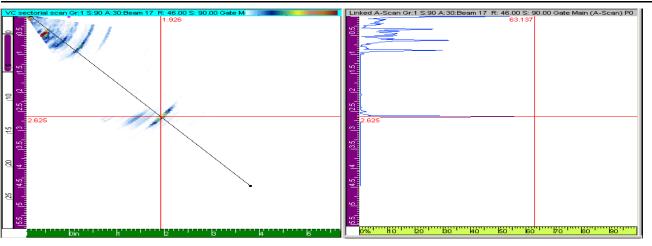
THIEL	SCH					
ENGINE	RING Pha	ased-A	Arra	y Kel	port	
Customer:	AEP - Mitchell Gen	erating	Compor	nent:		ng Superheater Inlet
	Station				Heade	
Unit Number:	1		Weld Nu		FSHIH	•
Project Number:	43-11-0066		Weld Co	onfiguratio		r to Tee Connection
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	3.0"	
Machine Informatior						
Model #	Serial #	Software Vers	sion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0		8/11		A-Scan
		TomoView-2.4	R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Freque	ncy	Wedge Angle		Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pat	h)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectificatio	n	Band Pass Filter
Compression	32	On		FW(Full Wa	ve)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Echo))	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Element		Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resolut	tion	Focus Dep	th	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS: Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the south side of weld was accessible for scanning due to the outside configuration

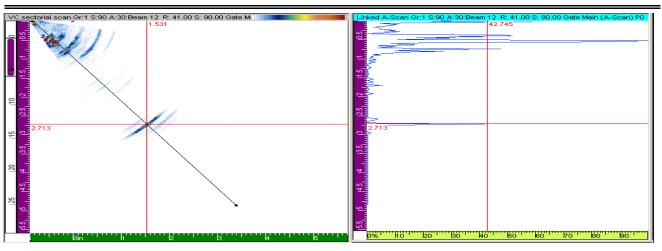
					<u> </u>
Customer:	AEP - Mitchell Gene	AEP - Mitchell Generating C		nent:	Finishing Superheater Inlet
	Station				Header
Unit Number:	1		Weld Nu	umber:	FSHIH-GW8
Project Number:	43-11-0066		Weld Co	onfiguration:	Header to End Cap
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thi		3.0"
Machine Informatior					
Model #	Serial #	Software Ver	sion	Calibration D	ue Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.	0R20	8/11	A-Scan
		TomoView-2.4	4R15		
Probe Characterization					
Probe Model	Probe Serial	Probe Freque	ency	Wedge Angle	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	0.378 in
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 pa	ıth)	PRF	Туре
10.454us	0.000in	6.456		4	PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	Band Pass Filter
Compression	32	On		FW(Full Wave) 5MHz
Voltage	Gain	Mode		Wave Type	Pulse Width
80(volts)	40dB	PE(Pulse Ech	ю)	Shear	100ns
Transducer Calculato					
Element Quantity	1st Element	Last Element	t	Resolution	Scan Type
16	1	16		1.0	Sectoral
10					
Start Angle	Stop Angle	Angle Resolu	ution	Focus Depth	Sound Velocity



COMMENTS:

Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	AEP - Mitchell Gener	Il Generating		Component:		Finishing Superheater Inlet	
	Station	-	•		Header		
Unit Number:	1		Weld Nu	ımber:	FSHIH-G	W9	
Project Number:	43-11-0066		Weld Co	onfiguration	: Pipe to Te	ee Connection	
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	3.0"		
Machine Informatior							
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2	2.0R20	8/11		A-Scan	
		TomoView-2	.4R15				
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Ang	le	Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degree	S	0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре	
10.454us	0.000in	6.456		4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter	
Compression	32	On		FW(Full Way	ve)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	40dB	PE(Pulse Ec	ho)	Shear		100ns	
Transducer Calculato							
Element Quantity	1st Element	Last Elemen	nt	Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us	



COMMENTS:

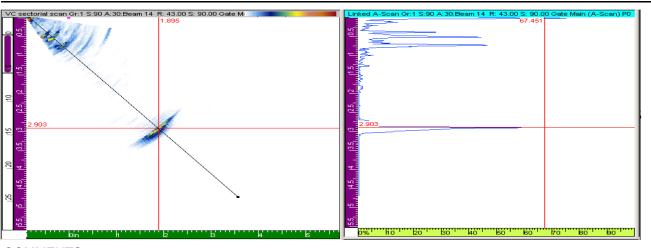
Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the upstream side of weld was accessible for scanning due to the outside configuration

Date:

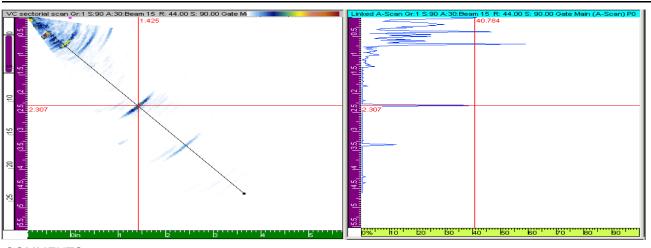
THIELSCH Phased-Array Report

Customer:			Component:		Finishing Superheater Inlet	
	Station				Header	
Unit Number:	1		Weld N	lumber:	FSHIH-G	GW10
Project Number:	43-11-0066		Weld C	configuration	: Pipe to F	Pipe
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	nickness:	3.0"	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2.		8/11		A-Scan
Probe Characterizatior		TOTTO VIEw-2.	41(15			
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	е	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	8	0.378 in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
10.454us	0.000in	6.456		4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	32	On		FW(Full Wav	re)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	40dB	PE(Pulse Ech	ho)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in		0.126 in/us



COMMENTS: Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Customer:	AEP - Mitchell Gene	· Mitchell Generating		Component:		Finishing Superheater Inlet	
	Station				Header		
Unit Number:	1		Weld N	umber:	FSHIH-C	GW11	
Project Number:	43-11-0066		Weld C	onfiguration	: Pipe to T	Tee Connection	
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	3.0"		
Machine Informatior							
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan	
		TomoView-2.	4R15				
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	е	Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degree	5	0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре	
10.454us	0.000in	6.456		4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter	
Compression	32	On		FW(Full Way	ve)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	40dB	PE(Pulse Ech	(סו	Shear		100ns	
Transducer Calculato							
	Ant Element	Last Elemen	t	Resolution		Scan Type	
Element Quantity	1st Element	Last Liemen	-				
Element Quantity 16	1 st Element 1	16	-	1.0		Sectoral	
•	1st Element 1 Stop Angle			1.0 Focus Dept	n		



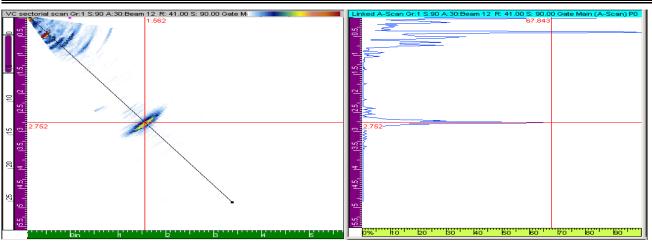
COMMENTS:

Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the upstream side of weld was accessible for scanning due to the outside configuration

THIELSCH Phased-Array Report Finishir

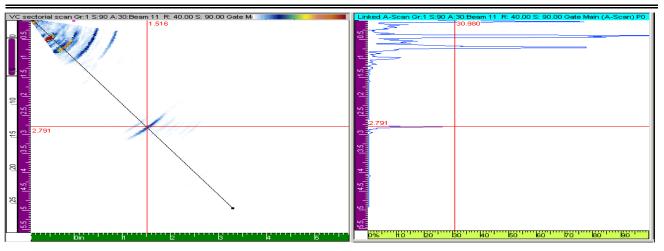
Customer:	AEP - Mitchell Gene	erating	Component:	<u> </u>	Finishing Superheater Inlet
	Station	U	•		Header
Unit Number:	1		Weld Numbe	er:	FSHIH-GW12
Project Number:	43-11-0066		Weld Config	uration:	Pipe to Pipe
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thickne	SS:	3.0"
Machine Informatior					
Model #	Serial #	Software Ver	sion Cal	ibration Du	e Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.	0R20 8/1	1	A-Scan
		TomoView-2.4	R15		
Probe Characterizatior					
Probe Model	Probe Serial	Probe Freque	ency We	dge Angle	Probe Aperture
5L16-A1	C0055	5MHz	55.0	0 Degrees	0.378 in
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 pa	th) PRI	F	Туре
10.454us	0.000in	6.456	4		PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Red	ctification	Band Pass Filter
Compression	32	On	FW	(Full Wave)	5MHz
Voltage	Gain	Mode	Wa	ve Туре	Pulse Width
80(volts)	40dB	PE(Pulse Ech	o) She	ar	100ns
Transducer Calculator					
Element Quantity	1st Element	Last Element	Res	solution	Scan Type
16	1	16	1.0		Sectoral
Start Angle	Stop Angle	Angle Resolu	tion Foo	cus Depth	Sound Velocity



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

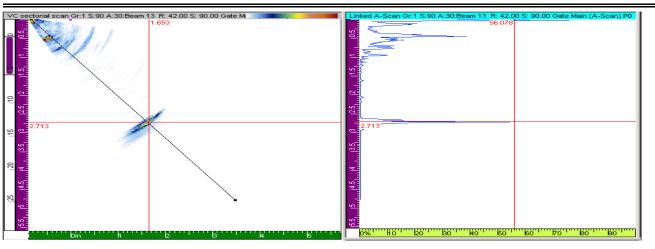
Customer:	AEP - Mitchell Gene	erating Compo	onent: Finishi	Finishing Superheater Inlet	
	Station		Heade	r	
Unit Number:	1	Weld N	lumber: FSHIH	-GW13	
Project Number:	43-11-0066	Weld C	Configuration: Pipe to	Tee Connection	
Procedure:	TEI NDT 55 FS-PA	Rev 0 Part TI	nickness: 3.0"		
Machine Informatior					
Model #	Serial #	Software Version	Calibration Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A1	C0055	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
10.454us	0.000in	6.456	4	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	32	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
80(volts)	40dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	



COMMENTS: Image of typical 360 ° non-relevant root signal / Root geometry No Relevant Indication Detected

Only the upstream side of weld was accessible for scanning due to the outside configuration

Customer:	AEP - Mitchell Generating		Component:		Finishing Superheater Inlet
	Station		-		Header
Unit Number:	1		Weld Nu	umber:	FSHIH-GW14
Project Number:	43-11-0066		Weld Co	onfiguration:	Pipe to Pipe
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thi	ckness:	3.0"
Machine Informatior					
Model #	Serial #	Software Ve	rsion	Calibration Du	e Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11	A-Scan
		TomoView-2.	4R15		
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angle	Probe Aperture
5L16-A1	C0055	5MHz		55.0 Degrees	0.378 in
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF	Туре
10.454us	0.000in	6.456		4	PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	Band Pass Filter
Compression	32	On		FW(Full Wave)	5MHz
Voltage	Gain	Mode		Wave Type	Pulse Width
80(volts)	40dB	PE(Pulse Ech	าด)	Shear	100ns
Transducer Calculato					
Element Quantity	1st Element	Last Elemen	t	Resolution	Scan Type
16	1	16		1.0	Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		3.5in	0.126 in/us



COMMENTS: Image of typical 360° non-relevant root signal / Root geometry No Relevant Indication Detected

	THI	ELSC		GINE	ERIN	G, INC	<u>,</u>	
	195 Frances						67-6454	
			NESS ME					
Job Name: AEP - Mitch Station		-		e: April 20			nber: 43-11-	
Component: Finishing S Header - Unit No. 1	Superheater	Inlet	Material:	SA-335,	P11	Hardnes	s Scale: HE	BN
Location:			Ha	ardness N	leasurer	nents		Corresponding
		1	2	3	4	5	Average	Tensile Strength
FSIH-R1	Weld	182	181	183	185	185	183	87,000
	Base	189	187	186	182	181	185	88,000
FSIH-R2	Weld	176	178	190	189	191	185	88,000
	Base	181	182	181	179	178	180	86,000
FSIH-R3	Weld	176	177	178	178	189	180	86,000
	Base	169	171	173	174	175	172	82,000
FSIH-R4	Weld	172	171	175	162	157	167	80,000
	Base	157	137	156	150	129	146	69,000
FSIH-R5	Weld	150	153	137	146	153	148	70,000
	Base	150	151	159	173	152	157	75,000
FSIH-R6	Weld	167	188	171	151	174	170	81,000
	Base	130	132	148	141	144	139	67,000
FSIH-R7	Weld	154	162	159	165	164	161	77,000
	Base	159	162	155	162	166	161	77,000
FSIH-R8	Weld	157	156	161	146	166	157	75,000
	Base	134	150	135	125	120	133	64,000
Inspector: Manny Graci	e, John McC	Carthy				Date: 05	5/04/2011	

APPENDIX D

NONDESTRUCTIVE EXAMINATION REPORTS FINISHING SUPERHEATER OUTLET HEADERS

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 197 of 256

Header Minimum Wall Calculation AEP - Mitchell Generating Station Unit No. 1 - Finishing Superheater Outlet Header

The minimum wall thickness requirements were calculated for the Finishing Superheater Outlet header. These calculations are based on the Original 1968 ASME Code for Boiler and Pressure Vessels.

ASME Material Specifications for:

SA-335, Gr. P22

Where:

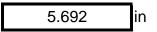
- T- Design Temperature
- P- Maximum Allowable Pressure
- D- Outside Diameter
- S- Maximum Stress Value
- E- Efficency
- y-Temperature Coefficient

	_
1025	°F
3,865	psig
28.00	in
6,800	psi Per. Sect II
1.000	Per. Sect I,
0.700	Per. Sect I,

Per. Sect II D, Table 1A Per. Sect I, PG 27.4 Note 1 Per. Sect I, PG 27.4 Note 6

The following equation applies: Per. Sect I, PG 27.2.2

 $t_m = (PD/(2(SE)+2(yP)))$



THIELSCH ENGINEERING, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
VISUAL EXAMINATION REPORT							
Job Name: AEP - Mitch Station	Job Date: April 2011						
Component: Upper Finis		Material: SA-213	3, T22	Procedure: NDT 11 FS			
Superheater Outlet Head	der - Unit No. 1						
Surface Condition:							
Welded	Cast	Worked	Paint	✓ Other			
Ground	As Fabricated	Grit Blast	Light Rust				
Examination Method:			_				
✓ Direct			Remote				
Aids Used			Equipment				
*Sketch or Other Detail:							
	0.75(1			ACTION (ACCEPT/REJECT			
LOCATION	SIZE(Inches)	DES	CRIPTION	AND COMMENT)			
Row-1 Tube-D	1/16"	Indica	tion on weld	Monitor			
Row-1 Tube-E	1/16"	Indica	tion on weld	Monitor			
Row-2 Tube-C	1/16"	Indica	tion on weld	Monitor			
Row-2 Tube-E	1/16"	Indica	ition on weld	Monitor			
Row-4 Tube-D	1/16"	Indica	ition on weld	Monitor			
Row-9 Tube-E	1/16"	Indica	tion on weld	Monitor			
Row-22 Tube-B	1/16"		Pitting	Monitor			
Row-28 Tube-E	1/16"	Indica	tion on weld	Monitor			
Row-29 Tube-C	1/16"	Indica	tion on weld	Monitor			
Row-30 Tube-A	1/16"	Indica	tion on weld	Monitor			
Row-30 Tube-B	1/16"	Indica	tion on weld	Monitor			
Row-30 Tube-C	1/16"	Indica	tion on weld	Monitor			
Row-31 Tube-D	3/16"	Indica	tion on weld	Reject - Requires repair			
Row-34 Tube-A	1/16"	Indica	tion on weld	Monitor			
Row-39 Tube-B	1/16"	Indica	tion on weld	Monitor			
Row-40 Tube-A	1/4"	Indica	ition on weld	Reject - Requires repair			
ROW-40 TUDE-A	1/16"	Indica	ition on weld	Monitor			
Row-41 Tube-D	1/16"	Indica	ition on weld	Monitor			
Row-42 Tube-D	3/16"	Indica	tion on weld	Reject - Requires repair			
Row-48 Tube-C	1/16"	Indica	tion on weld	Monitor			
Row-51 Tube-B	3/16"	Indica	tion on weld	Reject - Requires repair			
Row-52 Tube-B	1/4"	Indica	tion on weld	Reject - Requires repair			
Inspector: Manny Gracie	e, J. McCarthy	Level: II		Date: 05/02/2011			

THIELSCH ENGINEERING, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
VISUAL EXAMINATION REPORT							
Job Name: AEP - Mitche Station	ell Generating	Job Number: 43	3-11-0066	Job Date: A	April 2011		
Component: Upper Finis Superheater Outlet Head	-	Material: SA-21	3, T22	Procedure:	NDT 11 FS		
Surface Condition:	Cast	UWorked	Paint		✓ Other		
Examination Method:							
✓ Direct			Remote				
Aids Used			Equipment				
*Sketch or Other Detail:							
LOCATION	SIZE(Inches)	DES	SCRIPTION		ACCEPT/REJECT COMMENT)		
Row-52 Tube-D	1/16"	Indic	ation on weld		Monitor		
Row-52 Tube-E	1/16"	Indic	ation on weld		Monitor		
Row-53 Tube-B	1/8"	Indic	ation on weld	Reject	Requires repair		
Row-53 Tube-C	1/16"	Indic	ation on weld		Monitor		
Row-54 Tube-A	1/16"	Indic	ation on weld		Monitor		
Row-54 Tube-B	3/16"	Indic	ation on weld	Reject ·	- Requires repair		
Row-54 Tube-C	3/16"	Indic	ation on weld	Reject ·	Requires repair		
Row-54 Tube-D	1/16"	Indic	ation on weld		Monitor		
Row-54 Tube-E	1/16"	Indic	ation on weld		Monitor		
Row-55 Tube-A	1/16"	Indic	ation on weld		Monitor		
Row-55 Tube-B	1/16"	Indic	ation on weld		Monitor		
Row-55 Tube-C	1/8"	Indic	ation on weld	Reject ·	Requires repair		
Row-55 Tube-E	1/16"	Indic	ation on weld		Monitor		
Row-56 Tube-A	1/16"	Indic	ation on weld		Monitor		
Row-56 Tube-B	1/16"	Indic	ation on weld		Monitor		
Row-56 Tube-C	1/16"	Indic	ation on weld		Monitor		
Row-56 Tube-D	1/16"		ation on weld		Monitor		
Row-56 Tube-E	1/16"		ation on weld		Monitor		
Inspector: Manny Gracie, J. McCarthy Level: II Date: 05/02/2011							

THIELSCH ENGINEERING, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
VISUAL EXAMINATION REPORT							
Job Name: AEP - Mitche Station	b Name: AEP - Mitchell Generating ation Job Number: 43-11-0066		Job Date: April 2011				
Component: Lower Finisl	-	Material: SA-21	3, T22	Procedure: NDT 11 FS			
Superheater Outlet Heade Surface Condition:	er - Unit No. 1						
	Cast	Worked	Paint	√ Other			
Ground	As Fabricated	Grit Blast	Light Rust				
Examination Method:		_	-				
✓ Direct			Remote				
Aids Used			Equipment				
*Sketch or Other Detail:							
LOCATION	SIZE (Inches)	DE	SCRIPTION	ACTION (ACCEPT/REJECT AND COMMENT)			
Row-1 Tube-A	1/16"	Indic	ation on weld	Monitor			
Row-1 Tube-B	1/16"	Indic	ation on weld	Monitor			
Row-1 Tube-C	1/16"	Indic	ation on weld	Monitor			
Row-1 Tube-D	1/16"	Indic	ation on weld	Monitor			
Row-1 Tube-E	1/4"	Indic	ation on weld	Reject - Requires repair			
Row-2 Tube-C	1/16"	Indic	ation on weld	Monitor			
Row-2 Tube-D	1/16"	Indic	ation on weld	Monitor			
Row-2 Tube-E	1/16"	Indic	ation on weld	Monitor			
Row-3 Tube-B	1/16"	Indic	ation on weld	Monitor			
Row-3 Tube-C	1/16"	Indic	ation on weld	Monitor			
Row-3 Tube-D	1/16"	Indic	ation on weld	Monitor			
Row-3 Tube-E	1/16"	Indic	ation on weld	Monitor			
Row-4 Tube-A	1/16"	Indic	ation on weld	Monitor			
Row-4 Tube-B	1/16"	Indic	ation on weld	Monitor			
Row-4 Tube-C	1/16"	Indic	ation on weld	Monitor			
Row-4 Tube-D	1/16"	Indic	ation on weld	Monitor			
Row-4 Tube-E	1/16"	Indic	ation on weld	Monitor			
Row-5 Tube-B	1/16"	Indic	ation on weld	Monitor			
Row-5 Tube-C	1/16"	Indic	ation on weld	Monitor			
Row-5 Tube-D	1/16"	Indic	ation on weld	Monitor			
Inspector: Manny Gracie, J. McCarthy Level: II Date: 05/02/2011							

THIELSCH ENGINEERING, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
VISUAL EXAMINATION REPORT							
Job Name: AEP - Mitche Station	II Generating	Job Number: 43-11-0066	Job Date: April 2011				
Component: Lower Finisl Superheater Outlet Heade		Material: SA-213, T22	Procedure: NDT 11 FS				
Surface Condition:							
Welded	Cast	Worked Paint	✓ Other				
Ground	As Fabricated	Grit Blast					
Examination Method:							
✓ Direct		Remote					
Aids Used _		Equipment					
*Sketch or Other Detail:							
			ACTION (ACCEPT/REJECT				
LOCATION	SIZE (Inches)	DESCRIPTION	AND COMMENT)				
Row-7 Tube-A	1/16"	Indication on weld	Monitor				
Row-9 Tube-B	1/16"	Indication on weld	Monitor				
Row-10 Tube-E	1/16"	Indication on weld	Monitor				
Row-13 Tube-E	1/16"	Indication on weld	Monitor				
Row-14 Tube-C	1/16"	Indication on weld	Monitor				
Row-16 Tube-C	1/16"	Indication on weld	Monitor				
Row-17 Tube-A	1/8"	Indication on weld	Monitor				
Row-17 Tube-B	1/16"	Indication on weld	Monitor				
Row-17 Tube-E	3/16"	Indication on weld	Reject - Requires repair				
Row-18 Tube-A	3/16"	Indication on weld	Reject - Requires repair				
Row-18 Tube-E	3/16"	Indication on weld	Reject - Requires repair				
Row-19 Tube-A	1/16"	Indication on weld	Monitor				
Row-20 Tube-A	1/16"	Indication on weld	Monitor				
Row-20 Tube-E	1/16"	Indication on weld	Monitor				
Row-22 Tube-A	3/16"	Indication on weld	Reject - Requires repair				
Row-22 Tube-B	1/16"	Indication on weld	Monitor				
Row-24 Tube-B	1/16"	Indication on weld	Monitor				
Row-24 Tube-C	1/16"	Indication on weld	Monitor				
Row-25 Tube-A	1/4"	Indication on weld	Reject - Requires repair				
Row-26 Tube-D	1/16"	Indication on weld	Monitor				
Inspector: Manny Gracie,	J. McCarthy	Level: II	Date: 05/02/2011				

THIELSCH ENGINEERING, INC.						
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454						
	VIS	UAL EXAMINATION REPORT				
Job Name: AEP - Mitche Station	II Generating	Job Number: 43-11-0066	Job Date: April 2011			
Component: Lower Finisl	-	Material: SA-213, T22	Procedure: NDT 11 FS			
Superheater Outlet Heade Surface Condition:	er - Unit No. 1					
	Cast	Worked Paint	✓ Other			
Ground	As Fabricated	Grit Blast				
Examination Method:						
✓ Direct		Remote				
Aids Used _		Equipment				
*Sketch or Other Detail:						
LOCATION	SIZE (Inches)	DESCRIPTION	ACTION (ACCEPT/REJECT AND COMMENT)			
Row-27 Tube-A	3/16"	Indication on weld	Reject - Requires repair			
Row-29 Tube-E	1/16"	Indication on weld	Monitor			
Row-30 Tube-C	1/16"	Indication on weld	Monitor			
Row-31 Tube-A	1/8"	Indication on weld	Monitor			
Row-31 Tube-E	1/16"	Indication on weld	Monitor			
Row-33 Tube-D	1/16"	Indication on weld	Monitor			
Row-34 Tube-D	3/16"	Indication on weld	Reject - Requires repair			
Row-36 Tube-E	1/16"	Indication on weld	Monitor			
Row-37 Tube-D	1/16"	Porosity/Indication on weld	Monitor			
Row-44 Tube-A	1/16"	Indication on weld	Monitor			
Row-47 Tube-A	1/16"	Indication on weld	Monitor			
Row-47 Tube-E	1/4"	Indication on weld	Reject - Requires repair			
Row-48 Tube-E	3/16"	Indication on weld	Reject - Requires repair			
Row-49 Tube-A	1/16"	Indication on weld	Monitor			
Row-49 Tube-B	1/16"	Indication on weld	Monitor			
Row-49 Tube-C	1/16"	Indication on weld	Monitor			
Row-49 Tube-D	1/16"	Indication on weld	Monitor			
Row-50 Tube-B	1/16"	Indication on weld	Monitor			
Row-50 Tube-C	1/16"	Indication on weld	Monitor			
Row-50 Tube-D	1/16"	Indication on weld	Monitor			
Row-50 Tube-E	1/16"	Indication on weld	Monitor			
Inspector: Manny Gracie,	J. McCarthy	Level: II	Date: 05/02/2011			

THIELSCH ENGINEERING, INC.								
19	95 Frances Aven	ue - Cranston, RI 02910 - (401)) 467-6454					
VISUAL EXAMINATION REPORT								
Job Name: AEP - Mitchell Generating Station Job Number: 43-11-0066			Job Date: April 2011					
Component: Lower Finish		/laterial: SA-213, T22	Procedure: NDT 11 FS					
Superheater Outlet Heade	er - Unit No. 1							
Surface Condition:		Worked Paint						
Welded	Cast	Worked Paint	✓ Other					
Examination Method:		Remote						
✓ Direct								
Aids Used _		Equipment						
*Sketch or Other Detail:								
		1						
LOCATION	SIZE (Inches)	DESCRIPTION	ACTION (ACCEPT/REJECT AND COMMENT)					
Row-51 Tube-A	1/16"	Indication on weld	Monitor					
Row-51 Tube-C	1/16"	Indication on weld	Monitor					
Row-51 Tube-D	1/16"	Indication on weld	Monitor					
Row-51 Tube-E	1/8"	Indication on weld	Monitor					
Row-52 Tube-A	1/16"	Indication on weld	Monitor					
Row-52 Tube-B	1/16"	Indication on weld	Monitor					
Row-52 Tube-C	1/16"	Indication on weld	Monitor					
Row-52 Tube-D	1/16"	Indication on weld	Monitor					
Row-52 Tube-E	1/16"	Indication on weld	Monitor					
Row-53 Tube-A	1/8"	Indication on weld	Monitor					
Row-53 Tube-B	1/16"	Indication on weld	Monitor					
Row-53 Tube-C	1/16"	Indication on weld	Monitor					
Row-53 Tube-D	1/16"	Indication on weld	Monitor					
Row-53 Tube-E	1/16"	Indication on weld	Monitor					
Row-54 Tube-B	1/16"	Indication on weld	Monitor					
Row-54 Tube-C	1/16"	Indication on weld	Monitor					
Row-54 Tube-D	1/16"	Indication on weld	Monitor					
Row-54 Tube-E	1/16"	Indication on weld	Monitor					
Row-55 Tube-A	1/16"	Indication on weld	Monitor					
Row-55 Tube-B	1/16"	Indication on weld	Monitor					
Inspector: Manny Gracie,	J. McCarthy	Level: II	Date: 05/02/2011					

THIELSCH ENGINEERING, INC.									
19	195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454								
	VISU	JAL EXAMINATION REPORT							
Job Name: AEP - Mitchell Generating Job Number: 43-11-0066 Station			Job Date: April 2011						
Component: Lower Finish Superheater Outlet Heade	-	Material: SA-213, T22	Procedure: NDT 11 FS						
Surface Condition:	Cast	Worked Paint Grit Blast Light Rust	✓ Other						
Examination Method:									
✓ Direct		Remote							
Aids Used _		Equipment							
*Sketch or Other Detail:	Ι								
LOCATION	SIZE (Inches)	DESCRIPTION	ACTION (ACCEPT/REJECT AND COMMENT)						
Row-55 Tube-C	1/16"	Indication on weld	Monitor						
Row-55 Tube-D	3/16"	Indication on weld	Reject - Requires repair						
Row-56 Tube-A	3/16"	Indication on weld	Reject - Requires repair						
Row-56 Tube-B	3/16"	Indication on weld	Reject - Requires repair						
Row-56 Tube-C	3/16"	Indication on weld	Reject - Requires repair						
Row-56 Tube-D	3/16"	Indication on weld	Reject - Requires repair						
Row-56 Tube-E	3/16"	Indication on weld	Reject - Requires repair						
Inspector: Manny Gracie,	J. McCarthy	Level: II	Date: 05/02/2011						

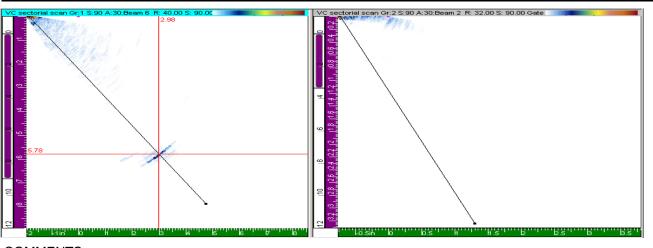
	THIELSC	H ENG	INEERING	, INC.		
	195 Frances Avenue	e - Cransto	on, RI 02910 -	(401) 467-6454		
	MAGNETIC P	ARTICLE E	EXAMINATION R	EPORT		
Job Name: AEP - Mitch	ell Generating Station	Job Date: /	April 2011	Job Number: 4	3-11-0066	
Component: Upper Finis		Material: S	SA-335, P22	Procedure: N	DT-21FS, R	ev. 8
Outlet Header - Unit No						
			TECHNIQUE	<u> </u>		
	Circular		Voke	Headshot	Coil	
Residual	Longitudinal		Prods	Central Cond.	Oth	er
CURRENT			WET	DRY		
✓ AC	AMP Turns		14AM	Red		
	Amperage		✓ 20B	Gray		
L	_ Other	 1	Other	Black		1
IDENTIFICATION	INDICATION SIZE	C	OMMENTS ON RE	SULTS	ACCEPT	REJECT
Girth Welds						
GW-1	N/A	No recorda	able indications.		х	
GW-2	N/A	No recorda	able indications.		х	
GW-3	N/A	No recorda	able indications.		х	
GW-4	N/A	No recorda	able indications.		х	
GW-5	N/A	No recorda	able indications.		x	
GW-6	N/A	No recorda	able indications.		х	
GW-7	N/A	No recorda	able indications.		Х	
Attachment Welds						
AW-1	N/A	No recorda	able indications.		х	
AW-2	N/A	No recorda	able indications.		х	
Penetrations						
P-1	N/A	No recorda	able indications.		Х	
P-2	N/A	No recorda	able indications.		Х	
P-3	N/A	No recorda	able indications.		х	
P-4	N/A	No recorda	able indications.		х	
			1			
INSPECTOR: Manny G	Gracie, J. McCarthy		LEVEL: II	DATE: 05/02/2	2011	

	THIELSC	H ENGI	NEERING,	INC.			
	195 Frances Avenue	- Cransto	on, RI 02910 - (4	401) 467-6454			
	MAGNETIC P	ARTICLE E	XAMINATION RE	PORT			
Job Name: AEP - Mitch Station	ell Generatting	Job Date: /	Job Date: April 2011 Job		Job Number: 43-11-0066		
Component: Lower Fini	shing Superheater	Material: S	SA-335, P22	Procedure:	NDT-21FS,	Rev. 8	
Outlet Header - Unit No							
			TECHNIQUE				
	Circular		✓ Yoke	Headshot	Coil		
Residual	Longitudinal		Prods	Central Con	d. 🗌 Oth	er	
CURRENT			WET	DRY			
⊡ AC	AMP Turns		14AM	Red			
	Amperage		✓ 20B	Gray			
L	Other		Other	Black			
IDENTIFICATION	INDICATION SIZE	co	MMENTS ON RES	BULTS	ACCEPT	REJECT	
Girth Welds							
GW-1	N/A	No recorda	able indications.		х		
GW-2	N/A	No recorda	able indications.		х		
GW-3	N/A	No recorda	able indications.		х		
GW-4	N/A	No recorda	able indications.		х		
GW-5	N/A	No recorda	able indications.		x		
GW-6	N/A	No recorda	able indications.		x		
GW-7	N/A	No recorda	able indications.		x		
GW-8	N/A	No recorda	able indications.		x		
Attachment Welds							
AW-1	N/A	No recorda	able indications.		x		
AW-2	N/A	No recorda	able indications.		x		
Penetrations							
P-1	N/A	No recorda	able indications.		x		
P-2	N/A	No recorda	able indications.		x		
P-3	N/A	No recorda	able indications.		x		
P-4	N/A	No recorda	able indications.		x		
INSPECTOR: Manny G	Gracie, J. McCarthy		LEVEL: II	DATE: 05/02	2/2011		

	Т	HIELSC	H ENG	INEER	ING, IN	IC.		
		nces Avenu						
	ULTRA	SONIC TI	HICKNES	S EXAMI	NATION F	REPORT		
Job Name: AEP - Mitch Station		0		b Date: April 2011 Job Number: 43-11-0066				
Component: Upper Fini Outlet Header - Unit No.		perheater	Material: S P22	A-335,	Nominal W 6.00"	all:	Minimum 5.692"	Wall:
EQUIPMENT NorthED:					KEY:			
✓ D-Meter	🗹 Pi-Tap	e	Other			North - Up	stream	
Micrometer	Calipe	rs				South -Dov	wnstream	
		DIAMETE	R MEASUR (IN.)	EMENTS	THICK	NESS MEA	SUREME	NTS (IN.)
IDENTIFICATION		Pi-TAPE	CALI	PERS	12:00	3:00	6:00	9:00
		FITAPE	12 to 6	3 to 9	12.00	3.00	0.00	9.00
GW-1	North	28.344			6.075	6.060	6.053	6.068
	South	28.344			6.188	6.197	6.235	6.209
GW-2	North	28.344			6.148	6.198	6.140	6.155
011-2	South	28.344			6.243	6.279	6.199	6.188
GW-3	North	28.344			6.075	6.068	6.080	5.983
011-5	South	28.344			6.260	6.285	6.199	6.249
GW-4	North	28.344			6.242	6.248	6.214	6.200
	South	28.344			6.065	6.128	6.108	6.098
GW-5	North	28.344			6.191	6.194	6.156	6.067
610-5	South	28.344			6.082	6.052	6.150	6.105
GW-6	North	28.344			6.219	6.156	6.141	6.205
000-0	South	28.344			6.242	6.270	6.204	6.209
GW-7	North	28.185			6.197	6.265	6.213	6.070
	South	28.185			6.115	6.108	6.102	6.093
INSPECTOR: T. Blazet	ic, D. Jal	kubowski		LEVEL: II		DATE: 05	/02/2011	

	TI	HIELSO	CH ENG	SINEER	RING, IN	IC.			
	195 Frai	nces Aveni	ue - Crans	ton, RI 02	910 - (401)	467-6454			
	ULTRA	SONIC T	HICKNES	S EXAM	INATION	REPORT			
Job Name: AEP - Mitch Station		U	Job Date: April 2011		Job Numbe	Job Number: 43-11-0066			
Component: Lower Finishing Superheate Outlet Header - Unit No. 1		iperheater	Material: S P22	SA-335,	Nominal W 6.00"	all:	Minimum 5.692"	Wall:	
EQUIPMENT NorthED:					KEY:		-		
✓ D-Meter	🗌 Pi-Tap	be	Other			North - Up	stream		
Micrometer	Calipe	ers				South -Do	wnstream		
		DIAMETE	ER MEASUF (IN.)	REMENTS	тніск	NESS MEA	SUREME	NTS (IN.)	
IDENTIFICATION	I		CALI	PERS					
	_	Pi-TAPE	12 to 6	3 to 9	12:00	3:00	6:00	9:00	
GW-1	North				6.049	6.044	6.044	6.050	
	South				6.078	6.080	6.068	6.043	
GW-2	North				6.199	6.214	6.172	6.136	
	South				5.995	6.046	6.065	6.105	
GW-3	North				6.164	6.130	6.254	6.239	
	South				6.256	6.242	6.180	6.206	
GW-4 —	North				6.120	6.103	6.154	6.201	
	South				6.127	6.159	6.267	6.240	
GW-5	North				6.188	6.122	6.086	6.126	
	South				6.197	6.221	6.166	6.190	
GW-6	North				6.129	6.133	6.157	6.106	
60.0	South				6.065	6.008	6.078	6.108	
GW-7	North				6.205	6.240	6.250	6.239	
	South				6.074	6.161	6.178	6.122	
GW-8	North				6.257	6.256	6.229	6.218	
	South				6.129	6.127	6.140	6.145	
INSPECTOR: T. Blazet	ic, D. Ja	kubowski		LEVEL: II		DATE: 05	/02/2011		

Customer:	American Electric P	ower Co	omponent:	Upper Finishing	Superheater
Unit Number: Project Number:	1 43-11-0066		eld Number: eld Configuratior	Outlet Header UFSHOH-GW1	cor
Procedure: Machine Informatior	TEI NDT 55 FS-PA		art Thickness:	6.0" MW	Cei
Model #	Serial #	Software Versio	n Calibration	Due Save	Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R TomoView-2.4R1		A-Sca	n
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequence	y Wedge Ang	le Probe	Aperture
5L64-A2	D0462	5MHz	55.0 Degree	s 0.756	'n
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Pł	nased Array)
Scale Type	Scale Factor	Video Filter	Rectificatio	n Band	Pass Filter
Compression	51/19	On	FW(Full Way	ve) 5MHz	
Voltage	Gain	Mode	Wave Type	Pulse	Width
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan	Туре
16	1	16	1.0	Secto	ral
Start Angle	Stop Angle	Angle Resolutio	on Focus Dept	h Soun	d Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126	in/us



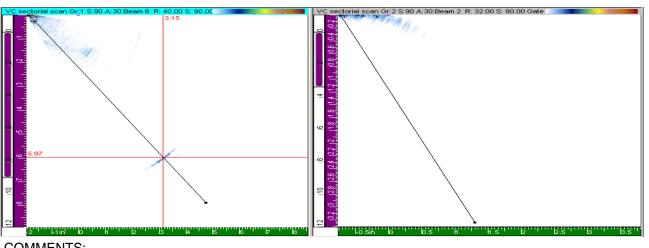
COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

Only the south side of weld was accessible for scanning due to the outside configuration

Date:

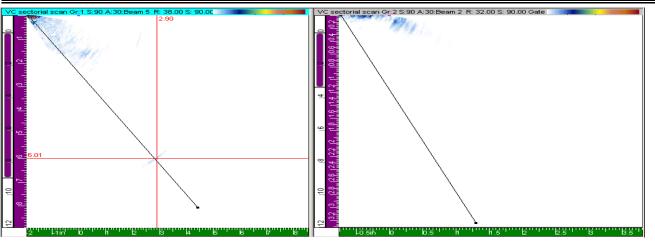
Customer:	American Electric Power		Compo	•		r Finishing Superheater	
Unit Number:	1		Weld N	umber:	UFSHOH		
Project Number:	43-11-0066		Weld C	onfiguration	: Header to	Header	
Procedure:	TEI NDT 55 FS-PA	Rev 0		ickness:	6.0" MW		
Machine Informatior							
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan	
		TomoView-2.	4R15				
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Ang	le	Probe Aperture	
5L64-A2	D0462	5MHz		55.0 Degree	S	0.756in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре	
14.502/30.122us	0.000in	10.280/3.830	in	28/28		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	n	Band Pass Filter	
Compression	51/19	On		FW(Full Way	/e)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	42/35dB	PE(Pulse Ecl	no)	Shear		100ns	
Transducer Calculato							
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us	



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

Customer:	American Electric	Power Compo		Finishing Superheater Header	
Unit Number:	1	Weld N		OH-GW3	
Project Number:	43-11-0066	Weld C	Configuration: Heade	r to Header	
Procedure:	TEI NDT 55 FS-P		hickness: 6.0" M		
Machine Informatior					
Model #	Serial #	Software Version	Calibration Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	51/19	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us	

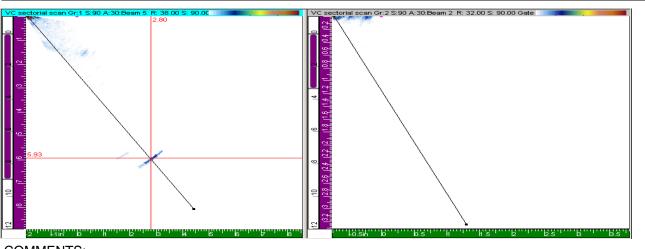


COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

Date:

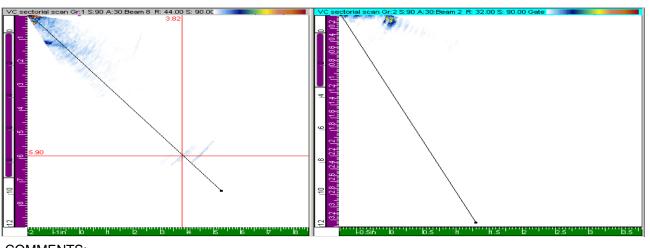
Customer:	American Electric Po	ower Comp		Upper Finishing Superheater
Unit Number:	1	Weld I		Outlet Header UFSHOH-GW4
Project Number:	43-11-0066	Weld (Configuration:	Header to Header
Procedure:	TEI NDT 55 FS-PA		-	6.0" MW
Machine Informatior				
Model #	Serial #	Software Version	Calibration D	ue Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	51/19	On	FW(Full Wave) 5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculato				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

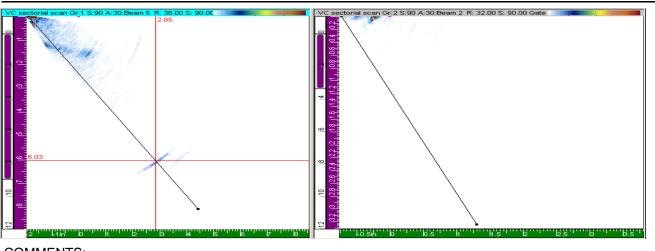
Customer:	American Electric Power		component:	Upper Fin Outlet He	Finishing Superheater	
Unit Number:	1	v	Veld Number:	UFSHOH		
Project Number:	43-11-0066	V	Veld Configuratio	n: Header to	Header	
Procedure:	TEI NDT 55 FS-PA		art Thickness:	6.0" MW		
Machine Information						
Model #	Serial #	Software Versi	on Calibration	n Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0F	R20 8/11		A-Scan	
		TomoView-2.4R	15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequen	cy Wedge An	gle	Probe Aperture	
5L64-A2	D0462	5MHz	55.0 Degre	es	0.756in	
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 path) PRF		Туре	
14.502/30.122us	0.000in	10.280/3.830in	28/28		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	on	Band Pass Filter	
Compression	51/19	On	FW(Full Wa	ave)	5MHz	
Voltage	Gain	Mode	Wave Type	•	Pulse Width	
80(volts)	42/35dB	PE(Pulse Echo)	Shear		100ns	
Transducer Calculato						
Element Quantity	1st Element	Last Element	Resolutior)	Scan Type	
16	1	16	1.0		Sectoral	
Start Angle	Stop Angle	Angle Resoluti	on Focus Dep	oth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in		0.126 in/us	



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

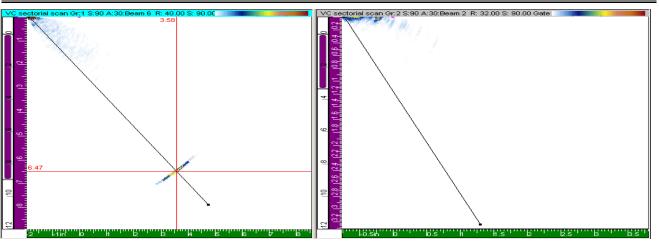
Customer:	American Electric Po	ower Compo		r Finishing Superheater t Header
Unit Number:	1	Weld N		HOH-GW6
Project Number:	43-11-0066	Weld C	configuration: Head	er to Header
Procedure:	TEI NDT 55 FS-PA		nickness: 6.0"	
Machine Informatior				
Model #	Serial #	Software Version	Calibration Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	51/19	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculato				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

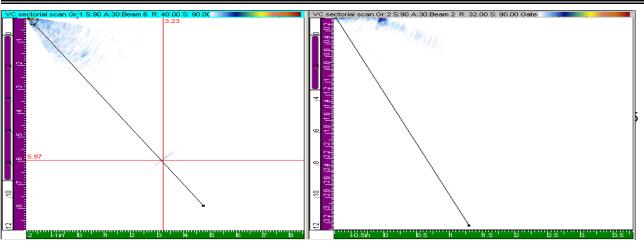
Customer:	American Electric Power		Component:		Upper Finishing Superheater	
Unit Number: Project Number:	1 43-11-0066		Weld Number: Weld Configuration		Outlet Header UFSHOH-GW7 1: Header to End Cap	
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0		ickness:	6.0" MW	•
Model #	Serial #	Software Ver	sion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20 TomoView-2.4R15		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequency		Wedge Angle		Probe Aperture
5L64-A2	D0462	5MHz		55.0 Degrees		0.756in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ith)	PRF		Туре
14.502/30.122us	0.000in	10.280/3.830i	n	28/28		PA(Phased Array)
Scale Type	Scale Factor	Video Filter	leo Filter		n	Band Pass Filter
Compression	51/19	On		FW(Full Wave)		5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	42/35dB	PE(Pulse Ech	0)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Element	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resolu	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us



COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

Customer:	American Electric Power		Component:		Lower Finishing Superheater Outlet Header	
Unit Number:			Weld Number:		LFSHOH-GW1	
Project Number: Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0	Weld Configuration: Header to ReducerPart Thickness:6.0" MW			
Model #	Serial #	Software Ver	Version Calibration		Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20 TomoView-2.4R15		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequency		Wedge Angle		Probe Aperture
5L64-A2	D0462	5MHz		55.0 Degrees		0.756in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	path) PRF			Туре
14.502/30.122us	0.000in	10.280/3.830i	in	28/28		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	51/19	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	42/35dB	PE(Pulse Ech	0)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resolu	ution	Focus Depth	า	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us



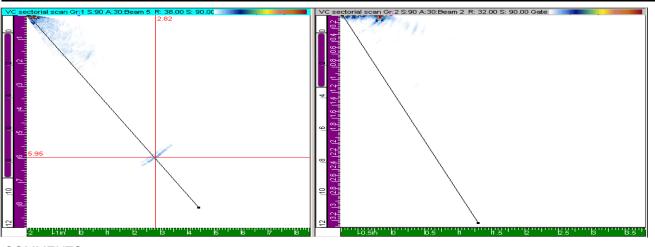
COMMENTS:

Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected

Only the south side of weld was accessible for scanning due to the outside configuration

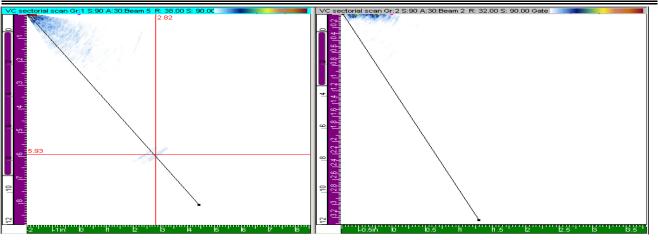
Date:

Customer:	American Electric Po	ower	Compone	ent:	Lower Finishing Superheater	
Unit Number:	1				Outlet Hea	GW2
Project Number: Procedure: Machine Informatior	43-11-0066 TEI NDT 55 FS-PA	Rev 0	Part Thic	nfiguration kness:	6.0" MW	Header
Model #	Serial #	Software Vers	sion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0 TomoView-2.4		8/11		A-Scan
Probe Characterizatior						
Probe Model	Probe Serial	Probe Freque	ency	Wedge Angl	e	Probe Aperture
5L64-A2	D0462	5MHz		55.0 Degrees	;	0.756in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	th)	PRF		Туре
14.502/30.122us	0.000in	10.280/3.830ir	n	28/28		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	1	Band Pass Filter
Compression	51/19	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	42/35dB	PE(Pulse Ech	o)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Element		Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resolu	ition	Focus Depth	1	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us



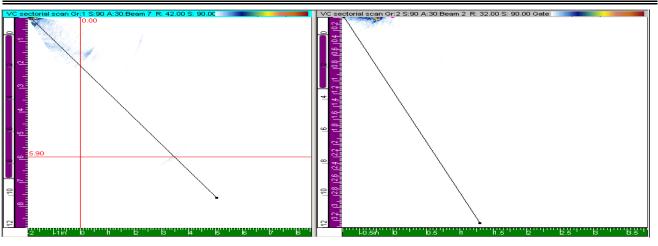
COMMENTS:

Customer:	American Electric Po	ower Compo	onent: Lower	r Finishing Superheater
			Outlet	Header
Unit Number:	1	Weld N	lumber: LFSH	OH-GW3
Project Number:	43-11-0066	Weld C	Configuration: Head	er to Header
Procedure:	TEI NDT 55 FS-PA	Rev 0 Part Th	nickness: 6.0" M	1W
Machine Informatior				
Model #	Serial #	Software Version	Calibration Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	51/19	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculato				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us



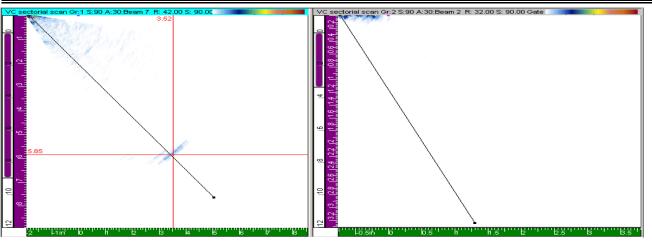
COMMENTS:

Customer:	American Electric Po	ower	Compo	onent:	Lower Fir	nishing Superheater
					Outlet He	
Unit Number:	1		Weld N	lumber:	LFSHOH	-GW4
Project Number:	43-11-0066		Weld C	Configuration	: Header to	b Header
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	nickness:	6.0" MW	
Machine Informatior						
Model #	Serial #	Software Ve	rsion	Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2	.0R20	8/11		A-Scan
		TomoView-2.	4R15			
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequ	ency	Wedge Angl	е	Probe Aperture
5L64-A2	D0462	5MHz		55.0 Degrees	6	0.756in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 pa	ath)	PRF		Туре
14.502/30.122us	0.000in	10.280/3.830	in	28/28		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	51/19	On		FW(Full Wav	e)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	42/35dB	PE(Pulse Ech	10)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth	ו	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us



COMMENTS:

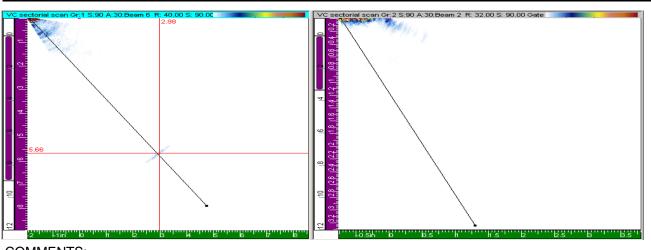
Customer:	American Electric Po	ower	Compo	onent:	Lower Finishing Superheater		
					Outlet He		
Unit Number:	1		Weld N	lumber:	LFSHOH	-GW5	
Project Number:	43-11-0066		Weld C	onfiguration	: Header to	b Header	
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Th	ickness:	6.0" MW		
Machine Informatior							
Model #	Serial #	Software Ver	sion	Calibration I	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.	0R20	8/11		A-Scan	
		TomoView-2.4	4R15				
Probe Characterizatior							
Probe Model	Probe Serial	Probe Freque	ency	Wedge Angl	е	Probe Aperture	
5L64-A2	D0462	5MHz		55.0 Degrees	6	0.756in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	th)	PRF		Туре	
14.502/30.122us	0.000in	10.280/3.830i	n	28/28		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter	
Compression	51/19	On		FW(Full Wav	e)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	42/35dB	PE(Pulse Ech	o)	Shear		100ns	
Transducer Calculato							
Element Quantity	1st Element	Last Element		Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Resolu	ution	Focus Depth	า	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us	



COMMENTS:

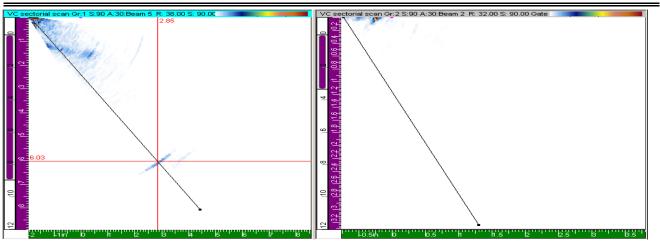
THIELSCH Phased-Array Report

Customer:	American Electric Po	ower	Compo	nent:	Lower Fin	ishing Superheater
Unit Number: Project Number: Procedure:	1 43-11-0066 TEI NDT 55 FS-PA	Rev 0		umber: onfiguration ickness:	Outlet He LFSHOH- Header to 6.0" MW	·GW6
Machine Informatior			-		-	
Model #	Serial #	Software Ve		Calibration	Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2		8/11		A-Scan
Probe Characterizatior		Tomoview-2.	.4K15			
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Angl	е	Probe Aperture
5L64-A2	D0462	5MHz	-	55.0 Degrees	S	0.756in
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре
14.502/30.122us	0.000in	10.280/3.830)in	28/28		PA(Phased Array)
Scale Type	Scale Factor	Video Filter		Rectification	า	Band Pass Filter
Compression	51/19	On		FW(Full Wav	ve)	5MHz
Voltage	Gain	Mode		Wave Type		Pulse Width
80(volts)	42/35dB	PE(Pulse Ecl	ho)	Shear		100ns
Transducer Calculato						
Element Quantity	1st Element	Last Elemen	nt	Resolution		Scan Type
16	1	16		1.0		Sectoral
Start Angle	Stop Angle	Angle Resol	ution	Focus Dept	h	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees		6.0/3.0in		0.126 in/us



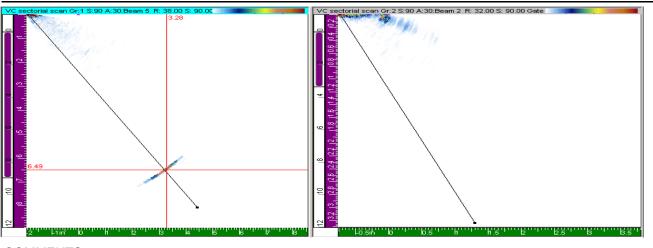
COMMENTS:

Customer:	American Electric	Power Compo	onent: Lower	Finishing Superheater
		-	Outlet	Header
Unit Number:	1	Weld N	lumber: LFSHC	DH-GW7
Project Number:	43-11-0066	Weld C	configuration: Heade	r to Header
Procedure:	TEI NDT 55 FS-PA	A Rev 0 Part Th	nickness: 6.0" M	W
Machine Informatior				
Model #	Serial #	Software Version	Calibration Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	51/19	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculato				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us



COMMENTS:

Customer:	American Electric Po	ower Compo	onent: Lower	Lower Finishing Superheater		
			Outlet	Header		
Unit Number:	1	Weld N	lumber: LFSH0	DH-GW8		
Project Number:	43-11-0066	Weld C	configuration: Heade	er to End Cap		
Procedure:	TEI NDT 55 FS-PA	Rev 0 Part Th	nickness: 6.0" M	W		
Machine Informatior						
Model #	Serial #	Software Version	Calibration Due	Save Mode		
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan		
		TomoView-2.4R15				
Probe Characterizatior						
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture		
5L64-A2	D0462	5MHz	55.0 Degrees	0.756in		
Setup						
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре		
14.502/30.122us	0.000in	10.280/3.830in	28/28	PA(Phased Array)		
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter		
Compression	51/19	On	FW(Full Wave)	5MHz		
Voltage	Gain	Mode	Wave Type	Pulse Width		
80(volts)	42/35dB	PE(Pulse Echo)	Shear	100ns		
Transducer Calculato						
Element Quantity	1st Element	Last Element	Resolution	Scan Type		
16	1	16	1.0	Sectoral		
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity		
30.0 Degrees	80.0 Degrees	1 Degrees	6.0/3.0in	0.126 in/us		



COMMENTS:

	THI	ELSC	HEN	GINE	ERIN	G, INC		
19	5 France		ie - Cran			. ,	67-6454	
			ESS ME					
Job Name: AEP - Mitche Station		U		e: April 20		Job Nun	nber: 43-11-	0066
Component: Upper Finisl Outlet Header - Unit No. 1		rheater	Material:	SA-335,	P22	Hardnes	s Scale: HB	N
Location:			Ha	ardness N	/leasurer	nents		Corresponding
		1						Tensile Strength
FSHOH-UPR-R1	Weld	165	167	192	189	185	180	86,000
	Base	161	160	159	157	154	158	76,000
FSHOH-UPR-R2	Weld	169	170	173	180	178	174	83,000
	Base	159	161	166	165	167	164	78,000
FSHOH-UPR-R3	Weld	164	165	163	159	160	162	78,000
	Base	173	172	171	150	149	163	78,000
FSHOH-UPR-R4	Weld	159	159	160	173	177	166	79,000
	Base	158	158	159	157	157	158	75,000
FSHOH-UPR-R5	Weld	177	196	169	171	172	177	85,000
	Base	148	164	153	143	144	150	72,000
	Weld	165	167	165	172	170	168	80,000
FSHOH-UPR-R6								
	Base	154	150	137	146	139	145	69,000
FSHOH-UPR-R7	Weld	151	143	136	144	157	146	70,000
	Base	149	150	151	160	151	152	73,000
Inspector: Manny Gracie,	John Mc	Carthy				Date: 05	5/04/2011	

	THI	ELSC	H EN	GINE	ERIN	G, INC).	
19	5 France					· /	67-6454	
			IESS ME		-			
Job Name: AEP - Mitche Station		C		e: April 2			nber: 43-11	
Component: Lower Finishing Superheater Material: SA-335, P22 Ha Outlet Header - Unit No. 1							ss Scale: HI	3N
Location:				ardness N	leasuren	1	1	Corresponding
		1	2	3	4	5	Average	Tensile Strength
FSHOH-LWR-R1	Weld	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Base	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FSHOH-LWR-R2	Weld	161	164	166	168	169	166	79,000
	Base	170	167	164	161	160	164	79,000
FSHOH-LWR-R3	Weld	165	170	171	173	175	171	81,000
	Base	159	158	155	159	161	158	76,000
FSHOH-LWR-R4	Weld	170	170	171	172	174	171	82,000
	Base	174	172	172	171	169	172	82,000
FSHOH-LWR-R5	Weld	158	156	149	134	133	146	70,000
	Base	169	167	166	164	166	166	80,000
FSHOH-LWR-R6	Weld	155	163	186	160	158	164	79,000
	Base	147	138	143	146	147	144	69,000
FSHOH-LWR-R7	Weld	180	186	173	176	173	178	85,000
	Base	148	155	149	137	141	146	70,000
FSHOH-LWR-R8	Weld	180	178	155	156	169	168	80,000
	Base	149	155	153	149	147	151	72,000
Inspector: Manny Gracie,	John McC	Carthy				Date: 05	5/04/2011	

APPENDIX E

NONDESTRUCTIVE EXAMINATION REPORTS HIGH-PRESSURE REHEAT OUTLET HEADER

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 227 of 256

Header Minimum Wall Calculation AEP - Mitchell Generating Station HP Reheat Outlet Header - Unit No. 1 Seam Welded

The minimum wall thickness requirements were calculated for the HP Reheat Outlet header. These calculations are based on the Original 1968 ASME Code for Boiler and Pressure Vessels, Per ASME Sect I, PG27.2.2.

ASTM Material Specifications for:

SA-387, Gr. D

Where:

T- Design Temperature P- Maximum Allowable Pressure D- Outside Diameter SE- Maximum Stress Value W-Weld Strength Reduction Factor y-Temperature Coefficient A- Additional Thickness

	_
1040	°F
1,200	psig
44.446	in
6,200	psi
0.82	
0.70	
0.000	in
	-

The following equation applies: Per. Sect I, PG 27.2.2

 $t_m = (PD/(2(SEW+PY))+A$

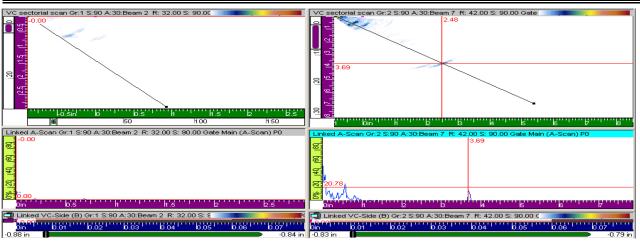
4.502	in

	THIELSC	H ENG	INEERING,	INC.		
	195 Frances Avenue					
	MAGNETIC P	ARTICLE E	XAMINATION RE	EPORT		
Job Name: AEP - Mitchell Generating Station Job Date: April 2011 Job Number: 43-					3-11-0066	
Component: High-Press	sure Reheat Outlet	Material: \$	SA-387, Gr. D	Procedure: ND	T-21FS, R	ev. 8
Header - Unit No. 1 EXAMINATION METHO			TECHNIQUE			
			TECHNIQUE	Headshot		
				Central Cond.		
Residual			Prods		L] Ot	her
CURRENT	-		WET	DRY Red		
I I AC	AMP Turns		☐ 14AM ✓ 20B	Gray		
	Amperage ——— Other ———		Other	Black		
L		I			1	
IDENTIFICATION	INDICATION SIZE	c	OMMENTS ON RE	SULTS	ACCEPT	REJECT
Girth Welds						
GW-1	N/A	No recorda	able indications.		х	
GW-2	N/A	No recorda	able indications.		х	
GW-3	1/4"	Longitudin	al indication. Req	uires repair		х
Attachment Welds						
AW-1	N/A	No recorda	able indications.		х	
AW-2	N/A	No recorda	able indications.		x	
AW-3	3"	Indication	in toe of weld. Red	quires repair.		х
AW-4	N/A	No recorda	able indications.		х	
AW-5	N/A	No recorda	able indications.		х	
AW-6	N/A	No recorda	able indications.		x	
AW-7	N/A	No recorda	able indications.		x	
Seam Welds						
LS-1W	N/A	No recorda	able indications.		x	
LS-2W	N/A	No recorda	able indications.		x	
LS-3W	N/A	No recorda	able indications.		x	
LS-1E	N/A	No recorda	able indications.		x	
LS-2E	N/A	No recorda	able indications.		x	
LS-3E	N/A	No recorda	able indications.		x	
Penetrations						
P-1	N/A	No recorda	able indications.		x	
P-2	N/A	No recorda	able indications.		x	
P-3	N/A	No recorda	able indications.		x	
P-4	N/A	No recorda	able indications.	1	x	
INSPECTOR: Manny G	Gracie, J. McCarthy		LEVEL: II	DATE: 05/02/2	011	

	THIELSC	H ENG	INEERING	i, INC.		
	195 Frances Avenue	e - Cranst	on, RI 02910 -	(401) 467-6454		
	MAGNETIC F	PARTICLE E	EXAMINATION F	EPORT		
Job Name: AEP - Mitch	ell Generating Station	Job Date: /	April 2011	Job Number: 43	8-11-0066	
Component: High-Press	sure Reheat Outlet	Material: S	SA-387, D	Procedure: ND	T-21FS, Re	v. 8
Header - Unit No. 1 EXAMINATION METHO			TECHNICHE			
			TECHNIQUE	Headshot	Coi	
	Circular			Central Cond.		
Residual	Longitudinal		Prods		Oth	ner
CURRENT	_		WET 14AM			
	AMP Turns		☐ 14AM	Red		
	Amperage		Other	Gray Black		
L	Other					
IDENTIFICATION	INDICATION SIZE	c	COMMENTS ON R	ESULTS	ACCEPT	REJECT
Tube Stubs						
Row 52, Tube I	1" LT	Linear indi	cation in toe of w	eld.	Monitor	
Row 77, Tube E	1/8" LT	Linear indi	cation in toe of w	eld.	Monitor	
Row 80, Tube J	1/8" TW	Transverse	e indication remov	x		
Dow 00 Tube I	1/2" TW (x2)	Transverse	e indication remov	ved by grinding.	х	
Row 88, Tube J	1" LT	Linear indi	cation in toe of w	Monitor		
Row 96, Tube J	1/4" TW	Transverse	e indication remov	ved by grinding.	х	
Row 97, Tube C	1/2" LT	Linear indi	cation in toe of w	eld.	Monitor	
Note: Tube stubs in ev were revealed.	very 5th row from the	e north end	l were examined	. No other record	dable indic	ations
					044	
INSPECTOR: Manny G	Fracie, J. McCarthy		LEVEL: II	DATE: 05/02/20	011	

					NG, INC			
					0 - (401)40			
					ATION RE			
Job Name: AEP - Mitche Station		-	Job Date: A	•	Job Number: 43-11-0066			
Component: High-Press Header - Unit No. 1	sure Reh	eat Outlet	Material: S	A-387, D	Nominal W 4.598"	all:	Minimum 4.502"	Wall:
EQUIPMENT USED:					KEY:			
✓ D-Meter	🗹 Pi-Tap	be	Other			US - Upstr	eam	
Micrometer Calipers					7-6454 PORT r: 43-11-0066 all: Minimum Wall:			
		ER MEASUF (IN.)	REMENTS	THICKN	ESS MEAS	UREMEN	TS (IN.)	
IDENTIFICATION			CAL	PERS	40-00	2.00	6-00	0.00
		Pi-TAPE	12 to 6	3 to 9	12:00	3:00	6:00	9:00
GW-1	US	N/A			N/A	4.345	N/A	N/A
6W 1	DS	N/A			N/A	4.842	N/A	N/A
GW-2	US	N/A			4.782	4.793	4.385	4.773
600-2	DS	44.904			4.800	4.795	4.375	4.756
GW-3	US	N/A			4.817	4.865	4.425	4.855
Gw-3	DS	44.904			4.758	4.765	4.393	4.799
	1							
			1		1			
	1		1		1			
INSPECTOR: T. Blazet	tic, D. Ja	kubowski	1	LEVEL: II	1	DATE: 05	/02/2011	

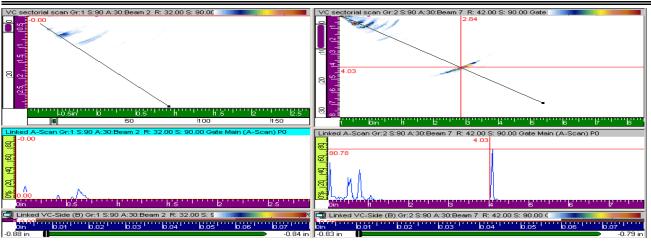
Customer:	American Electric Power		Compone	ent:	High-Pressure Reheat		
Unit Number: Project Number:	1 43-11-0066		0		Outlet Header HPRHOH-GW-1 n: Header to End Cap		
Procedure: Machine Informatior	TEI NDT 55 FS-PA	Rev 0	Part Thic	kness:	4.598" MV	V	
Model #	Serial #	Software Ve	rsion	Calibration I	Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2		8/11		A-Scan	
Probe Characterizatior							
Probe Model	Probe Serial	Probe Frequ	iency	Wedge Angle		Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees	3	0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре	
10.471/10.440us	0.000in	3.430/9.281ir	า	4/4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification	1	Band Pass Filter	
Compression	17/46	On		FW(Full Wav	e)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	27/37dB	PE(Pulse Ec	ho)	Shear		100ns	
Transducer Calculator							
		Last Elemen	+	Resolution		Scan Type	
Element Quantity	1st Element	Last Elemen		nooonation		ooun rype	
Element Quantity	1st Element	16	it.	1.0		Sectoral	
•	1st Element 1 Stop Angle				n		



COMMENTS:

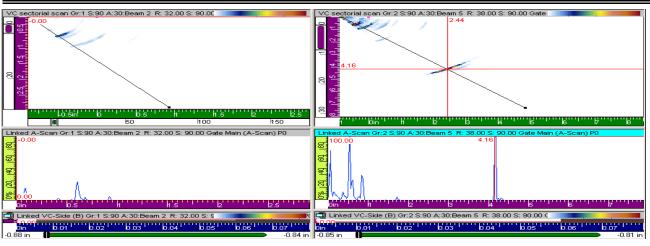
Image of typical 360° non-relevant root signal / Root geometry No Relevant Indications Detected Only the 2:00 to 5:00 location was accessible for scanning / Clockwise looking south

Customer:	American Electric Po	ower Component:		nent:	High-Pressure Reheat Outlet Header		
Unit Number: Project Number: Procedure: Machine Informatior	1 43-11-0066 TEI NDT 55 FS-PA	Rev 0	Weld Number: Weld Configuration: Part Thickness:		HPRHOH-GW-2		
Machine miormation	Serial #	Software Ve	rsion	Calibration D		Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2 TomoView-2	.0R20	8/11		A-Scan	
Probe Characterizatior			-				
Probe Model	Probe Serial	Probe Frequency		Wedge Angle		Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	ath)	PRF		Туре	
10.471/10.440us	0.000in	3.430/9.281 ir	า	4/4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter		Rectification		Band Pass Filter	
Compression	17/46	On		FW(Full Wave))	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
80(volts)	27/37dB	PE(Pulse Ec	ho)	Shear		100ns	
Transducer Calculato							
Element Quantity	1st Element	Last Elemen	t	Resolution		Scan Type	
16	1	16		1.0		Sectoral	
Start Angle	Stop Angle	Angle Resol	ution	Focus Depth		Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees		5.0in		0.126 in/us	



COMMENTS:

Customer:	American Electric Po	•		•	High-Pressure Reheat Outlet		
Unit Number: Project Number: Procedure:	1 43-11-0066 TEI NDT 55 FS-PA	Rev 0	Weld Number: Weld Configuratio Part Thickness:	Header HPRHOH- n: Header to 4.598" MW	Header		
Machine Informatior							
Model #	Serial #	Software Ver	sion Calibration	Due	Save Mode		
Omni Scan MX	Omni- 1179	Scan:Omni-2.4 TomoView-2.4			A-Scan		
Probe Characterizatior							
Probe Model	Probe Serial	Probe Freque	ency Wedge Ang	gle	Probe Aperture		
5L16-A1	C0055	5MHz	55.0 Degree	es	0.378 in		
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 pa	th) PRF		Туре		
10.471/10.440us	0.000in	3.430/9.281in	4/4		PA(Phased Array)		
Scale Type	Scale Factor	Video Filter	Rectificatio	on	Band Pass Filter		
Compression	17/46	On	FW(Full Wa	ive)	5MHz		
Voltage	Gain	Mode	Wave Type	1	Pulse Width		
80(volts)	27/37dB	PE(Pulse Ech	o) Shear		100ns		
Transducer Calculato							
Element Quantity	1st Element	Last Element	Resolution		Scan Type		
16	1	16	1.0		Sectoral		
Start Angle	Stop Angle	Angle Resolu	ition Focus Dep	th	Sound Velocity		
30.0 Degrees	80.0 Degrees	1 Degrees	5.0in		0.126 in/us		



COMMENTS:

THIELSCH ENGINEERING Phased Array Calibration

Customer:	American Electric Po	ower	Compon	ent:	High-Pressure Reheat Outlet		
Unit Number: Project Number:	1 43-11-0066		Weld Nu Weld Co		Header See Attached Report Longitudinal Seam		
Procedure:	TEI NDT 55 FS-PA	Rev 0	Part Thic		4.598" MW		
Machine Informatior							
Model #	Serial #	Software V	ersion	Calibration D)ue	Calibration ID#	
Omni Scan MX	Omni-1179	Scan:Omni-	2.0R5	8/11		42811.5.0"	
		Analysis:To	moView-2.4R1				
Probe Characterizatior							
Probe Model	Probe Serial	Probe Freq	uency	Wedge Angle		Probe Aperture	
5L16-A1	C0055	5MHz		55.0 Degrees		0.378 in	
Setup							
Beam Delay	Start(1/2 path)	Range(1/2 p	oath)	PRF		Туре	
10.471/10.440us	0.000in	3.430/9.281	in	4/4		PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	•	Rectification		Band Pass Filter	
Compression	17/46	On		FW(Full Wave	e)	5MHz	
Voltage	Gain	Mode		Wave Type		Pulse Width	
30(volts)	27/37dB	PE(Pulse Ed	cho)	Shear		100ns	
Fransducer Calculato							
Element Quantity	1st Element	Last Eleme	nt	Resolution		Scan Type	
6	1 Ston Angle	16 Amerika D agaa		1.0 Fears Denth		Sectoral	
S tart Angle 60.0 Degrees	Stop Angle 80.0 Degrees	Angle Reso 2.0 Degrees		Focus Depth 5.0in		Sound Velocity 0.126 in/us	
ncoder / Scan Area							
Encoder Model	Serial #	Туре		Resolution		Polarity	
JSDigital	USD3127	Quadrature		220.0step/in		Normal	
Scan Resolution	Max Scan Speed	Couplant		PCS		Cal. Block Reflector	
).050in	9.842in/sec	Sonatech	ectorial scan Gr:2 S	0in		NAV-0.040"SDH	
VC sectorial scan Gr:1 S:90 A:30.E	0.88 0.5 h H.5 2		3.92		3.89	5	
inked A-Scan Gr:1 S:90 A:30:Bea	m 7 R: 42.00 S: 90.00 Gate Main (A-Scan) PO	d A-Scan Gr:2 S:90	A:30:Beam 11 R: 50	1.00 S: 90.00 Gate 3.92	e Main (A-Scan) P0	
공 공 국 국 53.33 국 전 2 0in D.5 바	1.87	100% 120 160 160 160 160 160 160 160 160 160 16	(.45	5 ¹ ¹⁹ ¹⁹	3.92		
Date / Time	Date / Time	Date	e / Time	Date	/ Time	Date / Time	
		1					
4/28 - 7AM	4/29 - 7AM						

Customer:	American Electric Power	Component:	High-Pressure Reheat Outlet Header
Unit Number: Project Number: Procedure: Calibration ID #:	1 43-11-0066 TEI NDT 55 FS-PA Rev 0 42811-5.0"	Weld Configuration: Part Thickness: Part Diameter:	Longitudinal Seam 4.598" MW 40"

Weld #	Indication	Scan Location	Range of Depth	Comments / Obstructions
LS-1E	No Relevant	Indications Detected		Hand Scanned / Non-Encoded
LS-1W	No Relevant	Indications Detected		Hand Scanned / Non-Encoded
LS-2E	No Relevant	Indications Detected		Hand Scanned / Non-Encoded
LS-2W	No Relevant	Indications Detected		Hand Scanned / Non-Encoded
LS-3E	No Relevant	Indications Detected		Hand Scanned / Non-Encoded
LS-3W	No Relevant	Indications Detected		Hand Scanned / Non-Encoded

Notes and Comments

All seam welds were hand scanned non-encoded due to accessibility because of adjacent tube rows

	THIE	ELSC	HEN	GINE	ERINO	G, INC	· · · · · · · · · · · · · · · · · · ·	
1	95 Frances							
		HARDN	IESS MEA	SUREM	ENT SHE	ET		
Job Name: AEP - Mitche Station	ell Generati	ng	Job Date	e: April 20	011	Job Num	nber: 43-11-	0066
Component: High-Press Header - Unit No. 1	ure Reheat	Outlet	Material:	SA-387,	D	Hardnes	s Scale: HE	BN
Leastion			Ha	ardness N	/leasurer	nents		Corresponding
Location:		1	2	3	4	5	Average	Tensile Strength
	Girth	166	171	173	177	175	172	82,000
HPROH-R1	Seam	156	169	167	191	156	168	80,000
	Base	138	149	145	159	153	149	71,000
	Girth	155	163	170	172	187	169	81,000
HPROH-R2	Seam	160	161	155	164	153	159	76,000
	Base	140	133	151	153	144	144	69,000
	Girth	149	151	149	139	149	147	70,000
HPROH-R3	Seam	159	169	168	151	159	161	77,000
	Base	134	152	139	136	137	140	67,000
	Girth	152	159	138	157	172	156	74,000
HPROH-R4	Seam	134	154	153	165	158	153	73,000
	Base	125	129	122	145	136	131	64,000
	Girth	166	164	155	160	166	162	78,000
HPROH-R5	Seam	138	139	145	145	151	144	69,000
	Base	160	160	170	170	146	161	77,000
	Girth	154	145	140	153	168	152	73,000
HPROH-R6	Seam	157	154	153	138	128	146	71,000
	Base	156	157	148	137	141	148	70,000
	Girth	189	197	194	196	191	193	91,000
HPROH-R7	Seam	178	154	179	177	184	174	83,000
	Base	142	141	143	154	141	144	69,000
	Girth	156	154	150	178	151	158	75,000
HPROH-R8	Seam	152	154	145	138	134	145	69,000
	Base	151	150	152	137	135	145	69,000
Inspector: Manny Gracie	e I McCarl	hv				Date: 05	/02/2011	
nopoliti. Manny Oracle	, 0. 100000	y				Duit. 00		

APPENDIX F

NONDESTRUCTIVE EXAMINATION REPORTS LOW-PRESSURE REHEAT OUTLET HEADER

Header Minimum Wall Calculation AEP - Mitchell Generating Station Unit No. 1 - Low-Pressure Reheat Outlet Header Seam Welded

The minimum wall thickness requirements were calculated for the LP Reheat Outlet header. These calculations are based on the 2010 ASME Code for Boiler and Pressure Vessels, Per ASME Sect I, PG27.2.2.

ASTM Material Specifications for:

SA-387, Gr. 91, Cl. 2

Where:

T- Design Temperature P- Maximum Allowable Pressure D- Outside Diameter SE- Maximum Stress Value W-Weld Strength Reduction Factor y-Temperature Coefficient A- Additional Thickness

 1065
 °F

 475
 psig

 50.625
 in

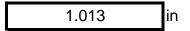
 12,890
 psi

 0.90
 0.70

 0.000
 in

The following equation applies: Per. Sect I, PG 27.2.2

t_m=(PD/(2(SEW+PY))+A



	THIELSC	H ENG	INEERING	, INC.		
	195 Frances Avenue					
	MAGNETIC F	PARTICLE E	EXAMINATION R	EPORT		
Job Name: AEP - Mitch	ell Generating Station	Job Date: A	April 2011	Job Number: 43	-11-0066	
Component: Low-Press	sure Reheat Outlet		SA-387, Gr. 91	Procedure: NDT	-21FS, Re	v. 8
Header - Unit No. 1	חר	Cl. 2	TECHNIQUE			
	-		Voke	Headshot	Co	il
	Circular		Prods	Central Cond.		
			WET	DRY		iei
	AMP Turns		14AM	Red		
	Amperage ——		✓ 20B	🗌 Gray		
	Other		Other	Black		
IDENTIFICATION	INDICATION SIZE	CC	OMMENTS ON R	ESULTS	ACCEPT	REJECT
Girth Welds						
GW-1	N/A		able indications.		X	
GW-2	N/A		able indications.		х	
GW-3	1/8"	Indication of	on weld. Remove	d by grinding.	х	
GW-4	N/A		able indications.	х		
GW-5	N/A		able indications.	x		
GW-6	N/A	No recorda	able indications.	х		
GW-7	N/A	No recordable indications.			х	
GW-8	N/A	No recorda	able indications.	х		
Attachment Welds						
AW-1	10" LT	Linear indic	cation on toe of w	eld.		x
	3/4" TW	Transverse	e indication on we	ld.		х
AW-2	N/A	No recorda	able indications.		х	
AW-3	10" (x2)	Indication of	on both sides.			х
AW-4	N/A	No recorda	able indications.		х	
AW-5	N/A	No recorda	able indications.		х	
AW-6	N/A	No recorda	able indications.		х	
Seam Welds						
LS-01	N/A	No recorda	able indications.		х	
LS-02	N/A	No recorda	able indications.		x	
LS-03	N/A	No recorda	able indications.		x	
LS-04	N/A	No recorda	able indications.		x	
LS-05	N/A	No recorda	able indications.		x	
LS-06	N/A		able indications.		x	
LS-07	1"	Linear india 1/2"	cation on toe of w	eld. Ground to		x
	1/2"	Linear indic	cation on toe of w	eld.		x
LS-08	N/A	No recorda	able indications.		х	
INSPECTOR: Manny Gracie, J. McCarthy LEVEL: II DATE: 05/02/2011						

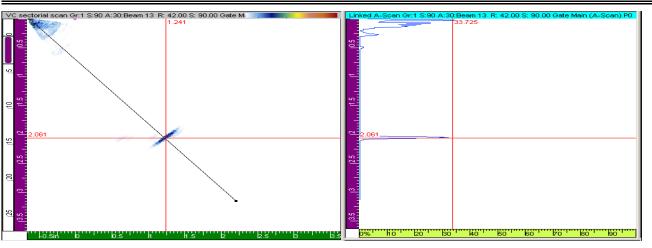
THIELSCH ENGINEERING, INC.								
	195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
	MAGNETIC P	ARTICLE E	XAMINATION R	EPORT				
Job Name: AEP - Mitche	ell Generating Station	Job Date: A	April 2011	Job Number: 43-11-0066				
	Component: Low-Pressure Reheat Outlet N			Procedure: ND	T-21FS, Re	v. 8		
Header - Unit No. 1 EXAMINATION METHO	חנ	Cl. 2, SA-2	13, Gr. T22 TECHNIQUE					
	Circular		✓ Yoke	Headshot	Coil			
			Prods	Central Cond.	Oth			
CURRENT			WET	DRY				
⊡ AC	AMP Turns		14AM	Red				
	Amperage		✓ 20B	Gray				
	Other		Other	Black				
IDENTIFICATION	INDICATION SIZE	С	OMMENTS ON RE	SULTS	ACCEPT	REJECT		
Penetration Welds								
P-1	N/A	No recorda	ble indications.		х			
P-2	N/A	No recorda	ble indications.		х			
P-3	N/A	No recorda	ble indications.		х			
P-4	N/A	No recorda	ble indications.		х			
Tube Stubs								
Row 5, Tube C	1/4"	Indication of	on weld. Remove	х				
Row 5, Tube D	1/4"	Indication of	on weld.	Monitor				
Row 5, Tube E	1/8"	Indication of	on weld.		Monitor			
Row 5, Tube J	1/4"	Indication of	on weld.		Monitor			
Row 9, Tube E	1/4"	Indication of	on weld.		Monitor			
Row 9, Tube F	1/4"	Indication of	on weld.		Monitor			
Row 13, Tube F	1/4"	Indication of	on weld.		Monitor			
Row 15, Tube H	1"	Linear indic	cation on toe of w	eld.	Monitor			
Row 17, Tube F	1/4"	Indication of	on weld.		Monitor			
Row 17, Tube G	1/4"	Indication of	on weld.		Monitor			
Row 21, Tube E	1/4"	Indication of	on weld.		Monitor			
Row 21, Tube F	1/4"	Indication of	on weld.		Monitor			
Row 25, Tube I	1/4"	Indication of	on toe of weld.		Monitor			
Row 29, Tube E	1/4"	Indication of	on toe of weld.		Monitor			
Row 29, Tube F	1/4"	Indication of	on toe of weld.		Monitor			
Row 29, Tube G	1/4"	Indication of	on toe of weld.		Monitor			
Row 29, Tube I	1/4"	Indication of	on toe of weld.		Monitor			
Row 33, Tube E	1/4"	Indication of	on toe of weld.		Monitor			
Row 33, Tube F	1/4"	Indication of	on toe of weld.		Monitor			
INSPECTOR: Manny G	Bracie, J. McCarthy		LEVEL: II	DATE: 05/02/2	011			

	THIELSC	H ENG	INEERING	, INC.		
	195 Frances Avenue	e - Cranste	on, RI 02910 -	(401) 467-6454		
	MAGNETIC P	ARTICLE E	EXAMINATION R	EPORT		
Job Name: AEP - Mitch	ell Generating Station	Job Date: A	April 2011	Job Number: 43-	-11-0066	
Component: Low-Press Header - Unit No. 1	sure Reheat Outlet	Material: S	SA-387, Gr. 91	Procedure: NDT	-21FS, Rev	. 8
EXAMINATION METHO	חכ	0I. Z	TECHNIQUE			
Continuous	Circular		✓ Yoke	Headshot	Coi	
			Prods	Central Cond.	Oth	
CURRENT			WET	DRY		
⊡ AC	AMP Turns		14AM	Red		
	Amperage ––––		✓ 20B	Gray		
	Other		Other	Black		
IDENTIFICATION	INDICATION SIZE	C		ESULTS	ACCEPT	REJECT
Tube Stubs						
Row 37, Tube F	1/4"	Indication of	on toe of weld.		Monitor	
Row 37, Tube G	1/4"	Indication of	on toe of weld.		Monitor	
Row 41, Tube E	1/4"	Indication of	on toe of weld.		Monitor	
Row 41, Tube F	1/4"	Indication on toe of weld.			Monitor	
Row 45, Tube E	1/4"	Indication on toe of weld.			Monitor	
Row 45, Tube F	1/4"	Indication of	on toe of weld.		Monitor	
Row 49, Tube E	1/4"	Indication of	on toe of weld.		Monitor	
Row 57, Tube F	1/4"	Indication of	on toe of weld.		Monitor	
Row 89, Tube H	1/4"	Indication of	on weld. Remove	d.	х	
Note: Tube stubs in ev were revealed.	very 4th row from the	e north end	were examined	. No other record	lable indica	ations
INSPECTOR: Manny G	Gracie, J. McCarthy		LEVEL: II	DATE: 05/02/20	011	

	TI	HIELSC	H ENG	NEER	ING, IN	C.		
	195 Frar	nces Avenu	e - Cransto	on, RI 029 [,]	10 - (401)	467-6454		
L L L	ULTRA	SONIC TH	ICKNESS	EXAMIN	NATION F	REPORT		
Job Name: AEP - Mitche Station		U		Job Date: April 2011 Job Number: 43-11-0066				
Component: Low-Pressure Reheat Outlet Header - Unit No. 1		Material: S 91 Cl. 2	A-387, Gr.	Nominal W 1.875"	all:	Minimum 1.013"	Wall:	
EQUIPMENT NorthED:					KEY:		•	
✓ D-Meter	🗹 Pi-Tap	e	Other			North - Up	stream	
Micrometer	Calipe	rs				South -Do	wnstream	
		DIAMETE	R MEASUR (IN.)	EMENTS	THICKN	IESS MEAS	SUREMEN	ITS (IN.)
IDENTIFICATION	1		CALIF	PERS	10.00			
		Pi-TAPE	12 to 6	3 to 9	12:00	3:00	6:00	9:00
GW-1	North	N/A			1.885	1.964	1.955	1.895
000-1	South	51.035			1.900	1.904	1.904	1.908
GW-2	North	50.876			1.900	1.905	1.908	1.895
600-2	South	50.756			1.885	1.877	1.887	1.893
GW-3	North	50.717			1.904	1.890	1.892	1.887
600-5	South	50.637			1.901	1.902	1.902	1.898
GW-4	North	50.637			1.904	1.904	1.911	1.908
500-4	South	50.717			1.900	1.891	1.898	1.899
GW-5	North	50.916			1.902	1.883	1.900	1.895
000-0	South	50.916			1.893	1.876	1.888	1.891
GW-6	North	50.637			1.909	1.900	1.893	1.922
500-0	South	50.637			1.880	1.881	1.870	1.884
GW-7	North	50.637			1.900	1.891	1.881	1.895
607	South	50.916			1.885	1.881	1.873	1.893
GW-8	North	50.916			1.899	1.879	1.869	1.885
000-0	South	50.756			1.909	1.905	1.894	1.907
INSPECTOR: M. Graci	e, J. McC	Carthy		LEVEL: II		DATE: 05	/02/2011	

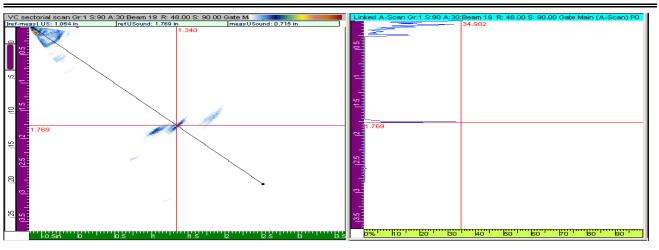
THIELSCH

Customer: Unit Number:	American Electric Po 1		component:	Low-Pressure Reheat Outlet Header
Project Number:	43-11-0066	-	Veld Number:	LPRHOH-GW1
Procedure:	TEI NDT 55 FS-PA	Rev 0 V	Veld Configuration:	Header to End Cap
Machine Information		P	art Thickness:	1.875"
Model #	Serial #	Software Versi	on Calibration D	ue Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0F	820 8/11	A-Scan
		TomoView-2.4R	15	
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequen	cy Wedge Angle	Probe Aperture
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path) PRF	Туре
5.820us	0.000in	4.237in	5	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	21	On	FW(Full Wave	e) 5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculator				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resoluti	on Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us



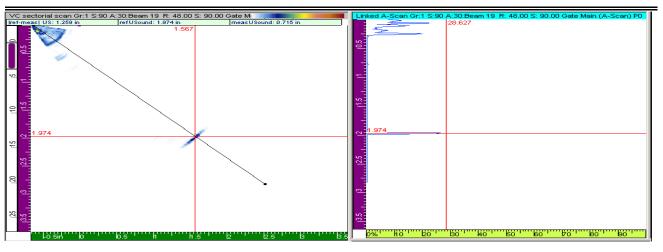
COMMENTS:

Customer: Unit Number:	American Electric	Power Compo		Low-Pressure Reheat Outlet Header	
Project Number:	43-11-0066	Weld N	lumber: LPR	HOH-GW2	
Procedure:	TEI NDT 55 FS-P	A Rev 0 Weld C	configuration: Hea	der to Header	
Machine Information		Part Th	nickness: 1.87	5"	
Model #	Serial #	Software Version	Calibration Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
5.820us	0.000in	4.237in	5	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	21	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us	



COMMENTS:

Customer: Unit Number:	American Electric P	ower Compo		Low-Pressure Reheat Outlet Header	
Project Number:	43-11-0066	Weld N	lumber: LP	RHOH-GW3	
Procedure:	TEI NDT 55 FS-PA	Rev 0 Weld C	configuration: He	ader to Header	
Machine Information			-	75"	
Model #	Serial #	Software Version	Calibration Due	Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
5.820us	0.000in	4.237in	5	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	21	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculator					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us	



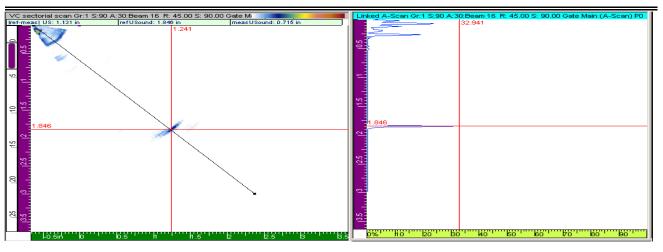
COMMENTS:

Image of typical 360 degree non-relevant root signal / Root geometry

No Relevant Indication Detected

Only the north side of weld was accessible for scanning due to hanger attachment

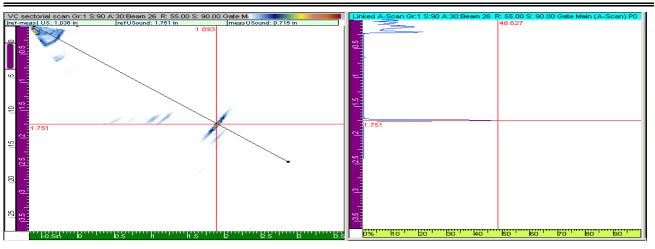
Customer: Unit Number:	American Electric Po	ower Comp	onent:	Low-Pressure Reheat Outlet Header	
Project Number:	43-11-0066	Weld	Number:	LPRHOH-GW4	
Procedure:	TEI NDT 55 FS-PA	Rev 0 Weld	Configuration:	Header to Header	
Machine Information		Part T	hickness:	1.875"	
Model #	Serial #	Software Version	Calibration Du	e Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
5.820us	0.000in	4.237in	5	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	21	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us	



COMMENTS:

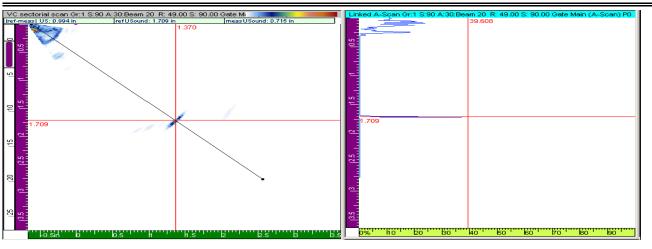
THIELSCH ENGINIEERING Phased-Array Report Component: Low-F

Customer: Unit Number:	American Electric	Power Compo	onent:	Low-Pressure Reheat Outlet Header	
Project Number:	43-11-0066	Weld N	lumber:	LPRHOH-GW5	
Procedure:	TEI NDT 55 FS-P	A Rev 0 Weld C	Configuration:	Header to Header	
Machine Information		Part Th	nickness:	1.875"	
Model #	Serial #	Software Version	Calibration Du	e Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
5.820us	0.000in	4.237in	5	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	21	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculator					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us	



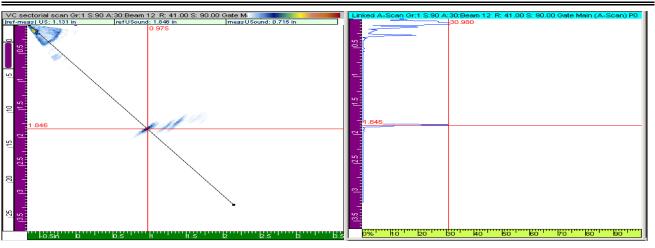
COMMENTS:

Customer:American Electric PowerUnit Number:1		Power Compo	onent:	Low-Pressure Reheat Outlet Header	
Project Number:	43-11-0066	Weld N	lumber:	LPRHOH-GW6	
Procedure:	TEI NDT 55 FS-PA	Rev 0 Weld C	Configuration:	Header to Header	
Machine Information		Part Th	nickness:	1.875"	
Model #	Serial #	Software Version	Calibration Du	Je Save Mode	
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan	
		TomoView-2.4R15			
Probe Characterizatior					
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture	
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in	
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре	
5.820us	0.000in	4.237in	5	PA(Phased Array)	
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter	
Compression	21	On	FW(Full Wave)	5MHz	
Voltage	Gain	Mode	Wave Type	Pulse Width	
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns	
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution	Scan Type	
16	1	16	1.0	Sectoral	
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity	
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us	



COMMENTS:

Customer: Unit Number: Project Number: Procedure:	American Electric Po 1 43-11-0066 TEI NDT 55 FS-PA	Weld N	He	w-Pressure Reheat Outlet ader RHOH-GW7 ader to Header
Machine Information		Part Th	nickness: 1.8	375"
Model #	Serial #	Software Version	Calibration Due	Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
5.820us	0.000in	4.237in	5	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	21	On	FW(Full Wave)	5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculator				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us



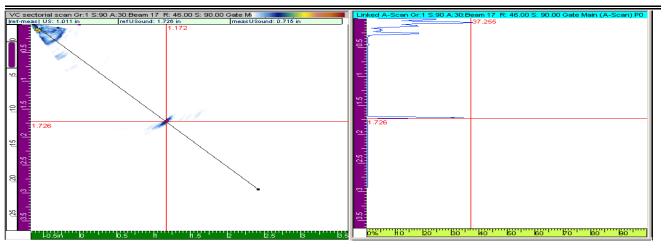
COMMENTS:

Image of typical 360 degree non-relevant root signal / Root geometry

No Relevant Indication Detected

No transverse scans due to hanger attachment

Customer: Unit Number:	American Electric Po	ower Comp	onent:	Low-Pressure Reheat Outlet Header
Project Number:	43-11-0066	Weld I	Number:	LPRHOH-GW8
Procedure:	TEI NDT 55 FS-PA	Rev 0 Weld	Configuration:	Header to Header
Machine Information		Part T	hickness:	1.875"
Model #	Serial #	Software Version	Calibration D	ue Save Mode
Omni Scan MX	Omni- 1179	Scan:Omni-2.0R20	8/11	A-Scan
		TomoView-2.4R15		
Probe Characterizatior				
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	G1745	5MHz	55.0 Degrees	0.378 in
Setup				
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF	Туре
5.820us	0.000in	4.237in	5	PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	21	On	FW(Full Wave) 5MHz
Voltage	Gain	Mode	Wave Type	Pulse Width
40/80(volts)	29dB	PE(Pulse Echo)	Shear	100ns
Transducer Calculator				
Element Quantity	1st Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30.0 Degrees	80.0 Degrees	1 Degrees	2.0in	0.126 in/us



COMMENTS:

THIEL		ased-Ar	ray Cal	ibrati	on
Customer:	American Electric P	ower Con	ponent:	Low-Press	sure Reheat Outlet
Unit Number:	1			Header	
Project Number:	43-11-0066		d Number:		ned Report
Procedure:	TEI NDT 55 FS-PA		d Configuration:	•	al Seam
Machine Information			Thickness:	1.875"	
Model #	Serial #	Software Version	Calibration I	Due	Calibration ID#
Omni Scan MX	Omni-1179	Scan:Omni-2.0R5	0.404		42811-3.0"
Probe Characterizatior		Analysis:TomoView	-2.4R1		
Probe Model	Probe Serial	Probo Eroquonov	Wedge Angl	0	Probe Aperture
5L16-A10/A1	G1745/C0055	Probe Frequency 5MHz	55.0 Degrees		0.378 in
SEIGRIGAT	01743/00033		55.0 Degree.	2	0.570 11
Setup					
Beam Delay	Start(1/2 path)	Range(1/2 path)	PRF		Туре
5.827/10.899us	0.000in	3.470/3.470in	50/50		PA(Phased Array)
Scale Type	Scale Factor	Video Filter	Rectification	n	Band Pass Filter
Compression	17/17	On	FW(Full Wav	e)	5MHz
Voltage	Gain	Mode	Wave Type		Pulse Width
80(High)	27/25dB	PE(Pulse Echo)	Shear		100ns
Transducer Calculato					
Element Quantity	1st Element	Last Element	Resolution		Scan Type
16	1	16	1.0		Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Dept	า	Sound Velocity
30.0 Degrees	80.0 Degrees	2.0 Degrees	2.0in		0.126 in/us
Encoder / Scan Area					
Encoder Model	Serial #	Туре	Resolution		Polarity
USDigital	USD3127	Quadrature	220.0step/in		Normal
Scan Resolution	Max Scan Speed	Couplant	PCS		Cal. Block Reflector
0.050in	9.842in/sec	Sonatech	2.5"		NAV-0.040"SDH
VC sectorial scan Gr:1 S:90 A:30:Be 2.2 1.1.5in L1 L0. Linked A-Scan Gr:1 S:90 A:30:Beam	am 6 R: 40.00 S: 90.00 Gate Main (A-Sc 2.2 6 R: 40.00 S: 90.00 Gate Main (A-Sc 2.2		can Gr:2 S:270 A:35:Beam 5		Main (A-Scan) P0
Din 0.5 H Din 0.5 H Date / Time 4/28 - 7AM	h.s 2 Date / Time 4/29 - 7AM	2.5 Date / Time	b.s h Date	h.s	2 Date / Time

Inspector: Manuel Gracie Level: III Date: 4/28/2011

Customer: Unit Number: Project Number: Procedure: Calibration ID #:	American Electric Power 1 43-11-0066 TEI NDT 55 FS-PA Rev 0 42811-2.0"	Component: Weld Configuration: Part Thickness: Part Diameter:	Low-Pressure Reheat Outlet Header Longitudinal Seam 1.875" 50"

Weld #	Indication	Scan Location	Range of Depth	Comments / Obstructions	
LS-1	No Relevant	Indications Detected			
LS-2	No Relevant	Indications Detected			
LS-3	No Relevant	Indications Detected			
LS-4	No Relevant	Indications Detected			
LS-5	No Relevant	Indications Detected			
LS-6	No Relevant Indications Detected				
LS-7	No Relevant	Indications Detected			
LS-8	No Relevant	Indications Detected			

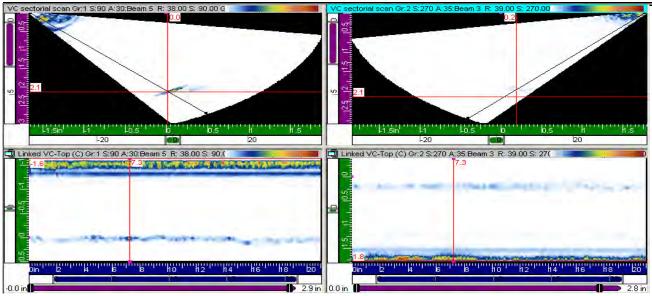
Notes and Comments

All seam welds inspected had intermittent non-relevant root signals through out the entire length of weld Indications were of inside root geometry / Random examples are shown in Figures # 1 and # 2

THIELSCH Phased-Array Report ENGINEERING Phased-Array Report Component: Low-Pressure Reheat Outlet Header / Longitudinal Seam Weld

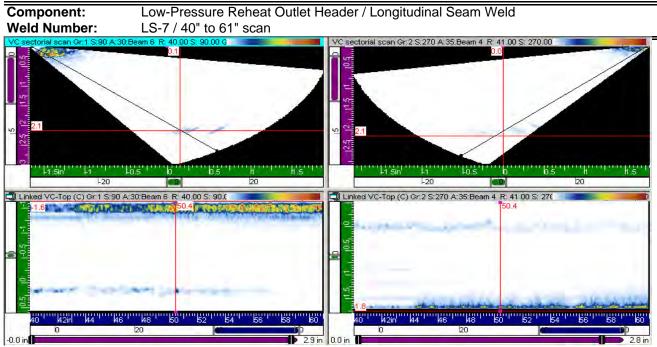
Weld Number:

Low-Pressure Reheat Outlet Header / Longitudinal Seam Weld LS-2 / 0" to 21" scan



Indication Comments and Location:

Image of typical non-relevant root signal found along all seam welds inspected / Inside geometry Above image taken on LS-2 at the 7.3" location along weld



Indication Comments and Location:

Image of typical non-relevant root signal found along all seam welds inspected / Inside geometry Above image taken on LS-7 at the 50.4" location along weld

Inspector:	Manuel Gracie	Level:		Date:	4/29/2011

THIELSCH ENGINEERING, INC.										
1	95 Frances					· · ·	7-6454			
			IESS ME							
Job Name: AEP - Mitchell Generating Station			Job Date: April 2011			Job Number: 43-11-0066				
Component: Low-Pressure Reheat Outlet Header - Unit No. 1			Material: SA-387 Gr. 91, Cl. 2			Hardness Scale: HBN				
		Hardness Measuren			nents Corresponding					
Location:		1	2	3	4	5	Average	Tensile Strength		
LPROH-R1	Girth	210	214	246	218	201	218	102,000		
	Seam	206	209	214	211	214	211	99,000		
	Base	189	201	183	180	196	190	90,000		
	Girth	180	177	190	181	199	185	88,000		
LPROH-R2	Seam	168	194	158	193	169	176	84,000		
	Base	156	163	154	165	163	160	77,000		
LPROH-R3	Girth	192	194	200	187	194	193	91,000		
	Seam	209	213	214	206	207	210	99,000		
	Base	186	191	187	193	192	190	90,000		
LPROH-R4	Girth	139	145	155	170	157	153	73,000		
	Seam	186	190	180	203	196	191	90,000		
	Base	160	161	152	163	164	160	77,000		
LPROH-R5	Girth	191	184	177	193	185	186	88,000		
	Seam	172	168	179	180	159	172	82,000		
	Base	189	192	189	195	183	190	90,000		
LPROH-R6	Girth	191	206	203	196	100	193	91,000		
	Seam	190	186	180	200	196	190	90,000		
	Base	167	169	168	174	188	173	83,000		
LPROH-R7	Girth	189	186	162	189	201	185	88,000		
	Seam	187	157	158	172	155	166			
	Base	180	182	170	196	187	183	79,000		
								87,000		
LPROH-R8	Girth	167	168	170	173	153	166	80,000		
	Seam Base	158 174	187 162	168 171	163 159	200 163	175 166	84,000 79,000		
								73,000		
Inspector: Manny Gracie	e, J. McCart	hy	· · · · · · · · · · · · · · · · · · ·	·	· · · · · · · · · · · · · · · · · · ·	Date: 05	/02/2011	-		

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 255 of 256

THIELSCH ENGINEERING, INC.

195 Frances Avenue Cranston, Rhode Island 02910-2211 Tel. (401) 467-6454 Fax (401) 467-2398

November 8, 2011

Mr. Ben Hackett American Electric Power 1 Riverside Plaza Columbus, OH 43215

SUBJECT: Inspection of Boiler Headers in Unit No. 1

Dear Mr. Hackett:

Enclosed are two copies of Report No. 13796 summarizing the inspection of the boiler headers in Unit No. 1 at the Mitchell Generating Station of AEP.

We appreciated the opportunity to be of service and look forward to working with you again in the future. If you have any questions or would like further assistance, please do not hesitate to contact us.

Very truly yours,

THIELSCH ENGINEERING, INC.

Peter Kennefick Vice President Field Engineering Services

Enclosure: Job No. 43-11-0066

KPSC Case No. 2012-00578 Commission Staff's First Set of Data Requests Order Dated February 6, 2013 Item No. 33 Attachment 6 Page 256 of 256

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