

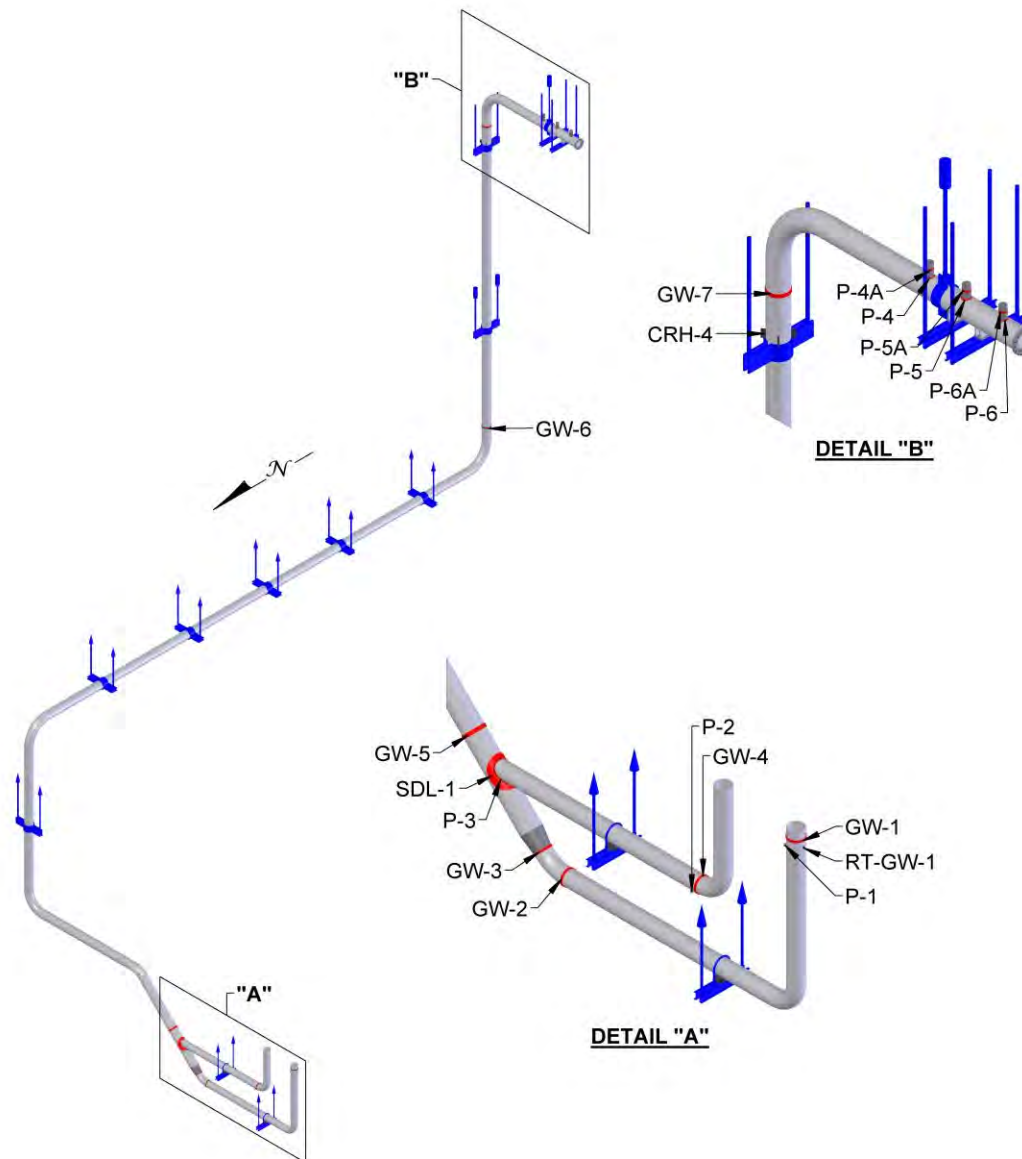


Fig. 30. Sketch of the inspection locations on the Cold Reheat piping system.

EASTERN KENTUCKY POWER COOPERATIVE (EKPC)
J.S. COOPER GENERATING STATION
UNIT NO. 2 - COLD REHEAT PIPING SYSTEM
JOB NO. 43-24-0331a

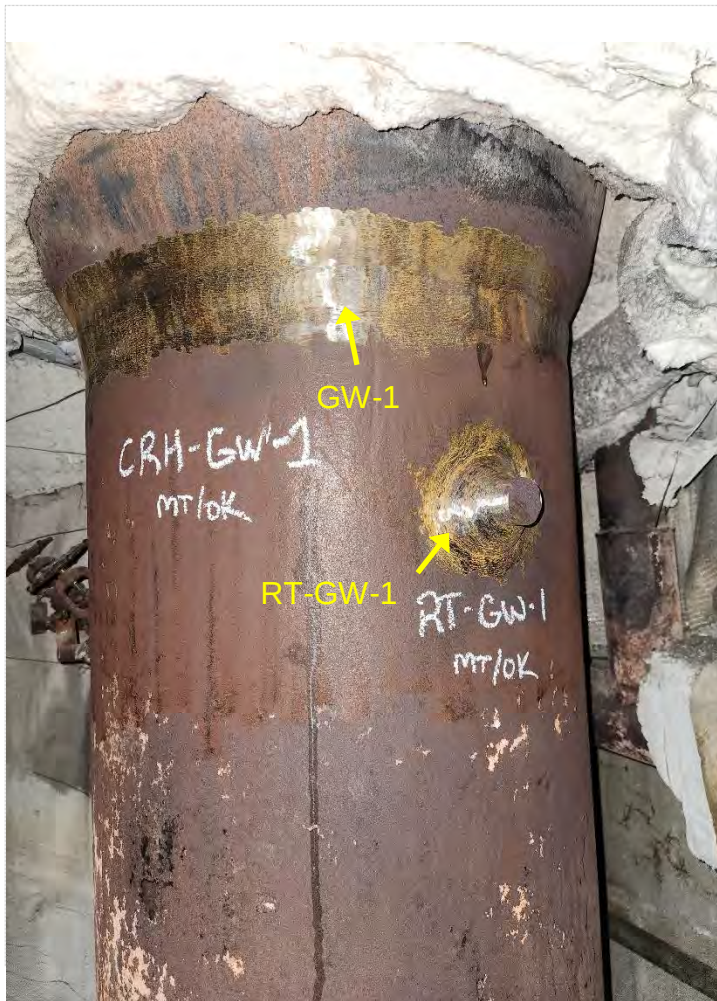


Fig. 31.

Photographs of the inspection locations on the Cold Reheat piping system.



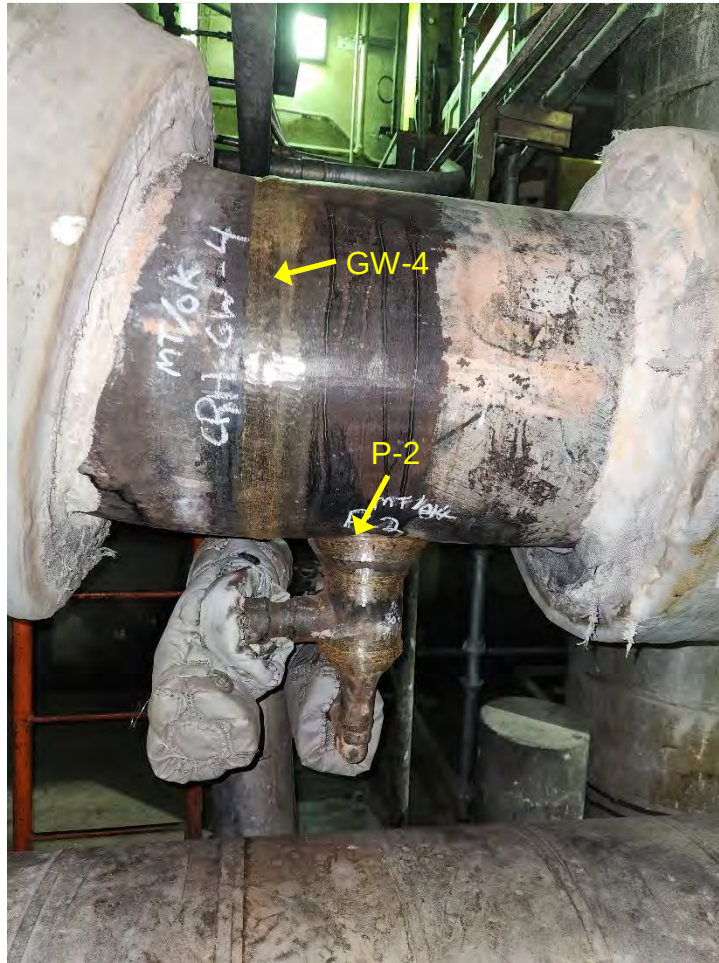


Fig. 32. Photographs of the inspection locations on the Cold Reheat piping system.

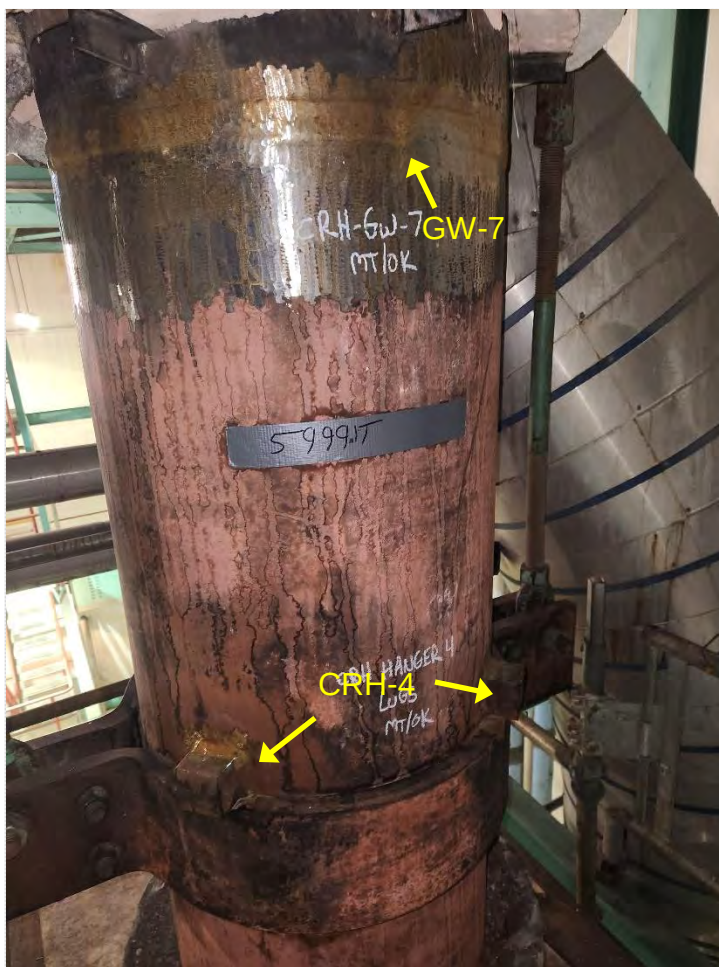


Fig. 33.

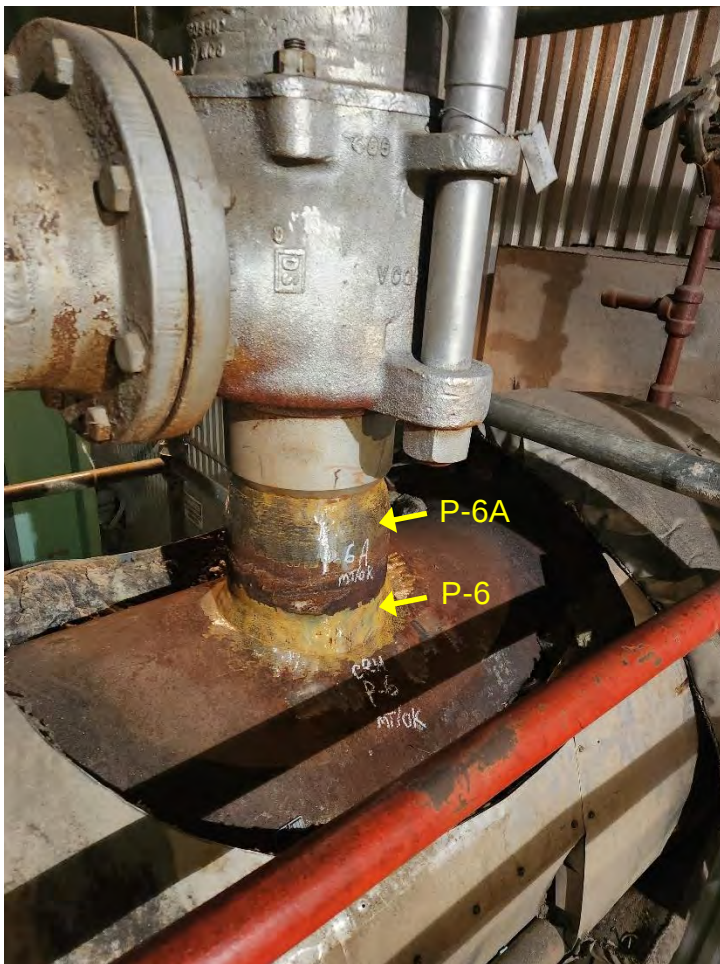
Photographs of the inspection locations on the Cold Reheat piping system.





Fig. 34.

Photographs of the inspection locations on the Cold Reheat piping system.



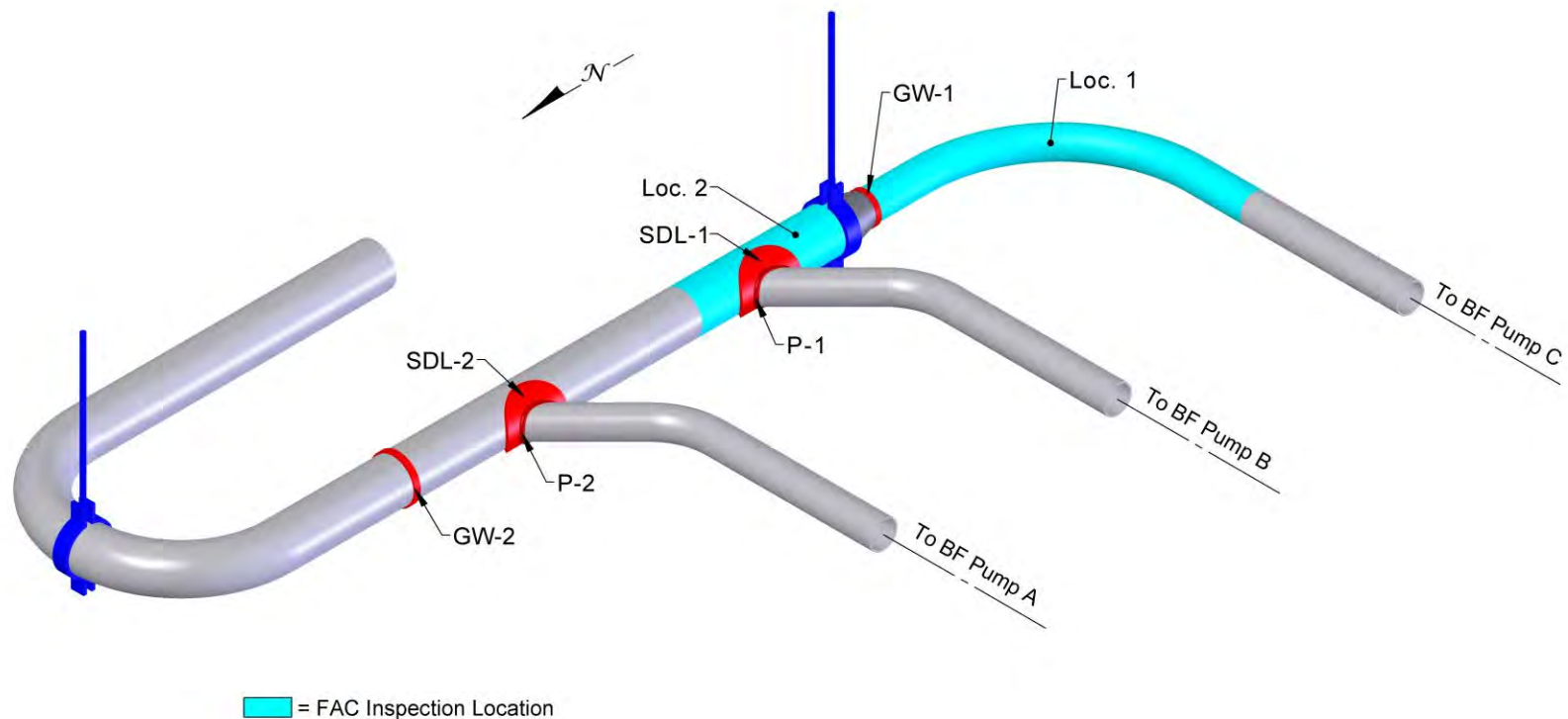


Fig. 35. Sketch of the inspection locations on the Boiler Feedwater Discharge piping system.

EASTERN KENTUCKY POWER COOPERATIVE (EKPC)
J.S. COOPER GENERATING STATION
UNIT NO. 2 - BOILER FEEDWATER DISCHARGE PIPING SYSTEM
JOB NO. 43-24-0331a

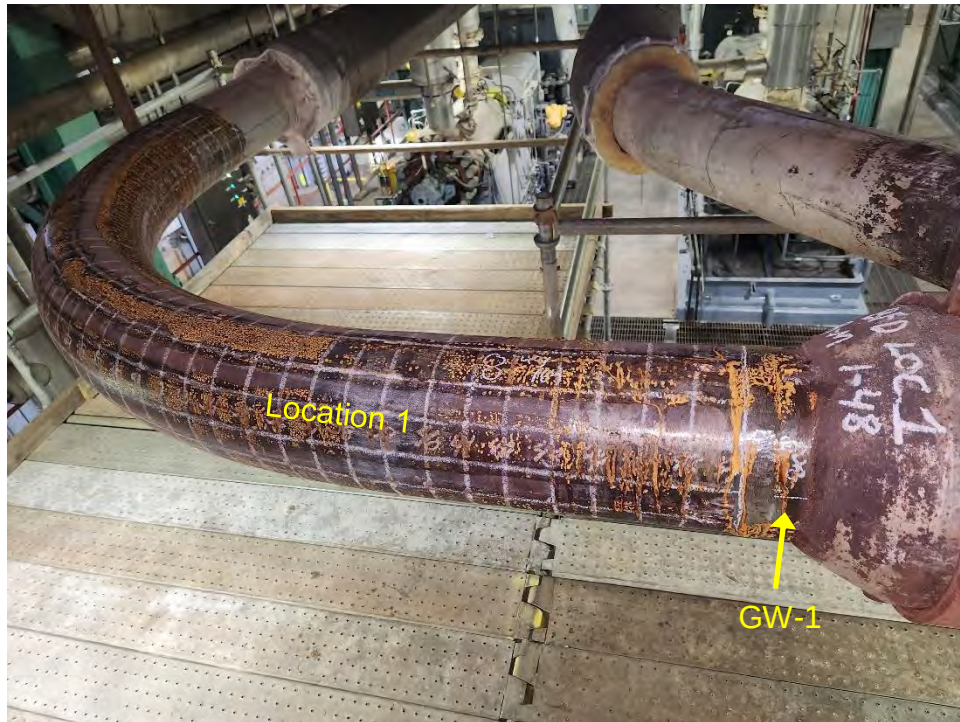


Fig. 36. Photographs of the inspection locations on the Boiler Feedwater Discharge piping system.

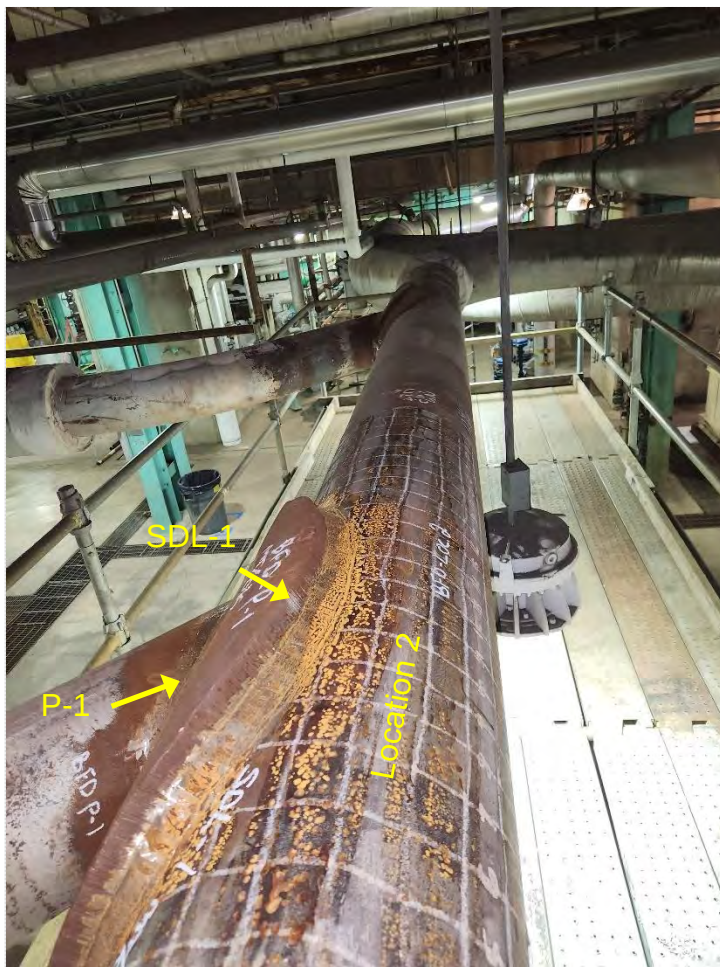


Fig. 37.

Photographs of the inspection locations on the Boiler Feedwater Discharge piping system.

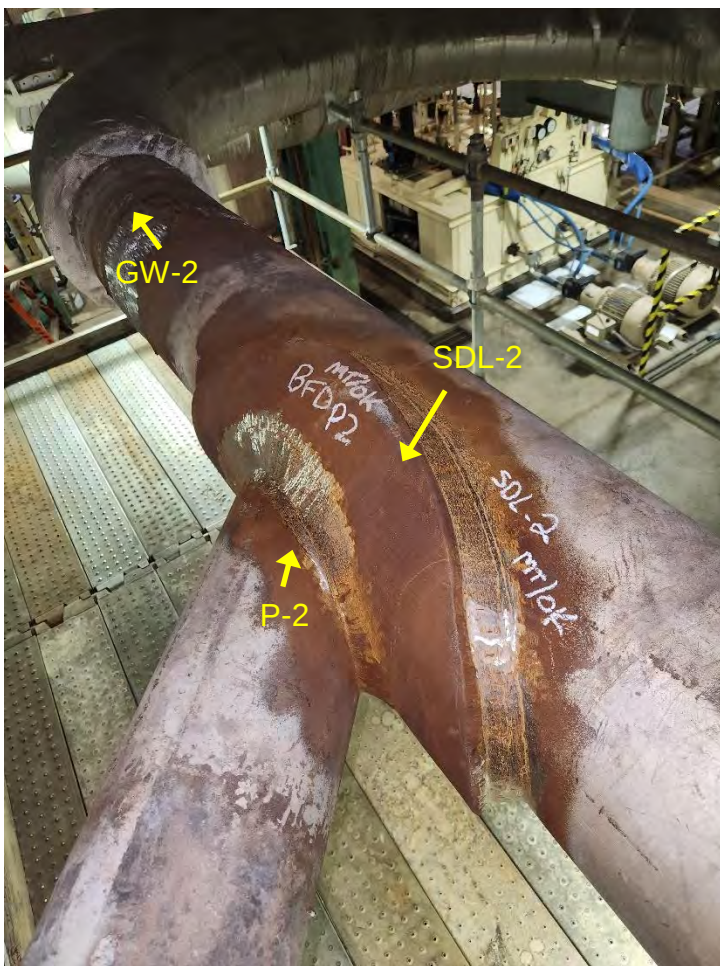




Fig. 38.

Photographs of the undercut location on the Boiler Feedwater Discharge piping system.



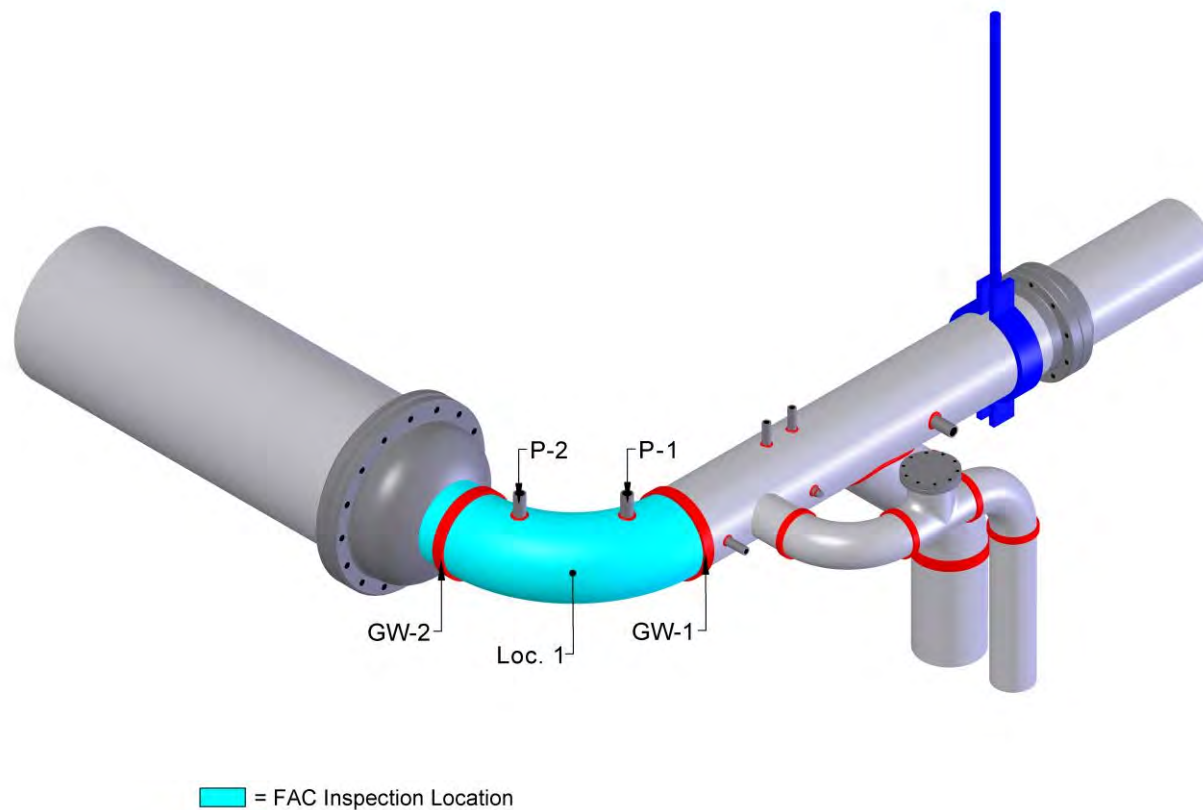


Fig. 39. Sketch of the inspection locations on the Condensate line.

EASTERN KENTUCKY POWER COOPERATIVE (EKPC)
J.S. COOPER GENERATING STATION
UNIT NO. 2 - CONDENSATE LINE
JOB NO. 43-24-0331a

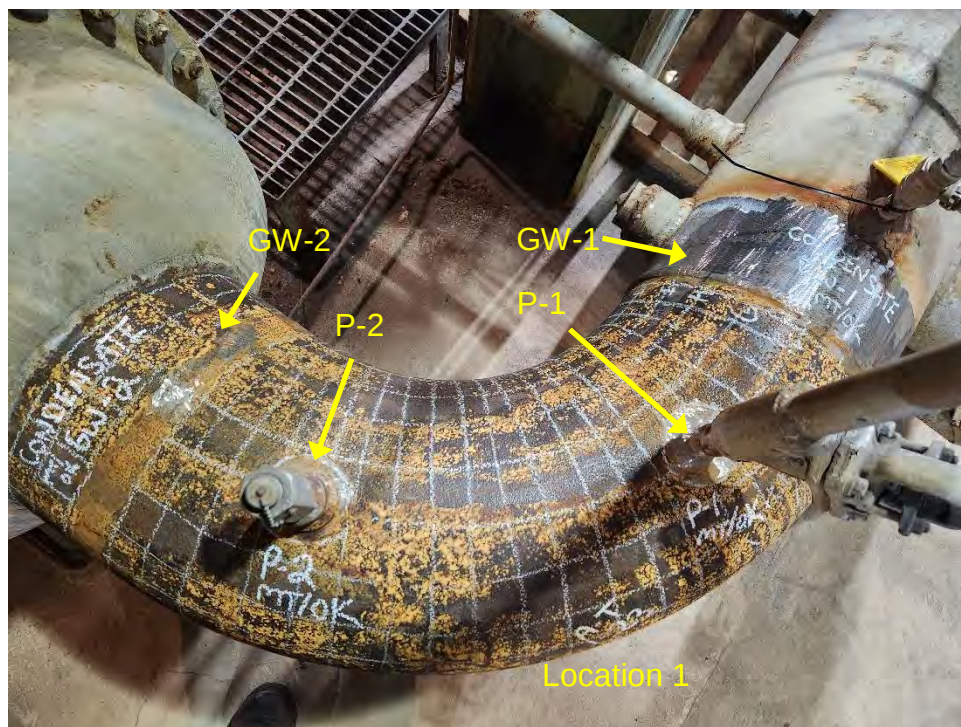
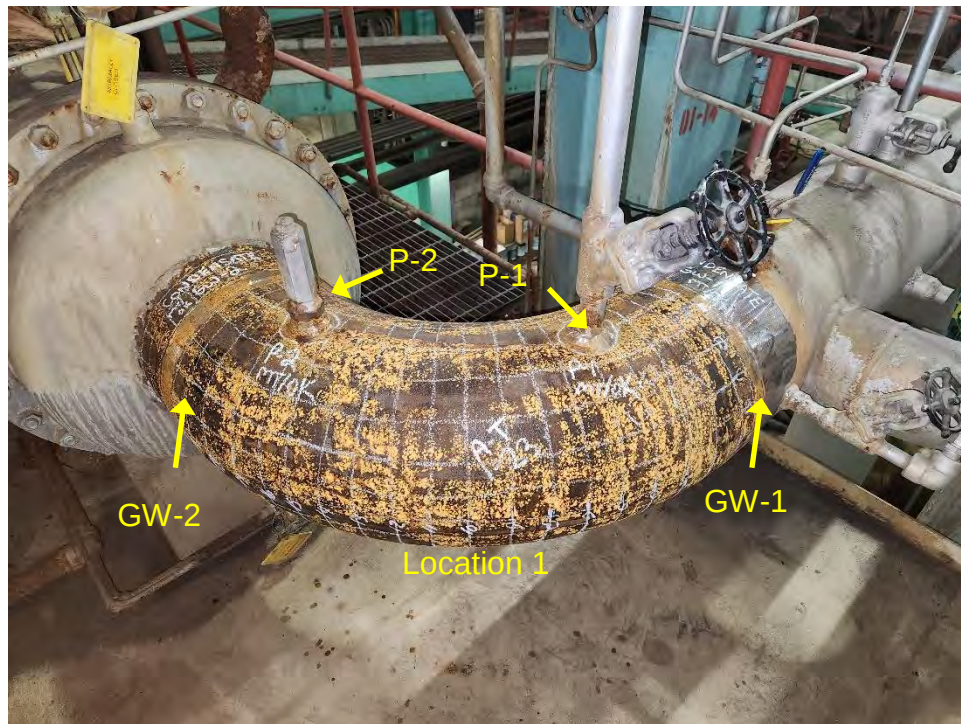


Fig. 40. Photographs of the inspection locations on the Condensate piping system.

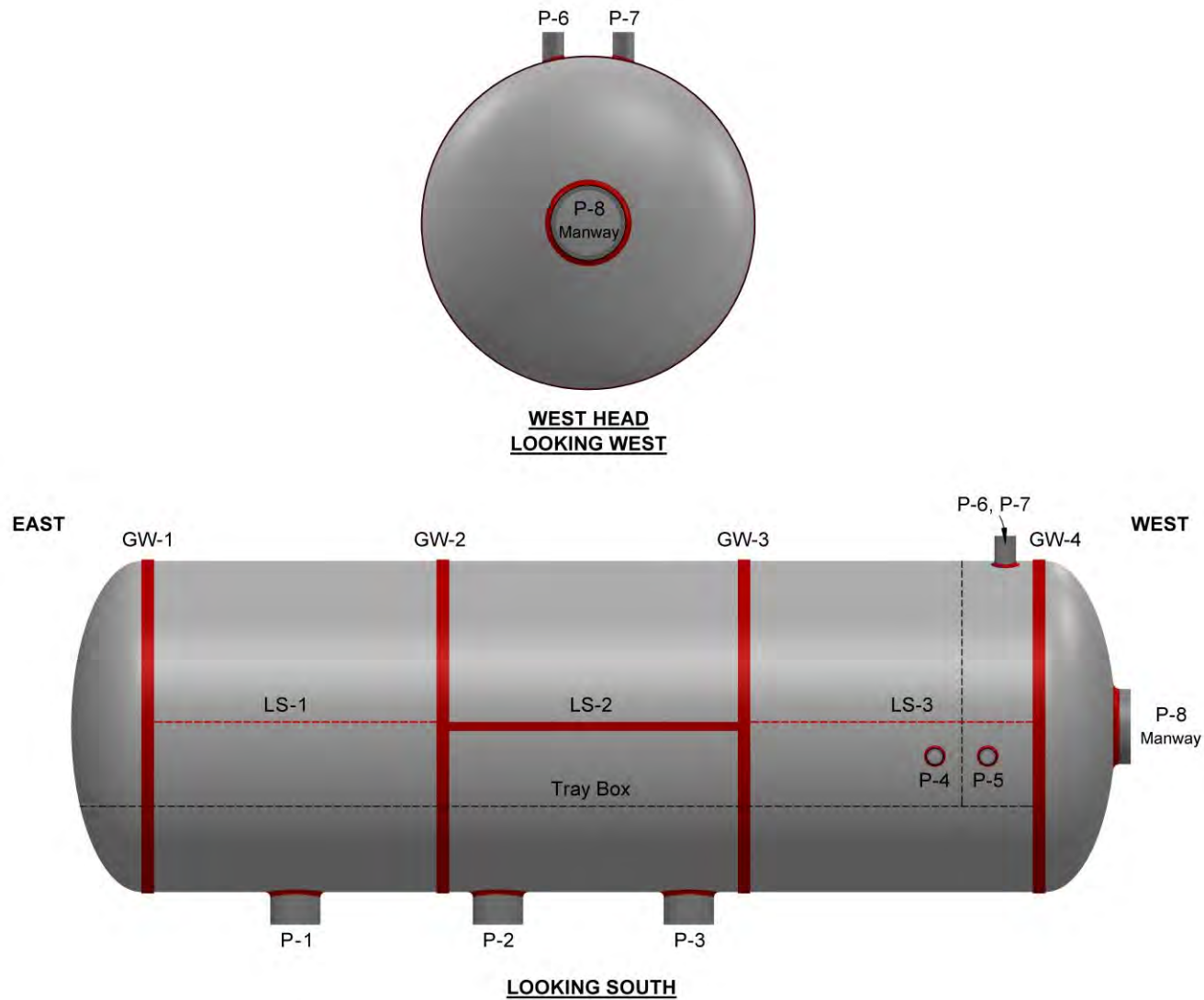


Fig. 41. Sketch of the deaerator heater, identifying the inspection locations.

EASTERN KENTUCKY POWER COOPERATIVE (EKPC)

J.S. COOPER GENERATING STATION

UNIT NO. 2 - DEAERATOR HEATER

JOB NO. 43-24-0331a

Thielsch 
DIVISION OF THE RISE GROUP



Fig. 42.

Photographs of the inspection locations on the deaerator heater.





Fig. 43.

Photographs of the inspection locations on the deaerator heater.



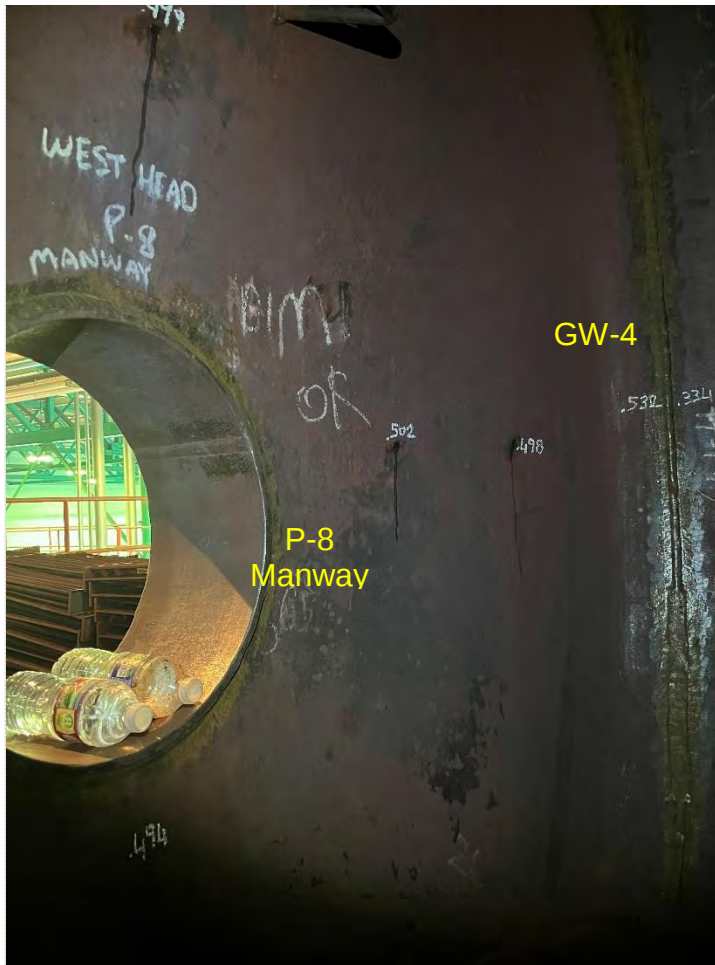


Fig. 44.

Photographs of the inspection locations on the deaerator heater.





Fig. 45.

Photographs of the broken welds on the deaerator heater.





Fig. 46.

Photographs of the broken welds on the deaerator heater.





Fig. 47.

Photographs of the broken welds on the deaerator heater.

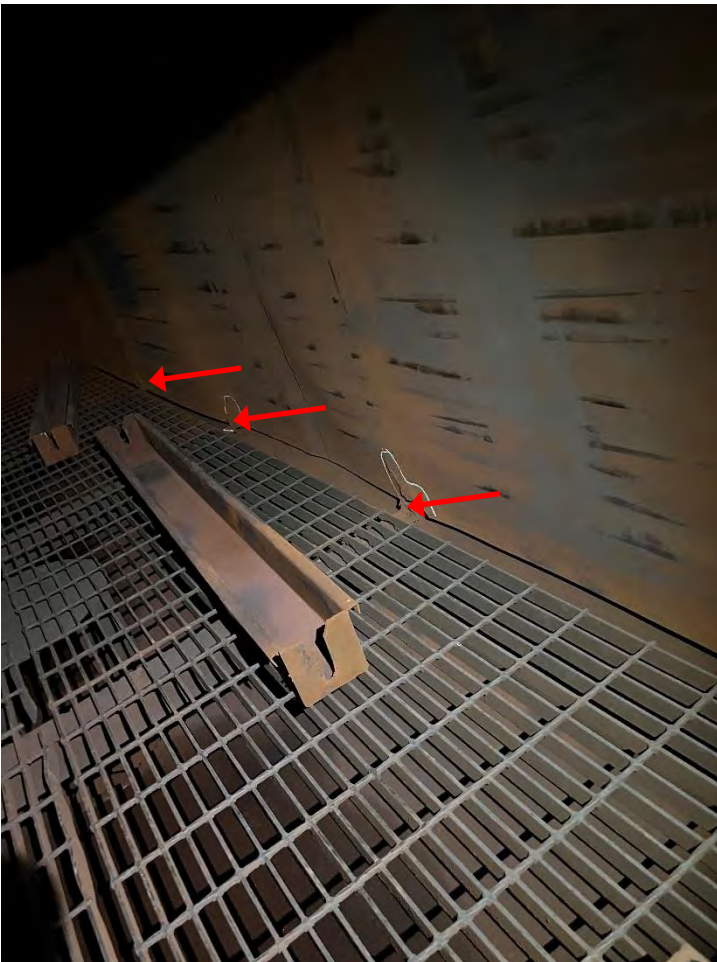




Fig. 48.

Photographs of the broken welds on the deaerator heater.





Fig. 49.

Photographs of the broken welds on the deaerator heater.





Fig. 50.

Photographs of the broken welds on the deaerator heater.





Fig. 51.

Photographs of the broken welds on the deaerator heater.

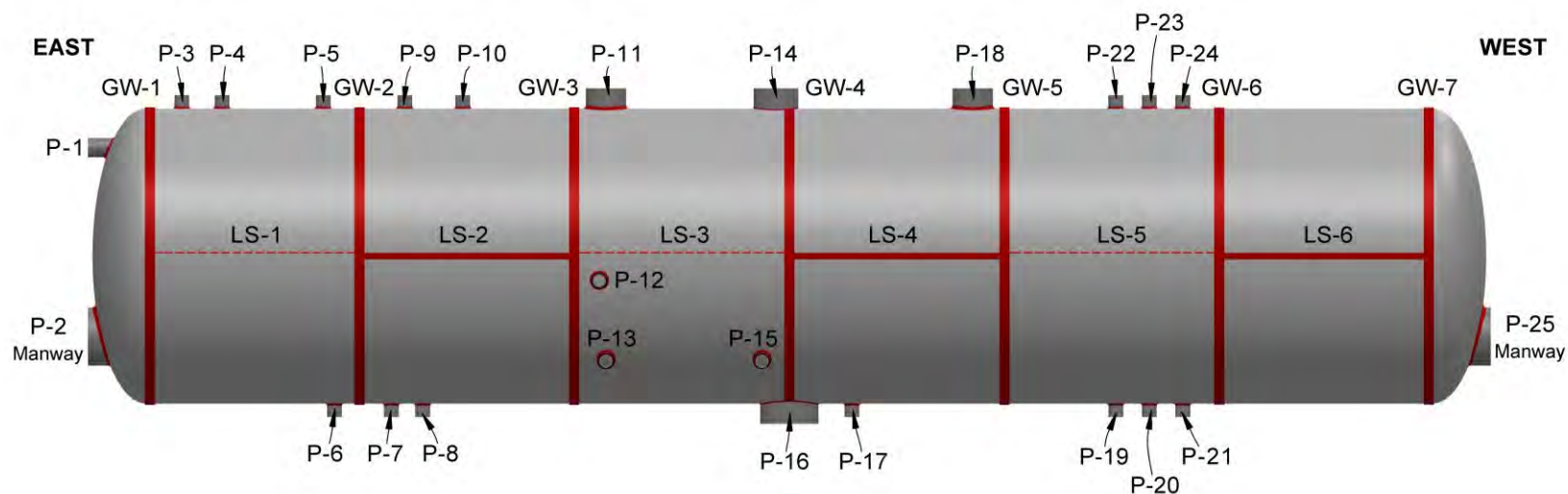




**EAST HEAD
LOOKING EAST**



**WEST HEAD
LOOKING WEST**



LOOKING SOUTH

Fig. 52. Sketch of the deaerator storage tank, identifying the inspection locations.

EASTERN KENTUCKY POWER COOPERATIVE (EKPC)
J.S. COOPER GENERATING STATION
UNIT NO. 2 - DEAERATOR STORAGE TANK
JOB NO. 43-24-0331a



Fig. 53. Photographs of the inspection locations on the deaerator storage tank.

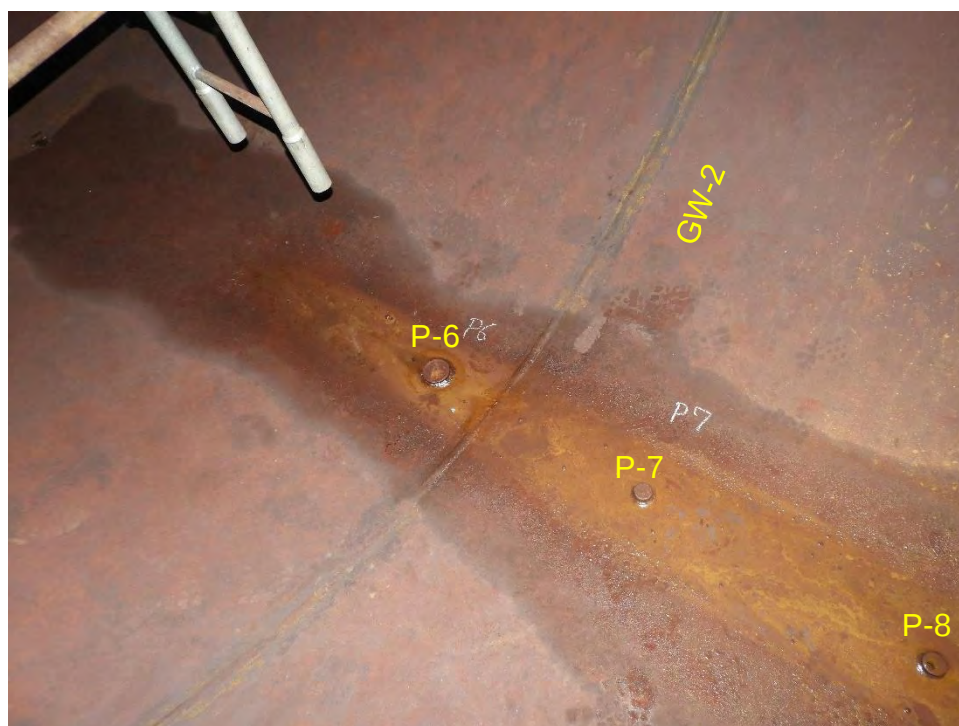


Fig. 54. Photographs of the inspection locations on the deaerator storage tank.



Fig. 55. Photographs of the inspection locations on the deaerator storage tank.



Fig. 56. Photographs of the inspection locations on the deaerator storage tank.



Fig. 57. Photographs of the inspection locations on the deaerator storage tank.

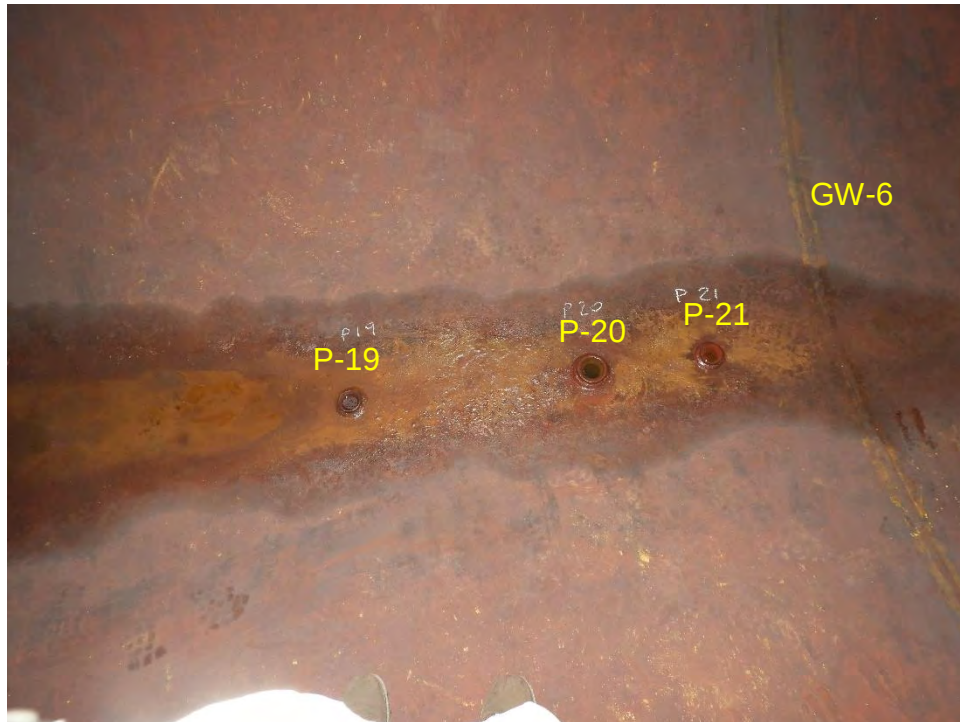


Fig. 58. Photographs of the inspection locations on the deaerator storage tank.

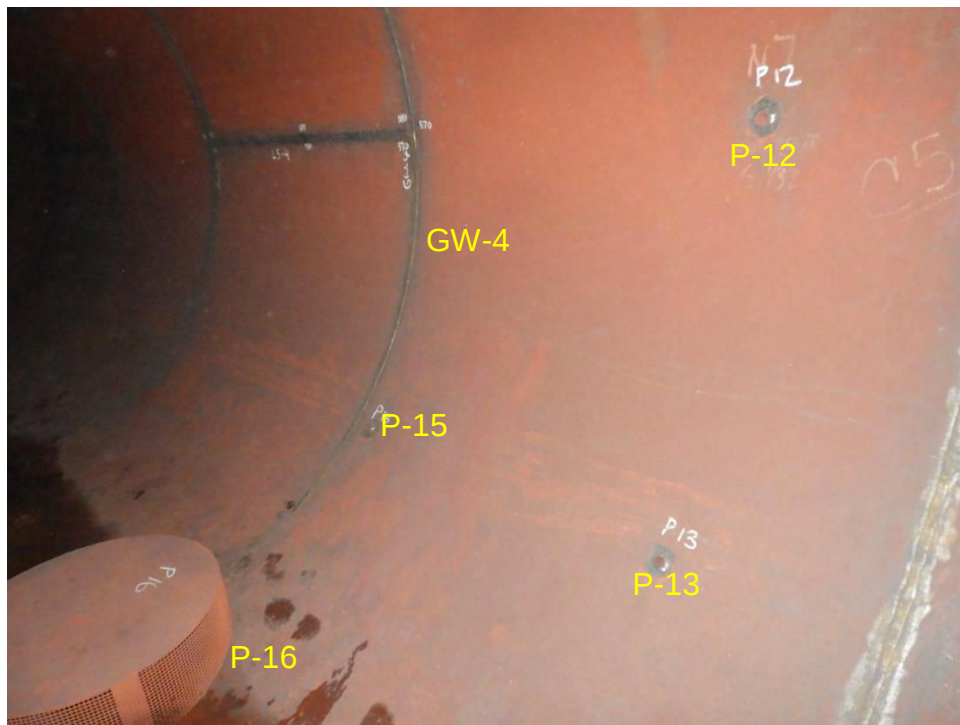


Fig. 59. Photographs of the inspection locations on the deaerator storage tank.



Fig. 60. Photographs of the inspection locations on the deaerator storage tank.



Fig. 61. Photographs of the indication at penetration No. P-4 on the deaerator storage tank.

APPENDIX A

**NONDESTRUCTIVE EXAMINATION REPORTS
MAIN STEAM PIPING SYSTEM**

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Main Steam Piping System - 8.625" OD

The minimum wall thickness requirements were calculated for the Main Steam piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-335, Grade P22

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

1010

°F

2,000

psig

8.625

inches

7,540

psi

0.70

0.000

inches

The following equation applies per B31.1 Section 104.1.2

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

0.965

inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Main Steam Piping System - 12.000" OD

The minimum wall thickness requirements were calculated for the Main Steam piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-335, Grade P22

Where:

T- Design Temperature

P- Maximum Allowable Pressure

D- Outside Diameter

SE- Maximum Stress Value

y-Temperature Coefficient

A- Addition Thickness

1010

°F

2,000

psig

12.000

inches

7,540

psi

0.70

0.000

inches

The following equation applies per B31.1 Section 104.1.2

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

1.342

inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Main Steam Piping System - 16.250" OD

The minimum wall thickness requirements were calculated for the Main Steam piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-335, Grade P22

Where:

T- Design Temperature

P- Maximum Allowable Pressure

D- Outside Diameter

SE- Maximum Stress Value

y-Temperature Coefficient

A- Addition Thickness

1010

°F

2,000

psig

16.250

inches

7,540

psi

0.70

0.000

inches

The following equation applies per B31.1 Section 104.1.2

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

1.818

inches

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Main Steam Piping System		Material: A-335, Grade P22	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☒ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Girth Welds					
GW-1	-	No recordable indications (NRI)		X	
GW-2	-	NRI		X	
GW-3	-	NRI		X	
GW-4	-	NRI		X	
GW-5	-	NRI		X	
GW-6	-	NRI		X	
GW-7	-	NRI		X	
GW-8	-	NRI		X	
RT Plugs					
RT-GW-1	-	NRI		X	
RT-GW-3	-	NRI		X	
RT-GW-4	-	NRI		X	
RT-GW-8	-	NRI		X	
Penetrations					
P-1	-	NRI		X	
P-2	-	NRI		X	
P-3	-	NRI		X	
P-4	-	NRI		X	
P-5	-	NRI		X	
P-6	-	NRI		X	
P-6A	-	NRI		X	
P-7	-	NRI		X	
P-7A	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Main Steam Piping System		Material: A-335, Grade P22	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☒ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Penetrations (continued)					
P-4B	-	No recordable indications (NRI)		X	
P-5B	-	NRI		X	
P-6B	-	NRI		X	
P-7B	-	NRI		X	
P-8B	-	NRI		X	
P-9B	-	NRI		X	
P-10B	-	NRI		X	
P-11B	-	NRI		X	
P-12B	-	NRI		X	
Hanger Lugs					
MSH-3	-	NRI		X	
Hanger Attachment					
MSH-5	4" LT	Linear fatigue-type indication in toe of weld (Removed at 1/8")		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.								
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454								
ULTRASONIC THICKNESS EXAMINATION REPORT								
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024		Job Number: 43-24-0331a			
Component: Main Steam Piping System			Material: A-335, Grade P22		Nominal Wall: N/A x 8.625" OD 1.500" x 12.000" OD 2.000" x 16.250" OD		Calc. Minimum Wall: 0.965" 1.342" 1.818"	
EQUIPMENT USED: ☒ D-Meter ☒ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers _____					KEY: All values recorded in inches. US - Upstream T - Top DS - Downstream B - Bottom			
IDENTIFICATION	CONFIGURATION		DIAMETER MEASUREMENTS	THICKNESS MEASUREMENTS				
			PI TAPE	12:00	3:00	6:00	9:00	
GW-1	US	Boiler Conn.	Not Accessible	-	-	-	-	
	DS	Pipe	16.422	2.219	2.239	2.162	2.181	
GW-2	US	Pipe	16.422	2.181	2.277	2.271	2.172	
	DS	Pipe	16.406	2.045	2.104	2.309	2.095	
GW-3	US	Pipe	16.375	2.249	2.232	2.147	2.277	
	DS	Pipe	16.359	2.344	2.262	2.247	2.308	
GW-4	US	Pipe	16.328	2.295	2.286	2.290	2.066	
	DS	Pipe	16.328	2.306	2.237	2.219	2.330	
GW-5	US	Pipe	16.328	2.296	2.245	2.133	2.185	
	DS	Wye	16.328	2.159	2.168	2.146	2.189	
GW-6	US	Wye	12.063	1.710	1.719	1.728	1.724	
	DS	Pipe	12.063	1.724	1.715	1.661	1.702	
GW-7	US	Valve	Not Accessible	-	-	-	-	
	DS	Pipe	8.813	1.185	1.090	1.115	1.205	
GW-8	US	Wye	12.016	1.727	1.722	1.709	1.712	
	DS	Pipe	12.078	1.717	1.703	1.729	1.738	
				OD	8.625"	12.000"	16.250"	
				Min.:	1.090	1.661	2.045	
				Max.:	1.205	1.738	2.344	
				Avg.:	1.149	1.715	2.219	
INSPECTOR: A. Giulitto, W. Fountain			LEVEL: II		DATE: 03/16/2024			

Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-1
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.0"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-2
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.0"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-3
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-4
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-5
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-6
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.0"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-7
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Main Steam
Unit Number:	2	Weld Number:	MS-GW-8
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	2.0"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	7.00 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	35	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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THIELSCH, INC.								
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454								
HARDNESS MEASUREMENT SHEET								
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024			Job Number: 43-24-0331a		
Component: Main Steam Piping System			Material: A-335, Grade P22			Hardness Scale: Brinell (BHN)		
Location:		Hardness Measurements						Corresponding Tensile Strength
		1	2	3	4	5	Average	
MS-R1 GW-1, 1:00 DS	Weld	164	162	176	166	171	168	81,000
	HAZ	158	161	155	155	163	158	76,000
	Base	138	141	148	138	132	139	67,000
MS-R2 GW-2, 12:30 DS	Weld	178	171	175	178	172	175	84,000
	HAZ	168	159	161	163	163	163	78,000
	Base	149	148	136	151	153	147	70,000
MS-R3 GW-3, 2:30 US	Weld	155	164	160	164	157	160	77,000
	HAZ	160	154	148	144	146	150	72,000
	Base	144	144	153	156	148	149	71,000
MS-R4 GW-4, 3:00 US	Weld	198	193	192	203	199	197	93,000
	HAZ	164	161	166	160	165	163	78,000
	Base	155	151	150	154	151	152	73,000
MS-R5 GW-5, 11:00 DS	Weld	180	185	183	184	184	183	87,000
	HAZ	163	160	151	159	160	159	76,000
	Base	151	158	165	158	161	159	76,000
MS-R6 GW-6, 11:00 US	Weld	201	193	196	200	190	196	92,000
	HAZ	149	151	146	153	155	151	72,000
	Base	142	140	143	141	149	143	69,000
MS-R7 GW-7, 9:00 US	Weld	191	196	186	179	193	189	90,000
	HAZ	192	184	191	185	198	190	90,000
	Base	191	187	179	189	191	187	89,000
MS-R8 GW-8, 11:00 US	Weld	157	163	165	160	155	160	77,000
	HAZ	151	149	155	151	150	151	72,000
	Base	146	141	139	141	143	142	68,000
Inspector: K. Veon						Date: 03/16/2024		

**NONDESTRUCTIVE EXAMINATION REPORTS
HOT REHEAT PIPING SYSTEM**

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Hot Reheat Piping System

The minimum wall thickness requirements were calculated for the Hot Reheat piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-335, Grade P22

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

1010

°F

575

psig

18.000

inches

7,540

psi

0.70

0.000

inches

The following equation applies per B31.1 Section 104.1.2

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

0.652

inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Hot Reheat Piping System

The minimum wall thickness requirements were calculated for the Hot Reheat piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-335, Grade P22

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

1010

°F

575

psig

24.000

inches

7,540

psi

0.70

0.000

inches

The following equation applies per B31.1 Section 104.1.2

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

0.869

inches

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Hot Reheat Piping System		Material: A-335, Grade P22	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☒ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Girth Welds					
GW-1	-	No recordable indications (NRI)		X	
GW-2	-	NRI		X	
GW-3	-	NRI		X	
GW-4	-	NRI		X	
GW-5	-	NRI		X	
GW-6	-	NRI		X	
GW-7	-	NRI		X	
RT Plugs					
RT-GW-1	-	NRI		X	
RT-GW-2	-	NRI		X	
RT-GW-5	-	NRI		X	
RT-GW-6	-	NRI		X	
RT-GW-7	-	NRI		X	
Penetrations					
P-1	-	NRI		X	
P-2	-	NRI		X	
P-3	1/2" TW	Transverse indication in weld (Removed with light grinding)		X	
	3" LT (x2)	Linear fatigue-type indications in toe of weld (Removed with light grinding)		X	
P-4	-	NRI		X	
P-4A	-	NRI		X	
Hanger Lugs					
HRH-2	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
ULTRASONIC THICKNESS EXAMINATION REPORT							
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024		Job Number: 43-24-0331a		
Component: Hot Reheat Piping System			Material: A-335, Grade P22		Nominal Wall: 0.938" x 18.000" OD 1.219" x 24.000" OD		Calc. Minimum Wall: 0.652" 0.869"
EQUIPMENT USED: ☒ D-Meter ☒ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers					KEY: All values recorded in inches. US - Upstream T - Top DS - Downstream B - Bottom		
IDENTIFICATION	CONFIGURATION		DIAMETER MEASUREMENTS	THICKNESS MEASUREMENTS			
			PI TAPE	12:00	3:00	6:00	9:00
GW-1	US	Boiler Conn.	24.109	1.645	1.630	1.655	1.548
	DS	Pipe	24.078	1.269	1.255	1.232	1.214
GW-2	US	Pipe	24.094	1.276	1.239	1.249	1.235
	DS	Pipe	24.203	1.185	1.230	1.195	1.237
GW-3	US	Pipe	24.109	1.250	1.219	1.189	1.277
	DS	Pipe	24.078	1.286	1.274	1.310	1.309
GW-4	US	Pipe	24.078	1.311	1.309	1.276	1.328
	DS	Wye	Not Accessible	-	-	-	-
GW-5	US	Wye	18.719	1.608	1.366	1.436	1.417
	DS	Pipe	18.063	1.144	1.172	1.140	1.132
GW-6	US	Pipe	18.094	1.013	0.997	0.996	0.993
	DS	Turbine Conn.	Not Accessible	-	-	-	-
GW-7	US	Wye	18.719	1.504	1.384	1.430	1.419
	DS	Pipe	18.078	1.091	0.903	0.878	1.043
				OD:	18.000"	24.000"	
				Min.:	0.878	1.185	
				Max.:	1.608	1.655	
				Avg.:	1.203	1.308	
INSPECTOR: A. Giulitto, W. Fountain			LEVEL: II		DATE: 03/16/2024		

Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-1
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-2
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.25"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-3
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.25"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-4
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.5"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.
One sided scan due to geometry of wye block.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-5
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.25"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-6
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.25"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Hot Reheat
Unit Number:	2	Weld Number:	HRH-GW-7
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.25"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.

No service-related indications detected.

An original defect from manufacturing which appears to be an inclusion type indication was found transverse at the 11:30 o'clock position. Example on the following sheet.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

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HRH-GW-7

An inclusion type indication found transverse at the 11:30 o'clock position on the downstream side of the weld. Approximately 1.125" at depth with a through wall height of 0.125".
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Inspector:	Tyler Walker	Level:	II	Date:
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THIELSCH, INC.								
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454								
HARDNESS MEASUREMENT SHEET								
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024			Job Number: 43-24-0331a		
Component: Hot Reheat Piping System			Material: A-335, Grade P22			Hardness Scale: Brinell (BHN)		
Location:		Hardness Measurements						Corresponding Tensile Strength
		1	2	3	4	5	Average	
HRH-R1 GW-1, 11:00 DS	Weld	176	179	175	174	183	177	85,000
	HAZ	193	189	186	184	193	189	90,000
	Base	183	187	178	181	185	183	87,000
HRH-R2 GW-2, 2:00 DS	Weld	189	198	196	201	189	195	92,000
	HAZ	191	178	186	186	188	186	88,000
	Base	182	182	183	188	180	183	87,000
HRH-R3 GW-3, 9:30 DS	Weld	210	206	207	208	209	208	98,000
	HAZ	193	187	197	192	186	191	90,000
	Base	171	184	169	175	179	176	84,000
HRH-R4 GW-4, 2:30 US	Weld	168	174	162	188	183	175	84,000
	HAZ	189	176	169	179	179	178	85,000
	Base	175	176	181	171	181	177	85,000
HRH-R5 GW-5, 9:30 US	Weld	182	179	178	178	182	180	86,000
	HAZ	183	188	179	185	203	188	89,000
	Base	179	170	176	180	179	177	85,000
HRH-R6 GW-6, 10:30 DS	Weld	211	201	213	215	205	209	99,000
	HAZ	186	194	191	185	190	189	90,000
	Base	176	184	185	181	186	182	87,000
HRH-R7 GW-7, 2:00 US	Weld	194	192	194	187	199	193	91,000
	HAZ	176	182	179	177	169	177	85,000
	Base	169	168	165	154	165	164	79,000
Inspector: K. Veon						Date: 03/16/2024		

**NONDESTRUCTIVE EXAMINATION REPORTS
COLD REHEAT PIPING SYSTEM**

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Cold Reheat Piping System - 18.000" OD

The minimum wall thickness requirements were calculated for the Cold Reheat piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade B

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

670	°F
620	psig
18.000	inches
16,500	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.333

 inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Cold Reheat Piping System - 24.000" OD

The minimum wall thickness requirements were calculated for the Cold Reheat piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade B

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

670	°F
620	psig
24.000	inches
16,500	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.444

 inches

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Cold Reheat Piping System		Material: A-106, Grade B	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Girth Welds					
GW-1	-	No recordable indications (NRI)		X	
GW-2	-	NRI		X	
GW-3	-	NRI		X	
GW-4	-	NRI		X	
GW-5	-	NRI		X	
GW-6	-	NRI		X	
GW-7	-	NRI		X	
RT Plug					
RT-GW-1	-	NRI		X	
Penetrations					
P-1	-	NRI		X	
P-2	-	NRI		X	
P-3	-	NRI		X	
P-4	-	NRI		X	
P-4A	-	NRI		X	
P-5	-	NRI		X	
P-5A	-	NRI		X	
P-6	-	NRI		X	
P-6A	-	NRI		X	
Hanger Lugs					
CRH-4	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
ULTRASONIC THICKNESS EXAMINATION REPORT							
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024		Job Number: 43-24-0331a		
Component: Cold Reheat Piping System			Material: A-106, Grade B		Nominal Wall: 0.500" x 18.000" OD 0.688" x 24.000" OD		Calc. Minimum Wall: 0.333" 0.444"
EQUIPMENT USED: ☒ D-Meter ☒ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers					KEY: All values recorded in inches. US - Upstream T - Top DS - Downstream B - Bottom		
IDENTIFICATION	CONFIGURATION		DIAMETER MEASUREMENTS	THICKNESS MEASUREMENTS			
			PI TAPE	12:00	3:00	6:00	9:00
GW-1	US	Turbine Conn.	Not Accessible	-	-	-	-
	DS	Pipe	18.063	0.510	0.490	0.493	0.502
GW-2	US	Pipe	18.078	0.513	0.500	0.524	0.545
	DS	Elbow	18.141	0.555	0.597	0.616	0.600
GW-3	US	Elbow	18.125	0.549	0.627	0.594	0.597
	DS	Reducer	18.375	0.813	0.844	0.841	0.818
GW-4	US	Pipe	18.063	0.541	0.528	0.557	0.478
	DS	Pipe	18.063	0.519	0.508	0.545	0.550
GW-5	US	Pipe	24.094	0.723	0.707	0.688	0.716
	DS	Pipe	24.094	0.748	0.739	0.726	0.717
GW-6	US	Pipe	24.109	0.696	0.696	0.700	0.688
	DS	Pipe	23.984	0.704	0.711	0.738	0.713
GW-7	US	Pipe	24.063	0.686	0.685	0.697	0.696
	DS	Pipe	24.016	0.699	0.700	0.691	0.695
				OD:	18.000"	24.000"	
				Min.:	0.478	0.685	
				Max.:	0.844	0.748	
				Avg.:	0.584	0.707	
INSPECTOR: A. Giulitto, W. Fountain			LEVEL: II		DATE: 03/16/2024		

Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-1
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.75"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.
Only one side was scannable due to geometry of turnine connection.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-2
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.70"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-3
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.70"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-4
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.70"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-5
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.70"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased-Array Report

Customer: EKPC Cooper
Unit Number: 2
Project Number: 43-24-0331a
Procedure: TEI-NDT-55 FS-PA Rev 4

Component: Cold Reheat
Weld Number: CRH-GW-6
Weld Configure: Circumferential
Thickness: 0.85"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

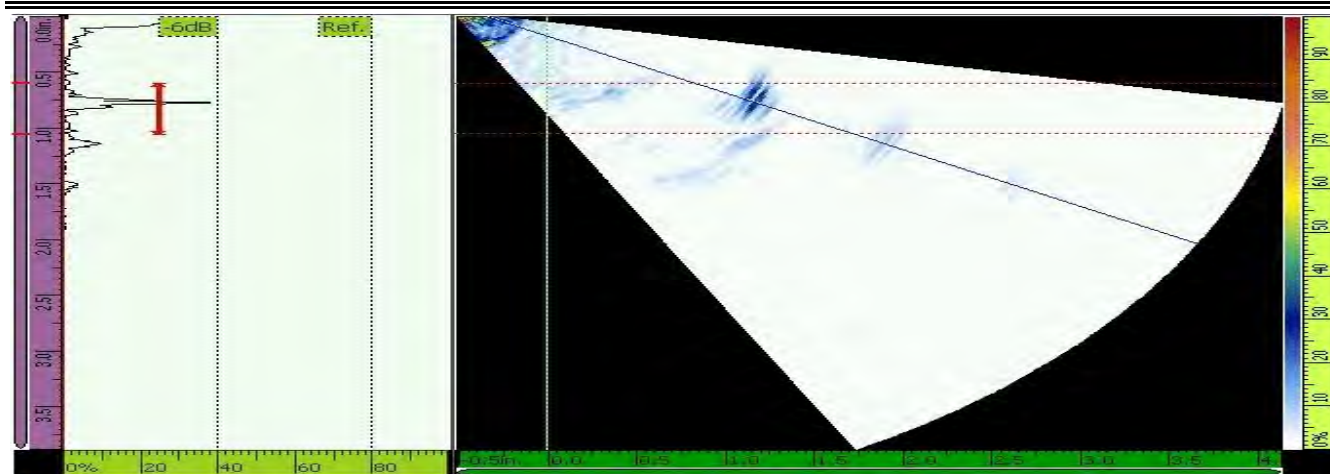
Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128



COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.
Only one side was scannable due to asbestos insulation on downstream side of weld.

Inspector: Tyler Walker **Level:** II **Date:** Mar-24

Phased-Array Report

Customer:	EKPC Cooper	Component:	Cold Reheat
Unit Number:	2	Weld Number:	CRH-GW-7
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.85"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	3.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	17	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.
Limited scan due to insulation of adjacent pipe (2:30 to 12:30 was not accessible).

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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**NONDESTRUCTIVE EXAMINATION REPORTS
BOILER FEEDWATER DISCHARGE PIPING SYSTEM**

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Boiler Feedwater Discharge Piping System - 12.750" OD

The minimum wall thickness requirements were calculated for the Boiler Feedwater Discharge piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade B

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

650	°F
2,800	psig
12.750	inches
17,100	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.980

 inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Boiler Feedwater Discharge Piping System - 8.625" OD

The minimum wall thickness requirements were calculated for the Boiler Feedwater Discharge piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade B

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

650	°F
2,800	psig
8.625	inches
17,100	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.663

 inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Boiler Feedwater Discharge Piping System - 12.750" OD

The minimum wall thickness requirements were calculated for the Boiler Feedwater Discharge piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade C

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

650	°F
2,800	psig
12.750	inches
19,800	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.853

 inches

Power Piping Minimum Wall Calculation
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Boiler Feedwater Discharge Piping System - 8.625" OD

The minimum wall thickness requirements were calculated for the Boiler Feedwater Discharge piping system based on the 2018 ASME Code for Power Piping, B31.1.

ASTM Material Specifications for:

A-106, Grade C

Where:

T - Design Temperature

P - Maximum Allowable Pressure

D - Outside Diameter

SE - Maximum Stress Value

y - Temperature Coefficient

A - Additional Thickness

650	°F
2,800	psig
8.625	inches
19,800	psi
0.40	
0.000	inches

The following equation applies per B31.1 Section 104.1.2

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

0.577

 inches

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Boiler Feedwater Discharge Piping System		Material: A-106, Grades B and C	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☒ Central Cond. ☐ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Girth Welds					
GW-1	-	No recordable indications (NRI)		X	
GW-2	-	NRI		X	
Saddle Welds					
SDL-1	-	NRI		X	
SDL-2	-	NRI		X	
Penetrations					
P-1	-	NRI		X	
P-2	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.							
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454							
ULTRASONIC THICKNESS EXAMINATION REPORT							
Job Name: EKPC - J.S. Cooper Station Unit No. 2			Job Date: March 2024		Job Number: 43-24-0331a		
Component: Boiler Feedwater Discharge Piping System			Material: A-106, Grades B and C		Nominal Wall: N/A x 12.750" OD N/A x 8.625" OD		Calc. Minimum Wall: 0.980"/0.853" 0.663"/0.577"
EQUIPMENT USED: ☒ D-Meter ☒ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers					KEY: All values recorded in inches. US - Upstream T - Top DS - Downstream B - Bottom		
IDENTIFICATION	CONFIGURATION		DIAMETER MEASUREMENTS	THICKNESS MEASUREMENTS			
			PI TAPE	12:00	3:00	6:00	9:00
GW-1	US	Pipe Bend	8.594	0.800	0.853	0.851	0.783
	DS	Pipe	8.500	0.838	0.847	0.823	0.828
GW-2	US	Pipe	12.766	1.132	1.116	1.143	1.112
	DS	Pipe	12.734	1.137	1.096	1.101	1.126
				OD	8.625"	12.750"	
				Min.:	0.783	1.096	
				Max.:	0.853	1.143	
				Avg.:	0.828	1.120	
INSPECTOR: K. Veon			LEVEL: II		DATE: 03/16/2024		

THIELSCH, INC.														
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454														
ULTRASONIC THICKNESS EXAMINATION REPORT														
Job Name: EKPC - J.S. Cooper Station - Unit No. 2								Job Date: March 2024			Job Number: 43-24-0331a			
Component: Boiler Feedwater Discharge Piping System - (Location 1)				Material: A-106, Grades B and C				Nominal Wall: 0.812" x 8.625" OD			Calc. Minimum Wall: 0.663"/0.577"			
EQUIPMENT USED: ☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers								KEY: All values recorded in inches. Less than Nominal Wall Less than 70% Nominal Wall Less than Calc. Minimum Wall						
	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	0.822	0.832	0.845	0.858	0.873	0.839	0.823	0.808	0.786	0.791	0.815	0.819	0.800	PIPE BEND
2	0.827	0.838	0.850	0.861	0.874	0.835	0.823	0.805	0.790	0.794	0.806	0.813	0.800	
3	0.822	0.840	0.857	0.868	0.871	0.839	0.824	0.810	0.806	0.802	0.808	0.807	0.798	
4	0.817	0.836	0.850	0.870	0.877	0.853	0.842	0.824	0.805	0.808	0.810	0.807	0.799	
5	0.818	0.830	0.839	0.857	0.877	0.850	0.842	0.818	0.805	0.806	0.809	0.809	0.804	
6	0.813	0.824	0.833	0.862	0.877	0.852	0.846	0.829	0.805	0.807	0.802	0.803	0.798	
7	0.799	0.819	0.838	0.883	0.875	0.852	0.855	0.831	0.812	0.807	0.798	0.786	0.782	
8	0.795	0.818	0.846	0.875	0.881	0.856	0.853	0.833	0.813	0.801	0.796	0.774	0.772	
9	0.790	0.814	0.850	0.890	0.884	0.861	0.852	0.826	0.803	0.800	0.790	0.768	0.771	
10	0.796	0.809	0.852	0.888	0.889	0.865	0.860	0.816	0.797	0.796	0.787	0.776	0.771	
11	0.802	0.805	0.850	0.888	0.886	0.871	0.857	0.806	0.794	0.787	0.795	0.770	0.779	
12	0.803	0.809	0.852	0.887	0.877	0.862	0.851	0.805	0.795	0.793	0.789	0.770	0.778	
13	0.806	0.825	0.854	0.892	0.877	0.854	0.846	0.818	0.798	0.796	0.785	0.772	0.776	
14	0.803	0.817	0.851	0.880	0.871	0.854	0.843	0.823	0.804	0.800	0.787	0.772	0.775	
15	0.801	0.807	0.850	0.876	0.877	0.861	0.850	0.820	0.805	0.802	0.786	0.774	0.779	
16	0.795	0.803	0.846	0.872	0.875	0.868	0.859	0.817	0.809	0.799	0.783	0.772	0.777	
17	0.794	0.806	0.855	0.871	0.873	0.874	0.867	0.820	0.806	0.791	0.774	0.765	0.773	
18	0.799	0.814	0.860	0.871	0.876	0.876	0.882	0.827	0.813	0.794	0.763	0.758	0.766	
19	0.799	0.814	0.864	0.875	0.879	0.875	0.869	0.820	0.803	0.787	0.755	0.754	0.770	
20	0.793	0.814	0.867	0.881	0.885	0.873	0.866	0.811	0.798	0.783	0.761	0.753	0.769	
21	0.790	0.816	0.865	0.879	0.887	0.883	0.868	0.810	0.793	0.782	0.768	0.763	0.775	
22	0.790	0.813	0.864	0.874	0.876	0.873	0.859	0.812	0.795	0.784	0.765	0.766	0.778	
23	0.796	0.819	0.862	0.862	0.876	0.869	0.868	0.824	0.808	0.789	0.758	0.762	0.777	
24	0.788	0.809	0.853	0.860	0.875	0.871	0.873	0.826	0.817	0.789	0.757	0.760	0.769	
25	0.777	0.805	0.843	0.863	0.881	0.870	0.876	0.829	0.814	0.788	0.762	0.760	0.770	
26	0.774	0.799	0.846	0.867	0.883	0.890	0.883	0.833	0.811	0.788	0.758	0.762	0.773	
27	0.769	0.799	0.848	0.867	0.888	0.898	0.885	0.835	0.814	0.779	0.746	0.750	0.767	
28	0.776	0.807	0.853	0.859	0.886	0.902	0.889	0.823	0.820	0.770	0.739	0.746	0.764	
29	0.773	0.809	0.863	0.869	0.896	0.900	0.884	0.821	0.812	0.768	0.741	0.745	0.763	
30	0.774	0.804	0.868	0.879	0.893	0.889	0.868	0.828	0.807	0.764	0.741	0.746	0.765	
31	0.774	0.804	0.869	0.880	0.900	0.903	0.864	0.828	0.806	0.775	0.744	0.754	0.764	
32	0.775	0.805	0.864	0.870	0.896	0.899	0.866	0.827	0.810	0.782	0.747	0.755	0.766	
33	0.777	0.807	0.857	0.863	0.891	0.899	0.878	0.833	0.816	0.784	0.750	0.755	0.764	
34	0.774	0.803	0.856	0.862	0.890	0.899	0.881	0.842	0.815	0.784	0.747	0.750	0.767	
INSPECTOR: K. Veon								LEVEL: II			DATE: 03/16/2024			

THIELSCH, INC.														
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454														
ULTRASONIC THICKNESS EXAMINATION REPORT														
Job Name: EKPC - J.S. Cooper Station - Unit No. 2								Job Date: March 2024			Job Number: 43-24-0331a			
Component: Boiler Feedwater Discharge Piping System - (Location 1)				Material: A-106, Grades B and C		Nominal Wall: 0.812" x 8.625" OD			Calc. Minimum Wall: 0.663"/0.577"					
EQUIPMENT USED:								KEY: All values recorded in inches.						
☒ D-Meter ☐ Pi-Tape ☐ Other								Less than Nominal Wall						
☐ Micrometer ☐ Calipers								Less than 70% Nominal Wall						
								Less than Calc. Minimum Wall						
	A	B	C	D	E	F	G	H	I	J	K	L	M	
35	0.760	0.796	0.851	0.864	0.895	0.902	0.879	0.842	0.819	0.787	0.750	0.750	0.758	PIPE BEND
36	0.760	0.792	0.855	0.868	0.895	0.908	0.879	0.849	0.819	0.787	0.755	0.753	0.754	
37	0.757	0.795	0.858	0.876	0.903	0.906	0.879	0.846	0.816	0.784	0.748	0.749	0.755	
38	0.768	0.808	0.869	0.874	0.899	0.896	0.873	0.842	0.824	0.781	0.754	0.752	0.762	
39	0.782	0.815	0.861	0.874	0.892	0.888	0.865	0.841	0.815	0.763	0.753	0.757	0.778	
40	0.791	0.825	0.870	0.875	0.888	0.871	0.842	0.826	0.810	0.772	0.762	0.768	0.772	
41	0.791	0.824	0.872	0.876	0.883	0.862	0.835	0.814	0.811	0.786	0.775	0.781	0.776	
42	0.796	0.823	0.856	0.866	0.877	0.851	0.829	0.817	0.807	0.784	0.788	0.792	0.775	
43	0.803	0.823	0.842	0.854	0.871	0.853	0.831	0.826	0.805	0.774	0.786	0.794	0.789	
44	0.797	0.821	0.840	0.849	0.867	0.863	0.839	0.830	0.806	0.791	0.788	0.793	0.785	
45	0.790	0.817	0.837	0.856	0.878	0.860	0.852	0.837	0.835	0.791	0.785	0.793	0.770	
46	0.788	0.819	0.841	0.849	0.876	0.852	0.846	0.834	0.820	0.798	0.772	0.793	0.767	
47	0.800	0.815	0.853	0.850	0.867	0.860	0.851	0.824	0.812	0.783	0.792	0.787	0.766	
48	0.838	0.830	0.847	0.825	0.830	0.826	0.823	0.828	0.828	0.828	0.825	0.823	0.827	PIPE
	Min.: 0.739													
	Max.: 0.908													
	Avg.: 0.822													
INSPECTOR: K. Veon								LEVEL: II			DATE: 03/16/2024			

THIELSCH, INC.													
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454													
ULTRASONIC THICKNESS EXAMINATION REPORT													
Job Name: EKPC - J.S. Cooper Station - Unit No. 2							Job Date: March 2024			Job Number: 43-24-0331a			
Component: Boiler Feedwater Discharge Piping System - (Location 2)				Material: A-106, Grades B and C			Nominal Wall: 1.000" x 12.750" OD			Calc. Minimum Wall: 0.980"/0.853"			
EQUIPMENT USED: ☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers								KEY: All values recorded in inches.					
								Less than Nominal Wall					
								Less than 70% Nominal Wall					
								Less than Calc. Minimum Wall					
	A	B	C	D	E	F	G	H	I	J	K	L	PIPE
1	1.147	1.157	1.139	1.130	1.133	1.145	1.139	1.137	1.133	1.140	1.143	1.144	
2	1.143	1.152	1.138	1.133	1.142	1.142	1.130	1.138	1.138	1.145	1.143	1.147	
3	1.143	1.147	1.140	1.135	1.142	1.138	1.137	1.141	1.135	1.141	1.144	1.148	
4	1.139	1.145	1.138	1.133	1.136	1.138	1.138	1.146	1.144	1.146	1.160	1.157	
5	1.131	1.134	1.134	1.127	1.132	1.142	1.144	1.150	1.151	1.153	1.158	1.152	
6	1.117	1.134	1.134	1.129	1.135	1.147	1.151	1.156	1.154	1.157	1.157	1.147	
7	1.118	1.128	1.129	1.131	1.139	1.145	1.152	1.156	1.155	1.160	1.161	1.146	
8	1.123	1.127	1.132	1.129	1.148	1.144	1.155	1.159	1.159	1.165	1.159	1.151	
9	1.123	1.127	1.131	1.131	1.142	1.143	1.150	1.158	1.162	1.165	1.158	1.152	
10	1.111	1.133	1.128	1.132	1.167	1.143	1.152	1.158	1.163	1.173	1.155	1.149	
11	1.121	1.122	1.129	1.133	1.163	1.146	1.156	1.161	1.166	1.170	1.157	1.153	
12	1.102	1.125	1.128	1.139	1.143	1.150	1.152	1.165	1.168	1.158	1.158	1.151	
13	1.108	1.128	1.136	1.144	1.146	1.149	1.151	1.159	1.168	1.156	1.148	1.152	
14	1.109	1.126	1.137	1.146	1.150	1.148	1.154	1.162	1.164	1.153	1.151	1.146	
15	1.107	1.126	1.137	1.140	1.144	1.149	1.153	1.160	1.158	1.154	1.146	1.176	
16	1.118	1.130	1.140	1.135	1.139	1.144	1.150	1.162	1.156	1.159	1.152	1.197	
17	1.120	1.127	1.137	1.130	1.136	1.146	1.152	1.167	1.156	1.158	1.159	1.151	
18	1.115	1.130	1.125	1.127	1.136	1.152	1.165	1.164	1.160	1.161	1.157	1.158	
19	1.120	1.133	1.134	1.132	1.141	1.147	1.162	1.171	1.162	1.164	1.161	1.162	
20	1.119	1.137	1.136	1.135	1.142	1.150	1.169	1.168	1.161	1.162	1.162	1.164	
21	1.121	1.140	1.129	1.136	1.146	1.159	1.173	1.169	1.160	1.161	1.167	1.164	
22	1.123	1.141	1.131	1.135	1.143	1.155	1.169	1.165	1.162	1.169	1.164	1.169	
23	1.120	1.129	1.127	1.135	1.145	1.158	1.171	1.163	1.164	1.166	1.170	1.167	
24	1.135	1.131	1.132	1.135	1.151	1.162	1.168	1.167	1.163	1.167	1.170	1.179	
25	1.136	1.137	1.135	1.136	1.146	1.161	1.147	1.161	1.161	1.167	1.168	1.182	
INSPECTOR: K. Veon							LEVEL: II			DATE: 03/16/2024			

THIELSCH, INC.

195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454

ULTRASONIC THICKNESS EXAMINATION REPORT

Job Name: EKPC - J.S. Cooper Station - Unit No. 2

Job Date: March 2024

Job Number: 43-24-0331a

Component: Boiler Feedwater Discharge Piping System - (Location 2)
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Material:
A-106, Grades
B and C

Nominal Wall: 1.000" x 12.750" OD

Calc. Minimum Wall: 0.980"/0.853"

EQUIPMENT USED:

- ☒ D-Meter
- ☒ Micrometer

- ☐ Pi-Tape
- ☐ Calipers

☐ Other

KEY: All values recorded in inches.

Less than Nominal Wall

Less than 70% Nominal Wall

Less than Calc. Minimum Wall

[illegible]

INSPECTOR: K. Veon

LEVEL: II

DATE: 03/16/2024

Phased-Array Report

Customer:	EKPC Cooper	Component:	Boiler Feed Discharge
Unit Number:	2	Weld Number:	BFD-GW-1
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.75"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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Phased-Array Report

Customer:	EKPC Cooper	Component:	Boiler Feed Discharge
Unit Number:	2	Weld Number:	BFD-GW-2
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	1.125"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	5.25 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	26	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	03/14/24
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**NONDESTRUCTIVE EXAMINATION REPORTS
CONDENSATE LINE**

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331a		
Component: Condensate Line		Material: N/A	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Girth Welds					
GW-1	-	No recordable indications (NRI)		X	
GW-2	-	NRI		X	
Penetrations					
P-1	-	NRI		X	
P-2	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.													
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454													
ULTRASONIC THICKNESS EXAMINATION REPORT													
Job Name: EKPC - J.S. Cooper Station - Unit No. 2								Job Date: March 2024		Job Number: 43-24-0331a			
Component: Condensate Line - (Location 1)				Material: N/A		Nominal Wall: N/A		Calc. Minimum Wall: N/A					
EQUIPMENT USED: ☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers								KEY: All values recorded in inches.					
	A	B	C	D	E	F	G	H	I	J	K	L	
1	0.419	0.420	0.399	0.406	0.408	0.401	0.399	0.398	0.389	0.378	0.387	0.383	ELBOW
2	0.430	0.404	0.399	0.405	0.403	0.416	0.401	0.393	0.394	0.386	0.393	0.378	
3	0.418	0.401	0.396	0.394	0.399	0.403	0.436	0.402	0.389	0.390	0.391	0.377	
4	0.412	0.397	0.396	0.395	0.401	0.403	0.443	0.403	0.391	0.389	0.391	0.377	
5	0.403	0.399	0.393	0.409	0.400	Obstr.	0.412	0.404	0.395	0.402	0.389	0.374	
6	0.404	0.397	0.391	0.400	0.400	Obstr.	0.417	0.409	0.406	0.406	0.391	0.404	
7	0.409	0.404	0.401	0.402	0.406	0.424	0.412	0.412	0.403	0.439	0.401	0.365	
8	0.408	0.404	0.408	0.408	0.414	0.424	0.419	0.424	0.407	0.400	0.401	0.364	
9	0.413	0.403	0.405	0.408	0.419	0.424	0.418	0.412	0.408	0.402	0.387	0.360	
10	0.415	0.414	0.411	0.414	0.446	0.426	0.421	0.412	0.404	0.398	0.378	0.360	
11	0.416	0.419	0.416	0.413	0.417	0.424	0.415	0.408	0.403	0.394	0.370	0.378	
12	0.423	0.418	0.417	0.411	0.413	0.421	0.417	0.403	0.395	0.386	0.367	0.351	
13	0.429	0.422	0.418	0.412	0.417	0.426	0.402	0.400	0.385	0.382	0.373	0.356	
14	0.439	0.421	0.421	0.412	0.412	0.420	0.401	0.402	0.386	0.374	0.378	0.354	
15	0.431	0.419	0.422	0.411	0.411	0.409	0.403	0.397	0.384	0.378	0.365	0.357	
16	0.436	0.422	0.425	0.406	0.411	Obstr.	0.394	0.388	0.378	0.372	0.366	0.345	
17	0.444	0.417	0.413	0.407	0.410	0.406	0.400	0.392	0.379	0.400	0.387	0.353	
18	0.435	0.422	0.412	0.430	0.404	0.410	0.398	0.385	0.376	0.365	0.366	0.351	
19	0.438	0.419	0.415	0.401	0.405	0.407	0.410	0.388	0.372	0.368	0.363	0.368	
20	0.434	0.417	0.418	0.401	0.412	0.412	0.406	0.392	0.375	0.355	0.357	0.371	
21	0.355	0.339	0.343	0.341	0.385	0.388	0.375	0.380	0.399	0.421	0.457	0.388	PIPE
22	0.348	0.334	0.341	0.353	0.381	0.389	0.381	0.377	0.396	0.426	0.441	0.417	
23	0.346	0.337	0.372	0.357	0.389	0.387	0.389	0.380	0.405	0.432	0.418	0.426	
INSPECTOR: K. Veon					LEVEL: II				DATE: 03/16/2024				

THIELSCH, INC.														
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454														
ULTRASONIC THICKNESS EXAMINATION REPORT														
Job Name: EKPC - J.S. Cooper Station - Unit No. 2						Job Date: March 2024			Job Number: 43-24-0331a					
Component: Condensate Line - (Location 1)				Material: N/A		Nominal Wall: N/A			Calc. Minimum Wall: N/A					
EQUIPMENT USED:								KEY: All values recorded in inches.						
☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers														
	M	N	O	P	Q	R	S	T	ELBOW					
1	0.387	0.420	0.413	0.414	0.412	0.389	0.397	0.411		Min:	0.334			
2	0.377	0.390	0.415	0.420	0.418	0.399	0.403	0.416		Max:	0.461			
3	0.374	0.389	0.412	0.412	0.412	0.399	0.406	0.413		Avg:	0.399			
4	0.375	0.383	0.406	0.420	0.408	0.396	0.401	0.407						
5	0.379	0.386	0.404	0.409	0.410	0.402	0.400	0.404						
6	0.381	0.388	0.409	0.400	0.411	0.398	0.398	0.404						
7	0.388	0.386	0.401	0.412	0.406	0.395	0.404	0.407						
8	0.384	0.385	0.399	0.405	0.402	0.403	0.395	0.404						
9	0.376	0.406	0.399	0.399	0.402	0.380	0.392	0.410						
10	0.372	0.380	0.393	0.402	0.405	0.391	0.404	0.412						
11	0.358	0.365	0.397	0.400	0.409	0.393	0.406	0.414						
12	0.360	0.369	0.390	0.396	0.414	0.400	0.409	0.418						
13	0.366	0.369	0.391	0.401	0.423	0.411	0.410	0.424						
14	0.363	0.363	0.387	0.402	0.428	0.406	0.410	0.428						
15	0.355	0.358	0.390	0.410	0.419	0.409	0.416	0.430						
16	0.359	0.390	0.391	0.410	0.412	0.407	0.419	0.431						
17	0.364	0.370	0.397	0.418	0.451	0.420	0.430	0.436						
18	0.374	0.384	0.412	0.429	0.461	0.429	0.434	0.441						
19	0.379	0.398	0.423	0.436	0.436	0.436	0.437	0.442						
20	0.373	0.411	0.452	0.445	0.437	0.433	0.441	0.445						
21	0.384	0.397	0.402	0.392	0.359	0.347	0.357	0.375		PIPE				
22	0.381	0.394	0.412	0.403	0.357	0.352	0.359	0.370						
23	0.385	0.403	0.398	0.408	0.378	0.354	0.372	0.374						
INSPECTOR: K. Veon						LEVEL: II			DATE: 03/16/2024					



Phased Array Report

Customer:	EKPC Cooper	Component:	Condensate
Unit Number:	2	Weld Number:	Condensate-GW-1
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.4"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	4.5 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	23	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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Phased Array Report

Customer:	EKPC Cooper	Component:	Condensate
Unit Number:	2	Weld Number:	Condensate-GW-2
Project Number:	43-24-0331a	Weld Configure:	Circumferential
Procedure:	TEI-NDT-55 FS-PA Rev 4	Thickness:	0.4"

Machine Information

Model #	Serial #	Software Version	Calibration Due	Save Mode
Omniscan MX2	OMNI2-101475	MXU-4.4R5	7/23/2024	Inspection Data

Probe Characterization

Probe Model	Probe Serial	Probe Frequency	Wedge Angle	Probe Aperture
5L16-A10	XAAB-0184	5MHz	55	0.384

Setup

Beam Delay	Start(1/2 path)	Range(1/2 path)	Acq Rate	Type
9.8	0.000 in	4.5 in	60	PA
Scale Type	Scale Factor	Video Filter	Rectification	Band Pass Filter
Compression	23	On	FW	None
Voltage	Gain	Mode	Wave Type	Pulse Width
40 (low)	35.3 dB	PE	Shear	100.00 ns

Transducer Calculator

Element Quantity	First Element	Last Element	Resolution	Scan Type
16	1	16	1.0	Sectoral
Start Angle	Stop Angle	Angle Resolution	Focus Depth	Sound Velocity
30	80	1	Unfocused	0.128

COMMENTS:

Above LPA image is of typical 360° non-relevant root signal/root geometry.
No service-related indications detected.

Inspector:	Tyler Walker	Level:	II	Date:	Mar-24
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**NONDESTRUCTIVE EXAMINATION REPORTS
DEAERATOR HEATER**

Minimum Wall Thickness Calculations
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Deaerator Heater

The minimum wall thickness requirements were calculated for the head and shell sections of the deaerator heater based on the 2015 ASME Boiler and Pressure Vessel Code, Section II. The head and shell material was specified to be produced

ASME Specification **SA-285, Grade C**

Where:

P = Design pressure **75** psig
D = Inner diameter (head) **77** inches
r = Inner radius (shell) **38.688** inches
S = Allowable stress

Head: ASME Specification

15,700	75 psi
	500 temp

Shell: ASME Specification

15,700	75 psi
	500 temp

E = joint efficiency (girth and seam welds) double butt welds

= 0.70 no radiography
= 0.85 spot radiography
= 1.00 full radiography

1.00

The following equations apply:

Shell Thickness:

0.185
 $t = Pr / (SE - 0.6P)$
(Paragraph UG27 for longitudinal joints under circumferential stress)

Head Thickness:

0.184
 $t = (PD) / (2SE - 0.2P)$
(Paragraph UG32 for torispherical heads)

THIELSCH, INC.									
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454									
ULTRASONIC WALL THICKNESS EXAMINATION REPORT									
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024			Job Number: 43-24-0331a			
Component: Deaerator Heater			Material: SA-285, Grade C			Nominal Wall: Heads: 0.500" Shell: 0.3125"		Calc. Minimum Wall: 0.184" 0.185"	
EQUIPMENT USED: ☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☒ Calipers _____						KEY: All values recorded in inches. E - East T - Top W - West B - Bottom			
IDENTIFICATION	CONFIGURATION		SEAM WELD THICKNESS MEASUREMENTS			GIRTH WELD THICKNESS MEASUREMENTS			
			East	Middle	West	12:00	3:00	6:00	9:00
GW-4	E	Shell				0.333	0.334	N/A	0.327
	W	Head				0.524	0.532	N/A	0.528
LS-3	T	Shell	N/A	0.341	0.327				
	B	Shell	N/A	0.317	0.320				
							Head	Shell	
						Min.	0.524	0.317	
						Max.	0.532	0.341	
						Avg.	0.528	0.328	
INSPECTOR: K. Veon			LEVEL: II			DATE: 03/16/2024			

THIELSCH, INC.				
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454				
MAGNETIC PARTICLE EXAMINATION REPORT				
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024		Job Number: 43-24-0331a
Component: Deaerator Heater		Material: SA-285, Grade C		Procedure: NDT-21FS, Rev. 11
EXAMINATION METHOD ☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		TECHNIQUE ☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other		
CURRENT ☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		WET ☐ 14AM ☒ 20B ☐ Other	DRY ☐ Red ☐ Gray ☐ Black	
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS	ACCEPT	REJECT
Girth Welds				
GW-1	N/A	Not Accessible		
GW-2	N/A	Not Accessible		
GW-3	N/A	Not Accessible		
GW-4	-	NRI	X	
Seam Welds				
LS-1	N/A	Not Accessible		
LS-2	N/A	Not Accessible		
LS-3	-	NRI (Only 24" of Seam Accessible)	X	
Penetrations				
P-1	N/A	Not Accessible		
P-2	N/A	Not Accessible		
P-3	N/A	Not Accessible		
P-4	N/A	Not Accessible		
P-5	-	NRI	X	
P-6	-	NRI (weld eroded)	X	
P-7	-	NRI (weld eroded)	X	
P-8	-	NRI	X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024	

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195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454

ULTRASONIC WALL THICKNESS EXAMINATION REPORT

Job Name: EKPC - J.S. Cooper Station -
Unit No. 2

Job Date: March 2024

Job Number: 43-24-0331a

Component:
Deaerator Heater

Material:
SA-285, Grade C

Nominal Wall:
Heads: 0.500"

Calc. Minimum Wall:
0.184"

EQUIPMENT USED:

☒ D-Meter

□ Pi-Tape

☐ Other

☐ Micrometer

☐ Calipers

KEY: All values recorded in inches.

N - North

T - Top

S - South

B - Bottom

[illegible]

**NONDESTRUCTIVE EXAMINATION REPORTS
DEAERATOR STORAGE TANK**

Minimum Wall Thickness Calculations
Eastern Kentucky Power Cooperative
J.S. Cooper Generating Station - Unit No. 2
Deaerator Storage Tank

The minimum wall thickness requirements were calculated for the head and shell sections of the deaerator storage tank based on the 2015 ASME Boiler and Pressure Vessel Code, Section II. The head and shell material was specified to be produced in accordance with:

ASME Specification **SA-285, Grade C**

Where:

P = Design pressure **75** psig
D = Inner diameter (head) **136.5** inches
r = Inner radius (shell) **68.348** inches
S = Allowable stress

Head: ASME Specification

15,700	75 psi
	500 temp

Shell: ASME Specification

15,700	75 psi
	500 temp

E = joint efficiency (girth and seam welds) double butt welds
= 0.70 no radiography
= 0.85 spot radiography
= 1.00 full radiography

1.00

The following equations apply:

Shell Thickness:

0.327
 $t = Pr / (SE - 0.6P)$
(Paragraph UG27 for longitudinal joints under circumferential stress)

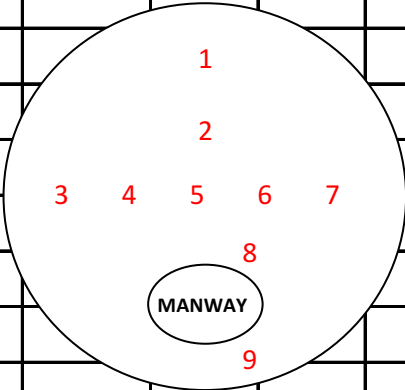
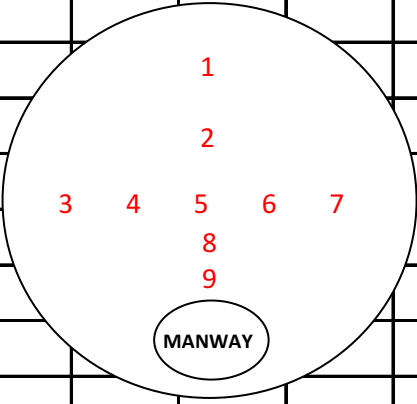
Head Thickness:

0.326
 $t = (PD) / (2SE - 0.2P)$
(Paragraph UG32 for torispherical heads)

THIELSCH, INC.				
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454				
MAGNETIC PARTICLE EXAMINATION REPORT				
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331	
Component: Deaerator Storage Tank		Material: SA-285, Grade C	Procedure: NDT-21FS, Rev. 11	
EXAMINATION METHOD ☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		TECHNIQUE ☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other		
CURRENT ☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		WET ☐ 14AM ☒ 20B ☐ Other	DRY ☐ Red ☐ Gray ☐ Black	
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS	ACCEPT	REJECT
Girth Welds				
GW-1	-	No recordable indications (NRI)	X	
GW-2	-	NRI	X	
GW-3	-	NRI	X	
GW-4	-	NRI	X	
GW-5	-	NRI	X	
GW-6	-	NRI	X	
GW-7	-	NRI	X	
Seam Welds				
LS-1	-	NRI	X	
LS-2	-	NRI	X	
LS-3	-	NRI	X	
LS-4	-	NRI	X	
LS-5	-	NRI	X	
LS-6	-	NRI	X	
Penetrations				
P-1	-	NRI	X	
P-2	-	NRI	X	
P-3	-	NRI	X	
P-4	1/2" LT	Linear fatigue-type indication in toe of weld (Removed with light grinding)	X	
P-5	-	NRI	X	
P-6	-	NRI	X	
P-7	-	NRI	X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024	

THIELSCH, INC.					
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454					
MAGNETIC PARTICLE EXAMINATION REPORT					
Job Name: EKPC - J.S. Cooper Station - Unit No. 2		Job Date: March 2024	Job Number: 43-24-0331		
Component: Deaerator Storage Tank		Material: SA-285, Grade C	Procedure: NDT-21FS, Rev. 11		
EXAMINATION METHOD		TECHNIQUE			
☒ Continuous ☐ Circular ☐ Residual ☒ Longitudinal		☒ Yoke ☐ Headshot ☐ Coil ☐ Prods ☐ Central Cond. ☐ Other			
CURRENT		WET	DRY		
☒ AC ☐ AMP Turns _____ ☐ DC ☐ Amperage _____ ☐ Other _____		☐ 14AM ☒ 20B ☐ Other	☐ Red ☐ Gray ☐ Black		
IDENTIFICATION	INDICATION SIZE	COMMENTS ON RESULTS		ACCEPT	REJECT
Penetrations continued					
P-8	-	No recordable indications (NRI)		X	
P-9	-	NRI		X	
P-10	-	NRI		X	
P-11	-	NRI		X	
P-12	-	NRI		X	
P-13	-	NRI		X	
P-14	-	NRI		X	
P-15	-	NRI		X	
P-16	-	NRI		X	
P-17	-	NRI		X	
P-18	-	NRI		X	
P-19	-	NRI		X	
P-20	-	NRI		X	
P-21	-	NRI		X	
P-22	-	NRI		X	
P-23	-	NRI		X	
P-24	-	NRI		X	
P-25	-	NRI		X	
INSPECTOR: A. Giulitto, D. Drennen		LEVEL: II	DATE: 03/16/2024		

THIELSCH, INC.									
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454									
ULTRASONIC WALL THICKNESS EXAMINATION REPORT									
Job Name: EKPC - J.S. Cooper Station - Unit No. 2			Job Date: March 2024			Job Number: 43-24-0331			
Component: Deaerator Storage Tank			Material: SA-285, Grade C			Nominal Wall: Heads: 0.750" Shell: 0.6525"		Calc. Minimum Wall: 0.326" 0.327"	
EQUIPMENT USED:						KEY: All values recorded in inches.			
☒ D-Meter ☐ Pi-Tape ☐ Other ☐ Micrometer ☐ Calipers _____						E - East T - Top W - West B - Bottom			
IDENTIFICATION	CONFIGURATION		SEAM WELD THICKNESS MEASUREMENTS			GIRTH WELD THICKNESS MEASUREMENTS			
			East	Middle	West	12:00	3:00	6:00	9:00
GW-1	E	Head				0.822	0.804	0.843	0.838
	W	Shell				0.581	0.572	0.571	0.572
GW-2	E	Shell				0.573	0.590	0.590	0.577
	W	Shell				0.575	0.585	0.595	0.582
GW-3	E	Shell				0.585	0.582	0.600	0.585
	W	Shell				0.576	0.575	0.583	0.565
GW-4	E	Shell				0.576	0.570	0.581	0.573
	W	Shell				0.595	0.580	0.587	0.581
GW-5	E	Shell				0.586	0.580	0.588	0.576
	W	Shell				0.584	0.579	0.585	0.580
GW-6	E	Shell				0.585	0.587	0.592	0.601
	W	Shell				0.569	0.589	0.582	0.581
GW-7	E	Shell				0.578	0.583	-	0.581
	W	Head				0.815	0.813	0.805	0.825
LS-1	T	Shell	0.572	0.586	0.577				
	B	Shell	0.580	0.573	0.561				
LS-2	T	Shell	0.590	0.576	0.582				
	B	Shell	0.582	0.581	0.580				
LS-3	T	Shell	0.565	0.579	0.573				
	B	Shell	0.547	0.502	0.583				
LS-4	T	Shell	0.570	0.580	0.580				
	B	Shell	0.580	0.581	0.576				
LS-5	T	Shell	0.580	0.598	0.601				
	B	Shell	0.586	0.593	0.510				
LS-6	T	Shell	0.589	0.584	0.583			Heads	Shell
	B	Shell	0.579	0.591	0.585		Min.	0.804	0.502
							Max.	0.843	0.601
							Avg.	0.821	0.579
INSPECTOR: K. Veon					LEVEL: II		DATE: 03/16/2024		

THIELSCH, INC.										
195 Frances Avenue - Cranston, RI 02910 - (401) 467-6454										
ULTRASONIC WALL THICKNESS EXAMINATION REPORT										
Job Name: EKPC - J.S. Cooper Station - Unit No. 2				Job Date: March 2024			Job Number: 43-24-0331			
Component: Deaerator Storage Tank				Material: SA-285, Grade C			Nominal Wall: Heads: 0.750"		Calc. Minimum Wall: 0.326"	
EQUIPMENT USED:							KEY: All values recorded in inches.			
☒ D-Meter ☐ Pi-Tape ☐ Other							N - North T - Top			
☐ Micrometer ☐ Calipers _____							S - South B - Bottom			
IDENTIFICATION	THICKNESS MEASUREMENTS									
	1	2	3	4	5	6	7	8	9	
East Head	0.767	0.770	0.777	0.766	0.761	0.761	0.825	0.780	0.809	
West Head	0.780	0.784	0.794	0.792	0.791	0.783	0.786	0.788	0.792	
										
										
	EAST HEAD WEST HEAD									
		Heads	East	West						
		Min.	0.761	0.780						
		Max.	0.825	0.794						
		Avg.	0.780	0.788						
INSPECTOR: K. Veon					LEVEL: II			DATE: 03/16/2024		

ARTICLE
"PROPER PIPING-SYSTEM EXAMS KEEP MONEY IN THE PLANT"

PUMPS, VALVES, PIPING

Proper piping-system exams keep money in the plant

Many nondestructive exams and metallurgical evaluations confirm that defects often do not affect the life and integrity of piping systems. The lack of understanding of materials used results in the repair of inconsequential defects—or needless and costly replacement

By Helmut Thielsch, PE, Florence Cone, and Peter Kennefick, Thielsch Engineering Inc

In North America alone, some 50 catastrophic failures or ruptures have occurred in main steam, hot reheat, and cold reheat piping systems since 1950—but only a few occurred in seam-welded, hot reheat piping systems. Operating statistics prove that seam-welded piping operates as reliably as seamless pipe. But damage caused by ruptures in seam-welded pipe makes headlines, because the seams tend to unzip and failures open large pipe areas, releasing great volumes of high-pressure, high-temperature steam.

Inspection methodologies have been refined over the past five decades. Current approaches, especially ultrasonic, acoustic-emission, and fluorescent magnetic particle examinations, can easily detect discontinuities in weld and base materials. These sensitive techniques can trace defects back to raw materials, manufacturing, shop fabrication, field erection, welding, and heat-treating. Some defects were not identified by the original manufacturer or after fabrication of the piping system.



1. Failure of this 12-in. OD hot reheat pipe was attributed to microstructural transformation, which occurred during welding

All the tools in the world cannot replace real-world experience, however. Inappropriate interpretations of exam results are costly. Test results attributed to mismatch, counter-boring, and root bead penetrations have been erroneously interpreted to suggest serious defects rather than inconse-

quential manufacturing or fabrication flaws, or benign surface contour variations. In extreme cases, incorrect evaluations have led to unnecessary repairs and expensive replacements.

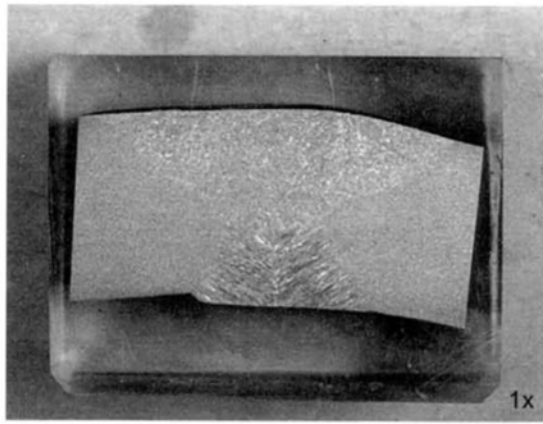
Evaluate weld condition

An arsenal of tools exists to evaluate seam-welded pipe. Of special note, volumetric inspections—such as ultrasonic and radiographic examinations—can identify subsurface defects as well as pinpoint their size. Conventional ultrasonic examinations, when performed properly, will identify defects.

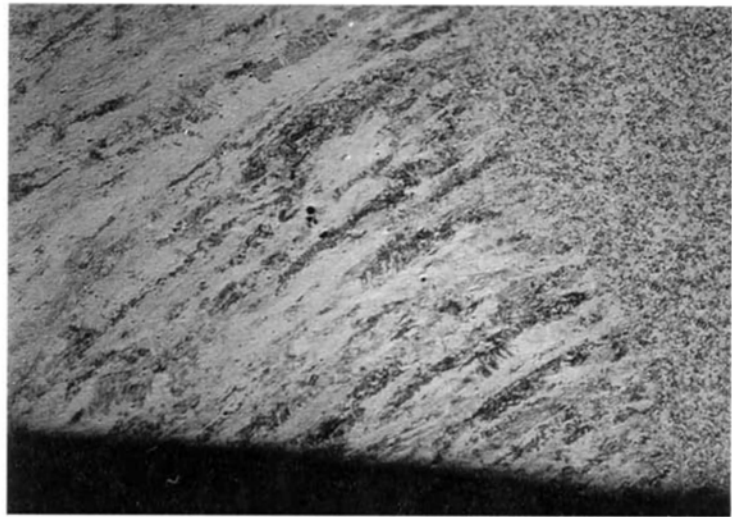
Although not the least expensive evaluations, ultrasonic exams are the easiest to apply and are cost-effective. Recent advances in ultrasonic technology have led to specialized approaches—such as time-of-flight diffraction and focus beam array. If defects are identified, they can be further characterized through radiographic exams. Other nondestructive examinations (NDE) available include surface inspections—such



2, 3. Catastrophic failures—such as these ruptures in large-diameter, seam-welded pipe—were initiated at the cusp of the seam weld. Cracks occurred at both sides of the seam welds



4. Defects introduced during the pipe manufacturing process are not always apparent at magnifications of 1x or even 10x



as magnetic particle exams—or liquid penetrant exams that identify cracking or linear indications on the accessible weld surface.

In-situ metallographic exams, or replication, are used to evaluate the condition of seam-welded piping. The technique involves intense polishing and etching of the metal surface. An acetate tape is then applied that retains the image of the material microstructure. The image is observed under a microscope and photographically documented. Replication can be used to evaluate the microstructural condition, search for evidence of creep, or characterize surface conditions—such as fissuring—that are undetected by other NDE techniques.

Be aware that replication is restricted to surface testing, and does have limitations. For example, if the surface of a pipe has become decarburized during manufacturing, it may not represent the thickness of the pipe cross-section.

Discontinuities

Seam-welded, low-alloy pipe is used extensively in hot reheat systems because they generally require large-diameter pipe with wall-thickness values ranging between 0.75 and 2.50 in. Pipe of this size is not readily available in the seamless version.

Both seamless and seam-welded pipe and related components contain discontinuities. Codes and standards that apply to piping materials as well as to fabricate and erected pipe systems recognize the presence of discontinuities. Even seam welded pipe that is manufactured according to the American Society for Testing & Materials codes contains base materials and welds with defects that do not affect the operability or integrity of the pipe spool or piping system.

Most seams are formed with a submerged-arc welding process, which generally results in a defect-free product. When defects are found through visual or radiographic exams, repairs are made with the shielded metal-arc welding process, and re-examined. After accep-

tance, the pipe is finished with a final heat treatment.

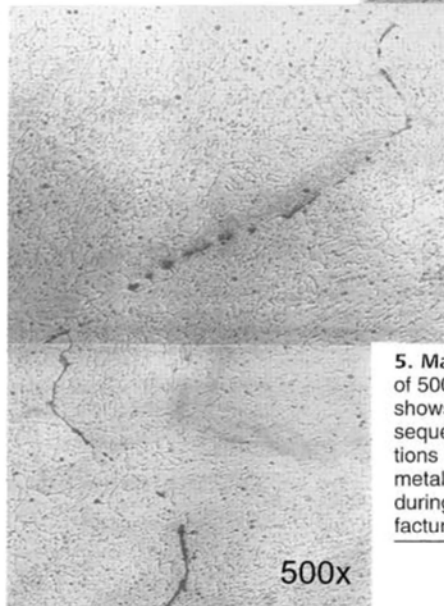
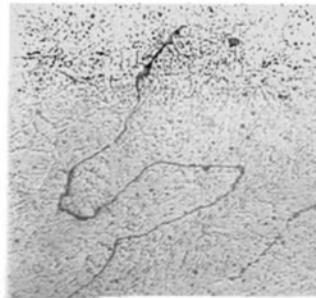
During the past 50 years, memorable ruptures took place at several US power stations and these were attributed to several problems with original material selection and fabrication. Most of the piping had been in service for over 15 years, operating at a temperature of 1000F, and pressures ranging between 450 and 1100 psig. In these instances, proper diagnosis was critical to conserving plant resources. For example, an entire hot reheat pipe section at a northeastern plant was scrapped following a 1970 clamshell elbow rupture (Fig 1). At the heart of the problem: A microstructural transformation that occurred during welding produced an extremely coarse-grained microstructure—a generic problem of the chromium-nickel-manganese stainless steel alloy used here. In two

other cases, failures at plants in Texas and California were initiated at the cusp of the seam weld (Figs 2, 3). Other sections were unaffected by the failures.

Proper interpretation of the results of in-service inspection is of paramount importance, and should include laminations, nonmetallic inclusions, surface laps, or slivers attributed to defects in the original plate material; seam-weld incongruities, such as inclusions, slag, fissures, or cracks; and imperfections associated with hot or cold bending, fit-up, welding, heat treating, or pipe erection.

The major problem with performing in-service inspections involves the interpretation of the conditions that are detected and the evaluation of their significance with respect to the operating integrity and life expectancy of the piping system. It's important to recognize manufacturing and fabrication defects, and take creep into consideration. Following are a few examples of each.

Manufacturing defects. A routine ultrasonic examination of a hot reheat piping system revealed an area with a particularly severe and extensive defect. Further examination with acoustic emission revealed noise background—indicating the potential for progressive cracking. A radiographic exam pinpointed the defect in the seam weld. Plate segments cut from the pipe contained a superficial indication in the surface of the inside seam weld. Cross sections cut from the pipe showed inconsequential marks in the base metal and original weld deposit. The



5. Magnification of 500x clearly shows inconsequential indications in the base metal introduced during the manufacturing process

defect was hard to see at a magnification of 10 diameters, but was easily viewed by a 500-diameter magnification (Figs 4, 5). This example is typical of the imperfections found in base metals and plates used for seam-welded pipe, and would not result in progressive cracking.

In another instance, a defect was found in the base metal adjacent to the weld in a hot reheat system that had operated for 90,000 hours. Observations of the microstructure at magnifications of 100 and 500 diameters confirmed a lamination defect. Lamination defects were apparent at the same location in six cross-sections cut through the pipe, but indications of progressive cracking were not apparent. This pipe is expected to operate for at least another 200,000 to 300,000 hours.

Fabrication defects. Spider-web-type fissures in the inner arc of a pipe bend were discovered on seam-welded low-alloy steel piping in a hot reheat system during the final stages of erection decades ago. Weld probe samples revealed fissuring that extended about 80% into the pipe wall. Fissures were also apparent on radiographic films (Fig 6).

A metallurgical evaluation established that the fissures occurred when the fabricator removed buckles that had developed on the inside arc of a pipe bend during the bending operation. Apparently this was accomplished by heating the local buckled pipe surface areas with rosebuds, a type of

What about combined-cycle plants?

Issues surrounding seam-welded piping are not relevant to newer combined-cycle stations, because the steam piping is generally smaller in diameter than that of hot and cold reheat piping used in conventional fossil-fired and nuclear plants. Piping materials typically are seamless A-335 Grade 22 and A-106 Grade B or C.

Heat-recovery steam generator (HRSG) evaluations are performed when serious questions of integrity arise because of original fabrication concerns. Quality or serious deficiencies of the original fabrication and/or erection have been questioned on several units. It is difficult to inspect many areas in the HRSGs because space is limited for personnel and inspection equipment in the areas where leaks and ruptures are detected. Service failures have included various superheater header components, tubing, and piping.

oxy-acetylene torch, to temperatures in excess of 2100F, followed by pressing or hammering the buckled surface areas to return the pipe to a smooth contour.

Plant personnel removed the fissures by grinding and followed with repair welding in accordance with American Society of Mechanical Engineers B31.1 code on pressure piping covering powerplants. Re-inspections performed in 1985 and 1998 confirmed that the repairs were sound.

Creep develops as elevated temperatures and stresses cause dimensional changes to plant components, and is observed in three stages. The primary stage does not typically represent damage. Secondary creep is evidenced by initial void formation along the grain boundaries. In time, these voids join or link to form macrocracking, or third-stage creep.

The rate of void formation and void linkage is primarily affected by stress, and varies with cross-sectional thickness. To develop meaningful estimates of the remaining life of piping systems and components, metallurgical evaluations should include surface replication, metallurgical sampling, and actual creep testing.

Void formation generally tends to develop after approximately 50% of the life of the pipe material has been consumed, or about 200,000 hours of service. High-temperature piping systems can operate safely and effectively for 400,000 hours or 50 years, with proper care and examination interpretation by experienced personnel. Longer operating periods are possible, and are likely to be achieved as more information, experiences, and data are collected.

Edited by CarolAnn Giovando



6. Radiographic films illustrate surface fissuring on the inside arc of a pipe bend

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May 8, 2024

Mr. David Begley
Eastern Kentucky Power Cooperative
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Somerset, KY 42501

Via Email: david.begley@ekpc.coop

SUBJECT: Inspection of High-Energy Piping Systems and Pressure Vessels in Unit No.
2

Dear Mr. Begley:

Attached is a PDF of Report No. 18577 summarizing the inspection of the high-energy piping systems and pressure vessels at the Somerset, Kentucky facility of Eastern Kentucky Power Cooperative.

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, INC.

Peter Kennefick
Vice President
Field Engineering Services

Enclosures:
Job No. 43-24-0331a