



1595 So. Hwy 150, Suite F
Evanston, WY 82930

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH0004-C1 - Line Heater Coil 1	
Remaining Life: 6.5 YRS	Date of this Report: 11/10/2017
Rep. Corrosion Rate: 97.0 MPY	Next UT: 11/10/2018 Next VT: 11/10/2018
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03A
Date Built: 2005	National Board #: None
Alberta registration #: 514075	Canadian Registration #: ALD-05-001

FMC Technologies Completion - LH-0004 Line Heater Coil 1



PRESSURE VESSEL INVENTORY

☒ Code ☐ Code-invalidated ☐ Non-Code ☐ Unknown ☐ Code-Exempt

☐ High Consequence (HCO) ☐ Medium Consequence (MCO) ☐ Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-C1
Equipment Name/Service : Line Heater
Physical Location : In Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Horizontal Line Heater

Vessel Size:

Operating Pressure Range (psig):

Operating Temperature Range (°F):

Does the vessel have Internal Access? ☒ Yes ☐ No

Specify type of internal access, if available: Pull the bundles

Vessel is located: ☐ Inside ☒ Outside ☐ Under Roof

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam? ☐ Yes ☐ No

Any stamping pertaining to materials of construction? ☐ Yes ☐ No

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____ psi

Temperature (highest the equipment would ever see in the process) _____

Approximate Date built or installed (check associated equipment or info at facility) _____

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

Code stamp: ☐ U stamp ☐ U2 stamp ☐ UM stamp ☐ API-ASME ☒ No stamp

RTI
W
HT

MANUFACTURED &
CERTIFIED BY:

BLUESTAR
WELDING

GRANDE PRAIRIE, AB., CANADA
1-780-532-1160

A-NUMBER (A)514075

SERIAL No. BS10K2MM-03A

JOB No. 10252-F

DESIGN PRESSURE 10000 PSI

M.A.W.P. 10000 PSI

DESIGN TEMP. MINIMUM -40°F

CORROSION ALLOWANCE 0.125 IN.

DESIGN TEMP. MAXIMUM 150°F

CRN No. ALD-02-C01

YEAR BUILT 2005

STEAM COIL M.A.W.P. @ °F

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms
☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Robert W. Menke

Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-C1
Equipment Name/Service: Line Heater-Coil 1	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-03A
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514075	National Board Number: None

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access: No.

Corrosion Monitoring Locations (CMLs) and baseline thickness data established: Yes

Grounding Device in Place and Secure? N/A, the equipment is grounded through the skid. The unit was not in service at the time of this inspection.

Condition of Foundation and Anchor Bolts: Bundle removed from heater. Front plate in acceptable condition.

Condition of Steel Supports, Saddles and Bolting: Angle iron supports have heavy corrosion/scaling buildup.

Condition of Paint and/or Insulation: Front plate has minor chipping with surface corrosion.

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. Coils were pulled out of the Line Heater. There was no piping bolted.

Condition of Welds; Head and Shell Metal Surfaces: All exposed metal surfaces are painted. There is no distortion or indication of corrosion beneath the paint coating. The pressure boundary welds have no visual weld defects.

Condition of Ladders, Stairways, and Brackets: Access ladders and stairways are in acceptable condition.

If Equipment has Anomalous Data, did the Inspector check it? N/A

Is There a PSV on the Vessel? No

If Yes, is it set at or below the MAWP?

Date PSV last tested (if there is a tag on the valve)

Comments:

Coils have heavy corrosion with scaling.



Piping is to be discarded. Fired tubes were hammer tested at inspection. No issues were found during testing.

Recommendations:

None

Repairs Needed:

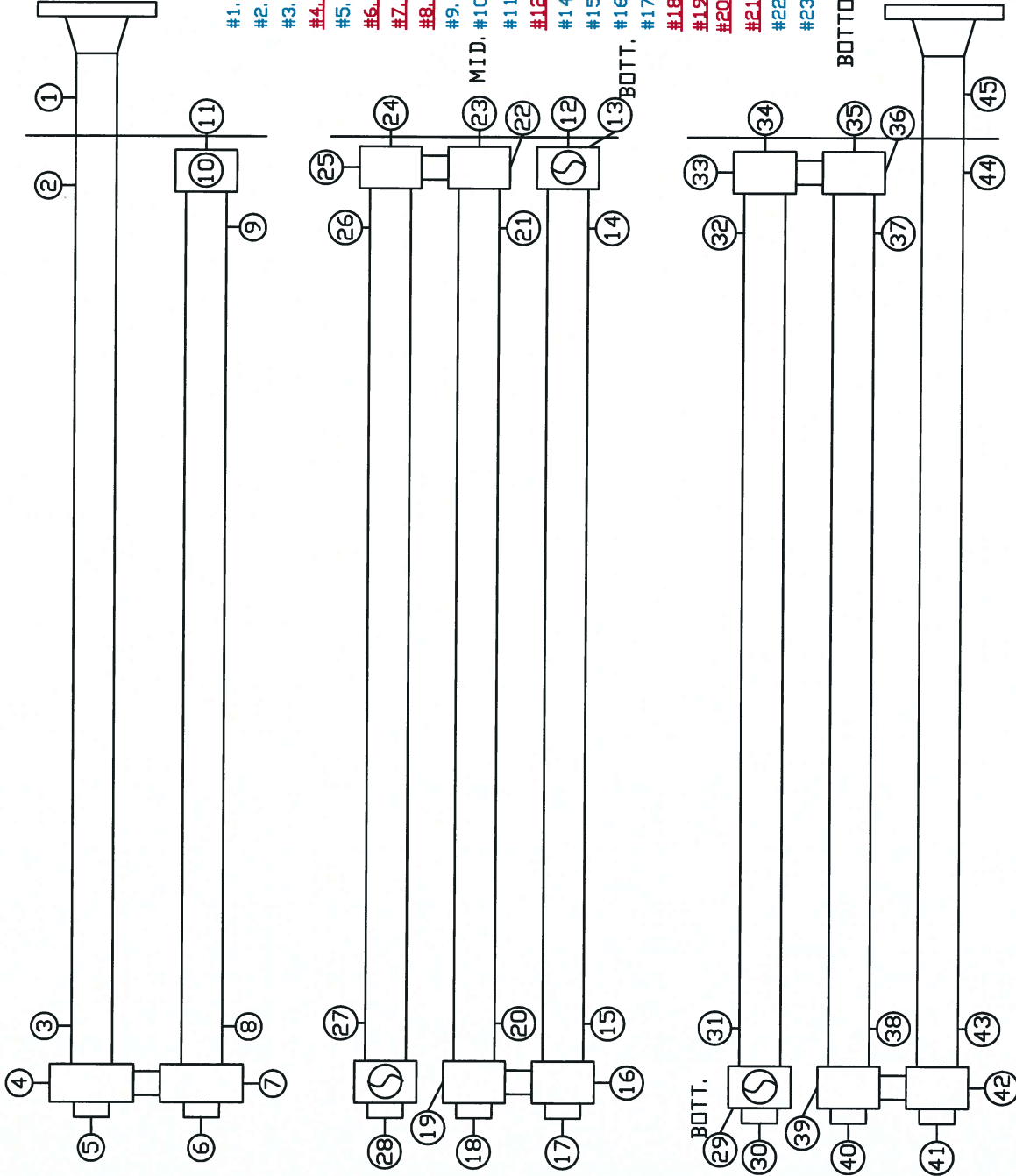
None

Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

11/10/2017
Date

EQUIP RETIREMENT DATE: 4/28/2024
NEXT INSPECTION IS DUE: 11/10/2018



TDP

BOTTOM

- #1. 01- TDP-T 0.980 TC
- #2. 01- TDP-T 0.971 TC
- #3. 01- TDP-T 0.970 TC
- #4. 01- TDP 2.648 IC
- #5. 01- TDP 3.185 TC
- #6. 01- TDP 2.626 IC
- #7. 01- TDP 2.119 IC
- #8. 01- TDP-T 0.831 IC
- #9. 01- TDP-BT 0.988 TC
- #10. 01- TDP-TURN 1.521 TC
- #11. 01- TDP 3.199 TC
- #12. 01- MID 2.440 IC
- #14. 01- MID-BT 0.954 TC
- #15. 01- MID-L 0.975 TC
- #16. 01- MID-TURN 1.610 TC
- #17. 01- MID 3.311 TC
- #18. 01- MID 2.259 IC
- #19. 01- MID 2.007 IC
- #20. 01- MID-R 0.941 IC
- #21. 01- MID-L 0.952 IC
- #22. 01- MID 0.000 NT
- #23. 01- MID 3.241 TC
- #24. 01- MID 1.936 DC
- #25. 01- MID 2.586 DC
- #26. 01- MID-BT 0.937 TC
- #27. 01- MID-T 0.973 TC
- #28. 01- MID 3.122 TC
- #29. 01- MID 2.069 IC
- #30. 01- TURN 2.631 TC
- #31. 01- BTM-R 0.937 TC
- #32. 01- BTM-BT 0.928 TC
- #33. 01- BTM-TURN 1.520 IC
- #34. 01- BTM-TURN 1.610 TC
- #37. 01- BTM-R 0.984 TC
- #38. 01- BTM-R 0.946 TC
- #39. 01- BTM-TURN 2.636 TC
- #40. 01- TURN 3.168 DC
- #41. 01- BTM 2.588 IC
- #42. 01- BTM-T 1.976 IC
- #43. 01- BTM-R 0.956 TC
- #44. 01- BTM-B 0.975 TC
- #45. 01- BTM-BT 0.960 TC
- #46. 01- MID 2.636 TC

PIPE=31°F
CAL BLK=35°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0004-C1
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0004-C1

DESC: COIL 1 ON LINE HEATER 1
DWG#: LH0004-C1-1.01-46.01

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BS10K2MM-03A
A NUMBER	514075
DATE BUILT	2005
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # ALD-05-001

TC-560

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

Summary: Group Name: Insp. Due Date = 11/10/2018
Pred. Ret. Date = 04/28/2024

Group Description:
RCR = 97.0 MPY
Rem. Life (from last survey 11/10/2017) = 6.5 yrs

0 C.A. Status: No
Total Caution TMLs = 15

TML No	Location	Ctn TML	First Survey Thick	First Date	Previous Survey Thick	Previous Date	Last Survey Thick	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	TOP-T	N	1.032	06/14/2007	0.968 TC	10/25/2016	0.968 RR	11/10/2017	0	6.1	7.0	30.9	0.750 U	6.1	08/06/2053	11/10/2018
2.01	TOP-T	N	1.034	06/14/2007	0.912 TC	10/25/2016	0.912 RR	11/10/2017	0	11.7	12.1	36.5	0.750 U	11.7	09/15/2031	11/10/2018
3.01	TOP-T	N	0.995	06/14/2007	0.960 TC	10/25/2016	0.960 RR	11/10/2017	0	3.4	3.6	17.8	0.750 U	3.4	08/17/2079	11/10/2018
4.01	TOP	Y	2.391	06/14/2007	2.696 RR	10/25/2016	2.648 TC	11/10/2017	46.0	0	0	46.0	1.000 U	46.0	09/07/2053	11/10/2018
5.01	TOP	N	2.821	06/14/2007	3.183 RR	10/25/2016	3.185 TC	11/10/2017	0	0	0	27.6	1.000 U	0.1	11/25/4017	11/10/2018
6.01	TOP	Y	3.413	06/14/2007	2.617 RR	10/25/2016	2.626 TC	11/10/2017	0	75.6	81.6	212.1	1.000 U	75.6	05/15/2039	11/10/2018
7.01	TOP	Y	2.863	06/14/2007	2.095 TC	10/25/2016	2.095 RR	11/10/2017	0	73.8	72.6	96.0	1.000 U	73.8	09/11/2032	11/10/2018
8.01	TOP-T	Y *	1.029	06/14/2007	0.979 TC	10/25/2016	0.831 TC	11/10/2017	141.9	19.0	15.9	141.9	0.750 U	141.9	06/06/2018	11/10/2018
9.01	TOP-BT	N	1.020	06/14/2007	0.968 TC	10/25/2016	0.968 RR	11/10/2017	0	5.0	6.3	46.9	0.750 U	5.0	06/17/2061	11/10/2018
10.01	TOP-TURN	N	1.598	02/04/2012	1.536 RR	08/22/2015	1.521 TC	11/10/2017	6.8	13.4	14.6	53.9	1.000 U	13.4	09/27/2056	11/10/2018
11.01	TOP	N	3.224	06/14/2007	3.172 RR	10/25/2016	3.199 TC	11/10/2017	0	2.4	4.5	28.8	1.000 U	2.4	02/16/2934	11/10/2018
12.01	MID	Y	2.762	06/14/2007	2.442 TC	10/25/2016	2.440 TC	11/10/2017	1.9	30.9	31.0	248.0	1.000 U	30.9	06/17/2064	11/10/2018
14.01	MID-BT	N	1.031	06/14/2007	0.968 TC	10/25/2016	0.954 TC	11/10/2017	13.4	7.4	7.5	29.9	0.750 U	13.4	01/31/2033	11/10/2018
15.01	MID-L	N	0.998	06/14/2007	0.972 TC	10/25/2016	0.972 RR	11/10/2017	0	2.5	2.9	10.3	0.750 U	2.5	08/30/2106	11/10/2018
16.01	MID-TURN	N	1.563	06/14/2007	1.610 TC	10/25/2016	1.610 TC	11/10/2017	0	0	0	37.8	1.000 U	0.1	11/25/4017	11/10/2018
17.01	MID	N	3.328	06/14/2007	3.319 RR	10/25/2016	3.311 TC	11/10/2017	7.7	1.6	1.3	655.2	1.000 U	7.7	12/30/2317	11/10/2018
18.01	MID	Y *	2.726	06/14/2007	2.587 TC	10/25/2016	2.259 TC	11/10/2017	314.7	44.9	33.4	314.7	1.000 U	314.7	11/10/2021	11/10/2018
19.01	MID	Y	2.500 NM	02/24/2005		N/A	2.007 TC	11/10/2017	N/A	38.8	N/A	38.8	1.000 U	38.8	10/25/2043	11/10/2018
20.01	MID-R	Y *	1.043	06/14/2007	0.972 TC	10/25/2016	0.941 TC	11/10/2017	29.7	9.8	8.4	29.7	0.750 U	29.7	04/16/2024	11/10/2018
21.01	MID-L	Y *	1.013	06/14/2007	0.988 TC	10/25/2016	0.952 TC	11/10/2017	34.5	5.9	4.2	34.5	0.750 U	34.5	09/19/2023	11/10/2018

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Summary: Group Name:
Insp. Due Date = 11/10/2018
Pred. Ret. Date = 04/28/2024

Group Description:
RCR = 97.0 MPY
Rem. Life (from last survey 11/10/2017) = 6.5 yrs

0 C.A. Status: No
Total Caution TMLs = 15

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

TML No	Location	Ctn TML	First Survey Thick	First Date	Previous Survey Thick	Previous Date	Last Survey Thick	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
22.01	MID	N	2.817	06/14/2007	2.782	08/28/2014	2.782 TC	08/22/2015	0	4.3	4.5	4.9	1.000 U	4.3	01/24/2430	08/21/2016
23.01	MID	N	3.352	06/14/2007	3.247 TC	08/22/2015	3.241 TC	11/10/2017	2.7	10.7	11.4	39.9	1.000 U	10.7	04/22/2227	11/10/2018
24.01	MID	Y *	2.687	06/14/2007	1.915 TC	10/25/2016	1.915 RR	11/10/2017	0	74.2	84.3	325.6	1.000 U	74.2	03/11/2030	11/10/2018
25.01	MID	N	2.123	06/14/2007	2.060 RR	10/25/2016	2.064 RR	11/10/2017	0	5.7	7.4	1086.6	1.000 U	5.7	07/13/2204	11/10/2018
26.01	MID-BT	N	0.990	06/14/2007	0.952 TC	10/25/2016	0.937 TC	11/10/2017	14.4	5.1	4.6	31.9	0.750 U	14.4	11/05/2030	11/10/2018
27.01	MID-T	N	1.026	06/14/2007	0.970 TC	10/25/2016	0.970 RR	11/10/2017	0	5.4	6.0	28.9	0.750 U	5.4	08/08/2058	11/10/2018
28.01	MID	N	2.500 NM	02/24/2005		N/A	3.122 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018
29.01	MID	Y	2.500 NM	02/24/2005		N/A	2.069 TC	11/10/2017	N/A	33.9	N/A	33.9	1.000 U	33.9	05/24/2049	11/10/2018
30.01	TURN	N	2.500 NM	02/24/2005		N/A	2.631 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018
31.01	BTM-R	N	1.053	06/14/2007	0.930 TC	10/25/2016	0.930 RR	11/10/2017	0	11.8	11.8	40.8	0.750 U	11.8	02/11/2033	11/10/2018
32.01	BTM-BT	N	1.000	06/14/2007	0.935 RR	10/25/2016	0.928 TC	11/10/2017	6.7	6.9	8.0	40.7	0.750 U	6.9	08/28/2043	11/10/2018
33.01	BTM-TURN	Y	1.724	06/14/2007	1.521 TC	08/22/2015	1.520 TC	11/10/2017	0.5	19.6	21.9	122.1	1.000 U	19.6	05/22/2044	11/10/2018
34.01	BTM-TURN	N	1.625 NM	02/24/2005		N/A	1.610 TC	11/10/2017	N/A	1.2	N/A	1.2	1.000 U	1.2	03/16/2526	11/10/2018
37.01	BTM-R	N	1.026	06/14/2007	0.981 TC	10/25/2016	0.981 RR	11/10/2017	0	4.3	4.9	17.0	0.750 U	4.3	08/01/2071	11/10/2018
38.01	BTM-R	N	1.031	06/14/2007	0.934 TC	10/25/2016	0.934 RR	11/10/2017	0	9.3	9.3	46.7	0.750 U	9.3	08/23/2037	11/10/2018
39.01	BTM-TURN	N	2.500 NM	02/24/2005		N/A	2.636 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018
40.01	TURN	Y	2.500 NM	02/24/2005	3.240 TC	10/25/2016	3.168 TC	11/10/2017	69.0	0	0	69.0	1.000 U	69.0	04/12/2049	11/10/2018
41.01	BTM	Y	2.829	06/14/2007	2.584 TC	10/25/2016	2.584 RR	11/10/2017	0	23.5	22.8	98.5	1.000 U	23.5	04/06/2085	11/10/2018
42.01	BTM-T	Y *	2.500 NM	02/24/2005	2.082 TC	10/25/2016	1.976 TC	11/10/2017	101.6	41.2	39.0	101.6	1.000 U	101.6	06/20/2027	11/10/2018
43.01	BTM-R	N	1.013	06/14/2007	0.943	10/25/2016	0.943 RR	11/10/2017	0	6.7	8.2	56.9	0.750 U	6.7	08/31/2046	11/10/2018
44.01	BTM-B	N	1.045	06/14/2007	0.977 TC	10/25/2016	0.975 TC	11/10/2017	1.9	6.7	7.5	39.9	0.750 U	6.7	06/11/2051	11/10/2018

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

Summary: Group Name:
Insp. Due Date = 11/10/2018
Pred. Ret. Date = 04/28/2024

Group Description:
RCR = 97.0 MPY
Rem. Life (from last survey 11/10/2017) = 6.5 yrs

0 C.A. Status: No
Total Caution TMLs = 15

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
45.01	BTM-BT	N	1.026	06/14/2007	0.967 TC	10/25/2016	0.960 TC	11/10/2017	6.7	6.3	7.0	34.9	0.750 U	6.7	03/15/2049	11/10/2018
46.01	MID	N	2.500 NM	02/24/2005		N/A	2.636 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018

Eaton Inspection Services
11595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00
(B) -- Default Corrosion Rate

Varies
0.1 MPY

Representative Corrosion Rate is the Maximum of:

(A)	-- Average Corrosion Rate x 1.00	:	29.5 MPY
(B)	-- Average Max 25.0% of TMLs, Min of 2	:	97.0 MPY
(C)	-- Formula Corrosion Rate (Sigma = 1.28)	:	35.3 MPY
(D)	-- Default Corrosion Rate	:	0.1 MPY

RWML thickness readings have not been compensated for high Temperatures.
RWML thickness readings have been compensated for growths.

TWL Life calculations are based on the Representative TWL Corrosion Rate using Short Term and Long Term Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 3 months.

(A) -- 1.00 years.

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

Tq/Circ ID Estimated life = 6.5 years from the most recent survey date.
Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement

Predicted Eq/Circ ID Retirement date is 04/28/2024

Recommended Eq/Circ UT/RT Inspection Date is 11/10/2018
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 15 Caution TMLs in this Eg/Circ ID.



1595 So. Hwy 150, Suite F
Evanston, WY 82930

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH0004-C2 - Line Heater Coil 2	
Remaining Life: 4.3 YRS	Date of this Report: 11/10/2017
Rep. Corrosion Rate: 136.1 MPY	Next UT: 11/10/2018 Next VT: 11/10/2018
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03B
Date Built: 2005	National Board #: None
Alberta registration #: 514076	Canadian Registration #: ALD-05-001

FMC Technologies Completion - LH-0004 Line Heater Coil 2



PRESSURE VESSEL INVENTORY

☒ Code ☐ Code-invalidated ☐ Non-Code ☐ Unknown ☐ Code-Exempt

☐ High Consequence (HCO) ☐ Medium Consequence (MCO) ☐ Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-C2
Equipment Name/Service : Line Heater
Physical Location : In Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Horizontal Line Heater

Vessel Size:

Operating Pressure Range (psig):

Operating Temperature Range (°F):

Does the vessel have Internal Access? ☒ Yes ☐ No

Specify type of internal access, if available: Pull the bundles

Vessel is located: ☐ Inside ☒ Outside ☐ Under Roof

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam? ☐ Yes ☐ No

Any stamping pertaining to materials of construction? ☐ Yes ☐ No

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____ psi

Temperature (highest the equipment would ever see in the process) _____

Approximate Date built or installed (check associated equipment or info at facility) _____

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

Code stamp: ☐ U stamp ☐ U2 stamp ☐ UM stamp ☐ API-ASME ☒ No stamp

RTI
W
HT

MANUFACTURED &
CERTIFIED BY:
BLUESTAR
WELDING

GRANDE PRAIRIE, AB., CANADA
1-780-532-1160

A-NUMBER A514076

SERIAL No. BSC10K2MM-03B

JOB No. 10252-P

DESIGN PRESSURE 10000 PSI

M.A.W.P. 10000 PSI

DESIGN TEMP. MINIMUM -40°F

CORROSION ALLOWANCE 0.025 IN.

DESIGN TEMP. MAXIMUM 280°F

CRN No. ALD-C5-CC1

YEAR BUILT 2009

STEAM COIL M.A.W.P. @ °

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms
☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Robert W. Menke

Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-C2
Equipment Name/Service: Line Heater-Coil 2	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-03B
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514076	National Board Number: None

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access:

Corrosion Monitoring Locations (CMLs) and baseline thickness data established: Yes

Grounding Device in Place and Secure? N/A, the equipment is grounded through the skid. The unit was not in service at the time of this inspection.

Condition of Foundation and Anchor Bolts: The bundle was removed from the heater. Front plate is in unacceptable condition.

Condition of Steel Supports, Saddles and Bolting: Angle iron supports have heavy surface corrosion/scale buildup.

Condition of Paint and/or Insulation: The paint is in acceptable condition with minor localized chipping and peeling. Coils have heavy corrosion with scaling.

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. Coils were pulled out of the Line Heater. There was no piping attached.

Condition of Welds; Head and Shell Metal Surfaces: All exposed metal surfaces are painted. There is no distortion or indication of corrosion beneath the paint coating. The pressure boundary welds have no visual weld defects.

Condition of Ladders, Stairways, and Brackets: Access ladders and stairways are in acceptable condition.

If Equipment has Anomalous Data, did the Inspector check it? N/A

Is There a PSV on the Vessel? No

If Yes, is it set at or below the MAWP?

Date PSV last tested (if there is a tag on the valve)

Comments:

Coils have heavy corrosion with scaling.



Recommendations:

None

Repairs Needed:

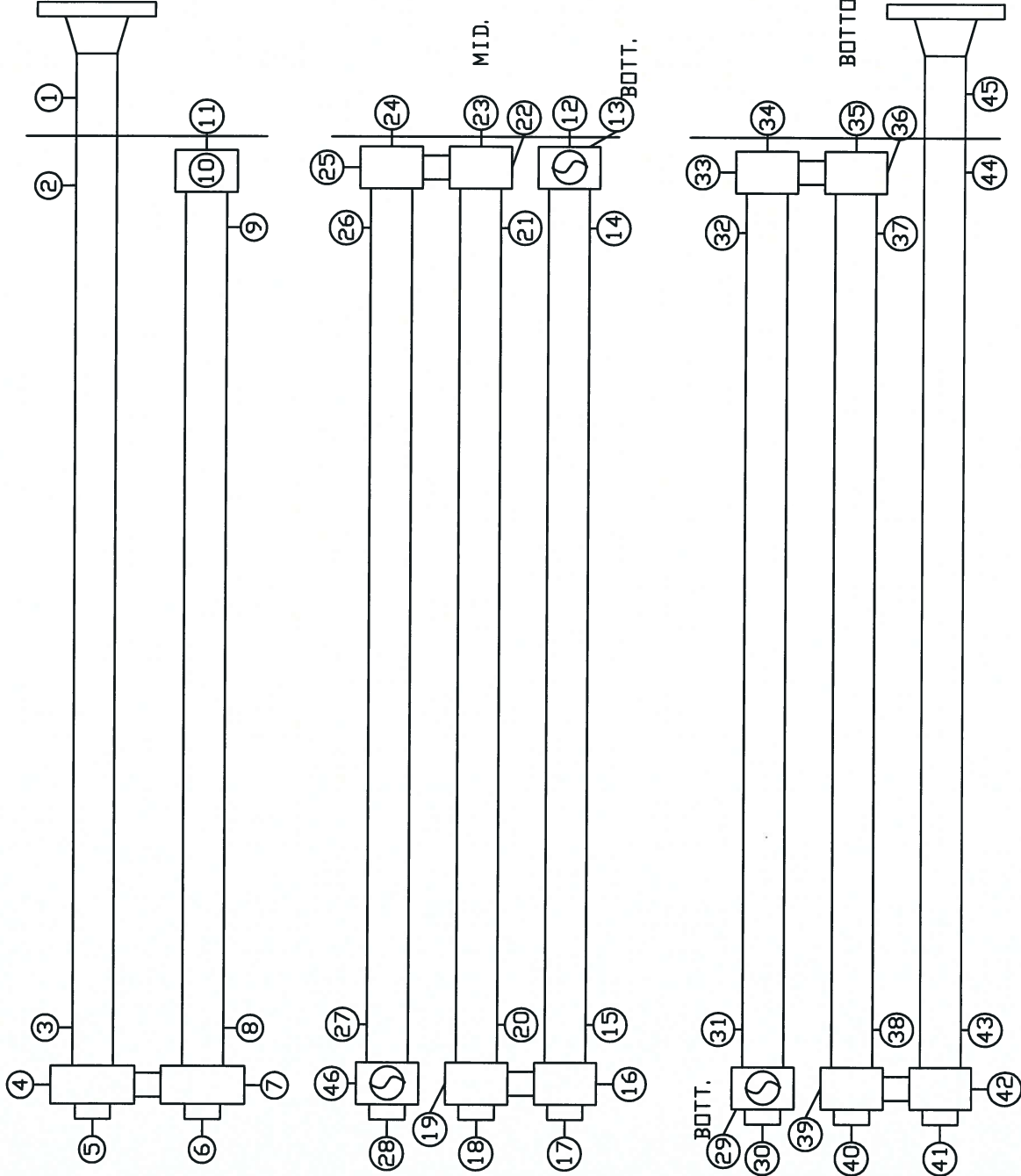
None

Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

11/10/2017
Date

EQUIP RETIREMENT DATE: 2/24/2022
NEXT INSPECTION IS DUE: 11/10/2018



TOP

MID.

BOTTL.

BOTTOM

#1. 01- TOP-B 0. 970 TC	#23. 01- TURN 3. 236 IC	TC-560
#2. 01- TOP-T 0. 924 IC	#24. 01- TURN 2. 549 IC	
#3. 01- TOP-T 0. 968 IC	#25. 01- MID 2. 034 IC	
#4. 01- TOP 2. 654 TC	#26. 01- MID-B 0. 960 TC	
#5. 01- TOP 3. 342 TC	#27. 01- MID-R 0. 967 TC	
#6. 01- TOP 2. 597 IC	#28. 01- MID 3. 143 IC	
#7. 01- TOP 2. 292 IC	#29. 01- TOP 1. 991 IC	
#8. 01- TOP-T 0. 968 TC	#30. 01- BTM 2. 665 IC	
#9. 01- TOP-BT 0. 967 TC	#31. 01- BTM-R 0. 932 IC	
#10. 01- TOP 1. 463 IC	#32. 01- BTM-R 0. 943 IC	
#11. 01- TOP 3. 154 IC	#33. 01- TURN 1. 520 IC	
#12. 01- MID 2. 664 TC	#34. 01- MID 3. 285 TC	
#14. 01- MID-BT 0. 937 TC	#35. 01- MID 2. 327 TC	
#15. 01- MID-L 0. 958 TC	#37. 01- BTM-T 0. 976 TC	
#16. 01- MID 1. 444 IC	#38. 01- BTM-L 0. 954 TC	
#17. 01- MID 3. 222 IC	#39. 01- TURN 2. 658 TC	
#18. 01- MID 2. 667 TC	#41. 01- BTM 2. 537 IC	
#19. 01- MID 3. 272 IC	#42. 01- BTM 2. 183 IC	
#20. 01- MID-L 0. 894 IC	#43. 01- BTM-T 0. 958 IC	
#21. 01- MID-BT 0. 988 TC	#44. 01- BTM-R 0. 981 TC	
#22. 01- BTM 2. 382 TC	#45. 01- BTM-L 0. 962 TC	
	#46. 01- MID-T 2. 595 IC	

CAL BLK=32°F

PIPE=27°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0004-C2
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0004-C2

DESC: COIL 2 ON LINE HEATER 1
DWG#: LH0004-C2-1.01-46.01

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 2 ON LINE HEATER 1, SN:BS10K2MM-03B

Summary: Group Name:
Insp. Due Date = 11/10/2018
Pred. Ret. Date = 02/24/2022

Group Description:
RCR = 144.6 MPY
Rem. Life (from last survey 11/10/2017) = 4.3 Yrs

0 C.A. Status: No
Total Caution TMLs = 23

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	TOP-B	N	1.019	06/14/2007	0.973 TC	10/25/2016	0.970 TC	11/10/2017	2.9	4.7	5.2	26.9	0.750 U	4.7	09/01/2064	11/10/2018
2.01	TOP-T	Y *	1.006	06/14/2007	0.964 TC	10/25/2016	0.924 TC	11/10/2017	38.3	7.9	6.1	38.3	0.750 U	38.3	05/27/2022	11/10/2018
3.01	TOP-T	Y	1.004	06/14/2007	0.995 TC	10/25/2016	0.968 TC	11/10/2017	25.9	3.5	2.5	25.9	0.750 U	25.9	04/11/2026	11/10/2018
4.01	TOP	N	2.325	06/14/2007	2.564 TC	10/25/2016	2.564 RR	11/10/2017	0	0	0	1.9	1.000 U	0.1	11/25/4017	11/10/2018
5.01	TOP	N	2.837	06/14/2007	2.610 RR	10/25/2016	3.282 RR	11/10/2017	0	0	0	269.1	1.000 U	0.1	11/25/4017	11/10/2018
6.01	TOP	Y	3.300	06/14/2007	2.597 TC	10/25/2016	2.597 TC	11/10/2017	0	67.5	74.3	337.3	1.000 U	67.5	07/09/2041	11/10/2018
7.01	TOP	Y	2.827	06/14/2007	2.292 RR	10/25/2016	2.292 TC	11/10/2017	0	51.4	50.4	78.8	1.000 U	51.4	12/30/2042	11/10/2018
8.01	TOP-T	N	1.002	06/14/2007	0.930 TC	10/25/2016	0.930 RR	11/10/2017	0	6.9	7.7	26.3	0.750 U	6.9	12/12/2043	11/10/2018
9.01	TOP-BT	N	0.995	06/14/2007	0.979 TC	10/25/2016	0.967 TC	11/10/2017	11.5	2.7	2.5	13.0	0.750 U	11.5	09/23/2036	11/10/2018
10.01	TOP	Y *	1.615	06/14/2007	1.632 TC	10/25/2016	1.463 TC	11/10/2017	162.0	14.6	7.2	162.0	1.000 U	162.0	09/19/2020	11/10/2018
11.01	TOP	Y	3.325	06/14/2007	3.110 RR	10/25/2016	3.154 TC	11/10/2017	0	16.4	20.8	84.6	1.000 U	16.4	03/15/2149	11/10/2018
12.01	MID	N	2.766	06/14/2007	2.658 TC	10/25/2016	2.658 RR	11/10/2017	0	10.4	9.7	28.4	1.000 U	10.4	04/14/2177	11/10/2018
14.01	MID-BT	N	1.032	06/14/2007	0.940 TC	10/25/2016	0.937 TC	11/10/2017	2.9	9.1	9.0	48.4	0.875 U	9.1	09/03/2024	11/10/2018
15.01	MID-L	N *	1.023	06/14/2007	0.933 TC	10/25/2016	0.933 RR	11/10/2017	0	8.6	10.2	63.9	0.875 U	8.6	08/08/2024	11/10/2018
16.01	MID	Y	1.674	06/14/2007	1.470 RR	10/25/2016	1.444 TC	11/10/2017	24.9	22.1	23.3	39.7	0.875 U	24.9	09/16/2040	11/10/2018
17.01	MID	Y	3.447	06/14/2007	3.223 RR	10/25/2016	3.222 TC	11/10/2017	1.0	21.6	22.5	48.9	1.000 U	21.6	09/24/2120	11/10/2018
18.01	MID	N	2.723	06/14/2007	2.661 TC	10/25/2016	2.661 RR	11/10/2017	0	6.0	7.0	20.5	1.000 U	6.0	09/12/2294	11/10/2018
19.01	MID	Y	3.248	06/14/2007	3.338 TC	10/25/2016	3.272 TC	11/10/2017	63.3	0	0	79.8	1.000 U	63.3	10/02/2053	11/10/2018
20.01	MID-L	Y *	1.015	06/14/2007	0.975 RR	10/25/2016	0.894 TC	11/10/2017	77.7	11.6	8.8	77.7	0.750 U	77.7	09/18/2019	11/10/2018
21.01	MID-BT	N	1.012	06/14/2007	0.978 TC	10/25/2016	0.978 RR	11/10/2017	0	3.3	4.0	18.3	0.750 U	3.3	12/13/2086	11/10/2018

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 2 ON LINE HEATER 1, SN:BS10K2MM-03B

Summary: Group Name: 11/10/2018
Insp. Due Date = 02/24/2022
Pred. Ret. Date =

Group Description:
RCR = 144.6 MPY
Rem. Life (from last survey 11/10/2017) = 4.3 Yrs

0 C.A. Status: No
Total Caution TMLs = 23

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
22.01	BTM	N	2.500 NM	02/24/2005	N/A	N/A	2.382 TC	11/10/2017	N/A	9.3	N/A	9.3	1.000 U	9.3	06/19/2166	11/10/2018
23.01	TURN	Y	2.500 NM	02/24/2005	3.357 TC	10/25/2016	3.236 TC	11/10/2017	116.0	0	0	116.0	1.000 U	116.0	02/19/2037	11/10/2018
24.01	TURN	Y	2.500 NM	02/24/2005	2.712 TC	10/25/2016	2.549 TC	11/10/2017	156.3	0	0	156.3	1.000 U	156.3	10/09/2027	11/10/2018
25.01	MID	Y	2.188	06/14/2007	2.105 TC	10/25/2016	2.034 TC	11/10/2017	68.1	14.8	12.8	1141.5	1.000 U	68.1	01/16/2033	11/10/2018
26.01	MID-B	N	1.023	06/14/2007	0.961 TC	10/25/2016	0.960 TC	11/10/2017	1.0	6.1	6.5	30.5	0.750 U	6.1	04/14/2052	11/10/2018
27.01	MID-R	N	1.005	06/14/2007	0.951 TC	10/25/2016	0.951 RR	11/10/2017	0	5.2	5.7	23.0	0.750 U	5.2	07/06/2056	11/10/2018
28.01	MID	Y	3.253	06/14/2007	2.626 RR	10/25/2016	2.718 RR	11/10/2017	0	51.4	56.0	162.8	1.000 U	51.4	04/14/2051	11/10/2018
29.01	TOP	Y	2.500 NM	02/24/2005		N/A	1.991 TC	11/10/2017	N/A	40.1	N/A	40.1	1.000 U	40.1	07/29/2042	11/10/2018
30.01	BTM	Y	2.944	06/14/2007	2.613 RR	10/25/2016	2.641 RR	11/10/2017	0	29.1	32.0	95.6	1.000 U	29.1	04/02/2074	11/10/2018
31.01	BTM-R	Y *	1.016	06/14/2007	0.964 RR	10/25/2016	0.932 TC	11/10/2017	30.7	8.1	7.5	49.9	0.750 U	30.7	10/15/2023	11/10/2018
32.01	BTM-R	Y	1.006	06/14/2007	0.962 RR	10/25/2016	0.943 TC	11/10/2017	18.2	6.1	6.0	248.0	0.750 U	18.2	06/18/2028	11/10/2018
33.01	TURN	Y	1.000 NM	02/24/2005	1.595 TC	10/25/2016	1.520 TC	11/10/2017	71.9	0	0	77.6	0.750 U	71.9	07/27/2028	11/10/2018
34.01	MID	N	2.500 NM	02/24/2005		N/A	3.285 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018
35.01	MID	N	2.500 NM	02/24/2005		N/A	2.327 TC	11/10/2017	N/A	13.6	N/A	13.6	1.000 U	13.6	06/09/2115	11/10/2018
37.01	BTM-T	N	1.017	06/14/2007	0.970 TC	10/25/2016	0.970 RR	11/10/2017	0	4.5	4.3	27.2	0.750 U	4.5	10/01/2066	11/10/2018
38.01	BTM-L	N	1.023	06/14/2007	0.947 RR	10/25/2016	0.952 RR	11/10/2017	0	6.8	8.0	57.0	0.750 U	6.8	07/26/2047	11/10/2018
39.01	TURN	N	2.500 NM	02/24/2005	2.669 TC	10/25/2016	2.658 TC	11/10/2017	10.5	0	0	10.5	1.000 U	10.5	10/08/2175	11/10/2018
41.01	BTM	Y	2.851	06/14/2007	2.725 TC	10/25/2016	2.537 TC	11/10/2017	180.2	30.2	22.4	180.2	1.000 U	180.2	05/22/2026	11/10/2018
42.01	BTM	Y	2.225	06/14/2007	2.208 RR	10/25/2016	2.183 TC	11/10/2017	24.0	4.0	3.3	37.6	1.000 U	24.0	02/25/2067	11/10/2018
43.01	BTM-T	Y	0.998	06/14/2007	0.980 RR	10/25/2016	0.958 TC	11/10/2017	21.1	3.8	3.1	35.6	0.750 U	21.1	09/20/2027	11/10/2018
44.01	BTM-R	N	1.002	06/14/2007	0.956 TC	10/25/2016	0.956 RR	11/10/2017	0	4.4	4.5	27.5	0.750 U	4.4	09/04/2064	11/10/2018

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 2 ON LINE HEATER 1, SN:BS10K2MM-03B

Summary: Group Name: Insp. Due Date = 11/10/2018
Pred. Ret. Date = 02/24/2022
Group Description: RCR = 144.6 MPY
Rem. Life (from last survey 11/10/2017) = 4.3 yrs
0 C.A. Status: NO
Total Caution TMLs = 23

TML No	Location	Ctn TML	First Survey Thick	Nt	First Date	Previous Survey Thick	Nt	Previous Date	Last Survey Thick	Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date	
45.01	BTM-L	N	1.035		06/14/2007	0.953	TC	10/25/2016	0.953	RR	11/10/2017	0	7.9	9.2	33.9	0.750	U	7.9	07/23/2043	11/10/2018
46.01	MID-T	Y *	1.000	NM	02/24/2005	3.099	TC	10/25/2016	2.595	TC	11/10/2017	483.2	0	0	483.2	0.750	U	483.2	09/05/2021	11/10/2018

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 2 ON LINE HEATER 1, SN:BS10K2MW-03B

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 0.1 MPY

Representative Corrosion Rate is the Maximum of:

(A) -- Average Corrosion Rate x 1.00 : 45.8 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 144.6 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 54.7 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 144.6 MPY

TML thickness readings have not been compensated for high Temperatures.
TML thickness readings have been compensated for growths.

TML Life calculations are based on the Representative TML Corrosion Rate using Short Term and Long Term Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 3 months.

TML Inspection Interval is:
(A) -- 1.00 years.

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

Eq/Circ ID Estimated life = 4.3 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 02/24/2022

Recommended Eq/Circ UT/RT Inspection Date is 11/10/2018
UT/RT Inspection Interval is 1.00 years.

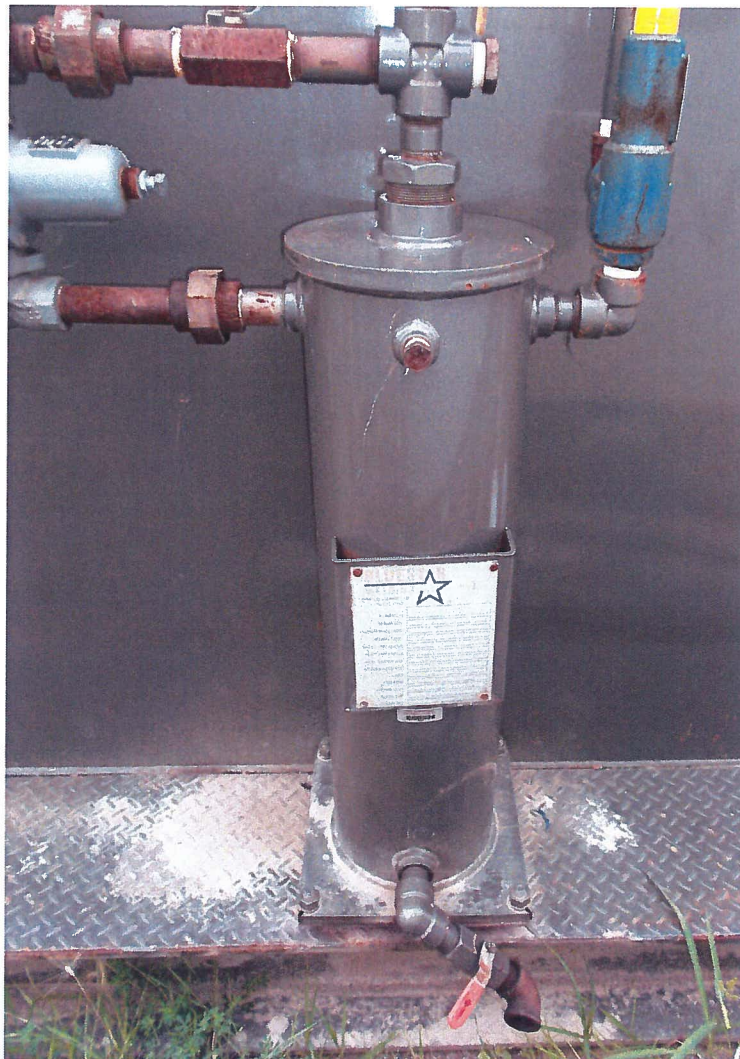
Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 23 Caution TMLs in this Eq/Circ ID.



1595 So. Hwy 150, Suite F
Evanston, WY 82930

Inspections Performed for: FMC Technologies Completion – PA District	
Inspection Report for: LH-0004 Fuel Gas Scrubber	
Remaining Life: 18.2 YRS	Date of this Report: 11/10/2017
Representative Corrosion Rate: .1 MPY	Next UT: 11/10/2018 Next VT: 11/10/2018
Manufacturer: Blue Star Welding	Mfg Serial #: BSFGS227
Date Built: 2004	National Board #: None
Alberta registration #: None	Canadian Registration #: OH6510.2

FMC Technologies Completion - LH-0004 Line Heater Fuel Gas Scrubber



PRESSURE VESSEL INVENTORY

☒ Code ☐ Code-invalidated ☐ Non-Code ☐ Unknown ☐ Code-Exempt

☐ High Consequence (HCO) ☐ Medium Consequence (MCO) ☐ Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District (at initial inspection)
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-FGS
Equipment Name/Service : (Line Heater) Fuel Gas Scrubber
Physical Location : On LH-0004 in Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Vertical Fuel Gas Scrubber

Vessel Size: 8.625" O.D.

Operating Pressure Range (psig): N/A

Operating Temperature Range (°F): N/A

Does the vessel have Internal Access? No

Specify type of internal access, if available:

Vessel is located: Outside

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam?

Any stamping pertaining to materials of construction?

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____ psi

Temperature (highest the equipment would ever see in the process) _____

Approximate Date built or installed (check associated equipment or info at facility) _____

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

Code stamp: ☐ U stamp ☐ U2 stamp ☐ UM stamp ☐ API-ASME ☒ No stamp

BLUESTAR
WELDING
GRANDE PRAIRIE, AB
1-780-532-1160
BYR MANU 2004

A-NUMBER _____
SERIAL NO. BSFGS 227
DESIGN PRESSURE 150 PSI
DESIGN TEMP -20°F / 100°F
SHELL THICKNESS _____
HEAD THICKNESS _____
REG. DESIGN NO. _____
STRESS RELIEVED NO
X-RAY NO
DERATED NO
HYDRO TEST 1.5 GPM
INSPECTOR TV
CRN NO. _____

SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

Repair stamp: ☐ R stamp ☐ Other Stamp ☐ No stamp

Repaired By _____ Date of Repair _____

Nat'l Bd. R-Certification No. _____

Other Stamping Information: _____

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms

☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Eric Crandall Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-FGS
Equipment Name/Service: Fuel Gas Scrubber	
Physical Location: In PA Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BSFGS227
Year Built: 2004	National board #: None
Alberta Registration #: None	Canadian Registration # : OH 6510.2

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access?: No

Corrosion Monitoring Locations (CMLs) and baseline thickness data established?: Yes

Grounding Device in Place and Secure?: N/A. The equipment is grounded through the skid. The unit was not in service at the time of this inspection.

Condition of Foundation and Anchor Bolts: Anchor bolts are in place and secure. All (4) anchor bolt nuts are in place and secure.

Condition of Steel Supports, Saddles, and Bolting: All support structural welds appear sound. Vessel is welded to baseplate.

Condition of Paint and/or Insulation: The paint is in acceptable condition with minor localized chipping and peeling.

Condition of Nozzles, Flanges, Repads, and Weepholes: All threaded connections. There is no evidence of leaks at any of the threaded connections.

Condition of Welds; Head and Shell Metal Surfaces: All (exposed) metal surfaces are painted. There is no distortion or indication of corrosion beneath the paint coating. The pressure boundary welds have no visual weld defects.

Condition of Ladders, Stairways, and Brackets: N/A

If Equipment has Anomalous Data, did the Inspector check it?: N/A

Is There a PSV on the Vessel?: Yes

If Yes, is it set at or below the MAWP? Set pressure not verified.

Date PSV last tested (if there is a tag on the valve):

Comments:

PSV removed for testing.

Recommendations:

None

Repairs Needed:

None

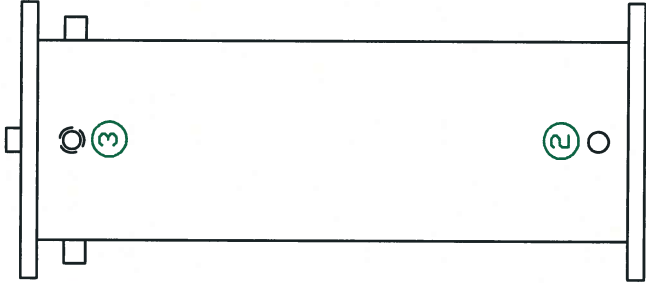
Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

11/10/2017
Date

EQUIP RETIREMENT DATE: 1/7/2036
NEXT INSPECTION IS DUE: 11/10/2018

- #2.01- BTM SH-FRONT 0.304 TC
- #2.02- BTM SH-LEFT 0.322 TC
- #2.03- BTM SH-BACK 0.318 TC
- #2.04- BTM SH-RIGHT 0.325 TC
- #3.01- TOP SH-FRONT 0.320 TC
- #3.02- TOP SH-LEFT 0.302 TC
- #3.03- TOP SH-BACK 0.305 TC
- #3.04- TOP SH-RIGHT 0.320 TC



TC-560

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BSFGS227
NATIONAL BOARD #	NONE
DATE BUILT	2004
DESIGN P & T	150 PSIG @ 100°F
NOTE	CRN # DH 6510.2 NO 'U' STAMP

CAL BLK=25°F		VESSEL=13°F	
BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION		
EQ/CIRC ID #	LH0004-FGS		
EQUIP NAME	FUEL GAS SCRUBBER		
LOCATION	DN LH-0004 SKID		
DWG #	LH0004-FGS		

DESC: FUEL GAS SCRUBBER
DWG#: LH0004-FGS-2.01-3.04

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-FGS
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 285 lb/in²
Design Pressure: 150 lb/in²
Design Temperature: 100 °F

Description: FUEL GAS SCRUBBER ON LH0004, SN:BSFGS227
(8.625" PIPE)-FLAT HEADS, SHELL UT ONLY

Summary:

Group Description:

Insp. Due Date = 11/10/2018
Pred. Ret. Date = 01/07/2036

RCR = 0.1 MPY

Rem. Life (from last survey 11/10/2017) = 18.2 yrs

0 C.A. Status: No

Total Caution TMLs = 1

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
2.01	BTM SH-FRONT	Y *	0.313 TC	02/04/2012	0.313 TC	10/25/2016	0.304 TC	11/10/2017	8.6	1.6	1.1	13.0	0.282 U	8.6	06/01/2020	11/10/2018
2.02	BTM SH-LEFT	N	0.320 TC	02/04/2012	0.311 TC	10/25/2016	0.322 TC	11/10/2017	0	0	0.8	18.3	0.282 U	0.1	11/13/2417	11/10/2018
2.03	BTM SH-BACK	N *	0.331 TC	02/04/2012	0.317 TC	10/25/2016	0.318 TC	11/10/2017	0	2.3	2.2	8.5	0.282 U	2.3	07/06/2033	11/10/2018
2.04	BTM SH-RIGHT	N *	0.333 TC	02/04/2012	0.324 TC	10/25/2016	0.325 TC	11/10/2017	0	1.4	1.4	11.0	0.282 U	1.4	07/28/2048	11/10/2018
3.01	TOP SH-FRONT	N	0.325 TC	02/04/2012	0.312 TC	10/25/2016	0.320 TC	11/10/2017	0	0.9	1.6	10.2	0.282 U	0.9	01/31/2060	11/10/2018
3.02	TOP SH-LEFT	N *	0.305 TC	02/04/2012	0.302 TC	10/25/2016	0.302 TC	11/10/2017	0	0.5	0.4	6.8	0.282 U	0.5	11/10/2057	11/10/2018
3.03	TOP SH-BACK	N *	0.306 TC	02/04/2012	0.307 TC	10/25/2016	0.305 TC	11/10/2017	1.9	0.2	0	2.1	0.282 U	1.9	12/18/2029	11/10/2018
3.04	TOP SH-RIGHT	N *	0.327 TC	02/04/2012	0.325 TC	10/25/2016	0.320 TC	11/10/2017	4.8	1.2	1.0	8.0	0.282 U	4.8	10/11/2025	11/10/2018

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Unit: LH-0004
Eq/Circ ID: LH0004-FGS
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Report Date: 11/20/2017

Flange Rating: 285 lb/in²
Design Pressure: 150 lb/in²
Design Temperature: 100 °F

Description: FUEL GAS SCRUBBER ON LH0004, SN-BSFGS227
(8.625" PIPE) -FLAT HEADS, SHELL UT ONLY

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 :
(B) -- Default Corrosion Rate : Varies
: 0.1 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : Not Used.
(B) -- Average Max 25.0% of TMLs, Min of 2 : Not Used.
(C) -- Formula Corrosion Rate (Sigma = 1.28) : Not Used.
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 0.1 MPY

TML thickness readings have not been compensated for high Temperatures.
TML thickness readings have not been compensated for growths.

TML Life calculations are based on the Representative TML Corrosion Rate using Short Term and Long Term Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 3 months.

TML Inspection Interval is:
(A) -- 1.00 years.

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

Eq/Circ ID Estimated life = 18.2 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 25% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 01/07/2036

Recommended Eq/Circ UT/RT Inspection Date is 11/10/2018
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 1 Caution TMLs in this Eq/Circ ID.

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Unit: LH-0004
Eq/Circ ID: LH0004-P
Eq Type: VESSEL
Class:
CM RBI: B31.3

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: ASSOCIATED PIPING ON LINE HEATER 1

Summary:

Group Name: Insp. Due Date = 10/26/2017
Pred. Ret. Date = 12/07/2076

Group Description:
RCR = 25.9 MPY
Rem. Life (from last survey 10/26/2016) = 60.1 yrs

0 C.A. Status: No
Total Caution TMLs = 2

TML No	Location	Ctn TML	First Survey Thick	Nt	First Survey Date	Previous Survey Thick	Nt	Previous Survey Thick	Nt	Last Survey Thick	Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date	
1.01	STR-BK	N *	0.761		06/14/2007	0.690		0.690	RR	0.690	RR	10/26/2016	0	7.6	8.3	24.2	0.260	P	7.6	05/18/2073	10/26/2017
2.01	STR-BK	N *	0.768		06/14/2007	0.724	RR	0.724	RR	0.727	FH	10/26/2016	0	4.4	4.8	10.9	0.260	P	4.4	12/04/2122	10/26/2017
3.01	STR-BK	Y *	0.774		06/14/2007	0.747		0.747		0.712	FH	10/26/2016	29.7	6.6	5.5	29.7	0.260	P	29.7	01/13/2032	10/26/2017
4.01	STR-R	N *	0.718		06/14/2007	0.709	RR	0.709	RR	0.700	FH	10/26/2016	7.6	1.9	1.8	7.6	0.260	P	7.6	09/11/2074	10/26/2017
5.01	STR-BT	Y *	0.724		06/14/2007	0.707	RR	0.707	RR	0.681	FH	10/26/2016	22.0	4.6	3.6	22.0	0.260	P	22.0	12/13/2035	10/26/2017
6.01	STR-R	N			N/A			N/A		0.835	RP	10/26/2016	N/A	N/A	N/A	2.9	0.260	P	0.1	11/10/4016	10/26/2017
7.01	STR-BT	N *	0.732		06/14/2007	0.694		0.694	RR	0.694	RR	10/26/2016	0	4.1	4.3	14.6	0.260	P	4.1	08/22/2122	10/26/2017

REMOVED @ INSP.
2017

Eaton Inspection Services
1595 So Hwy 150, Suite F, Evanston, WY 82930
Phone 307-789-3540 FAX 307-789-2822

Report Date: 11/20/2017

Unit: LH-0004
Eq/Circ ID: LH0004-P
Design Code: B31.3
Eq Type: VESSEL
Class:
CM RBI:

(Report in Inches, Corrosion Rates in MPY)
Analysis: Straight Line

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: ASSOCIATED PIPING ON LINE HEATER 1

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 :
(B) -- Default Corrosion Rate : Varies
0.1 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.00 : 10.8 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 25.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 16.0 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 25.9 MPY

TML thickness readings have not been compensated for high Temperatures.
TML thickness readings have been compensated for growths.

TML Life calculations are based on the Representative TML Corrosion Rate using Short Term and Long Term Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 3 months.

TML Inspection Interval is:
(A) -- 1.00 years.

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

Eq/Circ ID Estimated life = 60.1 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 12/07/2076

Recommended Eq/Circ UT/RT Inspection Date is 10/26/2017
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 2 Caution TMLs in this Eq/Circ ID.