



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

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH-0004 C1-C2	
Remaining Life: 1.3 YRS (Coil 1); 2.4 YRS (Coil 2)	Date of this Report: 08/22/2015
Rep. Corrosion Rate: 71.4 MPY (Coil 1); 93.1 MPY (Coil 2)	Next Inspection Due Date: 08/22/2016
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03A/B
Date Built: 2005	National Board #: None
Alberta registration #: 514075 / 514076	Canadian Registration #: ALD-05-001

FMC Technologies Completion - LH-0004 Line Heater



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/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:

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

Nameplate Coil #1

RTI W HT	MANUFACTURED & CERTIFIED BY: BLUESTAR WELDING 
GRANDE PRAIRIE, AB., CANADA  1-780-532-1160	
A-NUMBER	W514075
SERIAL No.	ESION MM 03A
JOB No.	10050
DESIGN PRESSURE	10000 PSI
M.A.W.P.	10000 PSI
DESIGN TEMP. MINIMUM	40°F
CORROSION ALLOWANCE	0.125 IN.
DESIGN TEMP. MAXIMUM	350°F
CRN No.	1.0
YEAR BUILT	2005
STEAM COIL M.A.W.P.	
	@ °F

Coil #1



Coil # 2



Nameplate Coil #2

RTI W HT	MANUFACTURED & CERTIFIED BY:
	BLUESTAR WELDING 
GRANDE PRAIRIE, AB., CANADA + 1-780-532-1160	
A-NUMBER	0514076
SERIAL No.	5010K2MM-03B
JOB No.	1050-HP
DESIGN PRESSURE	1000 PSI
M.A.W.P.	1500 PSI
DESIGN TEMP. MINIMUM	-40°F
CORROSION ALLOWANCE	0.015 IN.
DESIGN TEMP. MAXIMUM	250°F
CRN No.	LD-100001
YEAR BUILT	1995
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 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: LH-0004 C1-C2	
Size/Sched. Of Pipe: 4.500"	Eq/Circ. ID: LH-0004
Service/System:	Piping Class ☐ 1 ☐ 2 ☒ 3 ☐ Other
Design Pressure: 10000 psi	Materials: ☒ CS ☐ SS ☐ Other
Design Temperature: 180°F	Note Stamping (If Any)
P&ID#:	Flange Rating:

Reason for Inspection: ☐ Initial API-570 on Stream Inspection.

☒ Scheduled API-570 External Inspection. ☐ Other:

Testing Performed:

☒ Visual ☒ UT ☐ PT ☐ MT ☐ Other:

Comments: Info is for both coils

Insulation Observations:	Comments:
☐ Serviceable ☒ Not Insulated ☐ Missing/Damaged ☐ CUI Identification ☐ Corrosion Present (Describe) ☐ Other ☐ No Issues	Coils are not insulated.

Coating Condition:	Comments:
☐ Good ☒ Fair, Some Blistering/Peeling ☒ Corrosion Present (Describe) ☐ Other ☐ No Issues	Coated areas have light chipping and signs of light corrosion beneath the coating.

Loss of Containment:	Comments:
☐ Fluid Loss (Indicate How Much) ☐ Seeping or Evidence of Past Leakage ☐ Dripping (Size of Drops/Drops Per Minute) ☐ Leaking (Size of Stream, Noise Level, etc.) ☐ Clamps ☐ Other ☒ None Identified	No signs of fluid loss.

Condition of Welds:	Comments:
☒ Welds Are Full, Smooth and Well Profiled ☐ Incomplete Fusion/Penetration ☐ Crack Located Near Weld Seam ☐ Weld Does Not Appear to Be Original ☐ Joints-Misaligned ☐ Undercut ☐ Other ☒ No Issues	Welds show no signs of any defects.

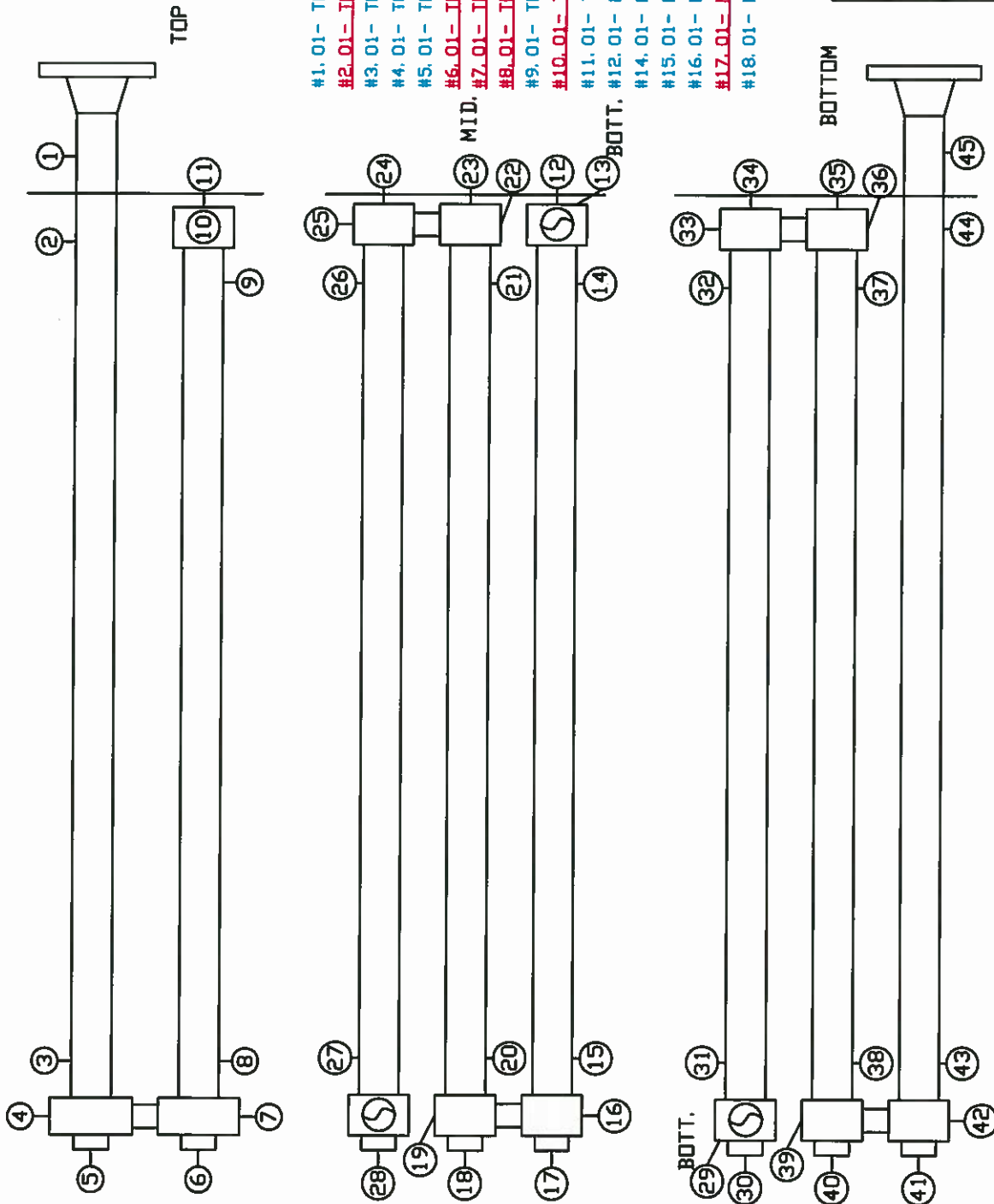
Relief Device:	Comments:
☒ PSV ☐ No PSV ☐ Rupture Disk ☐ Atmospheric ☐ No Relief Device Identified For This Equipment ☐ Tag Secure and Legible ☐ Set Pressure At Or Below MAWP ☐ Block Valve Not Locked/Car Sealed In Open Position ☐ Improper Drain Hole/Weather Cap On Atmos. Discharge ☐ Obstruction (i.e. Debris) ☐ Relief Installed In A Position Other Than Horiz. Or Upright ☒ Other ☐ No Issues	

Supports/Hangers:	Comments:
☐ In Serviceable Condition ☐ Foundation Is Damaged ☐ Additional Support Needed ☐ Hanger/Support Is Distorted/Broken/Missing ☐ Pipe Slide Or Shoe Is Off Of The Support ☐ Makeshift Support ☐ Loose Support Needed To Be Tightened ☐ Fireproofing Missing Or Damaged ☒ Support/Hanger Is Corroded ☐ Other ☐ No Issues	Signs of heavy corrosion with flaking present.

Flanged Connections:	Comments:
☐ Bolting Serviceable ☐ Short, Missing Or Damaged Bolting ☐ Nuts Lack Full Engagement ☐ Flanges Serviceable ☐ Flange Material Or Rating Inconsistent For System ☐ Flanges Deformed Or Damaged ☐ Corrosion Present (Describe) ☐ Gaskets ☐ Flange Rating Issues ☒ Other ☐ No Issues	Flanged connections are disconnected.

Mechanical Observations:	Comments:
☐ Deadleg ☐ Damaged Flex Hose ☐ Crack ☐ Biological Growth ☐ Threaded Exposed ☐ Threaded Connections Not Seal Welded ☐ Expansion Joint Issues ☐ Low Point Without Drain ☐ Open Ended ☐ Vibration (Excessive) ☐ Weep hole ☐ Other ☒ No Issues	No mechanical issues found.

EQUIP RETIREMENT DATE: 11/26/2016
 NEXT INSPECTION IS DUE: 8/21/2016



TC-560

- #1. 01- TOP-T 0.979 TC
- #2. 01- TOP-T 0.955 IC
- #3. 01- TOP-T 0.981 TC
- #4. 01- TOP 2.696 TC
- #5. 01- TOP 3.183 TC
- #6. 01- TOP 2.617 IC
- #7. 01- TOP 2.207 IC
- #8. 01- TOP-T 0.991 IC
- #9. 01- TOP-T 0.992 TC
- #10. 01- TOP-TURN 1.613 IC
- #11. 01- TOP 3.172 TC
- #12. 01- MID 2.756 TC
- #14. 01- MID-R 0.997 TC
- #15. 01- MID-T 0.000 NT
- #16. 01- MID-TURN 1.688 TC
- #17. 01- MID 3.319 IC
- #18. 01- MID 2.726 TC
- #20. 01- MID-T 0.999 TC
- #21. 01- MID-BTM 0.993 TC
- #22. 01- MID 2.782 TC
- #23. 01- MID 3.247 TC
- #24. 01- MID 1.950 IC
- #25. 01- MID 0.000 NI
- #26. 01- MID 0.992 TC
- #27. 01- MID-T 0.982 TC
- #31. 01- BTM-R 0.978 IC
- #32. 01- BTM-T 0.935 IC
- #33. 01- BTM-TURN 1.521 IC
- #37. 01- BTM-R 0.996 TC
- #38. 01- BTM-T 0.989 TC
- #41. 01- BTM 2.754 IC
- #43. 01- BTM-R 0.971 TC
- #44. 01- BTM 0.988 TC
- #45. 01- BTM-BTM 1.011 TC

CAL BLK=80°F		PIPE=75°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-C1-1.01-45.01

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

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 11/08/2015

(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 = 08/21/2016

Pred. Ret. Date = 11/26/2016

Group Description:

RCR = 71.4 MPY

Rem. Life (from last survey 08/22/2015) = 1.3 yrs

0 C.A. Status: No

Total Caution TMLs = 12

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-T	N	1.032	06/14/2007	0.975	08/28/2014	0.975	RR	0	7.0	7.1	30.9	0.875	7.0	12/04/2029	08/21/2016
2.01	TOP-T	Y	1.034	06/14/2007	0.981	08/28/2014	0.955	TC	26.5	9.6	8.7	26.5	0.875	26.5	08/29/2018	08/21/2016
3.01	TOP-T	N	0.995	06/14/2007	0.984	08/28/2014	0.981	TC	3.1	1.7	1.4	16.0	0.875	3.1	10/31/2049	08/21/2016
4.01	TOP	N	2.391	06/14/2007	2.368	08/28/2014	2.663	RR	0	0	0	10.9	2.000	0.1	09/06/4015	08/21/2016
5.01	TOP	N	2.821	06/14/2007	2.758	08/28/2014	3.183	TC	0	0	0	27.6	2.000	0.1	09/06/4015	08/21/2016
6.01	TOP	Y	3.413	06/14/2007	2.667	08/28/2014	2.617	TC	50.9	97.2	103.2	212.1	2.000	97.2	12/27/2021	08/21/2016
7.01	TOP	Y	2.863	06/14/2007	2.237	08/28/2014	2.207	TC	30.5	80.1	81.1	96.0	2.000	80.1	03/23/2018	08/21/2016
8.01	TOP-T	Y	1.029	06/14/2007	0.909	08/28/2014	0.909	RR	0	14.7	14.3	112.8	0.875	14.7	12/14/2017	08/21/2016
9.01	TOP-T	N	1.020	06/14/2007	0.962	08/28/2014	0.962	RR	0	7.1	7.0	46.9	0.875	7.1	11/23/2027	08/21/2016
10.01	TOP-TURN	Y	1.598	02/04/2012	1.536	08/28/2014	1.536	RR	0	17.5	20.1	53.9	1.300	17.5	02/15/2029	08/21/2016
11.01	TOP	N	3.224	06/14/2007	3.179	08/27/2013	3.172	TC	3.5	6.4	6.7	28.8	2.000	6.4	10/07/2198	08/21/2016
12.01	MID	N	2.762	06/14/2007	2.734	08/27/2013	2.734	RR	0	3.4	3.7	17.9	2.000	3.4	07/12/2231	08/21/2016
14.01	MID-R	N	1.031	06/14/2007	1.001	08/28/2014	0.997	TC	4.1	4.2	3.8	29.9	0.875	4.2	09/08/2044	08/21/2016
15.01	MID-T	N	0.998	06/14/2007	0.982	08/27/2013	0.982	RR	0	2.2	2.3	10.3	0.875	2.2	04/17/2063	08/28/2015
16.01	MID-TURN	N	1.563	06/14/2007	1.504	08/28/2014	1.639	RR	0	0	0	37.8	1.300	0.1	09/06/4015	08/21/2016
17.01	MID	Y	3.328	06/14/2007	3.370	08/28/2014	3.319	TC	51.9	1.1	0	655.2	2.000	51.9	01/20/2041	08/21/2016
18.01	MID	N	2.726	06/14/2007	2.608	08/28/2014	2.608	RR	0	14.4	15.4	58.9	2.000	14.4	11/11/2057	08/21/2016
20.01	MID-T	N	1.043	06/14/2007	1.011	08/28/2014	0.999	TC	12.2	5.4	4.9	12.2	0.875	12.2	10/20/2025	08/21/2016
21.01	MID-BTM	N	1.013	06/14/2007	0.993	08/28/2014	0.993	TC	0	2.4	2.5	3.5	0.875	2.4	10/21/2064	08/21/2016
22.01	MID	N	2.817	06/14/2007	2.782	08/28/2014	2.782	TC	0	4.3	4.5	4.9	2.000	4.3	07/03/2197	08/21/2016

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 11/08/2015

(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/in.
Design Pressure: 10000 lb/in.
Design Temperature: 180 °F

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

Summary:

Group Description:

Insp. Due Date = 08/21/2016
Pred. Ret. Date = 11/26/2016

RCR = 71.4 MPY

Rem. Life (from last survey 08/22/2015) = 1.3 yrs

0 C.A. Status: No
Total Caution TMLs = 12

TM L No	Location	Ctn	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	TM L Retirement Date	TM L Inspection Date
23.01	MID	N	3.352	06/14/2007	3.247	08/28/2014	3.247	TC	0	12.8	13.0	39.9	2.000 U	12.8	01/23/2113	08/21/2016
24.01	MID	Y *	2.687	06/14/2007	1.950	08/28/2014	1.950	TC	0	90.0	88.5	325.6	2.000 U	90.0	01/31/2015	08/21/2016
25.01	MID	Y *	2.123	06/14/2007	2.123	08/27/2013	2.060		62.9	8.7	5.6	1086.6	2.000 U	62.9	08/11/2015	08/28/2015
26.01	MID	N	0.990	06/14/2007	0.985	08/28/2014	0.985	RR	0	0.6	0	31.9	0.875 U	0.6	12/23/2198	08/21/2016
27.01	MID-T	N	1.026	06/14/2007	0.967	08/28/2014	0.967	RR	0	7.2	7.3	28.9	0.875 U	7.2	06/01/2028	08/21/2016
31.01	BTM-R	Y	1.053	06/14/2007	1.001	08/28/2014	0.978	TC	23.4	9.2	8.2	23.4	0.875 U	23.4	01/16/2020	08/21/2016
32.01	BTM-T	Y *	1.000	06/14/2007	0.975	08/28/2014	0.935	TC	40.7	7.9	5.7	40.7	0.875 U	40.7	02/10/2017	08/21/2016
33.01	BTM-TURN	Y *	1.724	06/14/2007	1.641	08/28/2014	1.521	TC	122.1	24.8	20.2	122.1	1.300 U	122.1	06/13/2017	08/21/2016
37.01	BTM-R	N	1.026	06/14/2007	1.009	08/28/2014	0.996	TC	13.2	3.7	2.9	17.0	0.875 U	13.2	10/21/2024	08/21/2016
38.01	BTM-T	N	1.031	06/14/2007	1.002	08/28/2014	0.989	TC	13.2	5.1	4.7	13.2	0.875 U	13.2	04/10/2024	08/21/2016
41.01	BTM	Y	2.829	06/14/2007	2.700	08/28/2014	2.700	RR	0	15.8	16.6	21.2	2.000 U	15.8	12/11/2059	08/21/2016
43.01	BTM-R	N	1.013	06/14/2007	0.952	08/28/2014	0.952	RR	0	7.4	7.3	56.9	0.875 U	7.4	01/17/2026	08/21/2016
44.01	BTM	N	1.045	06/14/2007	0.973	08/28/2014	0.973	RR	0	8.8	8.8	39.9	0.875 U	8.8	10/11/2026	08/21/2016
45.01	BTM-BTM	N	1.026	06/14/2007	0.972	08/28/2014	0.972	RR	0	6.6	6.6	34.9	0.875 U	6.6	05/03/2030	08/21/2016

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

Report Date: 11/08/2015

(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/in.
 Design Pressure: 10000 lb/in.
 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	:	22.9 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	71.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	27.9 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 71.4 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).

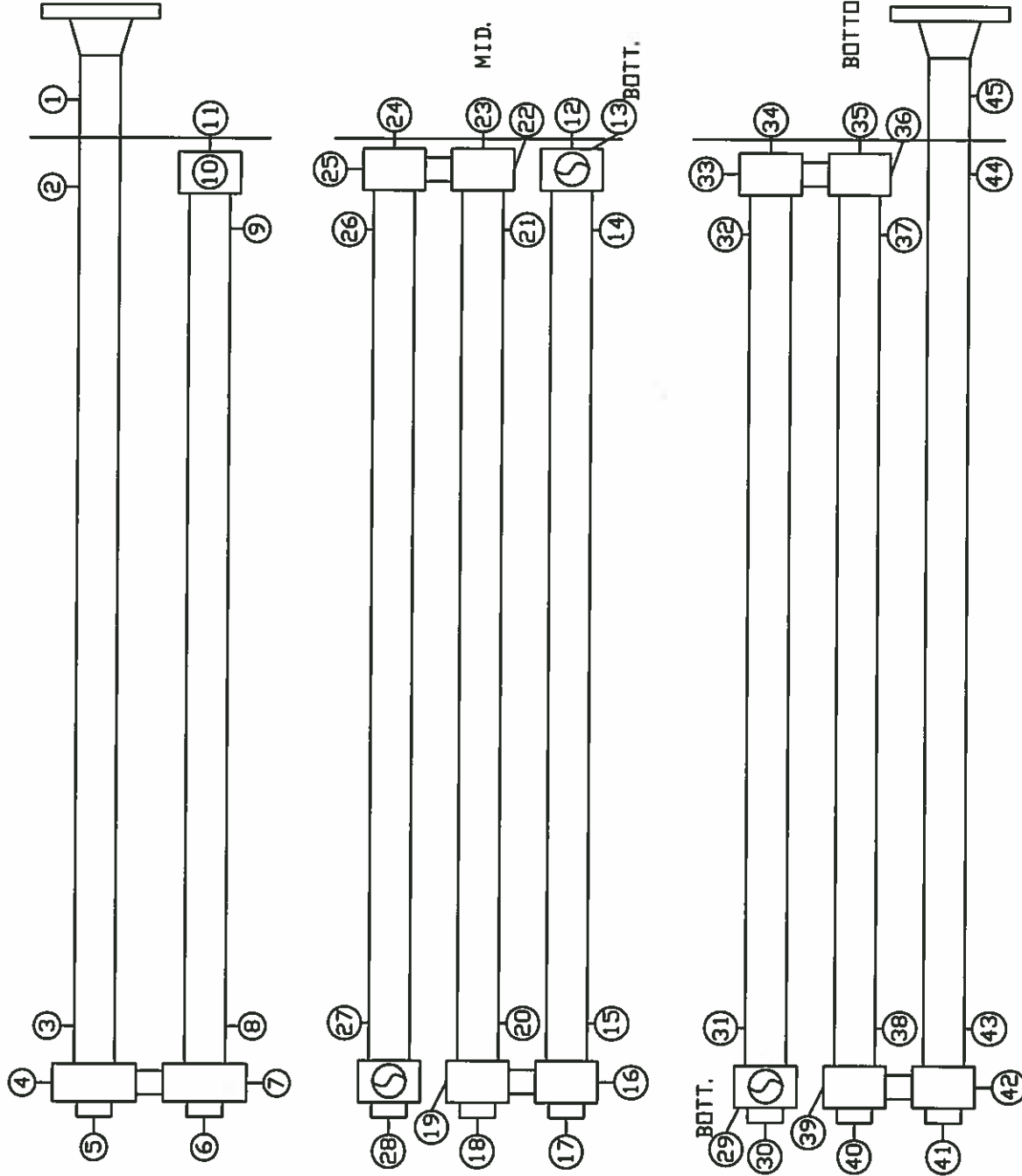
Eq/Circ ID Estimated life = 1.3 years from the most recent survey date.
 (Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 11/26/2016

Recommended Eq/Circ UT/RT Inspection Date is 08/21/2016
 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 12 Caution TMLs in this Eq/Circ ID.

EQUIP RETIREMENT DATE: 1/13/2018
NEXT INSPECTION IS DUE: 8/21/2016



#1. 01- TOP-B 0.998 TC #19. 01- MID 3.342 TC
#2. 01- TOP-T 0.999 TC #20. 01- MID-L 0.975 IC
#3. 01- TOP-L 1.014 TC #21. 01- MID-T 0.979 IC
#4. 01- TOP 2.627 TC #25. 01- MID 0.000 NT
#5. 01- TOP 2.610 IC #26. 01- MID-R 0.988 IC
#6. 01- TOP 2.608 IC #27. 01- MID-R 0.974 TC
#7. 01- TOP 2.292 IC #28. 01- MID 2.626 IC
#8. 01- TOP-T 0.961 IC #30. 01- BTM 2.613 IC
#9. 01- TOP-T 0.981 TC #31. 01- BTM-L 0.964 IC
#10. 01- TOP 1.710 TC #32. 01- BTM-T 0.962 IC
#11. 01- TOP 3.110 IC #37. 01- BTM-T 1.002 TC
#12. 01- MID 2.765 IC #38. 01- BTM-T 0.947 IC
#14. 01- MID-T 0.997 TC #41. 01- BTM 2.577 IC
#15. 01- MID-L 0.995 TC #42. 01- BTM 2.208 IC
#16. 01- MID 1.470 IC #43. 01- BTM-T 0.980 IC
#17. 01- MID 3.223 IC #44. 01- BTM-R 0.985 IC
#18. 01- MID 2.736 TC #45. 01- BTM-L 0.965 IC

CAL BLK=83°F		PIPE=79°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-C2-1.01-45.01

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: 11/08/2015

(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 = 08/21/2016

Pred. Ret. Date = 01/13/2018

Group Description:

RCR = 93.1 MPY

Rem. Life (from last survey 08/22/2015) = 2.4 yrs

O C.A. Status: No

Total Caution TMLs = 21

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	0.992	08/28/2014	0.992	RR	0	3.3	3.2	26.9	0.875	U	3.3	02/04/2051	08/21/2016	
2.01	TOP-T	N	1.006	06/14/2007	1.001	08/28/2014	0.999	TC	2.0	0.9	0.7	5.0	0.875	U	2.0	08/22/2077	08/21/2016	
3.01	TOP-L	N	1.004	06/14/2007	0.996	08/28/2014	0.996	RR	0	1.0	0.9	8.0	0.875	U	1.0	08/22/2136	08/21/2016	
4.01	TOP	N	2.325	06/14/2007	2.315	08/28/2014	2.315	RR	0	1.2	1.3	1.9	2.000	U	1.2	02/22/2278	08/21/2016	
5.01	TOP	Y	2.837	06/14/2007	2.417	RR	08/28/2014	2.610	TC	0	27.7	45.8	269.1	2.000	U	27.7	08/29/2037	08/21/2016
6.01	TOP	Y *	3.300	06/14/2007	2.360	08/28/2014	2.360	RR	0	114.8	116.6	337.3	2.000	U	114.8	10/10/2018	08/21/2016	
7.01	TOP	Y	2.827	06/14/2007	2.363	08/28/2014	2.292	TC	72.2	65.3	63.9	78.8	2.000	U	72.2	09/07/2019	08/21/2016	
8.01	TOP-T	Y	1.002	06/14/2007	0.976	08/28/2014	0.961	TC	15.3	5.0	4.3	18.0	0.875	U	15.3	04/05/2021	08/21/2016	
9.01	TOP-T	N	0.995	06/14/2007	0.981	08/28/2014	0.981	TC	0	1.7	1.7	13.0	0.875	U	1.7	12/28/2077	08/21/2016	
10.01	TOP	N	1.615	06/14/2007	1.615	RR	08/28/2014	1.624	RR	0	0	0	1.300	U	0.1	09/06/4015	08/21/2016	
11.01	TOP	Y	3.325	06/14/2007	3.278	08/27/2013	3.110	TC	84.6	26.3	21.8	84.6	2.000	U	84.6	10/04/2028	08/21/2016	
12.01	MID	Y	2.766	06/14/2007	2.634	02/04/2012	2.634	RR	0	16.1	16.7	28.4	2.000	U	16.1	01/07/2055	08/21/2016	
14.01	MID-T	N	1.032	06/14/2007	1.001	08/28/2014	0.997	TC	4.1	4.3	4.3	5.1	0.875	U	4.3	01/05/2044	08/21/2016	
15.01	MID-L	N	1.023	06/14/2007	0.933	08/28/2014	0.933	RR	0	11.0	10.9	63.9	0.875	U	11.0	11/29/2020	08/21/2016	
16.01	MID	Y	1.674	06/14/2007	1.509	08/28/2014	1.470	TC	39.7	24.9	24.4	39.7	0.875	U	39.7	08/17/2030	08/21/2016	
17.01	MID	Y	3.447	06/14/2007	3.229	08/28/2014	3.223	TC	6.1	27.4	28.0	48.9	1.300	U	27.4	10/27/2085	08/21/2016	
18.01	MID	N	2.723	06/14/2007	2.674	08/28/2014	2.674	RR	0	6.0	6.6	20.5	2.000	U	6.0	12/23/2127	08/21/2016	
19.01	MID	N	3.248	06/14/2007	3.271	08/28/2014	3.271	RR	0	0	0	79.8	2.000	U	0.1	09/06/4015	08/21/2016	
20.01	MID-L	Y *	1.015	06/14/2007	1.022	08/28/2014	0.975	TC	47.8	4.9	2.2	47.8	0.875	U	47.8	09/24/2017	08/21/2016	
21.01	MID-T	Y	1.012	06/14/2007	0.997	08/28/2014	0.979	TC	18.3	4.0	3.1	18.3	0.875	U	18.3	04/28/2021	08/21/2016	

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: 11/08/2015

(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 Description:

Insp. Due Date = 08/21/2016
Pred. Ret. Date = 01/13/2018

RCR = 93.1 MPY

Rem. Life (from last survey 08/22/2015) = 2.4 yrs

0 C.A. Status: No
Total Caution TMLs = 21

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
25.01	MID	N	2.188	06/14/2007	2.117	08/27/2013	2.110	08/28/2014	7.0	10.8	11.0	1141.5	1.300 U	10.8	08/28/2009	08/28/2015
26.01	MID-R	Y	1.023	06/14/2007	1.004 RR	08/28/2014	0.988 TC	08/22/2015	16.3	4.3	3.8	30.5	0.875 U	16.3	07/28/2022	08/21/2016
27.01	MID-R	N	1.005	06/14/2007	0.977	08/28/2014	0.974 TC	08/22/2015	3.1	3.8	3.6	23.0	0.875 U	3.8	09/10/2041	08/21/2016
28.01	MID	Y	3.253	06/14/2007	2.786	08/28/2014	2.626 TC	08/22/2015	162.8	76.6	70.9	162.8	2.000 U	162.8	06/26/2019	08/21/2016
30.01	BTM	Y	2.944	06/14/2007	2.707 RR	08/28/2014	2.613 TC	08/22/2015	95.6	40.4	37.5	95.6	2.000 U	95.6	01/19/2022	08/21/2016
31.01	BTM-L	Y *	1.016	06/14/2007	1.013 RR	08/28/2014	0.964 TC	08/22/2015	49.9	6.4	3.9	49.9	0.875 U	49.9	06/03/2017	08/21/2016
32.01	BTM-T	Y	1.006	06/14/2007	0.989	08/28/2014	0.962 TC	08/22/2015	27.5	5.4	4.1	27.5	0.875 U	27.5	10/21/2018	08/21/2016
37.01	BTM-T	N	1.017	06/14/2007	1.001 RR	08/28/2014	1.002 TC	08/22/2015	0	1.8	2.0	2.8	0.875 U	1.8	03/12/2086	08/21/2016
38.01	BTM-T	Y *	1.023	06/14/2007	1.003 RR	08/28/2014	0.947 TC	08/22/2015	57.0	9.3	6.6	57.0	0.875 U	57.0	11/25/2016	08/21/2016
41.01	BTM	Y	2.851	06/14/2007	2.683	08/28/2014	2.577 TC	08/22/2015	107.8	33.5	29.0	107.8	2.000 U	107.8	12/28/2020	08/21/2016
42.01	BTM	Y	2.225	06/14/2007	2.245	08/28/2014	2.208 TC	08/22/2015	37.6	2.1	0	37.6	2.000 U	37.6	03/04/2021	08/21/2016
43.01	BTM-T	Y *	0.998	06/14/2007	1.015 RR	08/28/2014	0.980 TC	08/22/2015	35.6	2.2	0.1	35.6	0.875 U	35.6	08/03/2018	08/21/2016
44.01	BTM-R	Y	1.002	06/14/2007	1.012 RR	08/28/2014	0.985 TC	08/22/2015	27.5	2.1	0.5	27.5	0.875 U	27.5	08/22/2019	08/21/2016
45.01	BTM-L	Y *	1.035	06/14/2007	0.993	08/28/2014	0.965 TC	08/22/2015	28.5	8.5	7.0	33.9	0.875 U	28.5	10/18/2018	08/21/2016

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

Report Date: 11/08/2015

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

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Design code: SB/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:BS10K2MM-03B

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 : 34.0 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 93.1 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 41.5 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 93.1 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 = 2.4 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 01/13/2018

Recommended Eq/Circ UT/RT Inspection Date is 08/21/2016
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 21 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: 20+YRS	Date of this Report: 08/22/20145
Representative Corrosion Rate: 0.1 MPY	Next Inspection Due Date: 08/22/2016
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
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	150PSI
DESIGN TEMP	-20°F / 100°F
SHELL THICKNESS	
HEAD THICKNESS	
REG. DESIGN NO.	
STRESS RELIEVED	NO
X-RAY	NO
DERATED	
HYDRO TEST	
INSPECTOR	
CIRN 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

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. There are signs of moderate corrosion beneath attachment area of nameplate-to-shell.

Internal Access?: No

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

Grounding Device in Place and Secure?: N/A. Vessel was not in service at the time of this inspection.

Condition of Foundation and Anchor Bolts: Anchor bolts are in place and secure. Vessel has a flat bottom head which also serves as a baseplate anchored to another baseplate welded to the skid. All (4) anchor bolt nuts are in place and secure.

Condition of Steel Supports, Saddles, and Bolting: All support structural welds appear sound.

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

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 at 150 psi

Date PSV last tested (if there is a tag on the valve): There is no test tag for the PSV.

Comments:

None.

Recommendations:

Ensure PSV is tested prior to returning the unit to service.

Repairs Needed:

None.

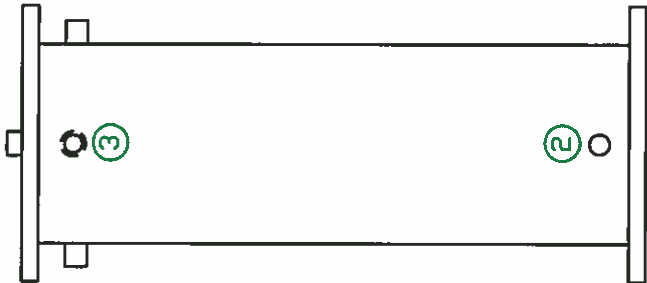
Robert W. Menke/SLM
API 510 Inspector Signature

0131
API 510 Inspector Number

08/22/2015
Date

EQUIP RETIREMENT DATE: 5/19/2052
NEXT INSPECTION IS DUE: 8/21/2016

- #2. 01- BTM SH-FRONT 0. 300 TC
- ~~#2. 02- BTM SH-LEFT 0. 301 TC~~
- #2. 03- BTM SH-BACK 0. 327 TC
- #2. 04- BTM SH-RIGHT 0. 323 TC
- #3. 01- TOP SH-FRONT 0. 324 TC
- #3. 02- TOP SH-LEFT 0. 310 TC
- #3. 03- TOP SH-BACK 0. 307 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 ND 'U' STAMP

CAL BLK=81°F VESSEL=79°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

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

Report Date: 11/08/2015

(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 Name:
Insp. Due Date = 08/21/2016
Pred. Ret. Date = 05/19/2052

Group Description:

RCR = 0.1 MPY
Rem. Life (from last survey 08/22/2015) = 36.7 yrs

0 C.A. Status: No
Total Caution TMLs = 1

TM L No	Location	Ctn TML	First Survey Thick Mt	First Date	Previous Survey Thick Mt	Previous Date	Last Survey Thick Mt	Last Date	Short Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TM L Retirement Date	TM L Inspection Date
2.01	BTM SH-FRONT	N *	0.313 TC	02/04/2012	0.300 TC	08/28/2014	0.300 TC	08/22/2015	0	3.7	4.3	13.0	0.282 U	3.7	07/03/2020	08/21/2016
2.02	BTM SH-LEFT	Y *	0.320 TC	02/04/2012	0.319 TC	08/28/2014	0.301 TC	08/22/2015	18.3	5.4	4.5	18.3	0.282 U	18.3	09/04/2016	08/21/2016
2.03	BTM SH-BACK	N *	0.331 TC	02/04/2012	0.321 TC	08/28/2014	0.327 TC	08/22/2015	0	1.1	1.6	5.0	0.282 U	1.1	07/19/2056	08/21/2016
2.04	BTM SH-RIGHT	N *	0.333 TC	02/04/2012	0.319 TC	08/28/2014	0.323 TC	08/22/2015	0	2.8	3.5	11.0	0.282 U	2.8	04/13/2030	08/21/2016
3.01	TOP SH-FRONT	N *	0.325 TC	02/04/2012	0.324 TC	08/28/2014	0.324 TC	08/22/2015	0	0.3	0.3	1.0	0.282 U	0.3	08/23/2155	08/21/2016
3.02	TOP SH-LEFT	N	0.305 TC	02/04/2012	0.304 TC	08/28/2014	0.310 TC	08/22/2015	0	0	0	2.2	0.282 U	0.1	08/24/2295	08/21/2016
3.03	TOP SH-BACK	N	0.306 TC	02/04/2012	0.305 TC	08/28/2014	0.307 TC	08/22/2015	0	0	0	2.1	0.282 U	0.1	08/24/2265	08/21/2016
3.04	TOP SH-RIGHT	N *	0.327 TC	02/04/2012	0.319 TC	08/28/2014	0.320 TC	08/22/2015	0	2.0	2.4	8.0	0.282 U	2.0	08/22/2034	08/21/2016

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

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

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

varies
0.1 MPa

Not Used.
Not Used.
Not Used.
0.1 MPY

Representative Corrosion Rate = 0.1 MPY

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.

(A) -- 1.00 years.

Eq/Circ ID Last Survey Date is based on the LAST of the last 04 of TML survey dates (Min 1).

Eg/Circ ID Estimated life = 36.7 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 25% (Min 6) TML retirement datas.)

Predicted Eq/Circ ID Retirement date is 05/19/2052

Recommended Eq/Circ UT/RT Inspection Date is 08/21/2016
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.0 Years.
There are 1 Caution TMLs in this Eq/Circ ID.

API 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: Associated piping with LH-0004	
Size/Sched. Of Pipe: 2.375"	Eq/Circ. ID: LH-0004-P
Service/System:	Piping Class ☐ 1 ☐ 2 ☒ 3 ☐ Other
Design Pressure: 10000 psi	Materials: ☒ CS ☐ SS ☐ Other
Design Temperature: 180°F	Note Stamping (If Any)
P&ID#:	Flange Rating:

Reason for Inspection: ☐ Initial API-570 on Stream Inspection.

☒ Scheduled API-570 External Inspection. ☐ Other:

Testing Performed:

☒ Visual ☒ UT ☐ PT ☐ MT ☐ Other:

Comments: Info is for both coils

Insulation Observations:	Comments:
☐ Serviceable ☒ Not Insulated ☐ Missing/Damaged ☐ CUI Identification ☐ Corrosion Present (Describe) ☐ Other ☐ No Issues	Not insulated

Coating Condition:	Comments:
☐ Good ☒ Fair, Some Blistering/Peeling ☒ Corrosion Present (Describe) ☐ Other ☐ No Issues	There is light coating damage with signs of light corrosion present in the damaged areas.

Loss of Containment:	Comments:
☐ Fluid Loss (Indicate How Much) ☐ Seeping or Evidence of Past Leakage ☐ Dripping (Size of Drops/Drops Per Minute) ☐ Leaking (Size of Stream, Noise Level, etc.) ☐ Clamps ☐ Other ☒ None Identified	No signs of fluid loss.

Condition of Welds:	Comments:
☒ Welds Are Full, Smooth and Well Profiled ☐ Incomplete Fusion/Penetration ☐ Crack Located Near Weld Seam ☐ Weld Does Not Appear to Be Original ☐ Joints-Misaligned ☐ Undercut ☐ Other ☒ No Issues	Welds show no signs of any defects.

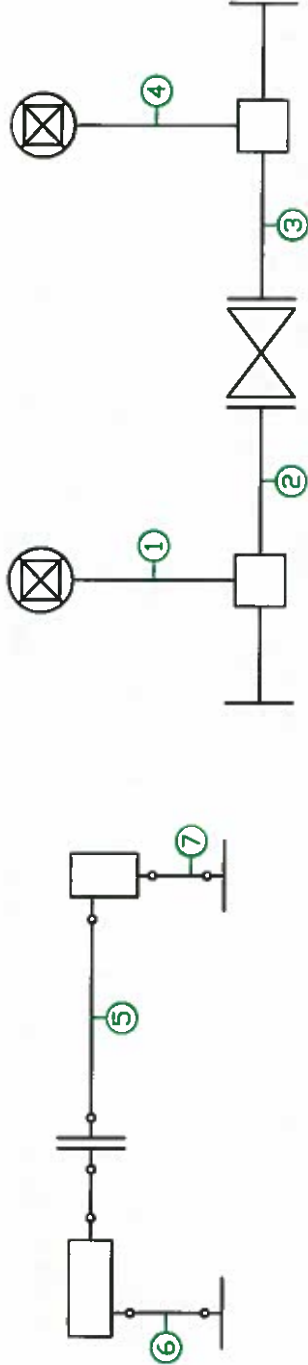
Relief Device:	Comments:
☒ PSV ☐ No PSV ☐ Rupture Disk ☐ Atmospheric ☐ No Relief Device Identified For This Equipment ☐ Tag Secure and Legible ☐ Set Pressure At Or Below MAWP ☐ Block Valve Not Locked/Car Sealed In Open Position ☐ Improper Drain Hole/Weather Cap On Atmos. Discharge ☐ Obstruction (i.e. Debris) ☐ Relief Installed In A Position Other Than Horiz. Or Upright ☒ Other ☐ No Issues	

Supports/Hangers:	Comments:
☐ In Serviceable Condition ☐ Foundation Is Damaged ☐ Additional Support Needed ☐ Hanger/Support Is Distorted/Broken/Missing ☐ Pipe Slide Or Shoe Is Off Of The Support ☐ Makeshift Support ☐ Loose Support Needed To Be Tightened ☐ Fireproofing Missing Or Damaged ☐ Support/Hanger Is Corroded ☐ Other ☒ No Issues	No supports present.

Flanged Connections:	Comments:
☒ Bolting Serviceable ☐ Short, Missing Or Damaged Bolting ☐ Nuts Lack Full Engagement ☒ Flanges Serviceable ☐ Flange Material Or Rating Inconsistent For System ☐ Flanges Deformed Or Damaged ☐ Corrosion Present (Describe) ☐ Gaskets ☐ Flange Rating Issues ☐ Other ☒ No Issues	Flanged connections are in acceptable condition.

Mechanical Observations:	Comments:
☐ Deadleg ☐ Damaged Flex Hose ☐ Crack ☐ Biological Growth ☐ Threaded Exposed ☐ Threaded Connections Not Seal Welded ☐ Expansion Joint Issues ☐ Low Point Without Drain ☐ Open Ended ☐ Vibration (Excessive) ☐ Weephole ☐ Other ☒ No Issues	No mechanical issues found.

EQUIP RETIREMENT DATE: 6/8/2120
NEXT INSPECTION IS DUE: 8/21/2016



- #1.01- STR-R 0.690
- #2.01- STR-BTM 0.760
- #3.01- STR-TOP 0.747
- #4.01- STR-L 0.742
- #5.01- STR-BK 0.710
- #6.01- STR 0.741
- #7.01- STR-F 0.694

CAL BLK=81°F PIPE=79°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH-0004
EQUIP NAME	LH0004-P
DWG #	LH0004-P

FH2E-D

DESC: ASSOCIATED PIPING ON LINE HEATER 1
DWG#: LH0004-P-1.01-7.01

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: 11/08/2015

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

Unit: LH-0004

Eq/Circ ID: LH0004-P

Eq Type: VESSEL

Class:

CM RBI:

Design Code: 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 = 08/21/2016

Pred. Ret. Date = 06/08/2120

Group Description:

RCR = 19.4 MPY

Rem. Life (from last survey 08/22/2015) = 104.8 yrs

0 C.A. Status: No

Total Caution TMLs = 1

TML No	Location	Ctn TML	First Survey Thick Mt	First Date	Previous Survey Thick Mt	Previous Date	Last Survey Thick Mt	Last Date	Short Term Rate	Long Term Rate	Best Rate	Max Rist CR	Retirement Thickness	Rep TML CR	THL Retirement Date	THL Inspection Date
1.01	STR-R	Y *	0.761	06/14/2007	0.738	08/27/2013	0.690	08/22/2015	24.2	8.7	7.5	24.2	0.260 P	24.2	05/27/2033	08/21/2016
2.01	STR-BTM	N *	0.768	06/14/2007	0.724	08/27/2013	0.724	08/22/2015	0	5.4	5.8	10.9	0.260 P	5.4	07/17/2101	08/21/2016
3.01	STR-TOP	N *	0.774	06/14/2007	0.761	08/27/2013	0.747	08/22/2015	7.1	3.3	3.0	7.1	0.260 P	7.1	03/18/2084	08/21/2016
4.01	STR-L	N	0.718	06/14/2007	0.709	08/27/2013	0.709	08/22/2015	0	1.1	1.2	5.8	0.260 P	1.1	09/12/2423	08/21/2016
5.01	STR-BK	N *	0.724	06/14/2007	0.707	08/27/2013	0.707	08/22/2015	0	2.1	2.2	3.2	0.260 P	2.1	06/07/2228	08/21/2016
6.01	STR	N *	0.749	06/14/2007	0.731	08/27/2013	0.731	08/22/2015	0	2.2	2.4	2.9	0.260 P	2.2	09/02/2229	08/21/2016
7.01	STR-F	N *	0.732	06/14/2007	0.723	08/27/2013	0.694	08/22/2015	14.6	4.6	3.9	14.6	0.260 P	14.6	05/10/2045	08/21/2016

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

Report Date: 11/08/2015

Unit: LH-0004
Eq/Circ ID: LH0004-P
Design Code: R31.3
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 : 8.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 19.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 12.0 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 19.4 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 = 104.8 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 06/08/2120

Recommended Eq/Circ UT/RT Inspection Date is 08/21/2016
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.