



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

<b>Inspections Performed for:</b> FMC Technologies Completion	
<b>Inspection Report for:</b> LH0004-C1 - Line Heater Coil 1	
<b>Remaining Life:</b> 0.7 YRS	<b>Date of this Report:</b> 10/25/2016
<b>Rep. Corrosion Rate:</b> 95.0 MPY	<b>Next UT:</b> 10/25/2017 <b>Next VT:</b> 10/25/2017
<b>Manufacturer:</b> Blue Star Welding	<b>Mfg Serial #:</b> BS10K2MM-03A
<b>Date Built:</b> 2005	<b>National Board #:</b> None
<b>Alberta registration #:</b> 514075	<b>Canadian Registration #:</b> 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



### 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

<b>Company Name:</b> FMC Technologies Completion	
<b>Field/Location:</b> PA District	
<b>Equipment Number:</b> LH-0004	<b>Eq/Circ. ID:</b> LH0004-C1
<b>Equipment Name/Service:</b> Line Heater-Coil 1	
<b>Physical Location:</b> In FMC Yard	
<b>Manufacturer:</b> Blue Star Welding	<b>Manufacturer Serial Number:</b> BS10K2MM-03A
<b>Year Built:</b> 2005	<b>CRN:</b> ALD-05-001
<b>Alberta Registration Number:</b> 514075	<b>National Board Number:</b> 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:** Yes if the bundles are pulled.

**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:** Coils pulled out of Line Heater.



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

**Condition of Steel Supports, Saddles and Bolting:** (2) vertical plates have heavy surface corrosion and peeling.



**Condition of Nozzles, Flanges, Repads, and Weepholes:** Nozzles and flanges are in good condition. Coils were pulled out of the Line Heater. There was light chipping on the flanges with minor surface corrosion.





**Condition of Welds; Head and Shell Metal Surfaces:** 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 moderate corrosion with scaling.



**Recommendations:**

None

**Repairs Needed:**

None

Robert W. Menke/JWW  
**API 510 Inspector Signature**

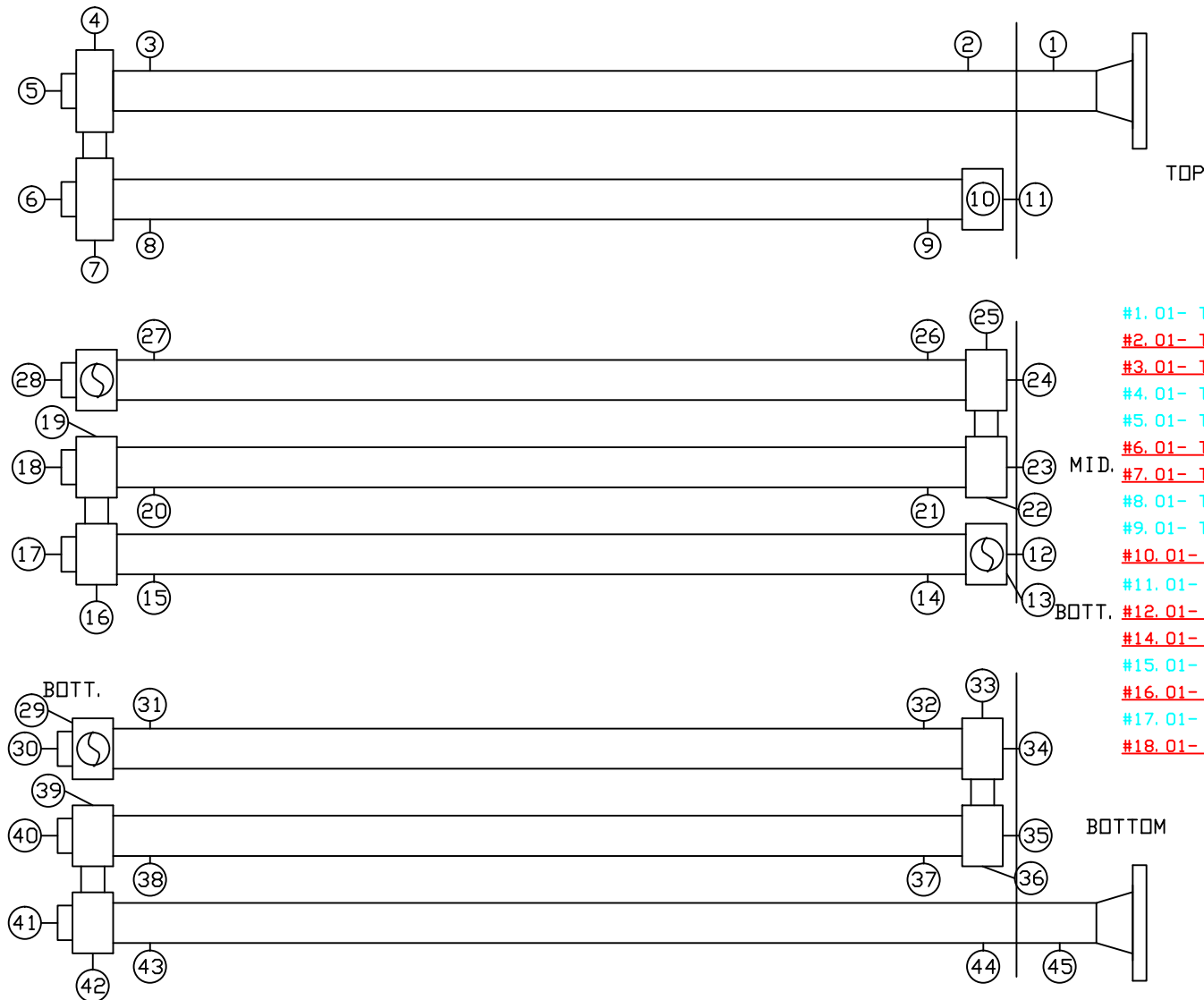
0131  
**API 510 Inspector Number**

10/25/2016  
**Date**

EQUIP RETIREMENT DATE: 7/9/2017  
NEXT INSPECTION IS DUE: 10/25/2017

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



#1.01- TOP-T 0.968 TC	#20.01- MID-R 0.972 TC
#2.01- TOP-T 0.912 TC	#21.01- MID-L 0.988 TC
#3.01- TOP-T 0.960 TC	#22.01- MID 0.000 NT
#4.01- TOP 2.708 TC	#23.01- MID 0.000 NT
#5.01- TOP 3.221 TC	#24.01- MID 1.915 TC
#6.01- TOP 2.770 TC	#25.01- MID 2.064 TC
#7.01- TOP 2.095 TC	#26.01- MID-BT 0.952 TC
#8.01- TOP-T 0.979 TC	#27.01- MID-T 0.970 TC
#9.01- TOP-BT 0.968 TC	#31.01- BTM-R 0.930 DC
#10.01- TOP-TURN 0.000 NT	#32.01- BTM-BT 0.960 TC
#11.01- TOP 3.252 TC	#33.01- BTM-TURN 0.000 NT
#12.01- MID 2.442 TC	#37.01- BTM-R 0.981 TC
#14.01- MID-BT 0.968 TC	#38.01- BTM-L 0.934 TC
#15.01- MID-L 0.972 TC	#40.01- TURN 3.240 TC
#16.01- MID-TURN 1.610 TC	#41.01- BTM 2.584 TC
#17.01- MID 3.387 TC	#42.01- BTM-T 2.082 TC
#18.01- MID 2.587 TC	#43.01- BTM-R 0.943
	#44.01- BTM-L 0.977 TC
	#45.01- BTM-BT 0.967 TC

CAL BLK=59°F PIPE=60°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

## 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:12/27/2016

(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<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 180 °F

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

Summary: Group Name: Group Description:  
 Insp. Due Date = 10/25/2017 RCR = 95.0 MPY  
 Pred. Ret. Date = 07/09/2017 Rem. Life (from last survey 10/25/2016) = 0.7 yrs

0 C.A. Status: NO  
 Total Caution TMLs = 17

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 RR	08/22/2015	0.968 TC	10/25/2016	5.9	6.8	7.3	30.9	0.875 U	6.8	06/29/2030	10/25/2017
2.01	TOP-T	Y *	1.034	06/14/2007	0.955 TC	08/22/2015	0.912 TC	10/25/2016	36.5	13.0	11.3	36.5	0.875 U	36.5	10/30/2017	10/25/2017
3.01	TOP-T	Y	0.995	06/14/2007	0.981 TC	08/22/2015	0.960 TC	10/25/2016	17.8	3.7	3.0	17.8	0.875 U	17.8	08/04/2021	10/25/2017
4.01	TOP	N	2.391	06/14/2007	2.663 RR	08/22/2015	2.696 RR	10/25/2016	0	0	0	10.9	2.000 U	0.1	11/09/4016	10/25/2017
5.01	TOP	N	2.821	06/14/2007	3.183 TC	08/22/2015	3.183 RR	10/25/2016	0	0	0	27.6	2.000 U	0.1	11/09/4016	10/25/2017
6.01	TOP	Y	3.413	06/14/2007	2.617 TC	08/22/2015	2.617 RR	10/25/2016	0	85.0	92.7	212.1	2.000 U	85.0	01/28/2024	10/25/2017
7.01	TOP	Y *	2.863	06/14/2007	2.207 TC	08/22/2015	2.095 TC	10/25/2016	95.1	82.0	78.4	96.0	2.000 U	95.1	10/25/2017	10/25/2017
8.01	TOP-T	N	1.029	06/14/2007	0.909 RR	08/22/2015	0.979 TC	10/25/2016	0	5.3	10.6	112.8	0.875 U	5.3	06/09/2036	10/25/2017
9.01	TOP-BT	N	1.020	06/14/2007	0.962 RR	08/22/2015	0.968 TC	10/25/2016	0	5.6	6.8	46.9	0.875 U	5.6	06/04/2033	10/25/2017
10.01	TOP-TURN	Y	1.598	02/04/2012	1.536	08/28/2014	1.536 RR	08/22/2015	0	17.5	20.1	53.9	1.300 U	17.5	02/15/2029	08/21/2016
11.01	TOP	N	3.224	06/14/2007	3.172 TC	08/22/2015	3.172 RR	10/25/2016	0	5.6	6.5	28.8	2.000 U	5.6	02/09/2226	10/25/2017
12.01	MID	Y	2.762	06/14/2007	2.734 RR	08/22/2015	2.442 TC	10/25/2016	248.0	34.2	23.6	248.0	2.000 U	248.0	08/07/2018	10/25/2017
14.01	MID-BT	Y	1.031	06/14/2007	0.997 TC	08/22/2015	0.968 TC	10/25/2016	24.6	6.7	6.0	29.9	0.875 U	24.6	08/06/2020	10/25/2017
15.01	MID-L	N	0.998	06/14/2007	0.982 RR	08/28/2014	0.972 TC	10/25/2016	4.6	2.8	2.8	10.3	0.875 U	4.6	11/26/2037	10/25/2017
16.01	MID-TURN	Y	1.563	06/14/2007	1.639 RR	08/22/2015	1.610 TC	10/25/2016	24.6	0	0	37.8	1.300 U	24.6	06/02/2029	10/25/2017
17.01	MID	N	3.328	06/14/2007	3.319 TC	08/22/2015	3.319 RR	10/25/2016	0	1.0	0	655.2	2.000 U	1.0	11/05/3335	10/25/2017
18.01	MID	Y	2.726	06/14/2007	2.608 RR	08/22/2015	2.587 TC	10/25/2016	17.8	14.8	16.4	58.9	2.000 U	17.8	10/17/2049	10/25/2017
20.01	MID-R	Y	1.043	06/14/2007	0.999 TC	08/22/2015	0.972 TC	10/25/2016	22.9	7.6	6.4	22.9	0.875 U	22.9	01/19/2021	10/25/2017
21.01	MID-L	N	1.013	06/14/2007	0.993 TC	08/22/2015	0.988 TC	10/25/2016	4.2	2.7	2.5	4.2	0.875 U	4.2	09/21/2043	10/25/2017
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	2.000 U	4.3	07/03/2197	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:12/27/2016

(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<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 180 °F

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

Summary: Group Name:

Insp. Due Date = 10/25/2017  
 Pred. Ret. Date = 07/09/2017

Group Description:

RCR = 95.0 MPY  
 Rem. Life (from last survey 10/25/2016) = 0.7 yrs

0 C.A. Status: No

Total Caution TMLs = 17

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
23.01	MID	N	3.352	06/14/2007	3.247	08/28/2014	3.247 TC	08/22/2015	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 TC	08/22/2015	1.915 TC	10/25/2016	29.7	82.4	79.6	325.6	2.000 U	82.4	10/14/2015	10/25/2017
25.01	MID	N	2.123	06/14/2007	2.060 TC	08/22/2015	2.060 RR	10/25/2016	0	6.7	7.6	1086.6	2.000 U	6.7	10/09/2025	10/25/2017
26.01	MID-BT	Y	0.990	06/14/2007	0.985 RR	08/22/2015	0.952 TC	10/25/2016	28.0	4.1	2.5	31.9	0.875 U	28.0	07/26/2019	10/25/2017
27.01	MID-T	N	1.026	06/14/2007	0.967 RR	08/22/2015	0.970 TC	10/25/2016	0	6.0	6.7	28.9	0.875 U	6.0	08/25/2032	10/25/2017
31.01	BTM-R	Y *	1.053	06/14/2007	0.978 TC	08/22/2015	0.930 TC	10/25/2016	40.8	13.1	10.9	40.8	0.875 U	40.8	03/01/2018	10/25/2017
32.01	BTM-BT	N	1.000	06/14/2007	0.935 TC	08/22/2015	0.935 RR	10/25/2016	0	6.9	7.2	40.7	0.875 U	6.9	07/06/2025	10/25/2017
33.01	BTM-TURN	Y *	1.724	06/14/2007	1.641 RR	08/28/2014	1.521 TC	08/22/2015	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	0.996 TC	08/22/2015	0.981 TC	10/25/2016	12.7	4.8	4.4	17.0	0.875 U	12.7	03/01/2025	10/25/2017
38.01	BTM-L	Y *	1.031	06/14/2007	0.989 TC	08/22/2015	0.934 TC	10/25/2016	46.7	10.4	8.0	46.7	0.875 U	46.7	01/29/2018	10/25/2017
40.01	TURN	N	2.500 NM	02/24/2005		N/A	3.240 TC	10/25/2016	N/A	0	N/A	35.8	2.000 U	0.1	11/09/4016	10/25/2017
41.01	BTM	Y	2.829	06/14/2007	2.700 RR	08/22/2015	2.584 TC	10/25/2016	98.5	26.2	21.4	98.5	2.000 U	98.5	09/30/2022	10/25/2017
42.01	BTM-T	Y	2.500 NM	02/24/2005		N/A	2.082 TC	10/25/2016	N/A	35.8	N/A	35.8	2.000 U	35.8	02/09/2019	10/25/2017
43.01	BTM-R	N	1.013	06/14/2007	0.952 RR	08/22/2015	0.943	10/25/2016	7.6	7.5	8.1	56.9	0.875 U	7.6	10/06/2025	10/25/2017
44.01	BTM-L	N	1.045	06/14/2007	0.973 RR	08/22/2015	0.977 TC	10/25/2016	0	7.3	8.2	39.9	0.875 U	7.3	10/15/2030	10/25/2017
45.01	BTM-BT	N	1.026	06/14/2007	0.972 RR	08/22/2015	0.967 TC	10/25/2016	4.2	6.3	6.9	34.9	0.875 U	6.3	06/03/2031	10/25/2017

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

Report Date: 12/27/2016

(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<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
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	:	Varies
(B) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate is the Maximum of:

(A) -- Average Corrosion Rate x 1.00	:	31.9 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	95.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	38.7 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 95.0 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 = 0.7 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 07/09/2017

Recommended Eq/Circ UT/RT Inspection Date is 10/25/2017  
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 17 Caution TMLs in this Eq/Circ ID.



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

<b>Inspections Performed for:</b> FMC Technologies Completion	
<b>Inspection Report for:</b> LH0004-C2 - Line Heater Coil 2	
<b>Remaining Life:</b> 2.8 YRS	<b>Date of this Report:</b> 10/25/2016
<b>Rep. Corrosion Rate:</b> 43.4 MPY	<b>Next UT:</b> 10/25/2017 <b>Next VT:</b> 10/25/2017
<b>Manufacturer:</b> Blue Star Welding	<b>Mfg Serial #:</b> BS10K2MM-03B
<b>Date Built:</b> 2005	<b>National Board #:</b> None
<b>Alberta registration #:</b> 514076	<b>Canadian Registration #:</b> 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 180°F

CRN No. ALD-05-001

YEAR BUILT 2005

TEAM 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

<b>Company Name:</b> FMC Technologies Completion	
<b>Field/Location:</b> PA District	
<b>Equipment Number:</b> LH-0004	<b>Eq/Circ. ID:</b> LH0004-C2
<b>Equipment Name/Service:</b> Line Heater-Coil 2	
<b>Physical Location:</b> In FMC Yard	
<b>Manufacturer:</b> Blue Star Welding	<b>Manufacturer Serial Number:</b> BS10K2MM-03B
<b>Year Built:</b> 2005	<b>CRN:</b> ALD-05-001
<b>Alberta Registration Number:</b> 514076	<b>National Board Number:</b> 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:** Yes if the bundles are pulled.

**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:** Coils pulled out of Line Heater.





**Condition of Steel Supports, Saddles and Bolting:** (2) vertical plates have heavy surface corrosion and peeling.

**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 light chipping on the flanges with minor surface corrosion.



**Condition of Welds; Head and Shell Metal Surfaces:** 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 moderate corrosion with scaling.



**Recommendations:**

None

**Repairs Needed:**

None

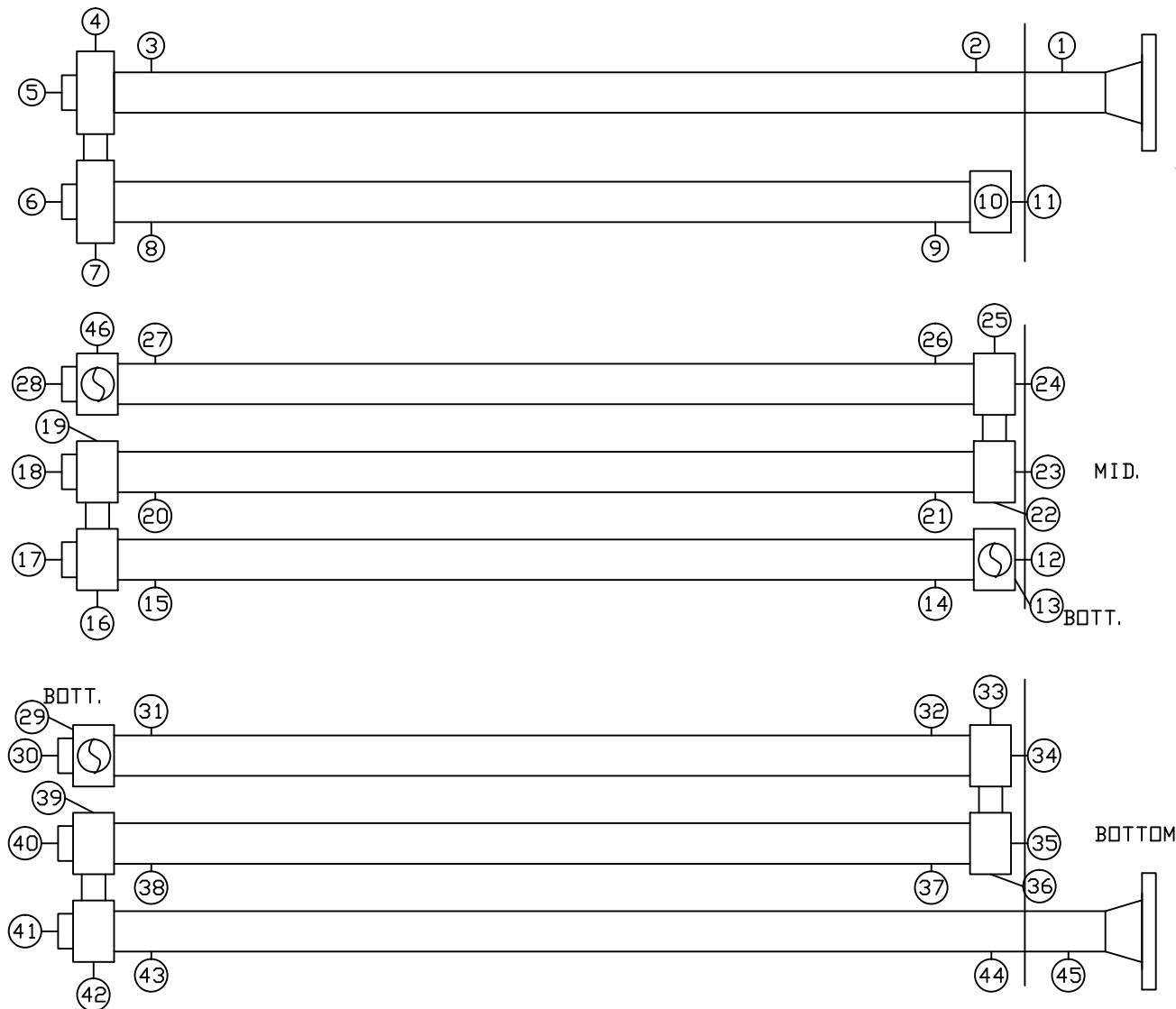
Robert W. Menke/JWW  
API 510 Inspector Signature

0131  
API 510 Inspector Number

10/25/2016  
Date

EQUIP RETIREMENT DATE: 8/24/2019  
NEXT INSPECTION IS DUE: 10/25/2017

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BS10K2MM-03B
A NUMBER	514076
DATE BUILT	2005
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # ALD-05-001



TC-560

#1.01- TOP-B 0.973 TC  
#2.01- TOP-T 0.964 TC  
#3.01- TOP-T 0.995 TC  
#4.01- TOP 2.564 TC  
#5.01- TOP 3.282 TC  
#6.01- TOP 2.597 TC  
#7.01- TOP 2.311 TC  
#8.01- TOP-T 0.930 TC  
#9.01- TOP-BT 0.979 TC  
#10.01- TOP 1.632 TC  
#11.01- TOP 3.226 TC  
#12.01- MID 2.658 TC  
#14.01- MID-BT 0.940 TC  
#15.01- MID-L 0.933 TC  
#16.01- MID 1.477 TC  
#17.01- MID 3.252 TC  
#18.01- MID 2.661 TC  
#19.01- MID 3.338 TC  
#20.01- MID-L 0.992 TC

#21.01- MID-BT 0.978 TC  
#23.01- TURN 3.357 TC  
#24.01- TURN 2.712 TC  
#25.01- MID 2.105 TC  
#26.01- MID-B 0.961 TC  
#27.01- MID-R 0.951 TC  
#28.01- MID 2.718 TC  
#30.01- BTM 2.641 TC  
#31.01- BTM-R 0.974 TC  
#32.01- BTM-R 0.970 TC  
#33.01- TURN 1.595 TC  
#37.01- BTM-T 0.970 DC  
#38.01- BTM-L 0.952 TC  
#39.01- TURN 2.669 TC  
#41.01- BTM 2.725 TC  
#42.01- BTM 2.235 TC  
#43.01- BTM-T 0.990 TC  
#44.01- BTM-R 0.956 TC  
#45.01- BTM-L 0.953 TC  
#46.01- MID-T 3.099 TC

CAL BLK=59°F  
PIPE=59°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:12/27/2016

(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/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
Design Temperature: 180 °F

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

Summary: Group Name: Group Description:  
Insp. Due Date = 10/25/2017 RCR = 43.4 MPY  
Pred. Ret. Date = 08/24/2019 Rem. Life (from last survey 10/25/2016) = 2.8 yrs

0 C.A. Status: NO  
Total Caution TMLs = 16

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	Y	1.019	06/14/2007	0.992 RR	08/22/2015	0.973 TC	10/25/2016	16.1	4.9	4.6	26.9	0.875 U	16.1	11/26/2022	10/25/2017
2.01	TOP-T	Y *	1.006	06/14/2007	0.999 TC	08/22/2015	0.964 TC	10/25/2016	29.7	4.5	3.0	29.7	0.875 U	29.7	10/25/2019	10/25/2017
3.01	TOP-T	N	1.004	06/14/2007	0.996 RR	08/22/2015	0.995 TC	10/25/2016	0.8	1.0	1.1	8.0	0.875 U	1.0	10/26/2136	10/25/2017
4.01	TOP	N	2.325	06/14/2007	2.315 RR	08/22/2015	2.564 TC	10/25/2016	0	0	0	1.9	2.000 U	0.1	11/09/4016	10/25/2017
5.01	TOP	Y	2.837	06/14/2007	2.610 TC	08/22/2015	2.610 RR	10/25/2016	0	24.2	35.0	269.1	2.000 U	24.2	01/09/2042	10/25/2017
6.01	TOP	Y	3.300	06/14/2007	2.360 RR	08/22/2015	2.597 TC	10/25/2016	0	75.1	92.3	337.3	2.000 U	75.1	10/07/2024	10/25/2017
7.01	TOP	Y	2.827	06/14/2007	2.292 TC	08/22/2015	2.292 RR	10/25/2016	0	57.1	57.1	78.8	2.000 U	57.1	12/06/2021	10/25/2017
8.01	TOP-T	Y *	1.002	06/14/2007	0.961 TC	08/22/2015	0.930 TC	10/25/2016	26.3	7.7	6.8	26.3	0.875 U	26.3	11/28/2018	10/25/2017
9.01	TOP-BT	N	0.995	06/14/2007	0.981 TC	08/22/2015	0.979 TC	10/25/2016	1.7	1.7	1.9	13.0	0.875 U	1.7	12/29/2077	10/25/2017
10.01	TOP	N	1.615	06/14/2007	1.624 RR	08/22/2015	1.632 TC	10/25/2016	0	0	0	0	1.300 U	0.1	11/09/4016	10/25/2017
11.01	TOP	Y	3.325	06/14/2007	3.110 TC	08/22/2015	3.110 RR	10/25/2016	0	23.0	23.6	84.6	2.000 U	23.0	01/28/2065	10/25/2017
12.01	MID	N	2.766	06/14/2007	2.634 RR	08/22/2015	2.658 TC	10/25/2016	0	11.5	12.1	28.4	2.000 U	11.5	01/13/2074	10/25/2017
14.01	MID-BT	Y *	1.032	06/14/2007	0.997 TC	08/22/2015	0.940 TC	10/25/2016	48.4	9.8	7.5	48.4	0.875 U	48.4	02/28/2018	10/25/2017
15.01	MID-L	N	1.023	06/14/2007	0.933 RR	08/22/2015	0.933 TC	10/25/2016	0	9.6	10.8	63.9	0.875 U	9.6	11/10/2022	10/25/2017
16.01	MID	Y	1.674	06/14/2007	1.470 TC	08/22/2015	1.470 RR	10/25/2016	0	21.8	23.6	39.7	0.875 U	21.8	02/10/2044	10/25/2017
17.01	MID	Y	3.447	06/14/2007	3.223 TC	08/22/2015	3.223 RR	10/25/2016	0	23.9	25.3	48.9	1.300 U	23.9	04/11/2097	10/25/2017
18.01	MID	N	2.723	06/14/2007	2.674 RR	08/22/2015	2.661 TC	10/25/2016	11.0	6.6	7.1	20.5	2.000 U	11.0	11/27/2076	10/25/2017
19.01	MID	N	3.248	06/14/2007	3.271 RR	08/22/2015	3.338 TC	10/25/2016	0	0	0	79.8	2.000 U	0.1	11/09/4016	10/25/2017
20.01	MID-L	N	1.015	06/14/2007	0.975 TC	08/22/2015	0.975 RR	10/25/2016	0	4.3	3.9	47.8	0.875 U	4.3	01/27/2040	10/25/2017
21.01	MID-BT	N	1.012	06/14/2007	0.979 TC	08/22/2015	0.978 TC	10/25/2016	0.8	3.6	3.8	18.3	0.875 U	3.6	06/05/2045	10/25/2017

## 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:12/27/2016

(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/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 180 °F

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

Summary: Group Name:

Insp. Due Date = 10/25/2017  
 Pred. Ret. Date = 08/24/2019

Group Description:

RCR = 43.4 MPY  
 Rem. Life (from last survey 10/25/2016) = 2.8 yrs

0 C.A. Status: No

Total Caution TMLs = 16

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
23.01	TURN	N	2.500 NM	02/24/2005		N/A	3.357 TC	10/25/2016	N/A	0	N/A	0	2.000 U	0.1	11/09/4016	10/25/2017
24.01	TURN	N	2.500 NM	02/24/2005		N/A	2.712 TC	10/25/2016	N/A	0	N/A	0	2.000 U	0.1	11/09/4016	10/25/2017
25.01	MID	N	2.188	06/14/2007	2.110	08/28/2014	2.105 TC	10/25/2016	2.3	8.9	9.7	1141.5	1.300 U	8.9	04/09/2107	10/25/2017
26.01	MID-B	Y *	1.023	06/14/2007	0.988 TC	08/22/2015	0.961 TC	10/25/2016	22.9	6.6	5.7	30.5	0.875 U	22.9	07/28/2020	10/25/2017
27.01	MID-R	Y	1.005	06/14/2007	0.974 TC	08/22/2015	0.951 TC	10/25/2016	19.5	5.8	5.2	23.0	0.875 U	19.5	09/18/2020	10/25/2017
28.01	MID	Y	3.253	06/14/2007	2.626 TC	08/22/2015	2.626 RR	10/25/2016	0	66.9	66.7	162.8	2.000 U	66.9	03/05/2026	10/25/2017
30.01	BTM	Y	2.944	06/14/2007	2.613 TC	08/22/2015	2.613 RR	10/25/2016	0	35.3	36.2	95.6	2.000 U	35.3	03/08/2034	10/25/2017
31.01	BTM-R	N	1.016	06/14/2007	0.964 TC	08/22/2015	0.964 RR	10/25/2016	0	5.6	5.3	49.9	0.875 U	5.6	09/16/2032	10/25/2017
32.01	BTM-R	N	1.006	06/14/2007	0.962 TC	08/22/2015	0.962 RR	10/25/2016	0	4.7	4.8	248.0	0.875 U	4.7	04/30/2035	10/25/2017
33.01	TURN	N	1.000 NM	02/24/2005		N/A	1.595 TC	10/25/2016	N/A	0	N/A	77.6	0.875 U	0.1	11/09/4016	10/25/2017
37.01	BTM-T	Y *	1.017	06/14/2007	1.002 TC	08/22/2015	0.970 TC	10/25/2016	27.2	5.0	3.6	27.2	0.875 U	27.2	04/23/2020	10/25/2017
38.01	BTM-L	N	1.023	06/14/2007	0.947 TC	08/22/2015	0.947 RR	10/25/2016	0	8.1	7.9	57.0	0.875 U	8.1	09/15/2025	10/25/2017
39.01	TURN	N	2.500 NM	02/24/2005		N/A	2.669 TC	10/25/2016	N/A	0	N/A	0	2.000 U	0.1	11/09/4016	10/25/2017
41.01	BTM	N	2.851	06/14/2007	2.683 RR	08/22/2015	2.725 TC	10/25/2016	0	13.5	16.2	107.8	2.000 U	13.5	07/09/2070	10/25/2017
42.01	BTM	N	2.225	06/14/2007	2.208 TC	08/22/2015	2.208 RR	10/25/2016	0	1.8	1.0	37.6	2.000 U	1.8	05/17/2132	10/25/2017
43.01	BTM-T	N	0.998	06/14/2007	0.980 TC	08/22/2015	0.980 RR	10/25/2016	0	1.9	1.4	35.6	0.875 U	1.9	01/30/2072	10/25/2017
44.01	BTM-R	Y *	1.002	06/14/2007	0.985 TC	08/22/2015	0.956 TC	10/25/2016	24.6	4.9	3.3	27.5	0.875 U	24.6	02/10/2020	10/25/2017
45.01	BTM-L	N	1.035	06/14/2007	0.965 TC	08/22/2015	0.953 TC	10/25/2016	10.2	8.8	8.7	33.9	0.875 U	10.2	06/18/2024	10/25/2017
46.01	MID-T	N	1.000 NM	02/24/2005		N/A	3.099 TC	10/25/2016	N/A	0	N/A	0	0.600 S	0.1	11/09/4016	10/25/2017

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

Report Date: 12/27/2016

(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/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
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	:	Varies
(B) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate is the Maximum of:

(A) -- Average Corrosion Rate x 1.00	:	16.4 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	43.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	19.8 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 43.4 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 = 2.8 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 08/24/2019

Recommended Eq/Circ UT/RT Inspection Date is 10/25/2017  
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 16 Caution TMLs in this Eq/Circ ID.



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

<b>Inspections Performed for:</b> FMC Technologies Completion – PA District	
<b>Inspection Report for:</b> LH-0004 Fuel Gas Scrubber	
<b>Remaining Life:</b> 20+ YRS	<b>Date of this Report:</b> 10/25/2016
<b>Representative Corrosion Rate:</b> 0.1 MPY	<b>Next UT:</b> 10/25/2017 <b>Next VT:</b> 10/25/2017
<b>Manufacturer:</b> Blue Star Welding	<b>Mfg Serial #:</b> BSFGS227
<b>Date Built:</b> 2004	<b>National Board #:</b> None
<b>Alberta registration #:</b> None	<b>Canadian Registration #:</b> 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	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 IN
INSPECTOR	
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

<b>Company Name:</b> FMC Technologies Completion	
<b>Field/Location:</b> PA District	
<b>Equipment Number:</b> LH-0004	<b>Eq/Circ. ID:</b> LH0004-FGS
<b>Equipment Name/Service:</b> Fuel Gas Scrubber	
<b>Physical Location:</b> In PA Yard	
<b>Manufacturer:</b> Blue Star Welding	<b>Manufacturer Serial Number:</b> BSFGS227
<b>Year Built:</b> 2004	<b>National board #:</b> None
<b>Alberta Registration #:</b> None	<b>Canadian Registration # :</b> 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. Vessel is welded to a baseplate which is in good condition.

**Condition of Steel Supports, Saddles, and Bolting:** All support structural welds appear sound. Baseplate is in good condition.

**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 at 150 psi

**Date PSV last tested (if there is a tag on the valve):** 03/2016

**Comments:**

None

**Recommendations:**

None

**Repairs Needed:**

None

Robert W. Menke/JWW  
**API 510 Inspector Signature**

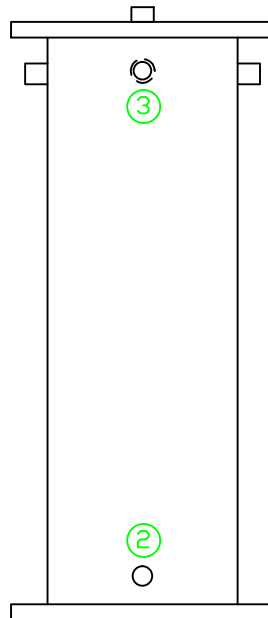
0131  
**API 510 Inspector Number**

10/25/2016  
**Date**



EQUIP RETIREMENT DATE: 8/17/2042  
NEXT INSPECTION IS DUE: 10/25/2017

#2.01- BTM SH-FRONT 0.313 TC  
#2.02- BTM SH-LEFT 0.311 TC  
#2.03- BTM SH-BACK 0.317 TC  
#2.04- BTM SH-RIGHT 0.324 TC  
#3.01- TOP SH-FRONT 0.312 TC  
#3.02- TOP SH-LEFT 0.302 TC  
#3.03- TOP SH-BACK 0.307 TC  
#3.04- TOP SH-RIGHT 0.325 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 # QH 6510.2 NO "U" STAMP

CAL BLK=55°F

VESSEL=53°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0004-FGS
EQUIP NAME	FUEL GAS SCRUBBER
LOCATION	ON 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: 12/27/2016

(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/in<sup>2</sup>  
 Design Pressure: 150 lb/in<sup>2</sup>  
 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 = 10/25/2017  
 Pred. Ret. Date = 08/17/2042

Group Description:  
 RCR = 0.1 MPY  
 Rem. Life (from last survey 10/25/2016) = 25.8 yrs

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

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	N	0.313 TC	02/04/2012	0.300 TC	08/22/2015	0.313 TC	10/25/2016	0	0	1.1	13.0	0.282 U	0.1	10/29/2326	10/25/2017
2.02	BTM SH-LEFT	N *	0.320 TC	02/04/2012	0.301 TC	08/22/2015	0.311 TC	10/25/2016	0	1.9	3.0	18.3	0.282 U	1.9	01/30/2032	10/25/2017
2.03	BTM SH-BACK	N *	0.331 TC	02/04/2012	0.327 TC	08/22/2015	0.317 TC	10/25/2016	8.5	3.0	2.4	8.5	0.282 U	8.5	12/07/2020	10/25/2017
2.04	BTM SH-RIGHT	N *	0.333 TC	02/04/2012	0.323 TC	08/22/2015	0.324 TC	10/25/2016	0	1.9	2.2	11.0	0.282 U	1.9	12/03/2038	10/25/2017
3.01	TOP SH-FRONT	Y *	0.325 TC	02/04/2012	0.324 TC	08/22/2015	0.312 TC	10/25/2016	10.2	2.8	2.3	10.2	0.282 U	10.2	10/04/2019	10/25/2017
3.02	TOP SH-LEFT	Y *	0.305 TC	02/04/2012	0.310 TC	08/22/2015	0.302 TC	10/25/2016	6.8	0.6	0	6.8	0.282 U	6.8	10/04/2019	10/25/2017
3.03	TOP SH-BACK	N	0.306 TC	02/04/2012	0.307 TC	08/22/2015	0.307 TC	10/25/2016	0	0	0	2.1	0.282 U	0.1	10/28/2266	10/25/2017
3.04	TOP SH-RIGHT	N *	0.327 TC	02/04/2012	0.320 TC	08/22/2015	0.325 TC	10/25/2016	0	0.4	1.0	8.0	0.282 U	0.4	04/26/2124	10/25/2017

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

Report Date: 12/27/2016

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

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

Flange Rating: 285 lb/in<sup>2</sup>  
Design Pressure: 150 lb/in<sup>2</sup>  
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	:	Varies
(B) -- Default Corrosion Rate	:	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 = 25.8 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 08/17/2042

Recommended Eq/Circ UT/RT Inspection Date is 10/25/2017  
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.

## API 570 Piping External Inspection

<b>Company Name:</b> FMC Technologies Completion	<b>Facility Name:</b> PA District
<b>Line Name/Number:</b> Associated piping with LH-0004	
<b>Size/Sched. Of Pipe:</b> 2.375"	<b>Eq/Circ. ID:</b> LH0004-P
<b>Service/System:</b>	<b>Piping Class</b> <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> Other
<b>Design Pressure:</b> 10000 psi	<b>Materials:</b> <input checked="" type="checkbox"/> CS <input type="checkbox"/> SS <input type="checkbox"/> Other
<b>Design Temperature:</b> 180°F	<b>Note Stamping (If Any)</b>
<b>P&amp;ID#:</b>	<b>Flange Rating:</b>

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:
<input type="checkbox"/> Serviceable <input checked="" type="checkbox"/> Not Insulated <input type="checkbox"/> Missing/Damaged <input type="checkbox"/> CUI Identification <input type="checkbox"/> Corrosion Present (Describe) <input type="checkbox"/> Other <input type="checkbox"/> No Issues	Not insulated

Coating Condition:	Comments:
<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair, Some Blistering/Peeling <input checked="" type="checkbox"/> Corrosion Present (Describe) <input type="checkbox"/> Other <input type="checkbox"/> No Issues	Coating minor chipping with signs of light surface corrosion present .

Loss of Containment:	Comments:
<input type="checkbox"/> Fluid Loss (Indicate How Much) <input type="checkbox"/> Seeping or Evidence of Past Leakage <input type="checkbox"/> Dripping (Size of Drops/Drops Per Minute) <input type="checkbox"/> Leaking (Size of Stream, Noise Level, etc.) <input type="checkbox"/> Clamps <input type="checkbox"/> Other <input checked="" type="checkbox"/> None Identified	No signs of fluid loss. Unit was not in service at the time of this inspection.

Condition of Welds:	Comments:
<input checked="" type="checkbox"/> Welds Are Full, Smooth and Well Profiled <input type="checkbox"/> Incomplete Fusion/Penetration <input type="checkbox"/> Crack Located Near Weld Seam <input type="checkbox"/> Weld Does Not Appear to Be Original <input type="checkbox"/> Joints-Misaligned <input type="checkbox"/> Undercut <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	Welds show no visible issues.



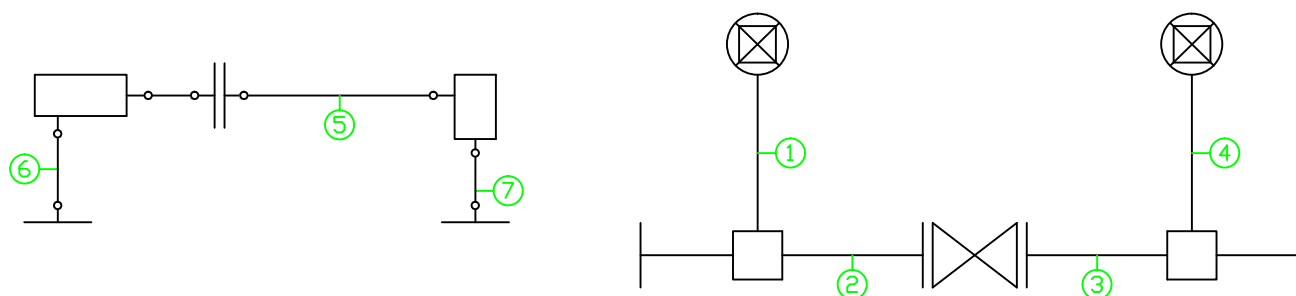
Relief Device:	Comments:
<input type="checkbox"/> PSV <input checked="" type="checkbox"/> No PSV <input type="checkbox"/> Rupture Disk <input type="checkbox"/> Atmospheric <input type="checkbox"/> No Relief Device Identified For This Equipment <input type="checkbox"/> Tag Secure and Legible <input type="checkbox"/>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

Supports/Hangers:	Comments:
<input type="checkbox"/> In Serviceable Condition <input type="checkbox"/> Foundation Is Damaged <input type="checkbox"/> Additional Support Needed <input type="checkbox"/> Hanger/Support Is Distorted/Broken/Missing <input type="checkbox"/> Pipe Slide Or Shoe Is Off Of The Support <input type="checkbox"/> Makeshift Support <input type="checkbox"/> Loose Support Needed To Be Tightened <input type="checkbox"/> Fireproofing Missing Or Damaged <input type="checkbox"/> Support/Hanger Is Corroded <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	No supports present, currently off for maintenance.

Flanged Connections:	Comments:
<input checked="" type="checkbox"/> Bolting Serviceable <input type="checkbox"/> Short, Missing Or Damaged Bolting <input type="checkbox"/> Nuts Lack Full Engagement <input checked="" type="checkbox"/> Flanges Serviceable <input type="checkbox"/> Flange Material Or Rating Inconsistent For System <input type="checkbox"/> Flanges Deformed Or Damaged <input type="checkbox"/> Corrosion Present (Describe) <input type="checkbox"/> Gaskets <input type="checkbox"/> Flange Rating Issues <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	Bolts are in good condition. Flanges have minor chipping with very minor surface corrosion.

Mechanical Observations:	Comments:
<input type="checkbox"/> Deadleg <input type="checkbox"/> Damaged Flex Hose <input type="checkbox"/> Crack <input type="checkbox"/> Biological Growth <input type="checkbox"/> Threaded Exposed <input type="checkbox"/> Threaded Connections Not Seal Welded <input type="checkbox"/> Expansion Joint Issues <input type="checkbox"/> Low Point Without Drain <input type="checkbox"/> Open Ended <input type="checkbox"/> Vibration (Excessive) <input type="checkbox"/> Weephole <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	No mechanical issues found.

EQUIP RETIREMENT DATE: 12/7/2076  
NEXT INSPECTION IS DUE: 10/26/2017



#1. 01- STR-BK 0.725 FH  
#2. 01- STR-BK 0.727 FH  
#3. 01- STR-BK 0.712 FH  
#4. 01- STR-R 0.700 FH  
#5. 01- STR-BT 0.681 FH  
#6. 01- STR-R 0.835 RP  
#7. 01- STR-BT 0.706 FH

CAL BLK=40°F PIPE=37°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: 12/27/2016

(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/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 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 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	STR-BK	N *	0.761	06/14/2007	0.690	08/22/2015	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	08/22/2015	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	08/22/2015	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	08/22/2015	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	08/22/2015	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	08/22/2015	0.694 RR	10/26/2016	0	4.1	4.3	14.6	0.260 P	4.1	08/22/2122	10/26/2017

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

Report Date: 12/27/2016

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

Flange Rating: 5734 lb/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
Design Temperature: 180 °F

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

Description: ASSOCIATED PIPING ON LINE HEATER 1

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	:	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.