



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

Inspections Performed for: FMC Technologies Completion – PA District	
Inspection Report for: LH-0009 - Line Heater (Coil 1)	
Remaining Life: 4.5 YRS	Date of this Report: 09/11/2018
Rep. Corrosion Rate: 9.9 MPY	Next UT: 09/11/2021 Next VT: 09/11/2021
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-04A
Date Built: 2005	National Board #: None
Alberta registration #: 514080	Canadian Registration #: ALD-05-001

FMC Technologies Completion LH-0009 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
Facility/Location Name : Mobile Unit ADO-018 on drilling location
Field Name : N/A
Equipment Number : LH-0009 (Previously ALH-002)
Eq/Circ. ID : LH0009-C1
Equipment Name/Service : Line Heater (w/two coils)
Physical Location : Evanston 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

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

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

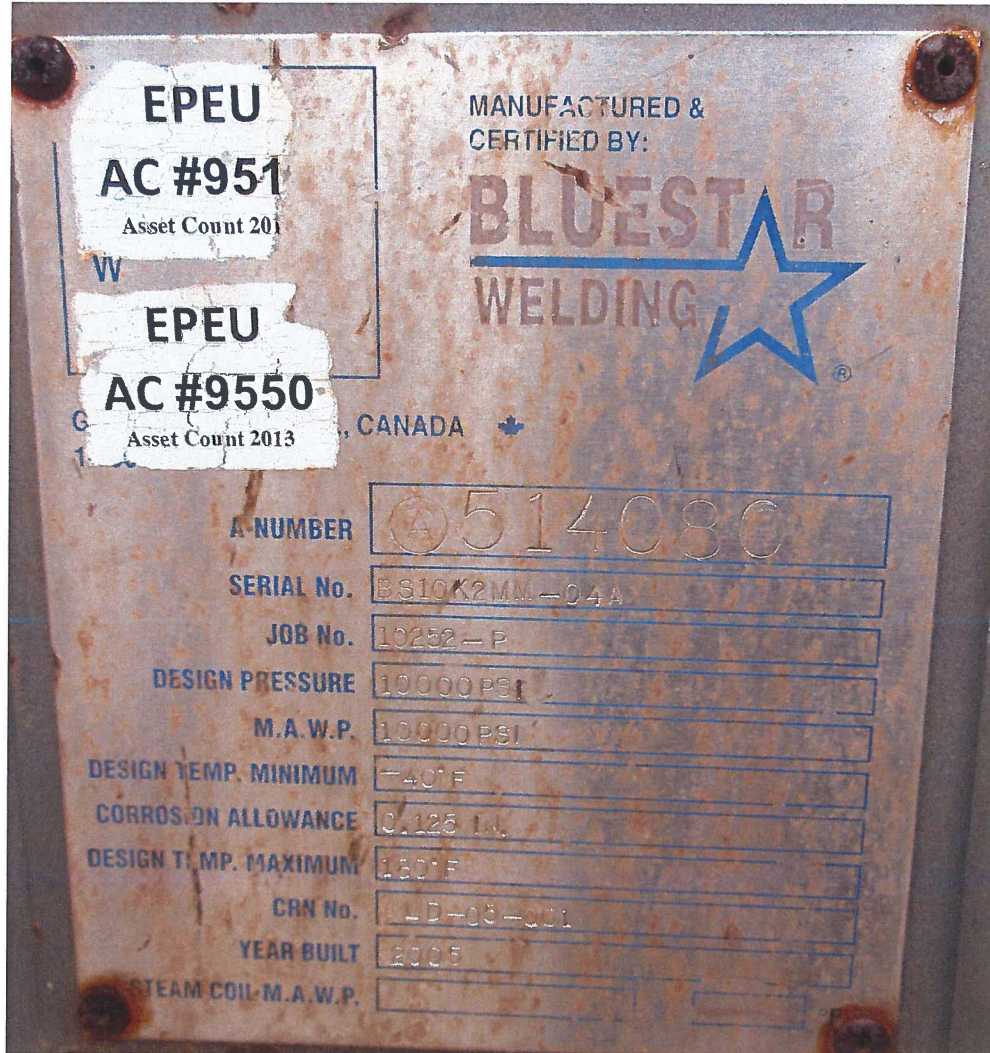
Temperature (highest the equipment would ever see in the process) _____

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

Any other pertinent information: _____

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.)

OEM QC package received, 10/2015, however stress values of material of construction is unknown for the MAWT of this equipment.

R.W. Menke
API 510 Inspector Signature

0131
API 510 Inspector Number

6/14/2007
Date

Robert W. Menke

Update: 10/2015

Name: _____

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0009	Eq/Circ. ID: LH0009-C1
Equipment Name/Service: Line Heater-Coil 1	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-04A
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514080	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: 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.

Tray:



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



Condition of Paint and/or Insulation: Front plate has minor chipping with minor 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. Unable to get readings in all locations.

Recommendations:

Repairs Needed:

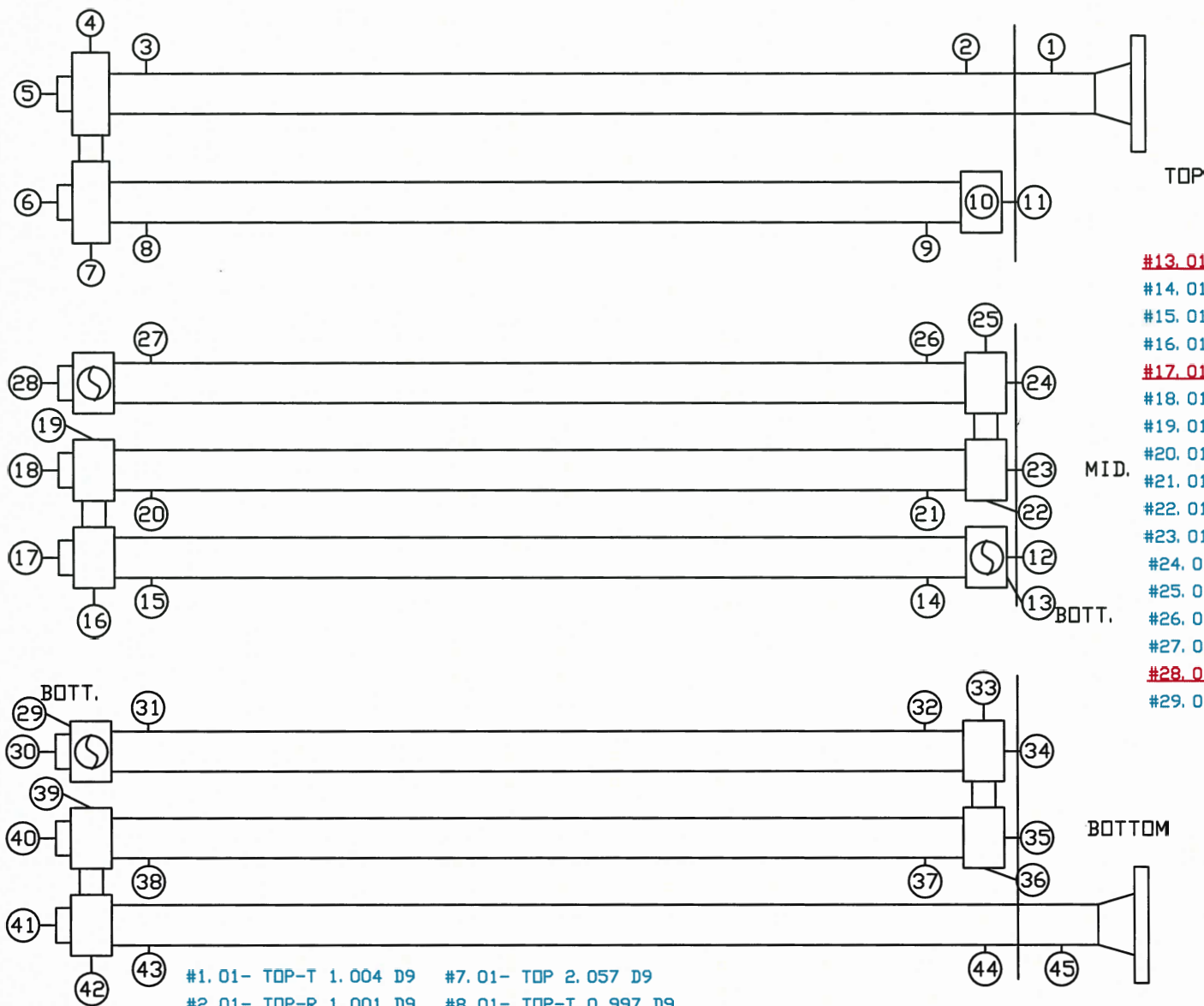
Mike York/MJW
API 510 Inspector Signature

66475
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 3/13/2020
NEXT INSPECTION IS DUE: 9/11/2019

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BS10K2MM-04A
A NUMBER	514080
DATE BUILT	2005
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # ALD-05-001



#13.01- MID 0.000 NT
#14.01- MID-L 1.041 D9
#15.01- MID-B 1.017 D9
#16.01- MID 1.334 D9
#17.01- MID 2.025 D9
#18.01- MID 1.516 D9
#19.01- MID 2.083 D9
#20.01- MID-R 1.034 D9
#21.01- MID-R 1.019 D9
#22.01- MID 0.000 NT
#23.01- MID 1.987 D9
#24.01- MID 1.308 D9
#25.01- MID 2.183 D9
#26.01- MID-R 0.997 D9
#27.01- MID-R 1.003 D9
#28.01- MID 1.499 DC
#29.01- BTM 1.986 D9

#30.01- BTM 1.468 D9
#31.01- BTM-R 1.029 D9
#32.01- BTM-R 0.998 D9
#33.01- BTM 1.348 D9
#34.01- BTM 2.160 D9
#35.01- BTM 1.390 D9
#36.01- BTM 0.000 NT
#37.01- BTM-T 1.048 D9
#38.01- BTM-T 1.010 D9
#39.01- BTM 1.425 D9
#40.01- BTM 2.064 D9
#41.01- BTM 1.450 D9
#42.01- BTM 2.071 D9
#43.01- BTM-L 1.024 D9
#44.01- BTM-L 0.992 D9
#45.01- BTM-L 0.996 D9

DA-590

CAL BLK=74°F

PIPE=76°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0009-C1
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0009-C1

#1.01- TOP-T 1.004 D9
#2.01- TOP-R 1.001 D9
#3.01- TOP-T 1.000 D9
#4.01- TOP 1.343 D9
#5.01- TOP 2.001 D9
#6.01- TOP 1.403 D9
#7.01- TOP 2.057 D9
#8.01- TOP-T 0.997 D9
#9.01- TOP-L 0.987 D9
#10.01- TOP 1.396 D9
#11.01- TOP 1.870 D9
#12.01- MID 1.286 D9

DESC: COIL 1 ON LH-0009 HTR, SN:BS10K2MM-04A
DWG#: LH0009-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:10/30/2018

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

Unit: LH-0009
Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04A

Summary: Group Name: Group Description:
Insp. Due Date = 09/11/2021 RCR = 69.9 MPY
Pred. Ret. Date = 03/13/2020 Rem. Life (from last survey 09/11/2018) = 1.5 yrs

0 C.A. Status: No
Total Caution TMLs = 8

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	1.026	06/14/2007	0.987 TC	10/26/2016	1.004 D9	09/11/2018	0	2.0	2.1	2.1	0.875 U	2.0	03/13/2083	09/11/2021
2.01	TOP-R	N	1.018	06/14/2007	0.998 TC	10/26/2016	1.001 D9	09/11/2018	0	1.5	1.3	1.5	0.875 U	1.5	09/12/2102	09/11/2021
3.01	TOP-T	N	1.018	06/14/2007	0.973 TC	10/26/2016	1.000 D9	09/11/2018	0	1.6	2.1	2.1	0.875 U	1.6	10/26/2096	09/11/2021
4.01	TOP	Y *	1.443	06/14/2007	1.593 TC	10/26/2016	1.343 D9	09/11/2018	133.3	8.9	1.1	133.3	0.875 U	133.3	03/16/2022	09/11/2021
5.01	TOP	N	2.109	06/14/2007	2.004 TC	10/26/2016	2.001 D9	09/11/2018	1.6	9.6	10.5	10.5	1.300 U	9.6	09/19/2091	09/11/2021
6.01	TOP	Y *	1.461	06/14/2007	1.487 TC	10/26/2016	1.403 D9	09/11/2018	44.8	5.2	1.7	44.8	1.300 U	44.8	12/29/2024	09/11/2021
7.01	TOP	N	2.072	06/14/2007	2.067 TC	10/26/2016	2.057 D9	09/11/2018	5.3	1.3	1.3	5.3	1.300 U	5.3	07/12/2161	09/11/2021
8.01	TOP-T	N	1.012	06/14/2007	0.992 TC	10/26/2016	0.997 D9	09/11/2018	0	1.3	1.6	1.6	0.875 U	1.3	07/17/2112	09/11/2021
9.01	TOP-L	N	0.975	06/14/2007	0.932 TC	10/26/2016	0.987 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/20/3138	09/11/2021
10.01	TOP	Y *	1.296	06/14/2007	1.433 TC	10/26/2016	1.396 D9	09/11/2018	19.7	0	0	19.7	1.300 U	19.7	07/27/2023	09/11/2021
11.01	TOP	N	1.883	06/14/2007	1.888 TC	10/26/2016	1.870 D9	09/11/2018	9.6	1.2	1.0	9.6	1.300 U	9.6	01/26/2078	09/11/2021
12.01	MID	N	1.281	06/14/2007	1.189 TC	10/26/2016	1.286 D9	09/11/2018	0	0	2.7	2.7	0.875 U	0.1	09/26/4018	09/11/2021
13.01	MID	Y *		06/14/2007	1.025	08/21/2014	1.034	08/20/2015	0				0.875 U		09/26/4018	09/11/2021
14.01	MID-L	N	1.055	06/14/2007	1.028 TC	10/26/2016	1.041 D9	09/11/2018	0	1.2	1.7	1.7	0.875 U	1.2	01/11/2157	09/11/2021
15.01	MID-B	N	1.017	06/14/2007	0.965 TC	10/26/2016	1.017 D9	09/11/2018	0	0	1.5	1.5	0.875 U	0.1	09/22/3438	09/11/2021
16.01	MID	N	1.334	06/14/2007	1.333 TC	10/26/2016	1.334 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
17.01	MID	Y	2.036	06/14/2007	2.055 TC	10/26/2016	2.025 D9	09/11/2018	16.0	1.0	6.3	16.0	0.875 U	16.0	07/27/2090	09/11/2021
18.01	MID	N	1.444	06/14/2007	1.502	08/20/2015	1.516 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
19.01	MID	N	2.050	06/14/2007	2.050 TC	10/26/2016	2.083 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
20.01	MID-R	N	0.995	06/14/2007	0.997 TC	10/26/2016	1.034 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/23/3608	09/11/2021

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:10/30/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04A

Summary: Group Name: Group Description:
 Insp. Due Date = 09/11/2021 RCR = 69.9 MPY
 Pred. Ret. Date = 03/13/2020 Rem. Life (from last survey 09/11/2018) = 1.5 yrs

O C.A. Status: No
 Total Caution TMLs = 8

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
21.01	MID-R	N	1.015	06/14/2007	0.949 TC	10/26/2016	1.019 D9	09/11/2018	0	0	1.9	1.9	0.875 U	0.1	09/22/3458	09/11/2021
22.01	MID	N	1.280	06/14/2007	1.254	08/21/2014	1.250	08/20/2015	4.0	3.7	3.6	4.0	0.875 U	4.0	05/21/2109	08/19/2016
23.01	MID	N	1.997	06/14/2007	1.990 TC	10/26/2016	1.987 D9	09/11/2018	1.6	0.9	0.7	1.6	1.300 U	1.6	01/29/2448	09/11/2021
24.01	MID	N	1.295	06/14/2007	1.286 TC	10/26/2016	1.308 D9	09/11/2018	0	0	0.2	0.2	0.875 U	0.1	09/26/4018	09/11/2021
25.01	MID	N	2.107	06/14/2007	2.118 TC	10/26/2016	2.183 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
26.01	MID-R	N	0.995	06/14/2007	0.976 TC	10/26/2016	0.997 D9	09/11/2018	0	0	0.1	0.1	0.875 U	0.1	09/20/3238	09/11/2021
27.01	MID-R	N	1.016	06/14/2007	0.992 TC	10/26/2016	1.003 D9	09/11/2018	0	1.2	1.7	1.7	0.875 U	1.2	05/13/2125	09/11/2021
28.01	MID	Y *	1.998	06/14/2007	1.979 TC	10/26/2016	1.499 D9	09/11/2018	255.9	44.4	28.1	255.9	1.300 U		05/22/2024	09/11/2021
29.01	BTM	N	2.018	06/14/2007	1.991	08/20/2015	1.986 D9	09/11/2018	1.6	2.8	3.0	3.0	1.300 U	2.8	09/13/2263	09/11/2021
30.01	BTM	N	1.430	06/14/2007	1.390 TC	10/26/2016	1.468 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
31.01	BTM-R	N	1.006	06/14/2007	0.990 TC	10/26/2016	1.029 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/23/3558	09/11/2021
32.01	BTM-R	N	1.018	06/14/2007	0.990 TC	10/26/2016	0.998 D9	09/11/2018	0	1.8	1.9	1.9	0.875 U	1.8	01/11/2087	09/11/2021
33.01	BTM	N	1.325	06/14/2007	1.304 TC	10/26/2016	1.348 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/14/2498	09/11/2021
34.01	BTM	N	2.087	06/14/2007	2.077 TC	10/26/2016	2.160 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
35.01	BTM	N	1.353	06/14/2007	1.343 TC	10/26/2016	1.390 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
36.01	BTM	Y *		06/14/2007	1.500	08/21/2014	1.481	08/20/2015					1.300 U		06/22/2041	06/22/2021
37.01	BTM-T	N	1.019	06/14/2007	1.005 TC	10/26/2016	1.048 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/24/3748	09/11/2021
38.01	BTM-T	N	1.018	06/14/2007	0.982 TC	10/26/2016	1.010 D9	09/11/2018	0	0.7	1.4	1.4	0.875 U	0.7	07/23/2211	09/11/2021
39.01	BTM	N	1.435	06/14/2007	1.302 TC	10/26/2016	1.425 D9	09/11/2018	0	0.9	4.4	4.4	0.875 U	0.9	10/26/2629	09/11/2021
40.01	BTM	N	2.031	06/14/2007	2.022 TC	10/26/2016	2.064 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
41.01	BTM	N	1.443	06/14/2007	1.455 TC	10/26/2016	1.450 D9	09/11/2018	2.7	0	0	2.7	1.300 U	2.7	04/02/2074	09/11/2021

Corrosion Monitoring Eq/Circ ID Analysis Report

Eaton Inspection Services
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 Phone 307-789-3540 FAX 307-789-2822

Report Date:10/30/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04A

Summary: Group Name:

Insp. Due Date = 09/11/2021
 Pred. Ret. Date = 03/13/2020

Group Description:

RCR = 69.9 MPY
 Rem. Life (from last survey 09/11/2018) = 1.5 yrs

0 C.A. Status: No
 Total Caution TMLs = 8

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
42.01	BTM	Y	1.627	06/14/2007	2.192 TC	10/26/2016	2.071 D9	09/11/2018	64.5	0	0	64.5	1.300 U	64.5	08/25/2030	09/11/2021
43.01	BTM-L	N	1.023	06/14/2007	0.970 TC	10/26/2016	1.024 D9	09/11/2018	0	0	1.6	1.6	0.875 U	0.1	09/23/3508	09/11/2021
44.01	BTM-L	N	0.995	06/14/2007	0.973 TC	10/26/2016	0.992 D9	09/11/2018	0	0.3	0.4	0.4	0.875 U	0.3	09/14/2408	09/11/2021
45.01	BTM-L	N	1.018	06/14/2007	0.967 TC	10/26/2016	0.996 D9	09/11/2018	0	2.0	3.4	3.4	0.875 U	2.0	03/13/2079	09/11/2021

Corrosion Monitoring Eq/Circ ID Analysis Report

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Report Date: 10/30/2018

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

Unit: LH-0009
Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04A

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	:	17.7 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	69.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	21.1 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 69.9 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 = 1.5 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 03/13/2020

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2019
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 8 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-0009 - Line Heater (Coil 2)	
Remaining Life: 3 YRS	Date of this Report: 09/11/2018
Rep. Corrosion Rate: 78.8 MPY	Next UT: 09/11/2021 Next VT: 09/11/2021
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-04B
Date Built: 2005	National Board #: None
Alberta registration #: 514081	Canadian Registration #: ALD-05-001

FMC Technologies Completion LH-0009 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
Facility/Location Name : Mobile Unit ADO-018 on drilling location
Field Name : N/A
Equipment Number : LH-0009 (Previously ALH-002)
Eq/Circ. ID : LH0009-C2
Equipment Name/Service : Line Heater (w/two coils)
Physical Location : Evanston 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

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

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: _____

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	514081
SERIAL No.	BS10K2MM-04B
JOB No.	10252-P
DESIGN PRESSURE	10000 PSI
M.A.W.P.	10000 PSI
DESIGN TEMP. MINIMUM	-40°F
CORROSION ALLOWANCE	0.125 IN.
DESIGN TEMP. MAXIMUM	130°F
CRN No.	ALD-05-001
YEAR BUILT	2005
STEEL COIL M.A.W.P.	

09/11

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.)

OEM QC package received, 10/2015, however stress values of material of construction is unknown for the MAWT of this equipment.

R.W. Menke
API 510 Inspector Signature

0131
API 510 Inspector Number

6/14/2007
Date

Name: Robert W. Menke

Update: 10/2015

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0009	Eq/Circ. ID: LH0009-C2
Equipment Name/Service: Line Heater-Coil 2	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-04B
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514081	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: 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 corrosion and peeling.

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

Condition of Nozzles, Flanges, Repads, and Weepholes: 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. Clamp is missing on upper LH tube.





Recommendations:

None

Repairs Needed:

None

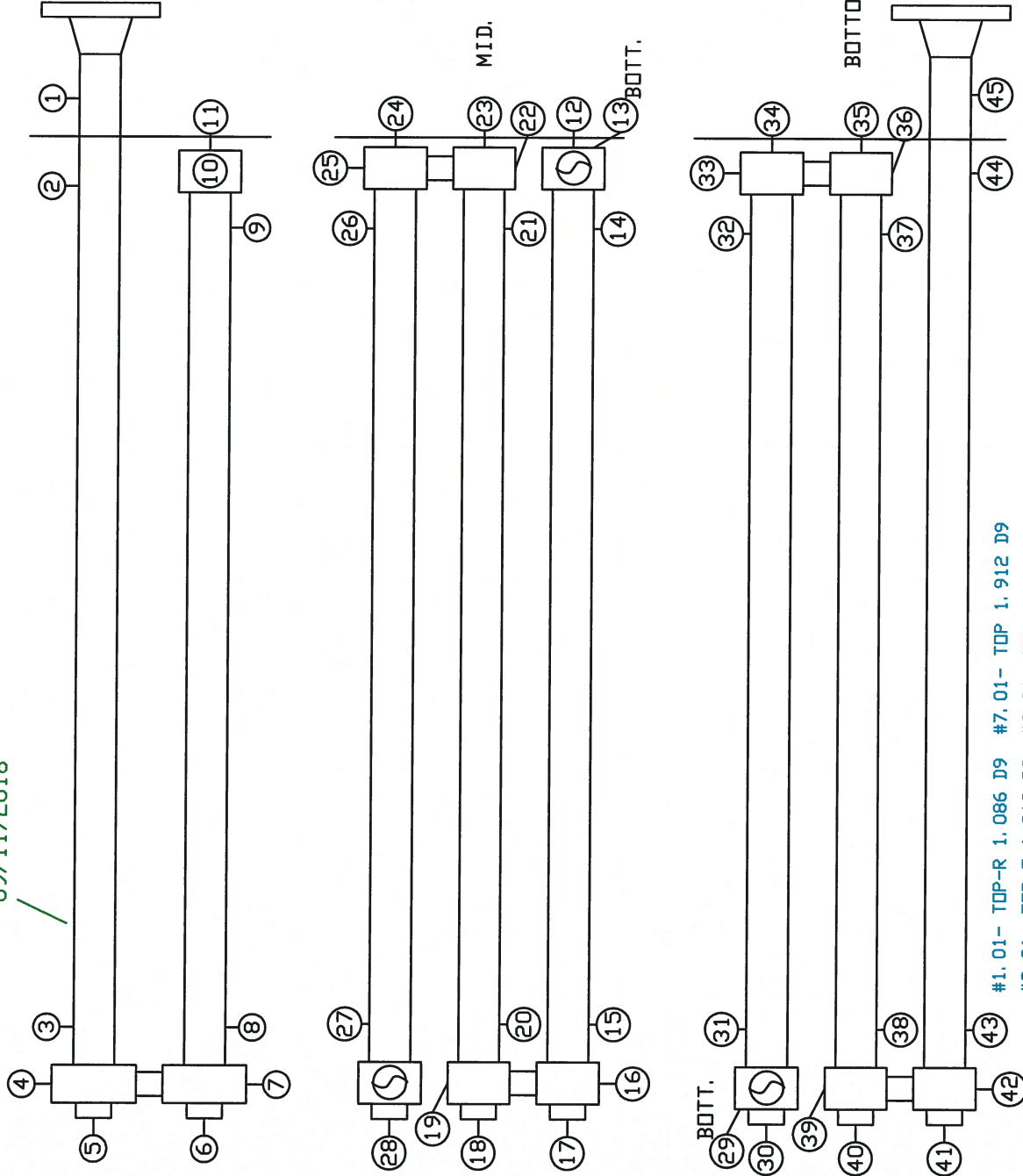
Mike York/MJW
API 510 Inspector Signature

66475
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 9/17/2021
NEXT INSPECTION IS DUE: 9/11/2019

MISSING CLAMP
09/11/2018



- #13. 01- MID 0.000 NT
#14. 01- MID-BT 1.020 D9
#15. 01- MID-R 1.009 D9
#16. 01- MID 1.415 D9
#17. 01- MID 1.978 D9
#18. 01- MID 1.433 D9
#19. 01- MID 1.751 D9
#20. 01- MID-R 0.992 D9
#21. 01- MID-BT 1.003 D9
#22. 01- MID 0.000 NT
#23. 01- MID 2.087 D9
#24. 01- MID 1.518 DC
#25. 01- MID 2.057 D9
#26. 01- MID-T 0.999 D9
#27. 01- MID-BT 1.004 D9
#28. 01- MID 1.454 D9
#29. 01- BTM 1.907 D9
#30. 01- BTM 1.436 D9
#31. 01- BTM-R 1.017 D9
#32. 01- BTM-T 1.001 D9
#33. 01- BTM 1.441 D9
#34. 01- BTM 1.890 D9
#35. 01- BTM 1.361 D9
#36. 01- BTM 0.000 NT
#37. 01- BTM-BT 1.042 D9
#38. 01- BTM-T 1.047 D9
#39. 01- BTM 1.770 D9
#40. 01- BTM 2.373 D9
#41. 01- BTM 1.372 D9
#42. 01- BTM 0.000 NT
#43. 01- BTM-R 0.985 D9
#44. 01- BTM-BT 1.045 D9
#45. 01- BTM-BT 1.041 D9

CAL BLK=74°F

PIPE=76°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0009-C2
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0009-C2

- #1. 01- TOP-R 1.086 D9
#2. 01- TOP-T 1.013 D9
#3. 01- TOP-T 1.008 D9
#4. 01- TOP 1.535 D9
#5. 01- TOP 0.000 NT
#6. 01- TOP 1.457 DC
#7. 01- TOP 1.912 D9
#8. 01- TOP-R 1.017 D9
#9. 01- TOP-T 1.001 D9
#10. 01- TOP 1.328 D9
#11. 01- TOP 1.987 D9
#12. 01- MID 1.499 D9

DESC: COIL 2 ON LH-0009 HTR, SN:BS10K2MM-04B
DWG#: LH0009-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:10/30/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04B

Summary: Group Name:
 Insp. Due Date = 09/11/2021
 Pred. Ret. Date = 09/17/2021

Group Description:
 RCR = 78.8 MPY
 Rem. Life (from last survey 09/11/2018) = 3.0 yrs

0 C.A. Status: No
 Total Caution TMLs = 9

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-R	N	0.998	06/14/2007	0.979 TC	10/26/2016	1.086 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
2.01	TOP-T	N	1.035	06/14/2007	1.012 TC	10/26/2016	1.013 D9	09/11/2018	0	2.0	2.1	2.1	0.875 U	2.0	09/11/2087	09/11/2021
3.01	TOP-T	N	1.017	06/14/2007	0.996 TC	10/26/2016	1.008 D9	09/11/2018	0	0.8	1.0	1.0	0.875 U	0.8	12/12/2184	09/11/2021
4.01	TOP	N	1.458	06/14/2007	1.444 TC	10/26/2016	1.535 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
5.01	TOP	N	1.951	06/14/2007	1.978	08/21/2014	1.978	08/21/2015	0	0	0	0	1.300 U	0.1	09/05/4015	09/11/2021
6.01	TOP	N	1.327	06/14/2007	1.264 TC	10/26/2016	1.457 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/23/3588	09/11/2021
7.01	TOP	N	1.948	06/14/2007	1.930 TC	10/26/2016	1.912 D9	09/11/2018	9.6	3.2	0	9.6	1.300 U	9.6	06/12/2082	09/11/2021
8.01	TOP-R	N	1.014	06/14/2007	0.994 TC	10/26/2016	1.017 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/22/3438	09/11/2021
9.01	TOP-T	N	1.024	06/14/2007	0.991 TC	10/26/2016	1.001 D9	09/11/2018	0	2.0	2.3	2.3	0.875 U	2.0	09/11/2081	09/11/2021
10.01	TOP	N	1.000 NM	03/10/2005	1.229 TC	10/26/2016	1.328 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
11.01	TOP	N	2.026	06/14/2007	1.860	08/21/2015	1.987 D9	09/11/2018	0	3.5	6.9	6.9	1.300 U	3.5	12/26/2214	09/11/2021
12.01	MID	N	1.174	06/14/2007	1.439 TC	10/26/2016	1.499 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
13.01	MID	N	2.040	06/14/2007	1.384	08/21/2015	2.182 TC	10/26/2016	0	0	18.9	18.9	1.300 U	0.1	11/10/4016	09/11/2021
14.01	MID-BT	N	1.018	06/14/2007	0.971 TC	10/26/2016	1.020 D9	09/11/2018	0	0	1.3	1.3	0.875 U	0.1	09/22/3468	09/11/2021
15.01	MID-R	N	1.048	06/14/2007	0.980 TC	10/26/2016	1.009 D9	09/11/2018	0	3.5	4.5	4.5	0.875 U	3.5	12/24/2056	09/11/2021
16.01	MID	N	1.480	06/14/2007	1.404 TC	10/26/2016	1.415 D9	09/11/2018	0	5.8	7.2	7.2	1.300 U	5.8	07/10/2038	09/11/2021
17.01	MID	N	1.969	06/14/2007	1.934 TC	10/26/2016	1.978 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
18.01	MID	Y *	1.476	06/14/2007	1.598 TC	10/26/2016	1.433 D9	09/11/2018	88.0	3.8	0	88.0	0.875 U	88.0	01/13/2025	09/11/2021
19.01	MID	Y *	1.845	06/14/2007	2.001	08/21/2015	1.751 D9	09/11/2018	81.7	8.4	2.8	81.7	1.300 U	81.7	03/19/2024	09/11/2021
20.01	MID-R	N	1.014	06/14/2007	0.953 TC	10/26/2016	0.992 D9	09/11/2018	0	2.0	2.8	2.8	0.875 U	2.0	03/12/2077	09/11/2021

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:10/30/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04B

Summary: Group Name:
 Insp. Due Date = 09/11/2021
 Pred. Ret. Date = 09/17/2021

Group Description:
 RCR = 78.8 MPY
 Rem. Life (from last survey 09/11/2018) = 3.0 yrs

0 C.A. Status: No
 Total Caution TMLs = 9

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
21.01	MID-BT	N	1.019	06/14/2007	0.968 TC	10/26/2016	1.003 D9	09/11/2018	0	1.4	2.5	2.5	0.875 U	1.4	02/15/2110	09/11/2021
22.01	MID	Y	1.000 NM	03/10/2005	1.366	06/14/2007	1.241	08/21/2015	15.3	0	0	15.3	0.875 U	15.3	07/23/2039	09/11/2021
23.01	MID	N	2.098	06/14/2007	2.020	08/21/2015	2.087 D9	09/11/2018	0	1.0	2.7	2.7	1.300 U	1.0	09/17/2805	09/11/2021
24.01	MID	N	1.585	06/14/2007	1.230 TC	10/26/2016	1.518 D9	09/11/2018	0	6.0	20.2	20.2	1.300 U	6.0	01/11/2055	09/11/2021
25.01	MID	Y	2.147	06/14/2007	2.181	08/21/2015	2.057 D9	09/11/2018	40.5	8.0	5.4	40.5	1.300 U	40.5	05/21/2037	09/11/2021
26.01	MID-T	N	1.017	06/14/2007	0.970 TC	10/26/2016	0.999 D9	09/11/2018	0	1.6	2.3	2.3	0.875 U	1.6	03/12/2096	09/11/2021
27.01	MID-BT	N	1.039	06/14/2007	1.004 TC	10/26/2016	1.004 D9	09/11/2018	0	3.1	3.6	3.6	0.875 U	3.1	04/22/2060	09/11/2021
28.01	MID	Y *	1.935	06/14/2007	1.475 TC	10/26/2016	1.454 D9	09/11/2018	11.2	42.8	41.2	42.8	1.300 U	42.8	04/17/2022	09/11/2021
29.01	BTM	N	1.939	06/14/2007	1.848 TC	10/26/2016	1.907 D9	09/11/2018	0	2.8	4.0	4.0	1.300 U	2.8	06/27/2235	09/11/2021
30.01	BTM	Y *	1.458	06/14/2007	1.508 TC	10/26/2016	1.436 D9	09/11/2018	38.4	2.0	0	38.4	1.300 U	38.4	03/28/2022	09/11/2021
31.01	BTM-R	N	1.036	06/14/2007	0.994 TC	10/26/2016	1.017 D9	09/11/2018	0	1.7	2.4	2.4	0.875 U	1.7	03/24/2102	09/11/2021
32.01	BTM-T	N	1.031	06/14/2007	1.001 TC	10/26/2016	1.001 D9	09/11/2018	0	2.7	2.7	2.7	0.875 U	2.7	05/12/2065	09/11/2021
33.01	BTM	Y *	1.464	06/14/2007	1.595 TC	10/26/2016	1.441 D9	09/11/2018	82.1	2.0	0	82.1	1.300 U	82.1	05/30/2020	09/11/2021
34.01	BTM	N	1.925	06/14/2007	1.600 TC	10/26/2016	1.890 D9	09/11/2018	0	3.1	12.9	12.9	1.300 U	3.1	01/08/2209	09/11/2021
35.01	BTM	N	1.285	06/14/2007	1.279	08/21/2015	1.361 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/26/4018	09/11/2021
36.01	BTM	Y *									0		U			
37.01	BTM-BT	N	1.036	06/14/2007	0.970 TC	10/26/2016			0	0	2.0	2.0	0.875 U	0.1	09/23/3688	09/11/2021
38.01	BTM-T	N	1.045	06/14/2007	0.990 TC	10/26/2016	1.047 D9	09/11/2018	0	0	2.0	2.0	0.875 U	0.1	09/24/3738	09/11/2021
39.01	BTM	N	1.678	06/14/2007	1.608 TC	10/26/2016	1.770 D9	09/11/2018	0	0	0	0	1.300 U	0.1	09/26/4018	09/11/2021
40.01	BTM	Y	2.366	06/14/2007	2.425 TC	10/26/2016	2.373 D9	09/11/2018	27.7	0	0	27.7	1.300 U	27.7	06/06/2057	09/11/2021
41.01	BTM	N	1.366	06/14/2007	1.280 TC	10/26/2016	1.372 D9	09/11/2018	0	0	2.9	2.9	1.300 U	0.1	09/17/2738	09/11/2021

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: 10/30/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04B

Summary: Group Name:

Insp. Due Date = 09/11/2021
 Pred. Ret. Date = 09/17/2021

Group Description:

RCR = 78.8 MPY
 Rem. Life (from last survey 09/11/2018) = 3.0 yrs

0 C.A. Status: No

Total Caution TMLs = 9

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
42.01	BTM	N	2.037	06/14/2007	1.918	08/21/2015	2.040 TC	10/26/2016	0	0	4.5	4.5	1.300 U	0.1	11/10/4016	09/11/2021
43.01	BTM-R	N	1.023	06/14/2007	0.969 TC	10/26/2016	0.985 D9	09/11/2018	0	3.4	0.4	3.4	0.875 U	3.4	01/18/2051	09/11/2021
44.01	BTM-BT	N	1.013	06/14/2007	0.976 TC	10/26/2016	1.045 D9	09/11/2018	0	0	0	0	0.875 U	0.1	09/24/3718	09/11/2021
45.01	BTM-BT	N	1.046	06/14/2007	0.995 TC	10/26/2016	1.041 D9	09/11/2018	0	0.4	1.9	1.9	0.875 U	0.4	09/14/2433	09/11/2021

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

Report Date: 10/30/2018

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

Unit: LH-0009
Eq/Circ ID: LH0009-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 2, SN:BS10K2MM-04B

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 : 20.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 78.8 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 24.1 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 78.8 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 = 3.0 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 09/17/2021

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2019
UT/RT Inspection Interval is 1.00 years.

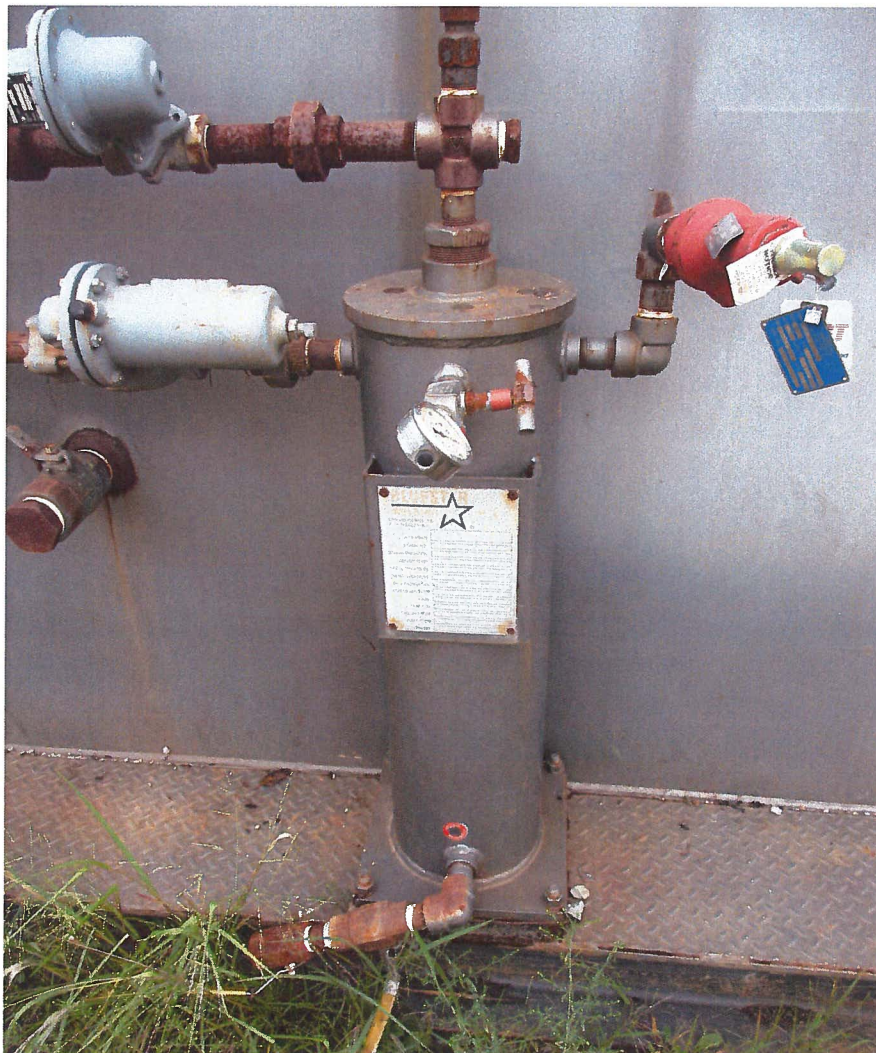
Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 9 Caution TMLs in this Eq/Circ ID.



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

Inspections Performed for: FMC Technologies Completion - PA District	
Inspection Report for: LH-0009 – Fuel Gas Scrubber	
Remaining Life: 10.3 YRS	Date of this Report: 09/11/2018
Representative Corrosion Rate: 3.1 MPY	Next UT: 09/11/2019 Next VT: 09/11/2018
Manufacturer: Blue Star Welding	Mfg Serial #: BSFGS228
Date Built: 2004	National Board #: None
Alberta registration #: None	Canadian Registration #: OH6510.2

FMC Technologies Completion LH-0009 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 : FMC Technologies
Facility/Location Name : PA District
Field Name : Canonsburg Yard
Equipment Number : LH-0009
Eq/Circ. ID : LH0009-FGS
Equipment Name/Service : Fuel Gas Scrubber
Physical Location : PA Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Vertical Fuel Scrubber

Vessel Size: 8.625" OD

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? No

Any stamping pertaining to materials of construction? No

****Diameter****(strap equipment): __8.625" O.D._____

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: _____

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	
® YR MANU 2004	
A-NUMBER	
SERIAL NO.	BSFGS 228
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	196 PSI
INSPECTOR	C.R.
CRN NO.	C-6510.2

Name: Eric Crandall Date: 08/27/2013

API 510 PRESSURE VESSEL EXTERNAL INSPECTION

Company Name: FMC Technologies Completion	
Facility/Location Name: PA District	
Equipment Number: LH-0009	Eq/Circ. ID: LH0009-FGS
Equipment Name/Service: Fuel Gas Scrubber for Line Heater	
Physical Location: PA FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BSFGS228
Year Built: 2004	Canadian Registration Number: 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. Vessel 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.

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. PSV is mounted horizontally.

If Yes, is it set at or below the MAWP?: Yes, set at 150 psi.

Date PSV last tested (if there is a tag on the valve): 01/2017, tested by Portersville PRD

Comments:

Recommendations:

Repairs Needed:

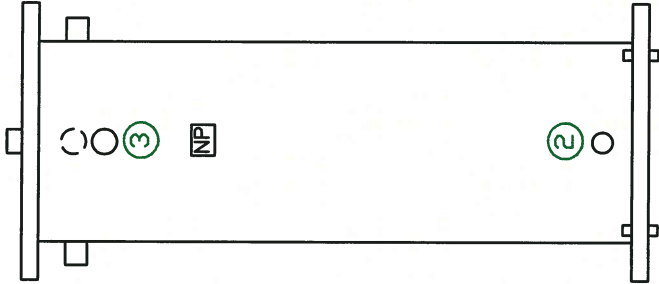
Robert W. Menke/MJW
API 510 Inspector Signature

0131
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 12/17/2028
NEXT INSPECTION IS DUE: 9/11/2019

- #2. 01- BTM SH-FRONT 0. 325 FH
- #2. 02- BTM SH-LEFT 0. 324 FH
- #2. 03- BTM SH-BACK 0. 324 FH
- #2. 04- BTM SH-RIGHT 0. 323 FH
- #3. 01- TOP SH-FRONT 0. 315 FH
- #3. 02- TOP SH-LEFT 0. 319 FH
- #3. 03- TOP SH-BACK 0. 313 FH
- #3. 04- TOP SH-RIGHT 0. 312 FH



FH2E-D

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BSFGS228
NATIONAL BOARD #	NONE
DATE BUILT	2004
DESIGN P & T	150 PSIG @ 100°F
NOTE	CRN # DH 6510. 2

CAL BLK=75°F		VESSEL=75°F	
BUSINESS UNIT	FMC TECHNOLOGIES		
EQ/CIRC ID #	LH0009-FGS		
EQUIP NAME	FUEL GAS SCRUBBER		
LOCATION	ON LH-0009 IN YARD		
DWG #	LH0009-FGS		

DESC: FUEL GAS SCRUBBER ON LH0009; SN:BSFGS228
DWG#: LH0009-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: 10/16/2018

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

Unit: LH-0009
 Eq/Circ ID: LH0009-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 LH0009; SN:BSFGS228

Summary: Group Name:
 Insp. Due Date = 09/11/2021
 Pred. Ret. Date = 12/17/2028

Group Description:
 RCR = 3.1 MPY
 Rem. Life (from last survey 09/11/2018) = 10.3 yrs

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

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 *	0.318 TC	08/27/2013	0.308 TC	10/25/2016	0.308 RR	09/11/2018	0	2.0	2.1	5.9	0.282 U	2.0	09/11/2031	09/11/2021
2.02	BTM SH-LEFT	N *	0.318 TC	08/27/2013	0.306 TC	10/25/2016	0.306 RR	09/11/2018	0	2.4	2.9	7.6	0.282 U	2.4	09/11/2028	09/11/2021
2.03	BTM SH-BACK	N *	0.322 NM	06/01/2004	0.302 TC	10/25/2016	0.302 RR	09/11/2018	0	1.4	1.5	1.6	0.282 U	1.4	12/24/2032	09/11/2021
2.04	BTM SH-RIGHT	N *	0.320 TC	08/27/2013	0.306 TC	10/25/2016	0.306 RR	09/11/2018	0	2.8	3.3	7.6	0.282 U	2.8	04/08/2027	09/11/2021
3.01	TOP SH-FRONT	N	0.315 TC	08/27/2013	0.307 TC	10/25/2016	0.307 RR	09/11/2018	0	1.6	1.5	4.1	0.282 U	1.6	04/27/2034	09/11/2021
3.02	TOP SH-LEFT	N *	0.313 TC	08/27/2013	0.302 TC	10/25/2016	0.302 RR	09/11/2018	0	2.2	2.6	6.8	0.282 U	2.2	10/14/2027	09/11/2021
3.03	TOP SH-BACK	N *	0.322 NM	06/01/2004	0.302 TC	10/25/2016	0.302 RR	09/11/2018	0	1.4	1.5	1.6	0.282 U	1.4	12/24/2032	09/11/2021
3.04	TOP SH-RIGHT	N *	0.317 TC	08/27/2013	0.302 TC	10/25/2016	0.302 RR	09/11/2018	0	3.0	3.3	10.0	0.282 U	3.0	05/12/2025	09/11/2021

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

Report Date: 10/16/2018

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

Unit: LH-0009
Eq/Circ ID: LH0009-FGS
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

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

Description: FUEL GAS SCRUBBER ON LH0009; SN:BSFGS228

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 : 2.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 2.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 3.1 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 3.1 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 6 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 = 10.3 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 12/17/2028

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2019
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 0 Caution TMLs in this Eq/Circ ID.

**MANUFACTURER'S DATA REPORT
FOR INDIRECT FIRED
HEATER COILS****(A) No.** 514080

Manufactured by Bluestar Welding Ltd. R.R.2, Site 7, Box 20, Gr. Pr. AB T8V 2Z9
Manufactured for Pure Energy Services Ltd. 300, 1010-1ST SW. Calgary AB. T2R 1K4
Ultimate Owner Pure Energy Services Ltd. 300, 1010-1ST SW. Calgary AB. T2R 1K4
Location of Installation Portable Equipment
Mfg. Serial No. BS10K2MM-04 A Code: ASME B31.3, Edition 2002 Addenda _____
Drawing Number 1931-06 Rev2 Year Built 2005 Intended Service CORROSIVE HYDROCARBONS
a. Material Specifications ASTMA519Gr4130 4130-APIClass L
Coil Ends (Flanges/N.P.T.) Rating
b. Material Specifications Elbows 90 Machined Gr4130
Coil Ends (Flanges/N.P.T.) Rating
a. Diameter 4 1/2" Nom. Thickness 1.0" O/A Length 112"-105" C.A. 0.125"
b. Diameter _____ Nom. Thickness _____ O/A Length _____ C.A. _____
a. Maximum Working Pressure 10,000 Psi kPa at Maximum Temperature 180 F °C
b. Maximum Working Pressure _____ kPa at Maximum Temperature _____ °C
a. Hydrostatic Test Pressure 15,000 Psi kPa C.R.N. ALD-05-001
b. Hydrostatic Test Pressure _____ kPa C.R.N. _____
Heating Surface 86.53 Sq. Ft. Radiography 100 (Random, % or Full)
Volume 10.01 Cubic Ft. P.W.H.T. 1150 F / 4Hrs.
Remarks _____

CERTIFICATE OF COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this coil bundle are in accordance with Registered Design No. _____.

Date March 10, 2005

Signed

C. H. H.
(Representative)

For

BLUESTAR WELDING
(Manufacturer)**CERTIFICATE OF SHOP INSPECTION**

I, the undersigned, a duly authorized Safety Codes Officer employed by The Alberta Boilers Safety Association have inspected the above Heater Coils and state that, to the best of my knowledge and belief, the construction is in accordance with the Alberta Safety Codes Act and Regulations.

Date March 10, 2005

Signed

Harvey A. Waddy AB-1834

**MANUFACTURER'S DATA REPORT
FOR INDIRECT FIRED
HEATER COILS**(A) No. 514081

Manufactured by Bluestar Welding Ltd. R.R.2, Site 7, Box 20, Gr. Pr. AB T8V 2Z9
Manufactured for Pure Energy Services Ltd. 300, 1010-1ST SW. Calgary AB. T2R 1K4
Ultimate Owner Pure Energy Services Ltd. 300, 1010-1ST SW. Calgary AB. T2R 1K4
Location of Installation Portable Equipment
Mfg. Serial No. BS10K2MM-04 B Code: ASME B31.3, Edition 2002 Addenda _____
Drawing Number 1931-06 Rev2 Year Built 2005 Intended Service CORROSIVE HYDROCARBONS
a. Material Specifications ASTMA519Gr4130 4130-API Class L
Coil *Ends (Flanges/N.P.T.)* *Rating*
b. Material Specifications Elbows 90 Machined Gr4130
Coil *Ends (Flanges/N.P.T.)* *Rating*
a. Diameter 4 1/2" Nom. Thickness 1.0" O/A Length 112"-105" C.A. 0.125"
b. Diameter _____ Nom. Thickness _____ O/A Length _____ C.A. _____
a. Maximum Working Pressure 10,000 Psi kPa at Maximum Temperature 180 F °C
b. Maximum Working Pressure _____ kPa at Maximum Temperature _____ °C
a. Hydrostatic Test Pressure 15,000 Psi kPa C.R.N. ALD-05-001
b. Hydrostatic Test Pressure _____ kPa C.R.N. _____
Heating Surface 86.53 Sq. Ft. Radiography 100 (Random, % or Full)
Volume 10.01 Cubic Ft. P.W.H.T. 1150 F / 4Hrs.
Remarks _____

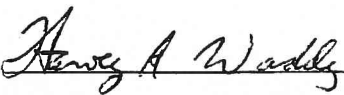
CERTIFICATE OF COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this coil bundle are in accordance with Registered Design No. _____.

Date March 10, 2005 Signed  For BLUESTAR WELDING
(Representative) (Manufacturer)

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, a duly authorized Safety Codes Officer employed by The Alberta Boilers Safety Association have inspected the above Heater Coils and state that, to the best of my knowledge and belief, the construction is in accordance with the Alberta Safety Codes Act and Regulations.

Date March 10, 2005 Signed  AB-1834