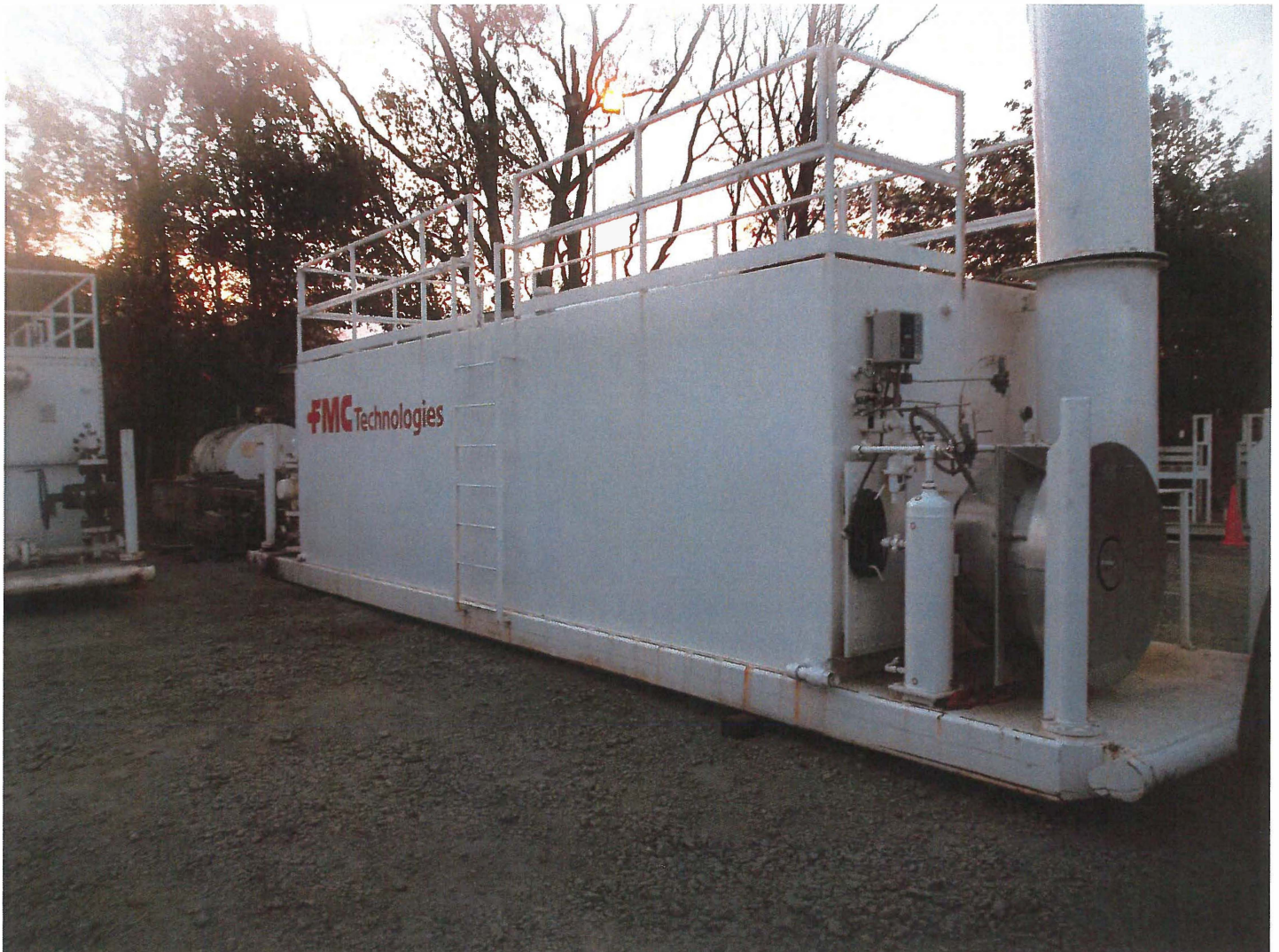




1595 So. Hwy 150, Suite F  
Evanston, WY 82930

<b>Inspections Performed for:</b> FMC Technologies Completion – PA District	
<b>Inspection Report for:</b> LH0035-C1 Line Heater	<b>Date Last Inspected:</b> 09/11/2018
<b>Remaining Life:</b> 10.2 YRS	<b>Next UT:</b> 09/11/2021 <b>Next VT:</b> 09/11/2021
<b>Representative Corrosion Rate:</b> 52.7 MPY	<b>Mfg Serial #:</b> 4049-01
<b>Manufacturer:</b> Coral Oilfield Services Inc.	<b>Alberta Registration #:</b> 626745
<b>Year Built:</b> 2013	<b>Canadian Registration #:</b> V6716.21

**FMC Technologies Completion LH0035-C1 (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 USA  
Facility/Location Name : Wyoming District  
Field Name :  
Equipment Number : LH-0035  
Eq/Circ. ID : LH0035-C1  
Equipment Name/Service : Line Heater-Coil 1  
Physical Location : In PA Yard  
GPS Coordinates :

## VESSEL DESCRIPTION AND SERVICE CONDITIONS

**Type of Vessel:** Line Heater

**Vessel Size:**

**Operating Pressure Range (psig):** N/A

**Operating Temperature Range (°F):** N/A

**Does the vessel have Internal Access?** Yes

**Specify type of internal access, if available:** When bundles are pulled

**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?: ☐ 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

MANUFACTURED & CERTIFIED BY		
CORAL OILFIELD SERVICES INC.		
780-402-9800 WWW.CORALOILFIELD.COM		
GRANDE PRAIRIE AB. CANADA		
MANUF SER NO	4049-01	
YEAR BUILT	2013	CRN V6716.21
	COIL #1	COIL #2
MAWP (kPa)	68950	
TEMP (°C)	93	
NPS (IN)	4.00	
THICKNESS (MM)	25.4	
MATERIAL (S.A.)	519	
XRAY	100	
CORR ALL (MM)	3.175	
CODE	E31.3	
TEST PRESS (kPa)	103425	
DRWG. NO.	3691-01	PWHT 649/120
MDMT	- 46 °C - 50 °F	09/1
INSP. NO.	3626745	

## SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

Repair stamp: ☐ R stamp ☐ Other Stamp ☐ No stamp  
Repaired By \_\_\_\_\_ Date of Repair \_\_\_\_\_  
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: Sterling Mack Date: 09/28/2012

# 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-0035	<b>Eq/Circ. ID:</b> LH0035-C1
<b>Equipment Name/Service:</b> Line Heater Coil 1	
<b>Physical Location:</b> In PA Yard	
<b>Manufacturer:</b> Coral Oilfield Services	<b>MFG Serial Number:</b> 4049-01
<b>Year Built:</b> 2013	<b>National Board #:</b> None
<b>Alberta Registration #:</b> 626745	<b>Canadian Registration # :</b> V6716.21

**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, there are 4 man hatches.

**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 60 anchor bolt nuts are in place and secure. Front plate in acceptable condition.

**Condition of Steel Supports, Saddles, and Bolting:** All support structural welds appear sound. Supports have moderate corrosion/scale build up.

**Condition of Nozzles, Flanges, Repads, and Weepholes:** Nozzles and flanges are in good condition. Valves are removed. The outlet flanges are open and will require cleaning before reassembly. They are moderately corroded on the surface. (See attached photo)



**Condition of Paint and/or Insulation:** The paint is in acceptable condition with minor localized chipping and peeling. There is light surface corrosion on the coils.

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

**Condition of Ladders, Stairways, and Brackets:** Access ladders and stairways are in acceptable condition. Folding handrails appear to be in working order.

**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:**

Fire tubes on this unit were hammer tested. No areas of concern were found.

**Recommendations:**

Clean oxidation from around exposed flanges before reassembly

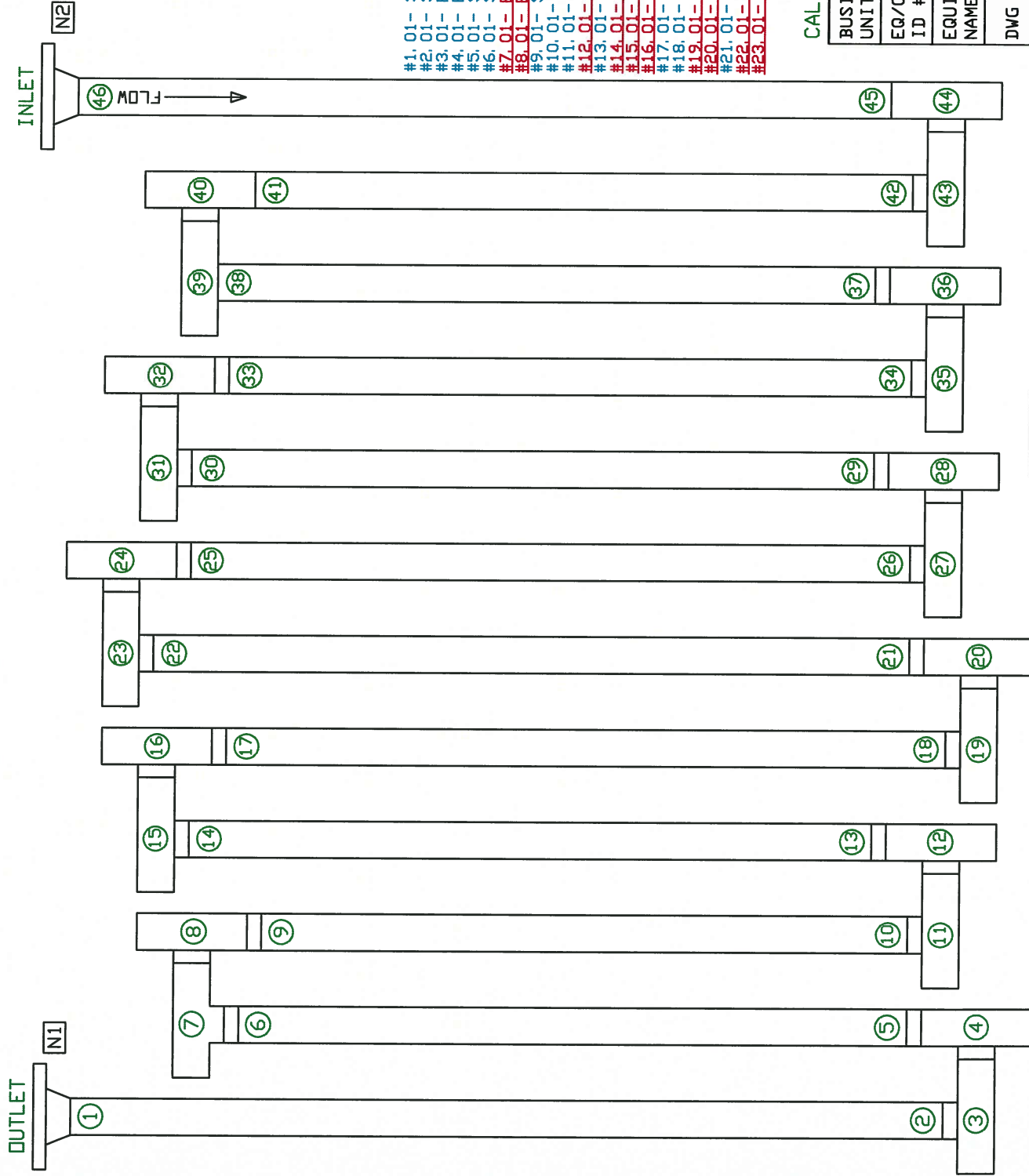
**Repairs Needed:**

Michael J. York  
**API 510 Inspector Signature**

66475  
**API 510 Inspector Number**

09/11/2018  
**Date**

EQUIP RETIREMENT DATE: 11/20/2028  
NEXT INSPECTION IS DUE: 9/11/2019



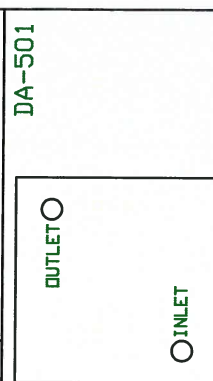
- #1. 01- STR-L 1.021 DA
- #2. 01- STR-B 1.014 DA
- #3. 01- END-L 1.241 DA
- #4. 01- END-BK 1.303 DA
- #5. 01- STR-L 1.027 DA
- #6. 01- STR-L 0.968 DA
- #7. 01- END-L 1.272 DA
- #8. 01- END-F 1.284 DA
- #9. 01- STR-R 1.027 DA
- #10. 01- STR-R 0.971 DA
- #11. 01- END-L 1.275 DA
- #12. 01- END-BK 1.297 DA
- #13. 01- STR-BT 1.003 DA
- #14. 01- STR-B 1.009 DA
- #15. 01- END-B 1.296 DA
- #16. 01- END-F 1.239 DA
- #17. 01- STR-T 0.994 DA
- #18. 01- STR-L 1.013 DA
- #19. 01- END-R 1.212 DA
- #20. 01- END-BK 1.256 DA
- #21. 01- STRBT 1.021 DA
- #22. 01- STR-LT 0.998 DA
- #23. 01- END-R 1.254 DA
- #24. 01- END-F 1.253 DA
- #25. 01- STR-B 1.002 DA
- #26. 01- STR-T 0.913 DA
- #27. 01- STR-R 1.274 DA
- #28. 01- END-BK 1.244 DA
- #29. 01- STR-L 1.003 DA
- #30. 01- STR-L 1.017 DA
- #31. 01- END-B 1.284 DA
- #32. 01- END-F 1.283 DA
- #33. 01- STR-L 1.017 DA
- #34. 01- STR-R 0.990 DA
- #35. 01- END-L 1.268 DA
- #36. 01- END-BK 1.281 DA
- #37. 01- STR-T 1.006 DA
- #38. 01- STR-T 0.986 DA
- #39. 01- END-F 1.243 DA
- #40. 01- END-F 1.249 DA
- #41. 01- STR-T 1.016 DA
- #42. 01- STR-R 0.975 DA
- #43. 01- END-L 1.259 DA
- #44. 01- END-L 1.267 DA
- #45. 01- STR-R 0.973 DA
- #46. 01- STR-L 0.986 DA

CAL BLK=60°F		PIPE=70°F	
BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION		
EQ/CIRC ID #	LH0035-C1		
EQUIP NAME	LINE HEATER		
DWG #	LH0035-C1		

4 READINGS TAKEN AROUND  
THE CIRCUMFERENCE  
RECORDED THE LOWEST.

DESC: COIL 1 ON LINE HEATER  
DWG#: LH0035-C1-1.01-46.01

NAMEPLATE INFO	
MFG	CORAL OILFIELD SERVICES INC.
SERIAL NUMBER	4049-01
ALBERTA REG. #	626745
DATE BUILT	2013
DESIGN P & T	10,000 psi @ 200°F



## 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-0035  
 Eq/Circ ID: LH0035-C1  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 1 ON LINE HEATER; SN:4049-01

Summary: Group Name: Group Description:  
 Insp. Due Date = 09/11/2021 RCR = 52.7 MPY  
 Pred. Ret. Date = 11/20/2028 Rem. Life (from last survey 09/11/2018) = 10.2 yrs  
 O C.A. Status: No  
 Total Caution TMLs = 21

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	STR-L	N	1.009	08/21/2014	0.975 TC	11/11/2017	0.975 RR	09/11/2018	0	8.4	9.7	11.4	0.600 S	8.4	05/04/2063	09/11/2021
2.01	STR-B	N	1.022	08/21/2014	0.967 TC	11/11/2017	0.967 RR	09/11/2018	0	13.6	14.2	26.9	0.600 S	13.6	09/05/2045	09/11/2021
3.01	END-L	N	1.009	10/20/2015	1.167 TC	11/11/2017	1.167 RR	09/11/2018	0	0	0	0	0.600 S	0.1	09/26/4018	09/11/2021
4.01	END-BK	N	1.030	10/20/2015	1.262 TC	11/11/2017	1.262 RR	09/11/2018	0	0	0	0	0.600 S	0.1	09/26/4018	09/11/2021
5.01	STR-L	N	1.028	08/21/2014	0.973 TC	11/11/2017	0.973 RR	09/11/2018	0	13.6	13.6	26.0	0.600 S	13.6	02/14/2046	09/11/2021
6.01	STR-L	N	0.998	08/21/2014	0.968 RR	11/11/2017	0.968 DA	09/11/2018	0	7.4	8.9	11.1	0.600 S	7.4	06/04/2068	09/11/2021
7.01	END-L	Y	1.293	10/20/2015	1.206 TC	11/11/2017	1.206 RR	09/11/2018	0	30.1	35.4	76.9	0.600 S	30.1	10/30/2038	09/11/2021
8.01	END-F	Y	1.288	10/20/2015	1.225 TC	11/11/2017	1.225 RR	09/11/2018	0	21.8	23.3	32.7	0.600 S	21.8	05/14/2047	09/11/2021
9.01	STR-R	N	1.020	08/21/2014	0.990 TC	11/11/2017	0.990 RR	09/11/2018	0	7.4	7.5	12.5	0.600 S	7.4	05/26/2071	09/11/2021
10.01	STR-R	N	1.029	08/21/2014	0.956 RR	11/11/2017	0.971 DA	09/11/2018	0	14.3	16.4	24.8	0.600 S	14.3	08/21/2044	09/11/2021
11.01	END-L	N	1.281	10/20/2015	1.271 TC	11/11/2017	1.271 RR	09/11/2018	0	3.5	4.2	9.6	0.600 S	3.5	06/01/2210	09/11/2021
12.01	END-BK	Y *	1.292	10/20/2015	1.152 TC	11/11/2017	1.152 RR	09/11/2018	0	48.4	58.1	134.6	0.600 S	48.4	02/06/2030	09/11/2021
13.01	STR-BT	N	1.018	08/21/2014	0.973 TC	11/11/2017	0.973 RR	09/11/2018	0	11.1	12.4	22.1	0.600 S	11.1	04/19/2052	09/11/2021
14.01	STR-B	Y	1.046	08/21/2014	0.978 TC	11/11/2017	0.978 RR	09/11/2018	0	16.8	16.9	22.1	0.600 S	16.8	03/12/2041	09/11/2021
15.01	END-B	Y	1.310	10/20/2015	1.244 TC	11/11/2017	1.244 RR	09/11/2018	0	22.8	26.2	1139.0	0.600 S	22.8	12/10/2046	09/11/2021
16.01	END-F	Y	1.299	10/20/2015	1.223 RR	11/11/2017	1.230 RR	09/11/2018	0	23.8	21.9	36.9	0.600 S	23.8	03/01/2045	09/11/2021
17.01	STR-T	N	0.998	08/21/2014	0.967 TC	11/11/2017	0.967 RR	09/11/2018	0	7.6	9.1	18.3	0.600 S	7.6	12/26/2066	09/11/2021
18.01	STR-L	N	1.008	08/21/2014	0.982 RR	11/11/2017	0.985 RR	09/11/2018	0	5.7	7.2	9.6	0.600 S	5.7	03/28/2086	09/11/2021
19.01	END-R	Y	1.301	10/20/2015	1.214 TC	11/11/2017	1.212 DA	09/11/2018	2.4	30.8	35.8	75.0	0.600 S	30.8	07/26/2038	09/11/2021
20.01	END-BK	Y *	1.310	10/20/2015	1.196 TC	11/11/2017	1.196 RR	09/11/2018	0	39.4	41.6	55.3	0.600 S	39.4	10/27/2033	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-0035  
 Eq/Circ ID: LH0035-C1  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 1 ON LINE HEATER; SN:4049-01

Summary: Group Name:

Insp. Due Date = 09/11/2021  
 Pred. Ret. Date = 11/20/2028

Group Description:

RCR = 52.7 MPY  
 Rem. Life (from last survey 09/11/2018) = 10.2 yrs

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

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
21.01	STRBT	N	1.018	08/21/2014	0.984 RR	11/11/2017	0.994 RR	09/11/2018	0	5.9	8.0	12.4	0.600 S	5.9	06/22/2085	09/11/2021
22.01	STR-LT	Y	1.038	08/21/2014	0.966 TC	11/11/2017	0.966 RR	09/11/2018	0	17.7	19.0	23.7	0.600 S	17.7	05/17/2039	09/11/2021
23.01	END-R	Y	1.298	10/20/2015	1.238 TC	11/11/2017	1.238 RR	09/11/2018	0	20.7	19.4	29.1	0.600 S	20.7	07/07/2049	09/11/2021
24.01	END-F	Y	1.305	10/20/2015	1.234 TC	11/11/2017	1.234 RR	09/11/2018	0	24.5	23.6	34.4	0.600 S	24.5	07/28/2044	09/11/2021
25.01	STR-B	N	1.028	08/21/2014	0.976 TC	11/11/2017	0.976 RR	09/11/2018	0	12.8	13.5	28.8	0.600 S	12.8	01/26/2048	09/11/2021
26.01	STR-T	Y *	1.036	08/21/2014	0.976 RR	11/11/2017	0.913 DA	09/11/2018	75.7	30.3	26.5	75.7	0.600 S	75.7	10/30/2022	09/11/2021
27.01	END-R	Y	1.310	10/20/2015	1.243 RR	11/11/2017	1.248 RR	09/11/2018	0	21.4	19.7	32.5	0.600 S	21.4	12/22/2048	09/11/2021
28.01	END-BK	Y	1.298	10/20/2015	1.205 TC	11/11/2017	1.205 RR	09/11/2018	0	32.1	29.4	45.1	0.600 S	32.1	07/17/2037	09/11/2021
29.01	STR-L	N	1.039	08/21/2014	0.987 TC	11/11/2017	0.987 RR	09/11/2018	0	12.8	11.8	16.1	0.600 S	12.8	12/05/2048	09/11/2021
30.01	STR-L	N	1.022	08/21/2014	0.993 TC	11/11/2017	0.993 RR	09/11/2018	0	7.1	5.6	9.0	0.600 S	7.1	01/17/2074	09/11/2021
31.01	END-B	Y	1.300	10/20/2015	1.240 TC	11/11/2017	1.240 RR	09/11/2018	0	20.7	24.1	50.0	0.600 S	20.7	08/12/2049	09/11/2021
32.01	END-F	N	1.301	10/20/2015	1.252 RR	11/11/2017	1.267 RR	09/11/2018	0	11.7	11.0	23.8	0.600 S	11.7	09/14/2075	09/11/2021
33.01	STR-L	Y *	1.018	08/21/2014	0.937 TC	11/11/2017	0.937 RR	09/11/2018	0	20.0	22.1	61.5	0.600 S	20.0	07/18/2035	09/11/2021
34.01	STR-R	N	1.004	08/21/2014	0.967 RR	11/11/2017	0.987 RR	09/11/2018	0	4.2	6.8	13.3	0.600 S	4.2	11/03/2110	09/11/2021
35.01	END-L	N	1.010	10/20/2015	1.195 TC	11/11/2017	1.195 RR	09/11/2018	0	0	0	0	0.600 S	0.1	09/26/4018	09/11/2021
36.01	END-BK	Y *	1.299	10/20/2015	1.145 TC	11/11/2017	1.145 RR	09/11/2018	0	53.2	62.7	136.5	0.600 S	53.2	12/09/2028	09/11/2021
37.01	STR-T	N	1.008	08/21/2014	0.965 TC	11/11/2017	0.965 RR	09/11/2018	0	10.6	10.3	13.5	0.600 S	10.6	02/16/2053	09/11/2021
38.01	STR-T	N	1.030	08/21/2014	0.956 RR	11/11/2017	0.986 DA	09/11/2018	0	10.8	11.0	22.9	0.600 S	10.8	06/08/2054	09/11/2021
39.01	END-F	Y	1.300	10/20/2015	1.209 TC	11/11/2017	1.209 RR	09/11/2018	0	31.4	30.5	44.1	0.600 S	31.4	02/02/2038	09/11/2021
40.01	END-F	Y *	1.801	10/20/2015	1.266 TC	11/11/2017	1.249 DA	09/11/2018	20.4	190.7	173.9	259.5	0.600 S	190.7	02/05/2022	09/11/2021
41.01	STR-T	N	1.016	08/21/2014	0.965 TC	11/11/2017	0.965 RR	09/11/2018	0	12.6	14.5	43.3	0.600 S	12.6	08/31/2047	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-0035  
 Eq/Circ ID: LH0035-C1  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 1 ON LINE HEATER; SN:4049-01

Summary: Group Name:

Insp. Due Date = 09/11/2021

Pred. Ret. Date = 11/20/2028

Group Description:

RCR = 52.7 MPY

Rem. Life (from last survey 09/11/2018) = 10.2 yrs

0 C.A. Status: No

Total Caution TMLs = 21

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
42.01	STR-R	N	1.024	08/21/2014	0.968 RR	11/11/2017	0.974 RR	09/11/2018	0	12.3	12.1	17.7	0.600 S	12.3	02/06/2049	09/11/2021
43.01	END-L	Y	1.311	10/20/2015	1.258 RR	11/11/2017	1.259 DA	09/11/2018	0	18.0	16.4	25.7	0.600 S	18.0	04/22/2055	09/11/2021
44.01	END-L	N	1.296	10/20/2015	1.267 RR	11/11/2017	1.267 DA	09/11/2018	0	10.0	9.1	14.1	0.600 S	10.0	05/24/2085	09/11/2021
45.01	STR-R	N	1.011	08/21/2014	0.956 TC	11/11/2017	0.956 RR	09/11/2018	0	13.6	15.3	23.1	0.600 S	13.6	11/14/2044	09/11/2021
46.01	STR-L	Y	1.038	08/21/2014	0.970 TC	11/11/2017	0.970 RR	09/11/2018	0	16.8	17.7	21.9	0.600 S	16.8	09/19/2040	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-0035  
Eq/Circ ID: LH0035-C1  
Design Code: B31.3  
Eq Type: VESSEL  
Class:  
CM RBI:

Flange Rating: 0 lb/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
Design Temperature: 200 °F

Description: COIL 1 ON LINE HEATER; SN:4049-01

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	21.6 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	52.7 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	25.7 MPY
(D) -- Default Corrosion Rate	0.1 MPY

Representative Corrosion Rate = 52.7 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) -- 3.00 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 = 10.2 years from the most recent survey date.  
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 11/20/2028

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2021  
UT/RT Inspection Interval is 3.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.  
There are 21 Caution TMLs in this Eq/Circ ID.



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

<b>Inspections Performed for:</b> FMC Technologies Completion – PA District	
<b>Inspection Report for:</b> LH-0035-C2 Line Heater	<b>Date Last Inspected:</b> 09/11/2018
<b>Remaining Life:</b> 6.7 YRS	<b>Next UT:</b> 09/11/2021 <b>Next VT:</b> 09/11/2021
<b>Representative Corrosion Rate:</b> 62.1 MPY	<b>Mfg Serial #:</b> 4049-02
<b>Manufacturer:</b> Coral Oilfield Services Inc.	<b>Alberta Registration #:</b> 626746
<b>Year Built:</b> 2013	<b>Canadian Registration #:</b> V6716.21

**FMC Technologies Completion LH0035-C2 (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 USA  
Facility/Location Name : Wyoming District  
Field Name :  
Equipment Number : LH-0035  
Eq/Circ. ID : LH0035-C2  
Equipment Name/Service : Line Heater-Coil 2  
Physical Location : In PA Yard  
GPS Coordinates :

## VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Line Heater

Vessel Size:

Operating Pressure Range (psig): N/A

Operating Temperature Range (°F): N/A

Does the vessel have Internal Access? Yes

Specify type of internal access, if available: When bundles are pulled

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?: ☐ 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

MANUFACTURED & CERTIFIED BY		
CORAL OILFIELD SERVICES INC.		
780-402-9800 WWW.CORALOILFIELD.COM		
GRANDE PRAIRIE AB. CANADA		
MANUF SER NO	4049-02	
YEAR BUILT	2013	CRN V6716.21
	COIL #1	COIL #2
MAWP (kPa)	68950	
@TEMP (°C)	93	
NPS (IN)	4.00	
THICKNESS (MM)	25.4	
MATERIAL (S.A.)	519	
XRAY	100	
CORR ALL (MM)	3.175	
CODE	B31.3	
TEST PRESS (kPa)	103425	
DRWG. NO.	3691-01	PWHT 649/120
MDMT	-46 °C	-50 °F
INSP. NO.	0626746	

## SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

Repair stamp: ☐ R stamp ☐ Other Stamp ☐ No stamp  
Repaired By \_\_\_\_\_ Date of Repair \_\_\_\_\_  
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: Sterling Mack Date: 09/28/2012

# 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-0035	<b>Eq/Circ. ID:</b> LH0035-C2
<b>Equipment Name/Service:</b> Line Heater Coil 2	
<b>Physical Location:</b> In PA Yard	
<b>Manufacturer:</b> Coral Oilfield Services	<b>MFG Serial Number:</b> 4049-02
<b>Year Built:</b> 2013	<b>National Board #:</b> None
<b>Alberta Registration #:</b> 626746	<b>Canadian Registration # :</b> V6716.21

**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 through (4) man hatches.

**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 6- anchor bolt nuts are in place and secure. Front plate bolts are all secure.

**Condition of Steel Supports, Saddles, and Bolting:** All support structural welds appear sound. Supports have moderate/scale buildup. .

**Condition of Nozzles, Flanges, Repads, and Weepholes:** Nozzles and flanges are in good condition. Valve has been removed. The outlet flange is open. Exposed flange will require cleaning before use due to surface rust. (See attached photo)



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

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

**Condition of Ladders, Stairways, and Brackets:** Access ladders and stairways are in acceptable condition. Folding handrails appear to be in serviceable 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:**

There is no PSV installed.

**Recommendations:**

Ensure a PSV is added prior to putting this unit into service.

Clean rust and oxidation off exposed flanges before reassembly.

**Repairs Needed:**

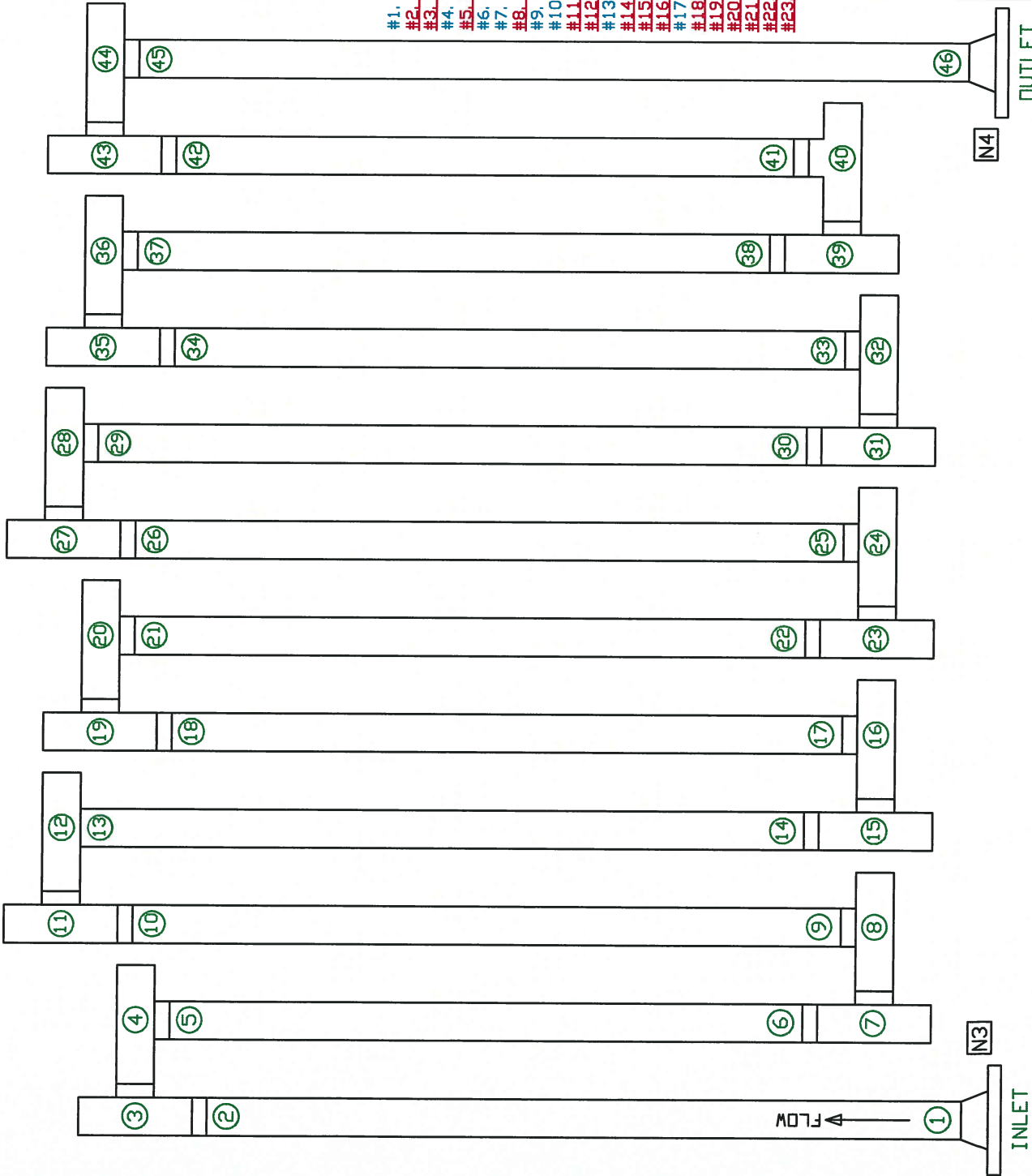
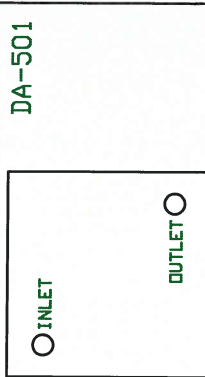
Michael J. York  
API 510 Inspector Signature

66475  
API 510 Inspector Number

09/11/2018  
Date

EQUIP RETIREMENT DATE: 5/18/2025  
NEXT INSPECTION IS DUE: 9/11/2019

NAMEPLATE INFO	
MFG	CORAL DILFIELD SERVICES INC.
SERIAL NUMBER	4049-02
ALBERTA REG. #	626746
DATE BUILT	2013
DESIGN P & T	10,000 psi @ 200°F



- #1. 01- STR-R 1.011 DA  
#2. 01- STR-L 1.003 DA  
#3. 01- END-L 1.196 DA  
#4. 01- END-B 1.280 DA  
#5. 01- STR-T 0.993 DA  
#6. 01- STR-B 1.028 DA  
#7. 01- END-L 1.258 DA  
#8. 01- END-F 1.260 DA  
#9. 01- STR-B 0.968 DA  
#10. 01- STR-T 1.005 DA  
#11. 01- END-L 1.282 DA  
#12. 01- END-B 1.224 DA  
#13. 01- STR-B 0.980 DA  
#14. 01- STR-T 0.999 DA  
#15. 01- END-T 1.220 DA  
#16. 01- END-T 1.360 DA  
#17. 01- STR-F 1.003 DA  
#18. 01- STR-B 1.010 DA  
#19. 01- END-R 1.243 DA  
#20. 01- END-B 1.278 DA  
#21. 01- STR-T 0.973 DA  
#22. 01- STR-T 1.036 DA  
#23. 01- END-R 1.197 DC  
#24. 01- END-T 1.213 DA  
#25. 01- STR-B 0.955 DA  
#26. 01- STR-R 1.023 DA  
#27. 01- END-R 1.204 DA  
#28. 01- END-B 1.246 DA  
#29. 01- STR-L 0.973 DA  
#30. 01- STR-L 1.032 DA  
#31. 01- END-T 1.205 DA  
#32. 01- END-F 1.224 DA  
#33. 01- STR-R 0.970 DA  
#34. 01- STR-R 1.022 DA  
#35. 01- END-L 1.183 DA  
#36. 01- END-BK 1.256 DA  
#37. 01- STR-L 0.984 DA  
#38. 01- STR-T 1.016 DA  
#39. 01- END-L 1.184 DA  
#40. 01- END-F 1.218 DA  
#41. 01- STR-B 0.969 DA  
#42. 01- STR-B 1.026 DA  
#43. 01- END-L 1.190 DA  
#44. 01- END-BK 1.249 DA  
#45. 01- STR-T 0.972 DA  
#46. 01- STR-B 0.998 DA

BUSINESS UNIT	FMC TECHNOLOGIES
EQ/CIRC ID #	LH0035-C2
EQUIP NAME	LINE HEATER
DWG #	LH0035-C2

DESC: COIL 2 ON LINE HEATER  
DWG#: LH0035-C2-1.01-46.01

4 READINGS TAKEN AROUND  
THE CIRCUMFERENCE  
RECORDED THE LOWEST.

## 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-0035  
 Eq/Circ ID: LH0035-C2  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 2 ON LINE HEATER; SN:4049-02

Summary: Group Name:  
 Insp. Due Date = 09/11/2021  
 Pred. Ret. Date = 05/18/2025

Group Description:  
 RCR = 62.1 MPY  
 Rem. Life (from last survey 09/11/2018) = 6.7 yrs

0 C.A. Status: No  
 Total Caution TMLs = 32

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-R	N	1.007	08/21/2014	0.972 RR	11/12/2017	0.980 RR	09/11/2018	0	6.7	8.9	34.4	0.600 S	6.7	05/31/2075	09/11/2021
2.01	STR-L	Y	1.006	08/21/2014	0.896 TC	11/12/2017	0.896 RR	09/11/2018	0	27.1	32.5	74.6	0.600 S	27.1	08/13/2029	09/11/2021
3.01	END-L	Y	1.298	10/21/2015	1.245 TC	11/12/2017	1.196 DA	09/11/2018	59.1	35.3	33.6	59.1	0.600 S	59.1	10/11/2028	09/11/2021
4.01	END-B	N	1.296	10/21/2015	1.275 TC	11/12/2017	1.275 RR	09/11/2018	0	7.3	8.7	20.1	0.600 S	7.3	03/01/2111	09/11/2021
5.01	STR-T	Y	1.001	08/21/2014	0.875 TC	11/12/2017	0.875 RR	09/11/2018	0	31.1	36.6	103.5	0.600 S	31.1	07/16/2027	09/11/2021
6.01	STR-B	N	0.990	08/21/2014	0.942 RR	11/12/2017	0.974 RR	09/11/2018	0	3.9	8.3	47.1	0.600 S	3.9	08/06/2114	09/11/2021
7.01	END-L	N	1.280	10/21/2015	1.259 TC	11/12/2017	1.258 DA	09/11/2018	1.2	7.6	7.7	12.8	0.600 S	7.6	04/11/2105	09/11/2021
8.01	END-F	Y	1.300	10/21/2015	1.221 TC	11/12/2017	1.221 RR	09/11/2018	0	27.3	25.9	67.7	0.600 S	27.3	06/10/2041	09/11/2021
9.01	STR-B	N	0.997	08/21/2014	0.979 TC	11/12/2017	0.968 DA	09/11/2018	13.3	7.1	7.3	19.2	0.600 S	13.3	05/13/2046	09/11/2021
10.01	STR-T	N	0.994	08/21/2014	0.967 TC	11/12/2017	0.967 RR	09/11/2018	0	6.7	7.9	24.9	0.600 S	6.7	06/21/2073	09/11/2021
11.01	END-L	Y	1.301	10/21/2015	1.216 TC	11/12/2017	1.216 RR	09/11/2018	0	29.4	34.8	76.7	0.600 S	29.4	08/25/2039	09/11/2021
12.01	END-B	Y	1.311	10/21/2015	1.271 TC	11/12/2017	1.224 DA	09/11/2018	56.7	30.1	30.1	56.7	0.600 S	56.7	09/13/2029	09/11/2021
13.01	STR-B	N	0.986	08/21/2014	0.971 TC	11/12/2017	0.971 RR	09/11/2018	0	3.7	4.3	24.9	0.600 S	3.7	12/20/2118	09/11/2021
14.01	STR-T	Y	1.018	08/21/2014	0.932 TC	11/12/2017	0.932 RR	09/11/2018	0	21.2	24.8	63.8	0.600 S	21.2	05/10/2034	09/11/2021
15.01	END-T	Y	1.311	10/21/2015	1.136 TC	11/12/2017	1.136 RR	09/11/2018	0	60.5	62.5	100.1	0.600 S	60.5	07/22/2027	09/11/2021
16.01	END-T	Y	1.299	10/21/2015	1.239 TC	11/12/2017	1.220 DA	09/11/2018	22.9	27.3	30.6	57.5	0.600 S	27.3	05/28/2041	09/11/2021
17.01	STR-F	N	0.987	08/21/2014	0.969 TC	11/12/2017	0.969 RR	09/11/2018	0	4.4	5.2	28.8	0.600 S	4.4	07/24/2102	09/11/2021
18.01	STR-B	Y	1.018	08/21/2014	0.942 RR	11/12/2017	0.946 RR	09/11/2018	0	17.7	21.2	67.7	0.600 S	17.7	03/30/2038	09/11/2021
19.01	END-R	Y	1.299	10/21/2015	1.201 TC	11/12/2017	1.201 RR	09/11/2018	0	33.9	39.8	85.3	0.600 S	33.9	06/03/2036	09/11/2021
20.01	END-B	Y	1.310	10/21/2015	1.216 TC	11/12/2017	1.216 RR	09/11/2018	0	32.5	31.5	74.6	0.600 S	32.5	08/25/2037	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:10/16/2018

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

Unit: LH-0035  
 Eq/Circ ID: LH0035-C2  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 2 ON LINE HEATER; SN:4049-02

Summary: Group Name:  
 Insp. Due Date = 09/11/2021  
 Pred. Ret. Date = 05/18/2025

Group Description:  
 RCR = 62.1 MPY  
 Rem. Life (from last survey 09/11/2018) = 6.7 yrs

0 C.A. Status: No  
 Total Caution TMLs = 32

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	STR-T	Y	1.018	08/21/2014	0.953 TC	11/12/2017	0.953 RR	09/11/2018	0	16.0	18.2	42.2	0.600 S	16.0	10/03/2040	09/11/2021
22.01	STR-T	Y	1.018	08/21/2014	0.944 TC	11/12/2017	0.944 RR	09/11/2018	0	18.2	21.1	38.3	0.600 S	18.2	08/06/2037	09/11/2021
23.01	END-R	Y *	1.296	10/21/2015	1.257 TC	11/12/2017	1.197 DA	09/11/2018	72.3	34.2	30.3	72.3	0.600 S	72.3	12/14/2026	09/11/2021
24.01	END-T	Y	1.300	10/21/2015	1.171 TC	11/12/2017	1.171 RR	09/11/2018	0	44.6	53.4	121.7	0.600 S	44.6	07/01/2031	09/11/2021
25.01	STR-B	N	1.000	08/21/2014	0.945 TC	11/12/2017	0.945 RR	09/11/2018	0	13.6	15.8	47.0	0.600 S	13.6	01/24/2044	09/11/2021
26.01	STRR	Y	1.009	08/21/2014	0.912 TC	11/12/2017	0.912 RR	09/11/2018	0	23.9	28.2	51.1	0.600 S	23.9	10/01/2031	09/11/2021
27.01	END-R	Y	1.305	10/21/2015	1.221 TC	11/12/2017	1.204 DA	09/11/2018	20.5	34.9	39.9	80.5	0.600 S	34.9	01/01/2036	09/11/2021
28.01	END-B	Y	1.310	10/21/2015	1.209 TC	11/12/2017	1.209 RR	09/11/2018	0	34.9	38.3	61.4	0.600 S	34.9	02/23/2036	09/11/2021
29.01	STR-L	N	0.975	08/21/2014	0.965 TC	11/12/2017	0.965 RR	09/11/2018	0	2.5	2.9	9.9	0.600 S	2.5	09/12/2164	09/11/2021
30.01	STR-L	Y	1.030	08/21/2014	0.952 RR	11/12/2017	0.967 RR	09/11/2018	0	15.5	17.9	50.1	0.600 S	15.5	05/16/2042	09/11/2021
31.01	END-T	Y	1.296	10/21/2015	1.186 TC	11/12/2017	1.186 RR	09/11/2018	0	38.0	39.4	61.9	0.600 S	38.0	02/12/2034	09/11/2021
32.01	END-F	Y	1.303	10/21/2015	1.189 TC	11/12/2017	1.189 RR	09/11/2018	0	39.4	40.8	64.8	0.600 S	39.4	08/23/2033	09/11/2021
33.01	STR-R	N	1.015	08/21/2014	0.960 RR	11/12/2017	0.970 DA	09/11/2018	0	11.1	12.7	35.3	0.600 S	11.1	01/11/2052	09/11/2021
34.01	STR-R	Y *	1.020	08/21/2014	0.879 TC	11/12/2017	0.879 RR	09/11/2018	0	34.8	40.3	92.0	0.600 S	34.8	09/17/2026	09/11/2021
35.01	END-L	Y *	1.311	10/21/2015	1.243 TC	11/12/2017	1.183 DA	09/11/2018	72.3	44.3	39.2	72.3	0.600 S	72.3	10/04/2026	09/11/2021
36.01	END-BK	Y	1.287	10/21/2015	1.200 TC	11/12/2017	1.200 RR	09/11/2018	0	30.1	36.2	83.4	0.600 S	30.1	08/18/2038	09/11/2021
37.01	STR-L	Y *	1.027	08/21/2014	0.837 TC	11/12/2017	0.837 RR	09/11/2018	0	46.8	51.3	136.1	0.600 S	46.8	10/05/2023	09/11/2021
38.01	STR-T	Y	1.031	08/21/2014	0.958 TC	11/12/2017	0.958 RR	09/11/2018	0	18.0	18.8	25.7	0.600 S	18.0	08/01/2038	09/11/2021
39.01	END-L	Y	1.297	10/21/2015	1.236 TC	11/12/2017	1.184 DA	09/11/2018	62.7	39.1	40.1	62.7	0.600 S	62.7	01/04/2028	09/11/2021
40.01	END-F	Y	1.303	10/21/2015	1.235 TC	11/12/2017	1.218 DA	09/11/2018	20.5	29.4	27.2	59.9	0.600 S	29.4	09/19/2039	09/11/2021
41.01	STR-B	N	1.015	08/21/2014	0.967 RR	11/12/2017	0.969 DA	09/11/2018	0	11.3	12.4	31.4	0.600 S	11.3	05/08/2051	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:10/16/2018

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

Unit: LH-0035  
 Eq/Circ ID: LH0035-C2  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: B31.3

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: COIL 2 ON LINE HEATER; SN:4049-02

Summary: Group Name:  
 Insp. Due Date = 09/11/2021  
 Pred. Ret. Date = 05/18/2025

Group Description:  
 RCR = 62.1 MPY  
 Rem. Life (from last survey 09/11/2018) = 6.7 yrs

0 C.A. Status: No  
 Total Caution TMLs = 32

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	STR-B	Y *	1.010	08/21/2014	0.846 TC	11/12/2017	0.846 RR	09/11/2018	0	40.4	47.7	115.0	0.600 S	40.4	10/13/2024	09/11/2021
43.01	END-L	Y *	1.297	10/21/2015	1.296 TC	11/12/2017	1.190 DA	09/11/2018	127.8	37.0	31.7	127.8	0.600 S	127.8	04/24/2023	09/11/2021
44.01	END-BK	Y	1.304	10/21/2015	1.225 RR	11/12/2017	1.233 RR	09/11/2018	0	24.6	22.6	77.6	0.600 S	24.6	06/05/2044	09/11/2021
45.01	STR-T	N	1.013	08/21/2014	0.962 TC	11/12/2017	0.962 RR	09/11/2018	0	12.6	14.7	25.5	0.600 S	12.6	06/05/2047	09/11/2021
46.01	STR-B	N	1.012	08/21/2014	0.973 RR	11/12/2017	0.994 RR	09/11/2018	0	4.4	7.3	34.4	0.600 S	4.4	03/29/2108	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: 10/16/2018

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

Unit: LH-0035  
Eq/Circ ID: LH0035-C2  
Design Code: B31.3  
Eq Type: VESSEL  
Class:  
CM RBI:

Flange Rating: 0 lb/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
Design Temperature: 200 °F

Description: COIL 2 ON LINE HEATER; SN:4049-02

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	:	29.5 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	62.1 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	35.1 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 62.1 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) -- 3.00 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 = 6.7 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 05/18/2025

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2021  
UT/RT Inspection Interval is 3.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.  
There are 32 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-0035 Fuel Gas Scrubber	
<b>Remaining Life:</b> 20+ YRS	<b>Date of this Report:</b> 09/11/2018
<b>Representative Corrosion Rate:</b> 2.9 MPY	<b>Next UT:</b> 09/11/2021 <b>Next VT:</b> 09/11/2021
<b>Manufacturer:</b> Baron Oilfield Services, Ltd.	<b>Mfg Serial #:</b> 1007.12871
<b>Date Built:</b> 2012	<b>National Board #:</b> N/A
<b>Alberta registration #:</b> N/A	<b>Canadian Registration #:</b> N/A

**FMC Technologies Completion LH-0035 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 Completion  
Facility/Location Name : PA District  
Field Name :  
Equipment Number : LH-0035  
Eq/Circ. ID : LH0035-FGS  
Equipment Name/Service : Fuel Gas Scrubber  
Physical Location : PA Yard  
GPS Coordinates :

### VESSEL DESCRIPTION AND SERVICE CONDITIONS

**Type of Vessel:** Vertical Fuel Gas Scrubber

**Vessel Size:** 8.625" OD

**Operating Pressure Range (psig):** N/A, not in-service during initial inspection.

**Operating Temperature Range (°F):** N/A, not in-service during initial inspection.

**Does the vessel have Internal Access?** No

**Specify type of internal access, if available:**

**Vessel is located:** Inside

**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?

**\*\*Diameter\*\***(strap equipment): 8" pipe, 8.625" OD

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) \_\_\_\_\_

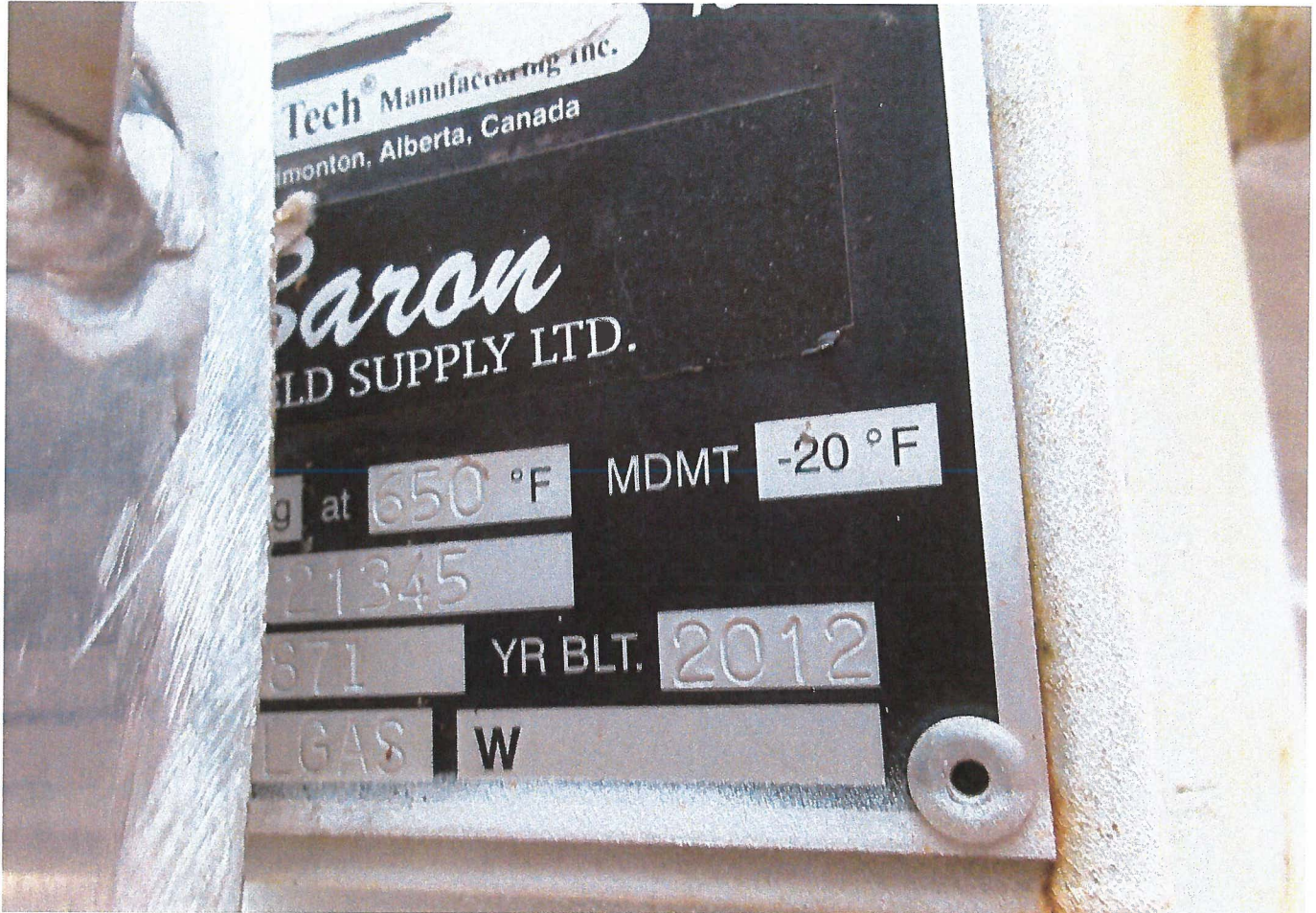
Any other pertinent information: \_\_\_\_\_

## PRESSURE VESSEL INVENTORY

### ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

There is limited access to the nameplate, due to close proximity of other equipment.



### 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: 08/21/2014

# 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-0035	<b>Eq/Circ. ID:</b> LH0035-FGS
<b>Equipment Name/Service:</b> Fuel Gas Scrubber	
<b>Physical Location:</b> In PA Yard	
<b>Manufacturer:</b> Baron Oilfield Services, Ltd.	<b>MFG Serial Number:</b> 1007.12871
<b>Year Built:</b> 2012	<b>National Board #:</b> None
<b>Alberta Registration #:</b> N/A	<b>Canadian Registration # :</b> N/A

**Is Vessel in-service?** No

**Reason for Inspection:** Scheduled API-510 External Inspection

**Condition of Nameplate and/or Bracket:** Nameplate is not fully accessible due to proximity of other equipment. The nameplate bracket is securely attached.

**Internal Access?:** No

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

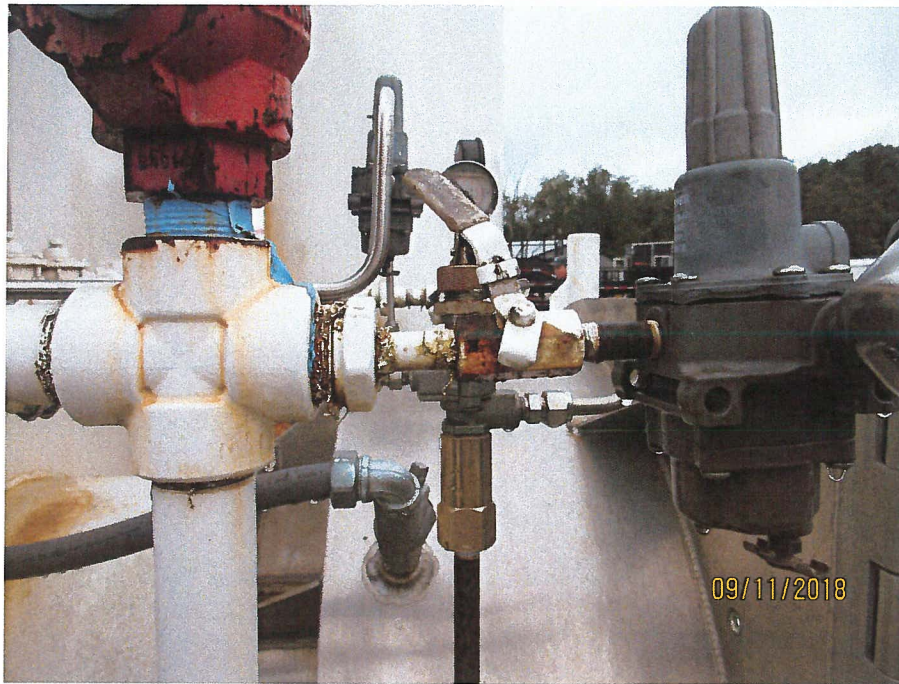
**Grounding Device in Place and Secure?:** N/A, the equipment would be grounded through the skid. The unit was not in service at the time of this inspection.

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

**Condition of Steel Supports, Saddles, and Bolting:** All support structural welds appear sound. Vessel is welded to the baseplate and 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. Pressure regulator ¼" piping is bent upwards at the tee above the Scrubber. (See photo next page).



**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 @ 150 psi.

**Date PSV last tested (if there is a tag on the valve):** 01/2018 by Portersville PRD

**Comments:**

. Pressure regulator ¼" piping is bent upwards at the tee above the Scrubber. (See photo above).

**Recommendations:**

**Repairs Needed:**

Replace ¼" piping at regulator above the Scrubber before placing in service.

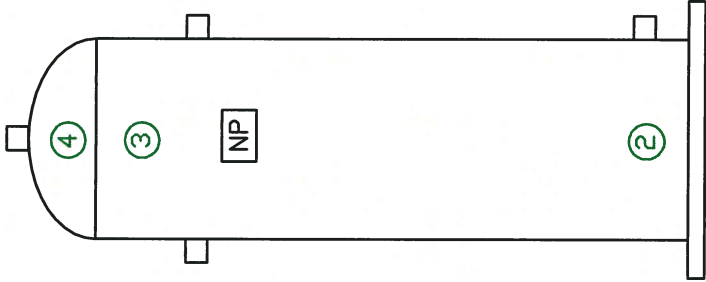
Michael J. York  
API 510 Inspector Signature

66475  
API 510 Inspector Number

09/11/2018  
Date

EQUIP RETIREMENT DATE: 9/27/2357  
NEXT INSPECTION IS DUE: 9/11/2019

- #2. 01- BTM SHELL-F 0. 370 DA
- #2. 02- BTM SHELL-L 0. 357 DA
- #2. 03- BTM SHELL-BK 0. 364 DA
- #2. 04- BTM SHELL-R 0. 330 DA
- #3. 01- TOP SHELL-F 0. 367 DA
- #3. 02- TOP SHELL-L 0. 356 DA
- #3. 03- TOP SHELL-BK 0. 344 DA
- #3. 04- TOP SHELL-R 0. 342 DA
- #4. 01- TOP HEAD-F 0. 323 DA
- #4. 02- TOP HEAD-L 0. 329 DA
- #4. 03- TOP HEAD-BK 0. 314 DA
- #4. 04- TOP HEAD-R 0. 314 DA



DA-501

NAMEPLATE INFO	
MFG	BARON OILFIELD SERVICES LTD.
SERIAL NUMBER	1007. 12871
NATIONAL BOARD #	NONE
DATE BUILT	2012
DESIGN P & T	150 PSIG @ 650°F
NOTE	NP IS DIFFICULT TO ACCESS

CAL BLK=60°F		VESSEL=70°F	
BUSINESS UNIT	FMC TECHNOLOGIES	COMPLETION	
EQ/CIRC ID #	LH0035-FGS		
EQUIP NAME	FUEL GAS SCRUBBER		
LOCATION	WITH LINE HEATER LH-0035		
DWG #	LH0035-FGS		

DESC: FUEL GAS SCRUBBER  
DWG#: LH0035-FGS-2.01-4.04

## 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-0035  
 Eq/Circ ID: LH0035-FGS  
 Eq Type: VESSEL  
 Class:  
 CM RBI:  
 Design Code: S8/D1

Flange Rating: 0 lb/in<sup>2</sup>  
 Design Pressure: 150 lb/in<sup>2</sup>  
 Design Temperature: 100 °F

Description: FUEL GAS SCRUBBER SN: 1007.12871

Summary: Group Name:  
 Insp. Due Date = 09/11/2021  
 Pred. Ret. Date = 09/27/2357

Group Description:  
 RCR = 2.9 MPY  
 Rem. Life (from last survey 09/11/2018) = 339.0 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 SHELL-F	N	0.319 TC	08/21/2014	0.333 TC	11/10/2017	0.333 RR	09/11/2018	0	0	0	20.7	0.193 S	0.1	09/22/3418	09/11/2021
2.02	BTM SHELL-L	N	0.325 TC	08/21/2014	0.336 TC	11/10/2017	0.336 RR	09/11/2018	0	0	0	15.7	0.193 S	0.1	09/22/3448	09/11/2021
2.03	BTM SHELL-BK	N	0.318 TC	08/21/2014	0.321 TC	11/10/2017	0.321 RR	09/11/2018	0	0	0	21.5	0.193 S	0.1	09/20/3298	09/11/2021
2.04	BTM SHELL-R	N *	0.330 TC	08/21/2014	0.315 TC	11/10/2017	0.315 RR	09/11/2018	0	3.7	4.0	11.6	0.193 S	3.7	09/01/2051	09/11/2021
3.01	TOP SHELL-F	N *	0.334 TC	08/21/2014	0.330 TC	11/10/2017	0.330 RR	09/11/2018	0	1.0	1.1	8.3	0.193 S	1.0	09/12/2155	09/11/2021
3.02	TOP SHELL-L	N	0.327 TC	08/21/2014	0.334 TC	11/10/2017	0.334 RR	09/11/2018	0	0	0	14.1	0.193 S	0.1	09/22/3428	09/11/2021
3.03	TOP SHELL-BK	N *	0.330 TC	08/21/2014	0.327 TC	11/10/2017	0.327 RR	09/11/2018	0	0.7	0.8	11.6	0.193 S	0.7	02/16/2210	09/11/2021
3.04	TOP SHELL-R	N *	0.337 TC	08/21/2014	0.321 TC	11/10/2017	0.321 RR	09/11/2018	0	3.9	4.2	6.0	0.193 S	3.9	07/08/2051	09/11/2021
4.01	TOP HEAD-F	N	0.273 TC	08/21/2014	0.279 RR	11/10/2017	0.281 RR	09/11/2018	0	0	0	6.6	0.193 S	0.1	09/17/2898	09/11/2021
4.02	TOP HEAD-L	N *	0.274 TC	08/21/2014	0.274 RR	11/10/2017	0.275 RR	09/11/2018	0	0	0	5.8	0.193 S	0.1	09/17/2838	09/11/2021
4.03	TOP HEAD-BK	N *	0.270 TC	08/21/2014	0.275 TC	11/10/2017	0.275 RR	09/11/2018	0	0	0	9.1	0.193 S	0.1	09/17/2838	09/11/2021
4.04	TOP HEAD-R	N *	0.272 TC	08/21/2014	0.272 RR	11/10/2017	0.275 RR	09/11/2018	0	0	0	7.5	0.193 S	0.1	09/17/2838	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-0035  
Eq/Circ ID: LH0035-FGS  
Design Code: S8/D1  
Eq Type: VESSEL  
Class:  
CM RBI:

Flange Rating: 0 lb/in<sup>2</sup>  
Design Pressure: 150 lb/in<sup>2</sup>  
Design Temperature: 100 °F

Description: FUEL GAS SCRUBBER SN: 1007.12871

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	:	0.8 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	2.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	1.1 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 2.9 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 6 months.

TML Inspection Interval is:  
(A) -- 3 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 = 339.0 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 09/27/2357

Recommended Eq/Circ UT/RT Inspection Date is 09/11/2021  
UT/RT Inspection Interval is 3.00 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.

## API 570 Piping External Inspection

<b>Company Name:</b> FMC Technologies	<b>District:</b> Pennsylvania
<b>Line Name/Number:</b> LH-0035 Associated Piping	
<b>Size/Sched. Of Pipe:</b> 3"	<b>Eq/Circ. ID:</b> LH0035-P
<b>Service/System:</b>	<b>Piping Class</b> <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input 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> 200 °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:**

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 checked="" type="checkbox"/> No Issues	Piping is 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 has minor chipping and minor surface corrosion, but acceptable.

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	Piping was not in service during 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 are full with a good weld profile.

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 checked="" type="checkbox"/> No Issues	No PSV. Not in serve at the time of inspection.

Supports/Hangers:	Comments:
<input checked="" 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 checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	Support is undone for valve replacement.

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 checked="" type="checkbox"/> Corrosion Present (Describe) <input type="checkbox"/> Gaskets <input type="checkbox"/> Flange Rating Issues <input type="checkbox"/> Other <input type="checkbox"/> No Issues	Bolts are in acceptable condition. The flanges have light chipping and peeling with 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"/> Weep hole <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Issues	Lower piping and valves are not attached (or on site). Upper pipe between coils only. (See attached photo).

