



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

Inspections Performed for: FMC Technologies Completion – PA District	
Inspection Report for: LH0035-C1 Line Heater	Date Last Inspected: 10/27/2016
Remaining Life: 2.3 YRS	Next UT: 10/27/2017 Next VT: 10/27/2017
Representative Corrosion Rate: 103.4 MPY	Mfg Serial #: 4049-01
Manufacturer: Coral Oilfield Services Inc.	Alberta Registration #: 626745
Year Built: 2013	Canadian Registration #: 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	B31.3	
TEST PRESS (kPa)	103425	
DRWG. NO.	3691-01	PWHT 649/120
MDMT	- 46 °C - 50 °F	
INSP. NO.	0626745	

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

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0035	Eq/Circ. ID: LH0035-C1
Equipment Name/Service: Line Heater Coil 1	
Physical Location: In PA Yard	
Manufacturer: Coral Oilfield Services	MFG Serial Number: 4049-01
Year Built: 2013	National Board #: None
Alberta Registration #: 626745	Canadian Registration # : 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?: No

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

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

Condition of Foundation and Anchor Bolts: Front plate bolts are all secure.

Condition of Steel Supports, Saddles, and Bolting: There is light corrosion on the angle iron bottom supports.

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. There is a missing elbow on the inlet piping.

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: 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:

Recommendations:

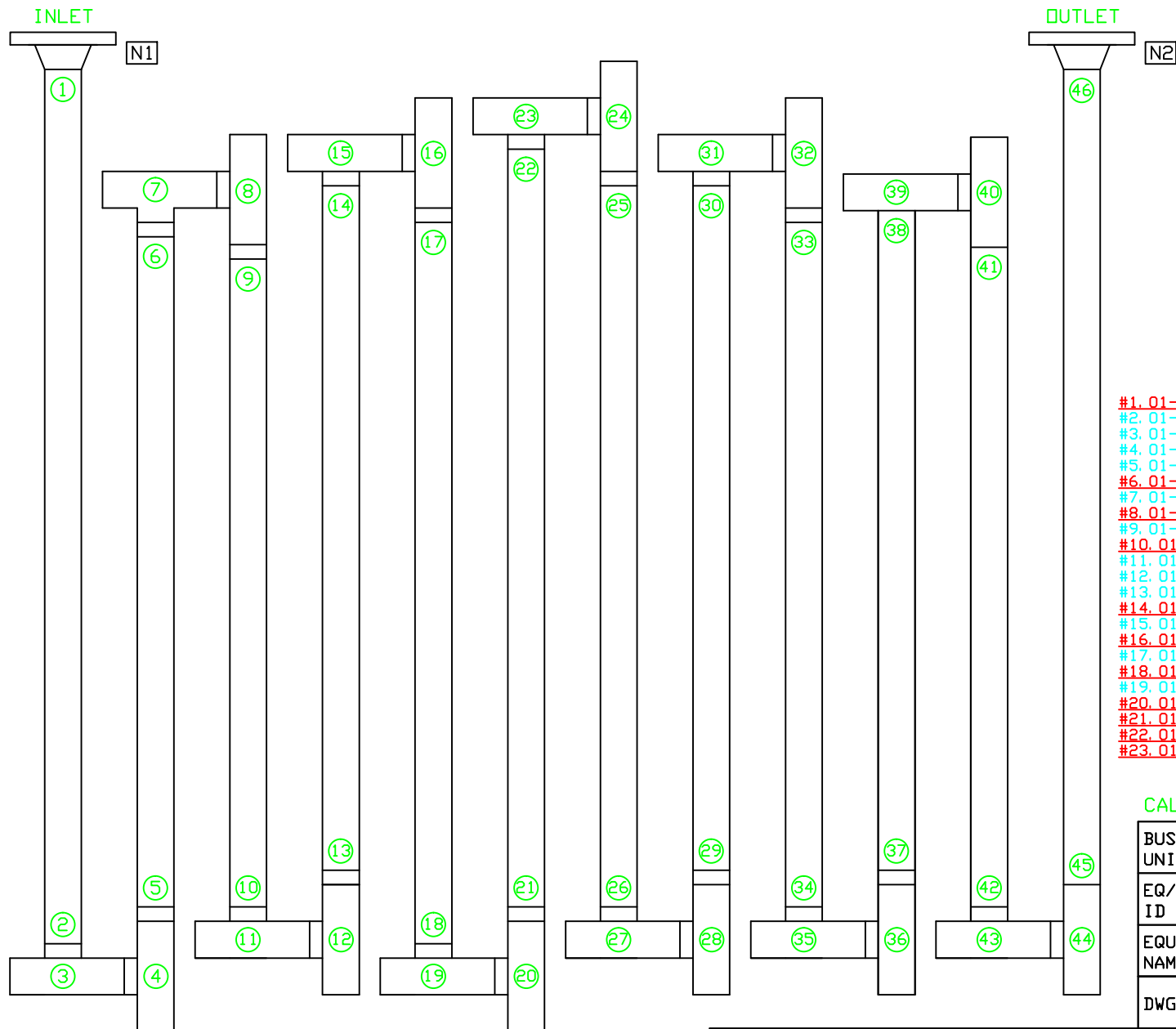
Repairs Needed:

Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

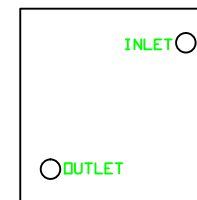
10/27/2016
Date

EQUIP RETIREMENT DATE: 2/16/2019
NEXT INSPECTION IS DUE: 10/27/2017



4 READINGS TAKEN AROUND
THE CIRCUMFERENCE
RECORDED THE LOWEST.

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



TC-560

#1.01- STR-B 0.984 TC #24.01- END 1.246 TC
#2.01- STR-T 0.995 TC #25.01- STR-B 1.006 TC
#3.01- END 1.290 DC #26.01- STR-T 0.976 TC
#4.01- END 1.283 TC #27.01- END 1.243 TC
#5.01- STR-L 1.029 TC #28.01- END 1.206 TC
#6.01- STR-T 0.968 TC #29.01- STR-R 0.987 TC
#7.01- END 1.286 TC #30.01- STR-L 1.006 TC
#8.01- END 1.259 TC #31.01- END 1.292 TC
#9.01- STR-R 1.003 TC #32.01- END 1.252 TC
#10.01- STR-R 0.956 TC #33.01- STR-L 1.004 TC
#11.01- END 1.318 TC #34.01- STR-L 0.967 TC
#12.01- END 1.310 TC #35.01- END 1.272 DC
#13.01- STR-R 0.996 TC #36.01- END 1.287 TC
#14.01- STR-B 1.001 TC #37.01- STR-T 0.967 TC
#15.01- END 1.298 TC #38.01- STR-T 0.956 TC
#16.01- END 1.223 TC #39.01- END 1.227 TC
#17.01- STR-T 0.986 TC #40.01- END 1.267 DC
#18.01- STR-L 0.982 TC #41.01- STR-T 1.010 TC
#19.01- END 1.292 TC #42.01- STR-R 0.968 TC
#20.01- END 1.253 TC #43.01- END 1.258 TC
#21.01- STR-L 0.984 TC #44.01- END 1.267 TC
#22.01- STR-T 0.976 TC #45.01- STR-B 0.980 TC
#23.01- END 1.243 TC #46.01- STR-B 0.982 TC

CAL BLK=43°F

PIPE=40°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0035-C1
EQUIP NAME	LINE HEATER
DWG #	LH0035-C1

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

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:12/27/2016

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

Unit: LH-0035
Eq/Circ ID: LH0035-C1
Eq Type: VESSEL
Class:
CM RBL:
Design Code: B31.3

Flange Rating: 0 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 200 °F

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

Summary: Group Name:
Insp. Due Date = 10/21/2017
Pred. Ret. Date = 02/16/2019

Group Description:
RCR = 103.4 MPY
Rem. Life (from last survey 10/21/2016) = 2.3 yrs

0 C.A. Status: NO
Total Caution IMLs = 28

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-B	Y	1.009	08/21/2014	1.005	10/20/2015	0.984 TC	10/27/2016	20.6	11.4	11.3	20.6	0.875 S	20.6	02/11/2022	10/27/2017
2.01	STR-T	N	1.022	08/21/2014	1.000	10/20/2015	0.995 TC	10/27/2016	4.9	12.4	12.5	18.9	0.875 S	12.4	07/02/2026	10/27/2017
3.01	END	N	1.000 NM	03/19/2013	1.009	10/20/2015	1.009 RR	10/27/2016	0	0	0	11.2	0.875 S	0.1	11/06/3356	10/27/2017
4.01	END	N	1.000 NM	03/19/2013	1.030	10/20/2015	1.030 RR	10/27/2016	0	0	0	1242.7	0.875 S	0.1	11/09/3566	10/27/2017
5.01	STR-L	N	1.028	08/21/2014	1.000	10/20/2015	1.000 RR	10/27/2016	0	12.8	13.0	1244.4	0.875 S	12.8	08/06/2026	10/27/2017
6.01	STR-T	Y *	0.998	08/21/2014	0.998 RR	10/20/2015	0.968 TC	10/27/2016	29.4	13.7	13.4	29.4	0.875 S	29.4	12/26/2019	10/27/2017
7.01	END	N	1.000 NM	03/19/2013	1.293	10/20/2015	1.286 TC	10/27/2016	6.9	0	0	6.9	0.875 S	6.9	05/21/2076	10/27/2017
8.01	END	Y	1.000 NM	03/19/2013	1.288	10/20/2015	1.259 TC	10/27/2016	28.4	0	0	819.9	0.875 S	28.4	05/06/2030	10/27/2017
9.01	STR-R	N	1.020	08/21/2014	1.005	10/20/2015	1.003 TC	10/27/2016	2.0	7.8	7.9	1186.8	0.875 S	7.8	03/26/2033	10/27/2017
10.01	STR-R	Y *	1.029	08/21/2014	1.002	10/20/2015	0.956 TC	10/27/2016	45.0	33.4	33.2	45.0	0.875 S	45.0	08/15/2018	10/27/2017
11.01	END	N	1.000 NM	03/19/2013	1.281	10/20/2015	1.281 RR	10/27/2016	0	0	0	0	0.875 S	0.1	11/11/4016	10/27/2017
12.01	END	N	1.000 NM	03/19/2013	1.292	10/20/2015	1.292 RR	10/27/2016	0	0	0	1180.8	0.875 S	0.1	11/11/4016	10/27/2017
13.01	STR-R	N	1.018	08/21/2014	1.009	10/20/2015	0.996 TC	10/27/2016	12.7	10.1	10.0	1193.7	0.875 S	12.7	05/08/2026	10/27/2017
14.01	STR-B	Y	1.046	08/21/2014	1.012	10/20/2015	1.001 TC	10/27/2016	10.8	20.6	20.8	29.2	0.875 S	20.6	12/09/2022	10/27/2017
15.01	END	N	1.000 NM	03/19/2013	1.310	10/20/2015	1.298 TC	10/27/2016	11.8	0	0	11.8	0.875 S	11.8	09/01/2052	10/27/2017
16.01	END	Y	1.000 NM	03/19/2013	1.299	10/20/2015	1.223 TC	10/27/2016	74.4	0	0	1113.8	0.875 S	74.4	07/01/2021	10/27/2017
17.01	STR-T	N	0.998	08/21/2014	0.998 RR	10/20/2015	0.986 TC	10/27/2016	11.8	5.5	5.4	1174.8	0.875 S	11.8	03/25/2026	10/27/2017
18.01	STR-L	Y	1.008	08/21/2014	1.008 RR	10/20/2015	0.982 TC	10/27/2016	25.5	11.9	11.6	25.5	0.875 S	25.5	01/07/2021	10/27/2017
19.01	END	N	1.000 NM	03/19/2013	1.301	10/20/2015	1.292 TC	10/27/2016	8.8	0	0	8.8	0.875 S	8.8	03/17/2064	10/27/2017
20.01	END	Y	1.000 NM	03/19/2013	1.310	10/20/2015	1.253 TC	10/27/2016	55.8	0	0	1205.8	0.875 S	55.8	08/06/2023	10/27/2017

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:12/27/2016

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

Unit: LH-0035
 Eq/Circ ID: LH0035-C1
 Eq Type: VESSEL
 Class:
 CM RBL:
 Design Code: B31.3

Flange Rating: 0 lb/in²
 Design Pressure: 10000 lb/in²
 Design Temperature: 200 °F

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

Summary: Group Name: Group Description:
 Insp. Due Date = 10/27/2017 RCR = 103.4 MPY
 Pred. Ret. Date = 02/16/2019 Rem. Life (from last survey 10/27/2016) = 2.3 yrs

0 C.A. Status: No
 Total Caution IMLS = 28

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-L	Y	1.018	08/21/2014	1.015	10/20/2015	0.984 TC	10/27/2016	30.4	15.6	15.3	1180.8	0.875 S	30.4	05/29/2020	10/27/2017
22.01	STR-T	Y *	1.038	08/21/2014	1.013	10/20/2015	0.976 TC	10/27/2016	36.2	28.4	28.2	36.2	0.875 S	36.2	08/12/2019	10/27/2017
23.01	END	Y	1.000 NM	03/19/2013	1.298	10/20/2015	1.243 TC	10/27/2016	53.9	0	0	53.9	0.875 S	53.9	08/26/2023	10/27/2017
24.01	END	Y	1.000 NM	03/19/2013	1.305	10/20/2015	1.246 TC	10/27/2016	57.8	0	0	1122.4	0.875 S	57.8	03/29/2023	10/27/2017
25.01	STR-B	N	1.028	08/21/2014	1.009	10/20/2015	1.006 TC	10/27/2016	2.9	10.1	10.2	1094.0	0.875 S	10.1	10/16/2029	10/27/2017
26.01	STR-T	Y	1.036	08/21/2014	1.003	10/20/2015	0.976 TC	10/27/2016	26.4	27.5	27.5	28.4	0.875 S	27.5	06/29/2020	10/27/2017
27.01	END	Y	1.000 NM	03/19/2013	1.310	10/20/2015	1.243 TC	10/27/2016	65.6	0	0	65.6	0.875 S	65.6	06/07/2022	10/27/2017
28.01	END	Y	1.000 NM	03/19/2013	1.298	10/20/2015	1.206 TC	10/27/2016	90.1	0	0	1305.4	0.875 S	90.1	06/30/2020	10/27/2017
29.01	STR-R	Y	1.039	08/21/2014	1.000	10/20/2015	0.987 TC	10/27/2016	12.7	23.8	24.0	1116.4	0.875 S	23.8	07/12/2021	10/27/2017
30.01	STR-L	Y	1.022	08/21/2014	0.989	10/20/2015	0.989 RR	10/27/2016	0	15.1	15.4	43.0	0.875 S	15.1	05/16/2024	10/27/2017
31.01	END	N	1.000 NM	03/19/2013	1.300	10/20/2015	1.292 TC	10/27/2016	7.8	0	0	7.8	0.875 S	7.8	04/14/2070	10/27/2017
32.01	END	Y	1.000 NM	03/19/2013	1.301	10/20/2015	1.252 TC	10/27/2016	48.0	0	0	1245.3	0.875 S	48.0	09/04/2024	10/27/2017
33.01	STR-L	N	1.018	08/21/2014	1.001	10/20/2015	1.001 RR	10/27/2016	0	7.8	7.9	1210.9	0.875 S	7.8	12/22/2032	10/27/2017
34.01	STR-L	Y *	1.004	08/21/2014	0.999	10/20/2015	0.967 TC	10/27/2016	31.3	16.9	16.6	31.3	0.875 S	31.3	10/06/2019	10/27/2017
35.01	END	N	1.000 NM	03/19/2013	1.010	10/20/2015	1.010 RR	10/27/2016	0	0	0	0	0.875 S	0.1	11/07/3366	10/27/2017
36.01	END	N	1.000 NM	03/19/2013	1.299	10/20/2015	1.287 TC	10/27/2016	11.8	0	0	1284.0	0.875 S	11.8	09/27/2051	10/27/2017
37.01	STR-T	Y	1.008	08/21/2014	0.981	10/20/2015	0.967 TC	10/27/2016	13.7	18.8	18.9	1185.1	0.875 S	18.8	09/18/2021	10/27/2017
38.01	STR-T	Y *	1.030	08/21/2014	0.971	10/20/2015	0.956 TC	10/27/2016	14.7	33.9	34.3	50.7	0.875 S	33.9	03/19/2019	10/27/2017
39.01	END	Y	1.000 NM	03/19/2013	1.300	10/20/2015	1.227 TC	10/27/2016	71.5	0	0	71.5	0.875 S	71.5	09/29/2021	10/27/2017
40.01	END	Y *	1.000 NM	03/19/2013	1.801	10/20/2015	1.267 TC	10/27/2016	522.9	0	0	1196.3	0.875 S	522.9	07/28/2017	10/27/2017
41.01	STR-T	N	1.016	08/21/2014	1.012	10/20/2015	1.010 TC	10/27/2016	2.0	2.7	2.8	1381.9	0.875 S	2.7	10/28/2066	10/27/2017

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 12/27/2016

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

Unit: LH-0035
 Eq/Circ ID: LH0035-C1
 Eq Type: VESSEL
 Class:
 CM RBL:
 Design Code: B31.3

Flange Rating: 0 lb/in²
 Design Pressure: 10000 lb/in²
 Design Temperature: 200 °F

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

Summary: Group Name:
 Insp. Due Date = 10/27/2017
 Pred. Ret. Date = 02/16/2019

Group Description:
 RCR = 103.4 MPY
 Rem. Life (from last survey 10/27/2016) = 2.3 yrs

0 C.A. Status: No
 Total Caution IMLS = 28

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	Y	1.024	08/21/2014	0.987	10/20/2015	0.968 TC	10/27/2016	18.6	25.6	25.8	31.8	0.875 S	25.6	06/15/2020	10/27/2017
43.01	END	Y	1.000 NM	03/19/2013	1.311	10/20/2015	1.258 TC	10/27/2016	51.9	0	0	51.9	0.875 S	51.9	03/14/2024	10/27/2017
44.01	END	Y	1.000 NM	03/19/2013	1.296	10/20/2015	1.267 TC	10/27/2016	28.4	0	0	1291.7	0.875 S	28.4	08/16/2030	10/27/2017
45.01	STR-B	Y	1.011	08/21/2014	1.001	10/20/2015	0.980 TC	10/27/2016	20.6	14.2	14.1	1285.7	0.875 S	20.6	12/02/2021	10/27/2017
46.01	STR-B	Y	1.038	08/21/2014	1.012	10/20/2015	0.982 TC	10/27/2016	29.4	25.6	25.6	29.4	0.875 S	29.4	06/17/2020	10/27/2017

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

Report Date: 12/27/2016

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

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

Flange Rating: 0 lb/in²
Design Pressure: 10000 lb/in²
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	:	37.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	103.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	44.1 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 103.4 MPY

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

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

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

Minimum time between inspections required for corrosion rate calculation is 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 = 2.3 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 02/16/2019

Recommended Eq/Circ UT/RT Inspection Date is 10/27/2017
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 28 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-0035-C2 Line Heater	Date Last Inspected: 10/27/2016
Remaining Life: 5.8 YRS	Next UT: 10/27/2017 Next VT: 10/27/2017
Representative Corrosion Rate: 70.9 MPY	Mfg Serial #: 4049-02
Manufacturer: Coral Oilfield Services Inc.	Alberta Registration #: 626746
Year Built: 2013	Canadian Registration #: 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.	0628746	

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

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0035	Eq/Circ. ID: LH0035-C2
Equipment Name/Service: Line Heater Coil 2	
Physical Location: In PA Yard	
Manufacturer: Coral Oilfield Services	MFG Serial Number: 4049-02
Year Built: 2013	National Board #: None
Alberta Registration #: 626746	Canadian Registration # : 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?: No

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

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

Condition of Foundation and Anchor Bolts: Front plate bolts are all secure.

Condition of Steel Supports, Saddles, and Bolting: There is light corrosion on the angle iron bottom supports.

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. There is a missing elbow on the inlet piping.

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: 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:

Recommendations:

Repairs Needed:

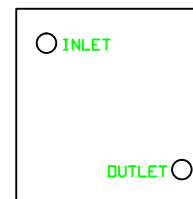
Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

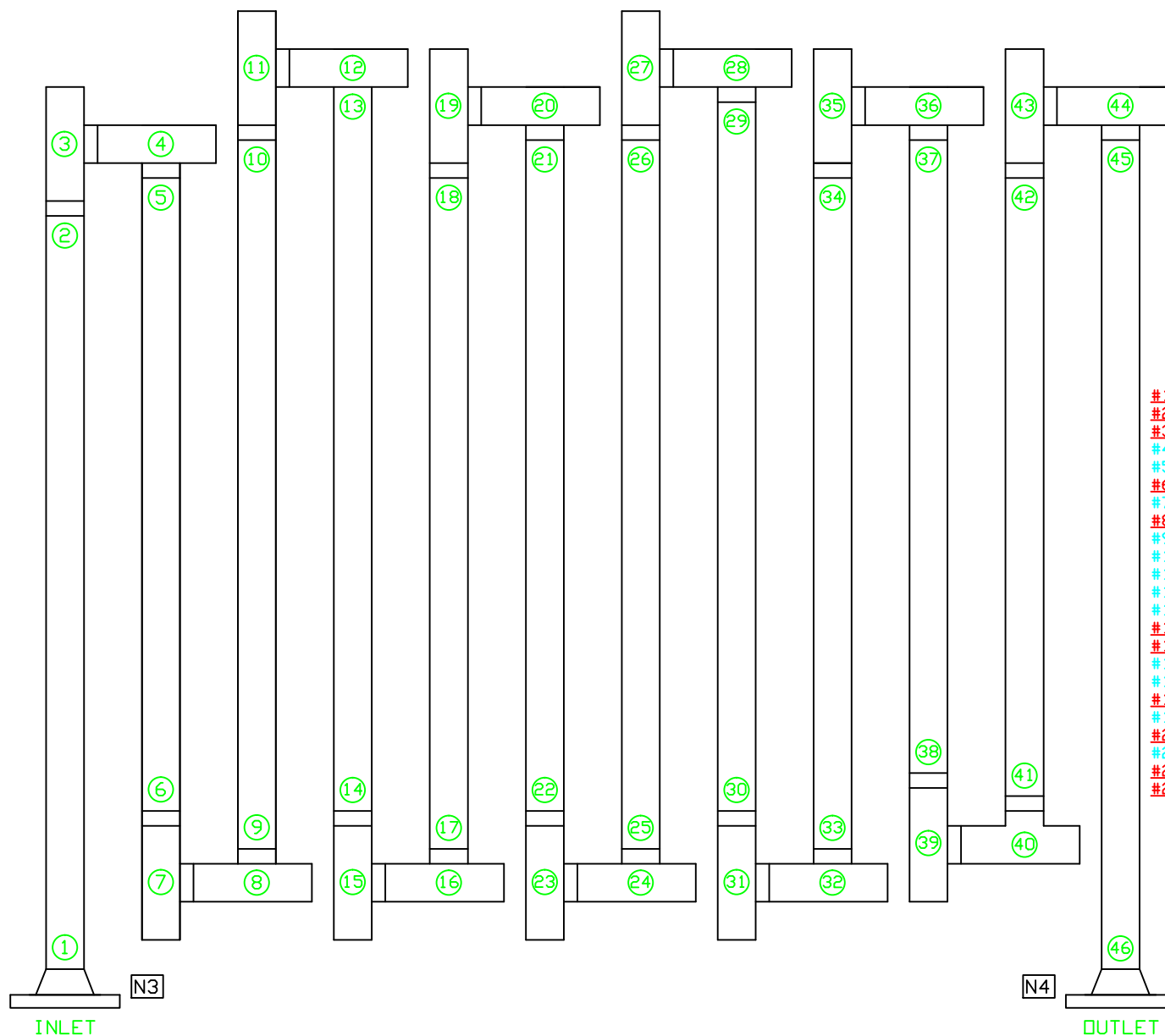
10/27/2016
Date

EQUIP RETIREMENT DATE: 8/22/2022
NEXT INSPECTION IS DUE: 10/27/2017

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



TC-560



#1.01- STR-L 0.972 TC
#2.01- STR-T 0.930 TC
#3.01- END 1.269 TC
#4.01- END 1.299 TC
#5.01- STR-T 0.983 TC
#6.01- STR-R 0.942 TC
#7.01- END 1.267 TC
#8.01- END 1.231 TC
#9.01- STR-R 1.009 TC
#10.01- STR-R 0.993 TC
#11.01- END 1.296 TC
#12.01- END 1.307 TC
#13.01- STR-B 1.008 TC
#14.01- STR-R 0.946 TC
#15.01- END 1.209 TC
#16.01- END 1.315 TC
#17.01- STR-T 0.999 TC
#18.01- STR-L 0.942 TC
#19.01- END 1.290 TC
#20.01- END 1.234 TC
#21.01- STR-L 0.997 TC
#22.01- STR-L 0.984 TC
#23.01- END 1.260 TC
#24.01- END 1.298 TC
#25.01- STR-B 0.994 TC
#26.01- STR-T 0.953 TC
#27.01- END 1.318 TC
#28.01- END 1.273 TC
#29.01- STR-T 0.973 TC
#30.01- STR-T 0.952 TC
#31.01- END 1.233 TC
#32.01- END 1.237 TC
#33.01- STR-L 0.960 TC
#34.01- STR-B 0.975 TC
#35.01- END 1.243 TC
#36.01- END 1.302 TC
#37.01- STR-B 0.986 TC
#38.01- STR-R 0.978 TC
#39.01- END 1.291 TC
#40.01- END 1.242 TC
#41.01- STR-R 0.967 TC
#42.01- STR-L 0.966 TC
#43.01- END 1.310 TC
#44.01- END 1.225 TC
#45.01- STR-T 0.983 TC
#46.01- STR-R 0.973 TC

CAL BLK=43°F

PIPE=45°F

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

4 READINGS TAKEN AROUND
THE CIRCUMFERENCE
RECORDED THE LOWEST.

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

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:12/27/2016

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

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

Flange Rating: 0 lb/in²
 Design Pressure: 10000 lb/in²
 Design Temperature: 200 °F

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

Summary: Group Name:
 Insp. Due Date = 10/21/2017
 Pred. Ret. Date = 08/22/2022

Group Description:
 RCR = 70.9 MPY
 Rem. Life (from last survey 10/21/2016) = 5.8 yrs

0 C.A. Status: NO
 Total Caution IMLS = 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	Y	1.007	08/21/2014	1.007	10/21/2015	0.972 TC	10/27/2016	34.4	16.0	15.6	34.4	0.600 S	34.4	08/21/2027	10/27/2017
2.01	STR-T	Y *	1.006	08/21/2014	1.006 RR	10/21/2015	0.930 TC	10/27/2016	74.6	34.8	33.9	74.6	0.600 S	74.6	03/31/2021	10/27/2017
3.01	END	Y	1.000 NM	03/19/2013	1.298	10/21/2015	1.269 TC	10/27/2016	28.5	0	0	28.5	0.600 S	28.5	04/18/2040	10/27/2017
4.01	END	N	1.000 NM	03/19/2013	1.296	10/21/2015	1.296 RR	10/27/2016	0	0	0	0	0.600 S	0.1	11/11/4016	10/27/2017
5.01	STR-T	N	1.001	08/21/2014	0.998	10/21/2015	0.983 TC	10/27/2016	14.7	8.2	8.1	14.7	0.600 S	14.7	11/16/2042	10/27/2017
6.01	STR-R	Y	0.990	08/21/2014	0.990 RR	10/21/2015	0.942 TC	10/27/2016	47.1	22.0	21.4	47.1	0.600 S	47.1	01/31/2024	10/27/2017
7.01	END	N	1.000 NM	03/19/2013	1.280	10/21/2015	1.267 TC	10/27/2016	12.8	0	0	12.8	0.600 S	12.8	12/06/2068	10/27/2017
8.01	END	Y	1.000 NM	03/19/2013	1.300	10/21/2015	1.231 TC	10/27/2016	67.7	0	0	67.7	0.600 S	67.7	02/21/2026	10/27/2017
9.01	STR-R	N	0.997	08/21/2014	0.997 RR	10/21/2015	0.999 RR	10/27/2016	0	0	0	1.2	0.600 S	0.1	11/11/4016	10/27/2017
10.01	STR-R	N	0.994	08/21/2014	0.994 RR	10/21/2015	0.993 TC	10/27/2016	1.0	0.5	0.4	4.2	0.600 S	1.0	10/30/2409	10/27/2017
11.01	END	N	1.000 NM	03/19/2013	1.301	10/21/2015	1.296 TC	10/27/2016	4.9	0	0	4.9	0.600 S	4.9	11/12/2158	10/27/2017
12.01	END	N	1.000 NM	03/19/2013	1.311	10/21/2015	1.307 TC	10/27/2016	3.9	0	0	3.9	0.600 S	3.9	02/08/2198	10/27/2017
13.01	STR-B	N	0.986	08/21/2014	0.986 RR	10/21/2015	0.997 RR	10/27/2016	0	0	0	5.6	0.600 S	0.1	11/11/4016	10/27/2017
14.01	STR-R	Y *	1.018	08/21/2014	1.011	10/21/2015	0.946 TC	10/27/2016	63.8	33.0	32.3	63.8	0.600 S	63.8	03/31/2022	10/27/2017
15.01	END	Y *	1.000 NM	03/19/2013	1.311	10/21/2015	1.209 TC	10/27/2016	100.1	0	0	100.1	0.600 S	100.1	11/27/2022	10/27/2017
16.01	END	N	1.000 NM	03/19/2013	1.299	10/21/2015	1.299 RR	10/27/2016	0	0	0	0	0.600 S	0.1	11/11/4016	10/27/2017
17.01	STR-T	N	0.987	08/21/2014	0.987 RR	10/21/2015	0.999 TC	10/27/2016	0	0	0	5.2	0.600 S	0.1	11/11/4016	10/27/2017
18.01	STR-L	Y *	1.018	08/21/2014	1.011	10/21/2015	0.942 TC	10/27/2016	67.7	34.8	34.1	67.7	0.600 S	67.7	11/15/2021	10/27/2017
19.01	END	N	1.000 NM	03/19/2013	1.299	10/21/2015	1.290 TC	10/27/2016	8.8	0	0	8.8	0.600 S	8.8	03/26/2095	10/27/2017
20.01	END	Y	1.000 NM	03/19/2013	1.310	10/21/2015	1.234 TC	10/27/2016	74.6	0	0	74.6	0.600 S	74.6	04/27/2025	10/27/2017

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:12/27/2016

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

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

Flange Rating: 0 lb/in²
 Design Pressure: 10000 lb/in²
 Design Temperature: 200 °F

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

Summary: Group Name: Group Description:
 Insp. Due Date = 10/27/2017 RCR = 70.9 MPY
 Pred. Ret. Date = 08/22/2022 Rem. Life (from last survey 10/27/2016) = 5.8 yrs

0 C.A. Status: No
 Total Caution IMLS = 27

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-L	N	1.018	08/21/2014	1.009	10/21/2015	0.997 TC	10/27/2016	11.8	9.6	9.6	11.8	0.600 S	11.8	06/19/2050	10/27/2017
22.01	STR-L	Y	1.018	08/21/2014	1.011	10/21/2015	0.984 TC	10/27/2016	26.5	15.6	15.3	26.5	0.600 S	26.5	04/25/2031	10/27/2017
23.01	END	Y	1.000 NM	03/19/2013	1.296	10/21/2015	1.260 TC	10/27/2016	35.3	0	0	35.3	0.600 S	35.3	07/09/2035	10/27/2017
24.01	END	N	1.000 NM	03/19/2013	1.300	10/21/2015	1.298 TC	10/27/2016	2.0	0	0	2.0	0.600 S	2.0	10/30/2365	10/27/2017
25.01	STR-B	N	1.000	08/21/2014	0.997	10/21/2015	0.994 TC	10/27/2016	2.9	2.7	2.7	2.9	0.600 S	2.9	09/08/2152	10/27/2017
26.01	STR-T	Y *	1.009	08/21/2014	1.005	10/21/2015	0.953 TC	10/27/2016	51.1	25.6	25.1	51.1	0.600 S	51.1	09/24/2023	10/27/2017
27.01	END	N	1.000 NM	03/19/2013	1.305	10/21/2015	1.305 RR	10/27/2016	0	0	0	0	0.600 S	0.1	11/11/4016	10/27/2017
28.01	END	Y	1.000 NM	03/19/2013	1.310	10/21/2015	1.273 TC	10/27/2016	36.3	0	0	36.3	0.600 S	36.3	05/13/2035	10/27/2017
29.01	STR-T	N	0.975	08/21/2014	0.975 RR	10/21/2015	0.973 TC	10/27/2016	2.0	0.9	0.9	9.9	0.600 S	2.0	04/30/2203	10/27/2017
30.01	STR-T	Y *	1.030	08/21/2014	1.003	10/21/2015	0.952 TC	10/27/2016	50.1	35.7	35.4	50.1	0.600 S	50.1	11/06/2023	10/27/2017
31.01	END	Y	1.000 NM	03/19/2013	1.296	10/21/2015	1.233 TC	10/27/2016	61.9	0	0	61.9	0.600 S	61.9	01/18/2027	10/27/2017
32.01	END	Y	1.000 NM	03/19/2013	1.303	10/21/2015	1.237 TC	10/27/2016	64.8	0	0	64.8	0.600 S	64.8	08/26/2026	10/27/2017
33.01	STR-L	Y	1.015	08/21/2014	0.996	10/21/2015	0.960 TC	10/27/2016	35.3	25.2	25.0	35.3	0.600 S	35.3	01/08/2027	10/27/2017
34.01	STR-B	Y	1.020	08/21/2014	1.008	10/21/2015	0.975 TC	10/27/2016	32.4	20.6	20.3	32.4	0.600 S	32.4	05/24/2028	10/27/2017
35.01	END	Y	1.000 NM	03/19/2013	1.311	10/21/2015	1.243 TC	10/27/2016	66.8	0	0	66.8	0.600 S	66.8	06/13/2026	10/27/2017
36.01	END	N	1.000 NM	03/19/2013	1.287	10/21/2015	1.287 RR	10/27/2016	0	0	0	0	0.600 S	0.1	11/11/4016	10/27/2017
37.01	STR-B	Y	1.027	08/21/2014	0.979	10/21/2015	0.979 RR	10/27/2016	0	22.0	22.4	41.2	0.600 S	22.0	01/18/2034	10/27/2017
38.01	STR-R	Y	1.031	08/21/2014	1.001	10/21/2015	0.978 TC	10/27/2016	22.6	24.3	24.3	25.7	0.600 S	24.3	05/18/2032	10/27/2017
39.01	END	N	1.000 NM	03/19/2013	1.297	10/21/2015	1.291 TC	10/27/2016	5.9	0	0	5.9	0.600 S	5.9	12/11/2133	10/27/2017
40.01	END	Y	1.000 NM	03/19/2013	1.303	10/21/2015	1.242 TC	10/27/2016	59.9	0	0	59.9	0.600 S	59.9	07/17/2027	10/27/2017
41.01	STR-R	Y	1.015	08/21/2014	0.999	10/21/2015	0.967 TC	10/27/2016	31.4	22.0	21.8	31.4	0.600 S	31.4	07/05/2028	10/27/2017

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 12/27/2016

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

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

Flange Rating: 0 lb/in²
 Design Pressure: 10000 lb/in²
 Design Temperature: 200 °F

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

Summary: Group Name:
 Insp. Due Date = 10/27/2017
 Pred. Ret. Date = 08/22/2022

Group Description:
 RCR = 70.9 MPY
 Rem. Life (from last survey 10/27/2016) = 5.8 yrs

0 C.A. Status: No
 Total Caution IMLS = 27

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-L	Y	1.010	08/21/2014	1.006	10/21/2015	0.966 TC	10/27/2016	39.3	20.1	19.7	39.3	0.600 S	39.3	02/19/2026	10/27/2017
43.01	END	N	1.000 NM	03/19/2013	1.297	10/21/2015	1.297 RR	10/27/2016	0	0	0	0	0.600 S	0.1	11/11/4016	10/27/2017
44.01	END	Y	1.000 NM	03/19/2013	1.304	10/21/2015	1.225 TC	10/27/2016	77.6	0	0	77.6	0.600 S	77.6	11/16/2024	10/27/2017
45.01	STR-T	Y	1.013	08/21/2014	1.009	10/21/2015	0.983 TC	10/27/2016	25.5	13.7	13.5	25.5	0.600 S	25.5	11/04/2031	10/27/2017
46.01	STR-R	Y	1.012	08/21/2014	1.008	10/21/2015	0.973 TC	10/27/2016	34.4	17.9	17.5	34.4	0.600 S	34.4	08/31/2027	10/27/2017

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

Report Date: 12/27/2016

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

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

Flange Rating: 0 lb/in²
Design Pressure: 10000 lb/in²
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	:	30.5 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	70.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	36.3 MPY
(D) -- Default Corrosion Rate	:	0.1 MPY

Representative Corrosion Rate = 70.9 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) -- 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 = 5.8 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 08/22/2022

Recommended Eq/Circ UT/RT Inspection Date is 10/27/2017
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 27 Caution TMLs in this Eq/Circ ID.



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

Inspections Performed for: FMC Technologies Completion – Pennsylvania	
Inspection Report for: LH-0035-C3 Line Heater	Date Last Inspected: 10/27/2016
Remaining Life: No UT taken	Next UT: N/A Next VT: 10/27/2017
Representative Corrosion Rate: N/A	Mfg Serial #: 4049-03
Manufacturer: Coral Oilfield Services Inc.	Alberta Registration #: 626747
Year Built: 2013	Canadian Registration #: P9408.21

FMC Technologies Completion LH0035-C3 Steam Coil



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-C3
Equipment Name/Service : Line Heater Steam Coil
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



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



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

Inspections Performed for: FMC Technologies Completion – PA District	
Inspection Report for: LH-0035 Fuel Gas Scrubber	
Remaining Life: 20+ YRS	Date of this Report: 10/25/2016
Representative Corrosion Rate: 3.2 MPY	Next UT: 10/25/2017 Next VT: 10/25/2017
Manufacturer: Baron Oilfield Services, Ltd.	Mfg Serial #: 1007.12871
Date Built: 2012	National Board #: N/A
Alberta registration #: N/A	Canadian Registration #: 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) _____

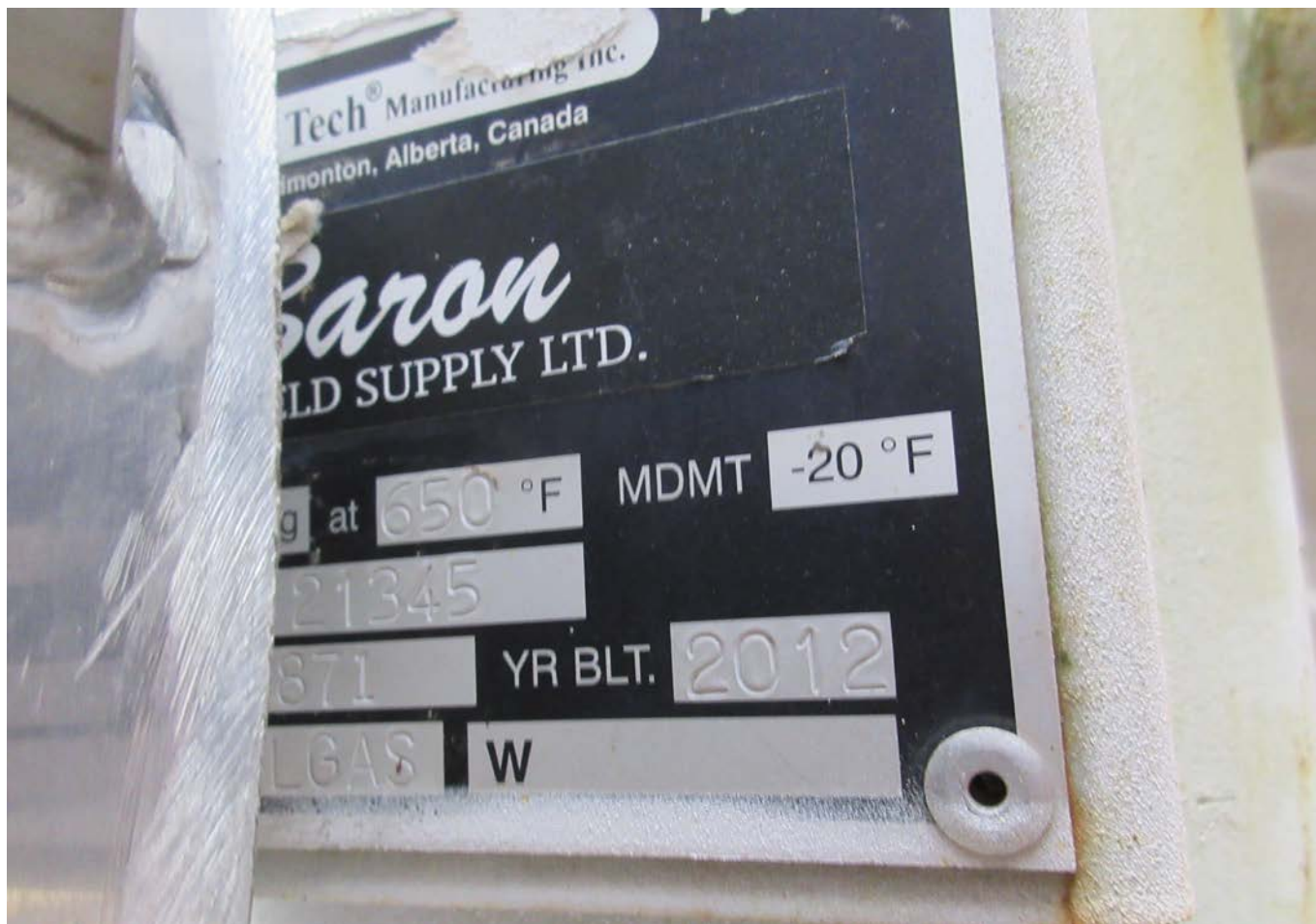
Any other pertinent information: _____

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

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

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible but almost inaccessible. 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, 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.

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? 150 psi

Date PSV last tested (if there is a tag on the valve): 10/2015

Comments:

Recommendations:

Repairs Needed:

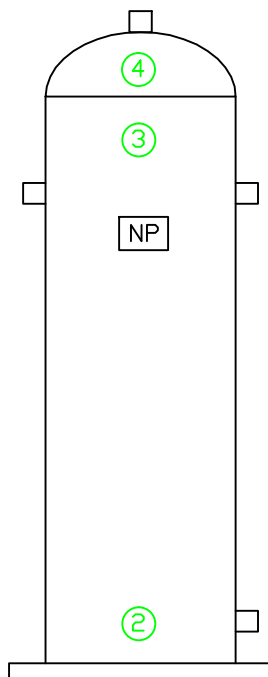
Robert W. Menke/JWW
API 510 Inspector Signature

0131
API 510 Inspector Number

10/27/2016
Date

EQUIP RETIREMENT DATE: 6/18/2113
NEXT INSPECTION IS DUE: 10/25/2017

- ```
#2. 01- BTM SHELL-F 0. 340 TC
#2. 02- BTM SHELL-L 0. 338 TC
#2. 03- BTM SHELL-BK 0. 327 TC
#2. 04- BTM SHELL-R 0. 324 TC
#3. 01- TOP SHELL-F 0. 336 TC
#3. 02- TOP SHELL-L 0. 339 TC
#3. 03- TOP SHELL-BK 0. 328 TC
#3. 04- TOP SHELL-R 0. 324 TC
#4. 01- TOP HEAD-F 0. 279 TC
#4. 02- TOP HEAD-L 0. 274 TC
#4. 03- TOP HEAD-BK 0. 276 TC
#4. 04- TOP HEAD-R 0. 272 TC
```

[illegible]

TC-560

| 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=55° F

VESSEL=59° 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:12/27/2016

(report in inches, corrosion rates in MPY)  
 Analysis: Straight Line

Unit: LH-0035  
 Eq/Circ ID: LH0035-FGS  
 Eq Type: VESSEL  
 Class:  
 CM RBL:  
 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 = 10/25/2017  
 Pred. Ret. Date = 06/18/2113

Group Description:  
 RCR = 3.2 MPY  
 Rem. Life (from last survey 10/25/2016) = 96.6 yrs

0 C.A. Status: NO  
 Total Caution IMLS = 0

| TML No | Location     | Ctn<br>TML | First<br>Survey<br>Thick Nt | First<br>Date | Previous<br>Survey<br>Thick Nt | Previous<br>Date | Last<br>Survey<br>Thick Nt | Last<br>Date | Shrt<br>Term<br>Rate | Long<br>Term<br>Rate | Best<br>Rate | Max<br>Hist<br>CR | Retirement<br>Thickness | Rep<br>TML<br>CR | TML<br>Retirement<br>Date | TML<br>Inspection<br>Date |
|--------|--------------|------------|-----------------------------|---------------|--------------------------------|------------------|----------------------------|--------------|----------------------|----------------------|--------------|-------------------|-------------------------|------------------|---------------------------|---------------------------|
| 2.01   | BTM SHELL-F  | N          | 0.313 NM                    | 06/06/2002    | 0.319 TC                       | 08/21/2014       | 0.319 RR                   | 10/25/2016   | 0                    | 0                    | 0            | 20.7              | 0.193 S                 | 0.1              | 11/03/3276                | 10/25/2017                |
| 2.02   | BTM SHELL-L  | N          | 0.313 NM                    | 06/06/2002    | 0.325 TC                       | 08/21/2014       | 0.325 RR                   | 10/25/2016   | 0                    | 0                    | 0            | 15.7              | 0.193 S                 | 0.1              | 11/04/3336                | 10/25/2017                |
| 2.03   | BTM SHELL-BK | N          | 0.313 NM                    | 06/06/2002    | 0.318 TC                       | 08/21/2014       | 0.318 RR                   | 10/25/2016   | 0                    | 0                    | 0            | 21.5              | 0.193 S                 | 0.1              | 11/04/3266                | 10/25/2017                |
| 2.04   | BTM SHELL-R  | N *        | 0.313 NM                    | 06/06/2002    | 0.330 TC                       | 08/21/2014       | 0.324 TC                   | 10/25/2016   | 2.8                  | 0                    | 0            | 11.6              | 0.193 S                 | 2.8              | 08/08/2063                | 10/25/2017                |
| 3.01   | TOP SHELL-F  | N          | 0.313 NM                    | 06/06/2002    | 0.334 TC                       | 08/21/2014       | 0.334 RR                   | 10/25/2016   | 0                    | 0                    | 0            | 8.3               | 0.193 S                 | 0.1              | 11/06/3426                | 10/25/2017                |
| 3.02   | TOP SHELL-L  | N          | 0.313 NM                    | 06/06/2002    | 0.327 TC                       | 08/21/2014       | 0.327 RR                   | 10/25/2016   | 0                    | 0                    | 0            | 14.1              | 0.193 S                 | 0.1              | 11/04/3356                | 10/25/2017                |
| 3.03   | TOP SHELL-BK | N *        | 0.313 NM                    | 06/06/2002    | 0.330 TC                       | 08/21/2014       | 0.328 TC                   | 10/25/2016   | 0.9                  | 0                    | 0            | 11.6              | 0.193 S                 | 0.9              | 10/27/2166                | 10/25/2017                |
| 3.04   | TOP SHELL-R  | N *        | 0.313 NM                    | 06/06/2002    | 0.337 TC                       | 08/21/2014       | 0.324 TC                   | 10/25/2016   | 6.0                  | 0                    | 0            | 6.0               | 0.193 S                 | 6.0              | 08/26/2038                | 10/25/2017                |
| 4.01   | TOP HEAD-F   | N *        | 0.281 NM                    | 06/06/2002    | 0.273 TC                       | 08/21/2014       | 0.273 RR                   | 10/25/2016   | 0                    | 0.6                  | 0.6          | 6.6               | 0.193 S                 | 0.6              | 02/25/2150                | 10/25/2017                |
| 4.02   | TOP HEAD-L   | N          | 0.281 NM                    | 06/06/2002    | 0.274 TC                       | 08/21/2014       | 0.274 TC                   | 10/25/2016   | 0                    | 0.5                  | 0.5          | 5.8               | 0.193 S                 | 0.5              | 10/27/2178                | 10/25/2017                |
| 4.03   | TOP HEAD-BK  | N *        | 0.281 NM                    | 06/06/2002    | 0.270 TC                       | 08/21/2014       | 0.270 RR                   | 10/25/2016   | 0                    | 0.8                  | 0.8          | 9.1               | 0.193 S                 | 0.8              | 01/25/2113                | 10/25/2017                |
| 4.04   | TOP HEAD-R   | N *        | 0.281 NM                    | 06/06/2002    | 0.272 TC                       | 08/21/2014       | 0.272 TC                   | 10/25/2016   | 0                    | 0.6                  | 0.7          | 7.5               | 0.193 S                 | 0.6              | 06/26/2148                | 10/25/2017                |

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

Report Date: 12/27/2016

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

Unit: LH-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         | : | 1.1 MPY |
| (B) -- Average Max 25.0% of TMLs, Min of 2   | : | 3.2 MPY |
| (C) -- Formula Corrosion Rate (Sigma = 1.28) | : | 1.5 MPY |
| (D) -- Default Corrosion Rate                | : | 0.1 MPY |

Representative Corrosion Rate = 3.2 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 = 96.6 years from the most recent survey date.  
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 06/18/2113

Recommended Eq/Circ UT/RT Inspection Date is 10/25/2017  
UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.  
There are 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> 4.500"                 | <b>Eq/Circ. ID:</b> LH0035-P                                                                                                                   |
| <b>Service/System:</b>                             | <b>Piping Class</b> <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> Other |
| <b>Design Pressure:</b> 10,000 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> 150#                                                                                                                     |

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<br><input checked="" type="checkbox"/> Not Insulated<br><input type="checkbox"/> Missing/Damaged<br><input type="checkbox"/> CUI Identification<br><input type="checkbox"/> Corrosion Present (Describe)<br><input type="checkbox"/> Other<br><input checked="" type="checkbox"/> No Issues | Piping is not insulated. |

| Coating Condition:                                                                                                                                                                                                                             | Comments:                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> Good<br><input checked="" type="checkbox"/> Fair, Some Blistering/Peeling<br><input checked="" type="checkbox"/> Corrosion Present (Describe)<br><input type="checkbox"/> Other<br><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)<br><input type="checkbox"/> Seeping or Evidence of Past Leakage<br><input type="checkbox"/> Dripping (Size of Drops/Drops Per Minute)<br><input type="checkbox"/> Leaking (Size of Stream, Noise Level, etc.)<br><input type="checkbox"/> Clamps<br><input type="checkbox"/> Other<br><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<br><input type="checkbox"/> Incomplete Fusion/Penetration<br><input type="checkbox"/> Crack Located Near Weld Seam<br><input type="checkbox"/> Weld Does Not Appear to Be Original<br><input type="checkbox"/> Joints-Misaligned<br><input type="checkbox"/> Undercut<br><input type="checkbox"/> Other<br><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<br><input type="checkbox"/> Rupture Disk<br><input type="checkbox"/> Atmospheric<br><input type="checkbox"/> No Relief Device Identified For This Equipment<br><input type="checkbox"/> Tag Secure and Legible<br><input type="checkbox"/> Set Pressure At Or Below MAWP<br><input type="checkbox"/> Block Valve Not Locked/Car Sealed In Open Position<br><input type="checkbox"/> Improper Drain Hole/Weather Cap On Atmos. Discharge<br><input type="checkbox"/> Obstruction (i.e. Debris)<br><input type="checkbox"/> Relief Installed In A Position Other Than Horiz. Or Upright<br><input type="checkbox"/> Other<br><input checked="" type="checkbox"/> No Issues |           |

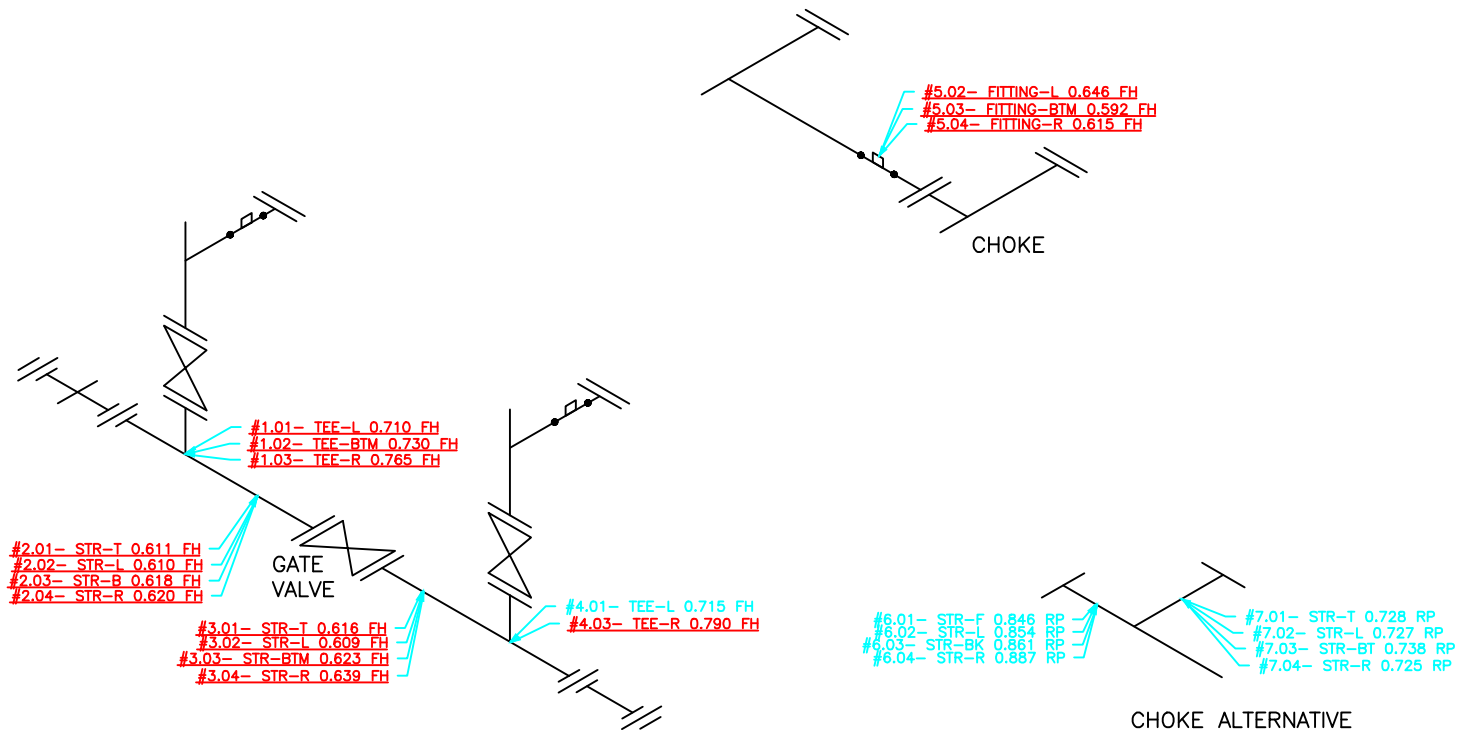
| Supports/Hangers:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comments:                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> In Serviceable Condition<br><input type="checkbox"/> Foundation Is Damaged<br><input type="checkbox"/> Additional Support Needed<br><input type="checkbox"/> Hanger/Support Is Distorted/Broken/Missing<br><input type="checkbox"/> Pipe Slide Or Shoe Is Off Of The Support<br><input type="checkbox"/> Makeshift Support<br><input type="checkbox"/> Loose Support Needed To Be Tightened<br><input type="checkbox"/> Fireproofing Missing Or Damaged<br><input type="checkbox"/> Support/Hanger Is Corroded<br><input checked="" type="checkbox"/> Other<br><input type="checkbox"/> No Issues | There is minor chipping with surface corrosion and 1 support is undone. |

| Flanged Connections:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comments:                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Bolting Serviceable<br><input type="checkbox"/> Short, Missing Or Damaged Bolting<br><input type="checkbox"/> Nuts Lack Full Engagement<br><input checked="" type="checkbox"/> Flanges Serviceable<br><input type="checkbox"/> Flange Material Or Rating Inconsistent For System<br><input type="checkbox"/> Flanges Deformed Or Damaged<br><input checked="" type="checkbox"/> Corrosion Present (Describe)<br><input type="checkbox"/> Gaskets<br><input type="checkbox"/> Flange Rating Issues<br><input type="checkbox"/> Other<br><input checked="" type="checkbox"/> No Issues | Flanges have light chipping. Bolts show light peeling. There is minor surface corrosion on bolts and flanges. Missing inlet elbows |

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



EQUIP RETIREMENT DATE: 1/13/2019  
NEXT INSPECTION IS DUE: 10/27/2017



LH0035-P

TEMP=53°F  
CAL BLK=49°F

FH2E-D

DESC: ASSOC PIPING ON LINE HEATER LH-0035  
DWG#: LH0035-P-1.01-7.04

## Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:12/27/2016

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

Unit: LH-0035  
 Eq/Circ ID: LH0035-P  
 Eq Type: PIPING  
 Class:  
 CM RBL:  
 Design Code: B31.3

Flange Rating: 5625 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: LH-0035 ASSOCIATED PIPING

Summary: Group Name:  
 Insp. Due Date = 10/21/2017  
 Pred. Ret. Date = 01/13/2019

Group Description:  
 RCR = 159.4 MPY  
 Rem. Life (from last survey 10/21/2016) = 2.2 yrs

0 C.A. Status: NO  
 Total Caution IMLs = 15

| TML No | Location    | Ctn TML | First Survey Thick Nt | First Date | Previous Survey Thick Nt | Previous Date | Last Survey Thick Nt | Last Date  | Shrt Term Rate | Long Term Rate | Best Rate | Max Hist CR | Retirement Thickness | Rep TML CR | TML Retirement Date | TML Inspection Date |
|--------|-------------|---------|-----------------------|------------|--------------------------|---------------|----------------------|------------|----------------|----------------|-----------|-------------|----------------------|------------|---------------------|---------------------|
| 1.01   | TEE-L       | Y       | 0.846                 | 10/21/2015 |                          | N/A           | 0.710 FH             | 10/27/2016 | N/A            | 133.5          | N/A       | 133.5       | 0.260 P              | 133.5      | 03/11/2020          | 10/27/2017          |
| 1.02   | TEE-BTM     | Y       | 0.870                 | 10/21/2015 |                          | N/A           | 0.730 FH             | 10/27/2016 | N/A            | 137.5          | N/A       | 137.5       | 0.260 P              | 137.5      | 03/28/2020          | 10/27/2017          |
| 1.03   | TEE-R       | Y       | 0.892                 | 10/21/2015 |                          | N/A           | 0.765 FH             | 10/27/2016 | N/A            | 124.7          | N/A       | 124.7       | 0.260 P              | 124.7      | 11/14/2020          | 10/27/2017          |
| 2.01   | STR-T       | Y *     | 0.767                 | 10/21/2015 |                          | N/A           | 0.611 FH             | 10/27/2016 | N/A            | 153.2          | N/A       | 153.2       | 0.260 P              | 153.2      | 02/11/2019          | 10/27/2017          |
| 2.02   | STR-L       | Y *     | 0.783                 | 10/21/2015 |                          | N/A           | 0.610 FH             | 10/27/2016 | N/A            | 169.9          | N/A       | 169.9       | 0.260 P              | 169.9      | 11/18/2018          | 10/27/2017          |
| 2.03   | STR-B       | Y       | 0.759                 | 10/21/2015 |                          | N/A           | 0.618 FH             | 10/27/2016 | N/A            | 138.4          | N/A       | 138.4       | 0.260 P              | 138.4      | 05/30/2019          | 10/27/2017          |
| 2.04   | STR-R       | Y       | 0.764                 | 10/21/2015 |                          | N/A           | 0.620 FH             | 10/27/2016 | N/A            | 141.4          | N/A       | 141.4       | 0.260 P              | 141.4      | 05/15/2019          | 10/27/2017          |
| 3.01   | STR-T       | Y *     | 0.762                 | 10/21/2015 |                          | N/A           | 0.616 FH             | 10/27/2016 | N/A            | 143.4          | N/A       | 143.4       | 0.260 P              | 143.4      | 04/22/2019          | 10/27/2017          |
| 3.02   | STR-L       | Y *     | 0.790                 | 10/21/2015 |                          | N/A           | 0.609 FH             | 10/27/2016 | N/A            | 177.7          | N/A       | 177.7       | 0.260 P              | 177.7      | 10/14/2018          | 10/27/2017          |
| 3.03   | STR-BTM     | Y *     | 0.772                 | 10/21/2015 |                          | N/A           | 0.623 FH             | 10/27/2016 | N/A            | 146.3          | N/A       | 146.3       | 0.260 P              | 146.3      | 04/21/2019          | 10/27/2017          |
| 3.04   | STR-R       | Y       | 0.760                 | 10/21/2015 |                          | N/A           | 0.639 FH             | 10/27/2016 | N/A            | 118.8          | N/A       | 118.8       | 0.260 P              | 118.8      | 01/05/2020          | 10/27/2017          |
| 4.01   | TEE-L       | N       | 0.716                 | 10/21/2015 |                          | N/A           | 0.715 FH             | 10/27/2016 | N/A            | 1.0            | N/A       | 50.9        | 0.260 P              | 1.0        | 10/31/2471          | 10/27/2017          |
| 4.03   | TEE-R       | Y       | 0.889                 | 10/21/2015 |                          | N/A           | 0.790 FH             | 10/27/2016 | N/A            | 97.2           | N/A       | 97.2        | 0.260 P              | 97.2       | 04/10/2022          | 10/27/2017          |
| 5.02   | FITTING-L   | Y       | 0.786                 | 10/21/2015 |                          | N/A           | 0.646 FH             | 10/27/2016 | N/A            | 137.5          | N/A       | 137.5       | 0.260 P              | 137.5      | 08/18/2019          | 10/27/2017          |
| 5.03   | FITTING-BTM | Y *     | 0.761                 | 10/21/2015 |                          | N/A           | 0.592 FH             | 10/27/2016 | N/A            | 165.9          | N/A       | 165.9       | 0.260 P              | 165.9      | 10/28/2018          | 10/27/2017          |
| 5.04   | FITTING-R   | Y       | 0.751                 | 10/21/2015 |                          | N/A           | 0.615 FH             | 10/27/2016 | N/A            | 133.5          | N/A       | 133.5       | 0.260 P              | 133.5      | 06/25/2019          | 10/27/2017          |
| 6.01   | STR-F       | N       |                       | N/A        |                          | N/A           | 0.846 RP             | 10/27/2016 | N/A            | N/A            | N/A       | 4.0         | 0.260 P              | 0.1        | 11/11/4016          | 10/27/2017          |
| 6.02   | STR-L       | N       |                       | N/A        |                          | N/A           | 0.854 RP             | 10/27/2016 | N/A            | N/A            | N/A       | 0           | 0.260 P              | 0.1        | 11/11/4016          | 10/27/2017          |
| 6.03   | STR-BK      | N       |                       | N/A        |                          | N/A           | 0.861 RP             | 10/27/2016 | N/A            | N/A            | N/A       | 0           | 0.260 P              | 0.1        | 11/11/4016          | 10/27/2017          |
| 6.04   | STR-R       | N       |                       | N/A        |                          | N/A           | 0.887 RP             | 10/27/2016 | N/A            | N/A            | N/A       | 0.6         | 0.260 P              | 0.1        | 11/11/4016          | 10/27/2017          |

## Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 12/27/2016

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

Unit: LH-0035  
 Eq/Circ ID: LH0035-P  
 Eq Type: PIPING  
 Class:  
 CM RBL:  
 Design Code: B31.3

Flange Rating: 5625 lb/in<sup>2</sup>  
 Design Pressure: 10000 lb/in<sup>2</sup>  
 Design Temperature: 200 °F

Description: LH-0035 ASSOCIATED PIPING

Summary: Group Name:  
 Insp. Due Date = 10/27/2017  
 Pred. Ret. Date = 01/13/2019

Group Description:  
 RCR = 159.4 MPY  
 Rem. Life (from last survey 10/27/2016) = 2.2 yrs

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

| TML No | Location | Ctn<br>TML | First<br>Survey<br>Thick Nt | First<br>Date | Previous<br>Survey<br>Thick Nt | Previous<br>Date | Last<br>Survey<br>Thick Nt | Last<br>Date | Shrt<br>Term<br>Rate | Long<br>Term<br>Rate | Best<br>Rate | Max<br>Hist<br>CR | Retirement<br>Thickness | Rep<br>TML<br>CR | TML<br>Retirement<br>Date | TML<br>Inspection<br>Date |
|--------|----------|------------|-----------------------------|---------------|--------------------------------|------------------|----------------------------|--------------|----------------------|----------------------|--------------|-------------------|-------------------------|------------------|---------------------------|---------------------------|
| 7.01   | STR-T    | N          |                             | N/A           |                                | N/A              | 0.728 RP                   | 10/27/2016   | N/A                  | N/A                  | N/A          | 1.2               | 0.260 P                 | 0.1              | 11/11/4016                | 10/27/2017                |
| 7.02   | STR-L    | N          |                             | N/A           |                                | N/A              | 0.727 RP                   | 10/27/2016   | N/A                  | N/A                  | N/A          | 0                 | 0.260 P                 | 0.1              | 11/11/4016                | 10/27/2017                |
| 7.03   | STR-BT   | N          |                             | N/A           |                                | N/A              | 0.738 RP                   | 10/27/2016   | N/A                  | N/A                  | N/A          | 0                 | 0.260 P                 | 0.1              | 11/11/4016                | 10/27/2017                |
| 7.04   | STR-R    | N          |                             | N/A           |                                | N/A              | 0.725 RP                   | 10/27/2016   | N/A                  | N/A                  | N/A          | 0                 | 0.260 P                 | 0.1              | 11/11/4016                | 10/27/2017                |

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

Report Date: 12/27/2016

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

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

Flange Rating: 5625 lb/in<sup>2</sup>  
Design Pressure: 10000 lb/in<sup>2</sup>  
Design Temperature: 200 °F

Description: LH-0035 ASSOCIATED PIPING

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         | : | 88.4 MPY  |
| (B) -- Average Max 25.0% of TMLs, Min of 2   | : | 159.4 MPY |
| (C) -- Formula Corrosion Rate (Sigma = 1.28) | : | 111.5 MPY |
| (D) -- Default Corrosion Rate                | : | 0.1 MPY   |

Representative Corrosion Rate = 159.4 MPY

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

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

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

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

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

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

Eq/Circ ID Estimated life = 2.2 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 01/13/2019

Recommended Eq/Circ UT/RT Inspection Date is 10/27/2017  
UT/RT Inspection Interval is 1.00 years.

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