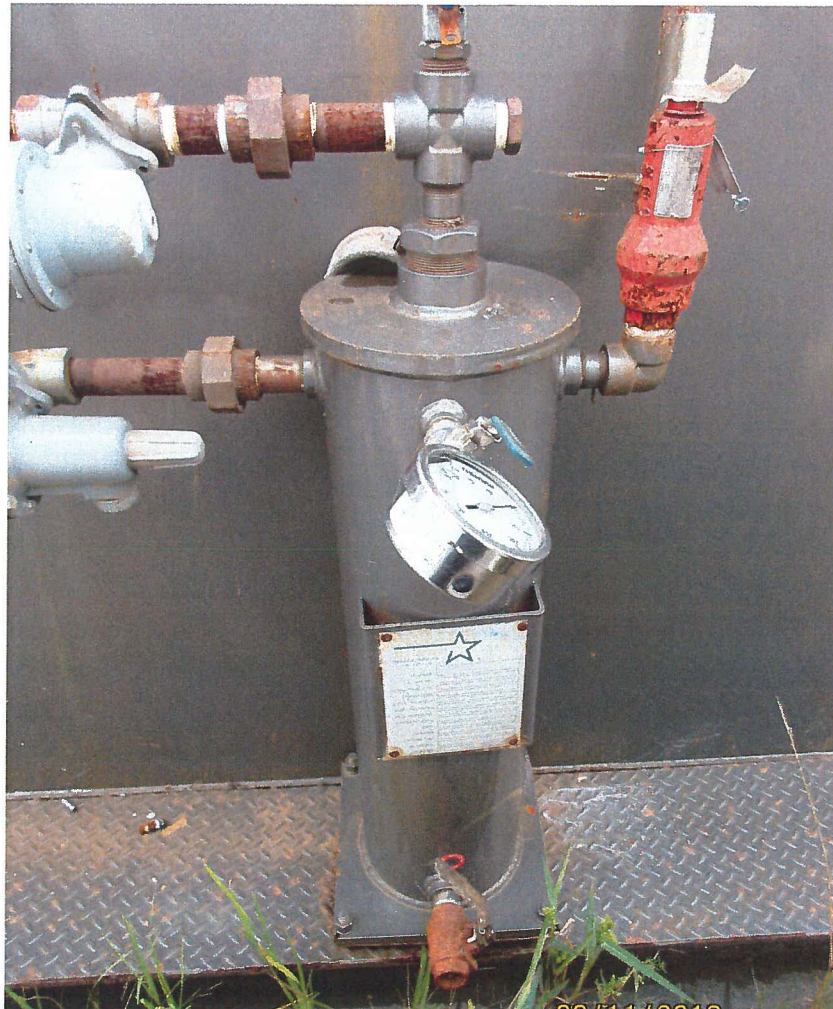




1595 So. Hwy 150, Suite F
Evanston, WY 82930

Inspections Performed for: FMC Technologies Completion – PA District	
Inspection Report for: LH-0004 Fuel Gas Scrubber	
Remaining Life: 20+ YRS	Date of this Report: 09/11/2018
Representative Corrosion Rate: 0.1 MPY	Next UT: 09/11/2019 Next VT: 09/11/2019
Manufacturer: Blue Star Welding	Mfg Serial #: BSFGS227
Date Built: 2004	National Board #: None
Alberta registration #: None	Canadian Registration #: OH6510.2

FMC Technologies Completion - LH-0004 Line Heater Fuel Gas Scrubber



PRESSURE VESSEL INVENTORY

☒ Code ☐ Code-invalidated ☐ Non-Code ☐ Unknown ☐ Code-Exempt

☐ High Consequence (HCO) ☐ Medium Consequence (MCO) ☐ Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District (at initial inspection)
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-FGS
Equipment Name/Service : (Line Heater) Fuel Gas Scrubber
Physical Location : On LH-0004 in Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Vertical Fuel Gas Scrubber

Vessel Size: 8.625" O.D.

Operating Pressure Range (psig): N/A

Operating Temperature Range (°F): N/A

Does the vessel have Internal Access? No

Specify type of internal access, if available:

Vessel is located: Outside

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam?

Any stamping pertaining to materials of construction?

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____psi

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

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

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

BLUESTAR
WELDING
GRANDE PRAIRIE, AB
1-780-532-1160
6 YR MANU 2004

A NUMBER _____
SERIAL NO. BSFGS 227
DESIGN PRESSURE 150 PSI
DESIGN TEMP -20°F / 100°F
SHELL THICKNESS _____
HEAD THICKNESS _____
REG. DESIGN NO. _____
STRESS RELIEVED NO
X-RAY _____
DERATED _____
HYDRO TEST _____
INSPECTOR _____
GRN NO. _____

SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

Repair stamp: ☐ R stamp ☐ Other Stamp ☐ No stamp

Repaired By _____ Date of Repair _____

Nat'l Bd. R-Certification No. _____

Other Stamping Information: _____

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms

☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Eric Crandall Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-FGS
Equipment Name/Service: Fuel Gas Scrubber	
Physical Location: In PA Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BSFGS227
Year Built: 2004	National board #: None
Alberta Registration #: None	Canadian Registration #: OH 6510.2

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access?: No

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

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

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

Condition of Steel Supports, Saddles, and Bolting: All support structural welds appear sound. Vessel is welded to baseplate.

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. The head is flat plate.

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): 03/29/2018 by PTW

Comments:

Piping associated with the Scrubber appears to be serviceable.

Recommendations:

None

Repairs Needed:

None

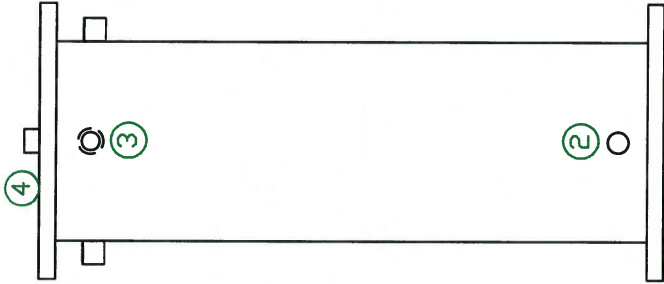
Michael J. York
API 510 Inspector Signature

66475
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 10/4/2306
NEXT INSPECTION IS DUE: 9/11/2019

- #2. 01- BTM SH-FRONT 0. 321 D9
- #2. 02- BTM SH-LEFT 0. 335 D9
- #2. 03- BTM SH-BACK 0. 326 D9
- #2. 04- BTM SH-RIGHT 0. 340 D9
- #3. 01- TOP SH-FRONT 0. 324 D9
- #3. 02- TOP SH-LEFT 0. 312 D9
- #3. 03- TOP SH-BACK 0. 317 D9
- #3. 04- TOP SH-RIGHT 0. 334 D9
- #4. 01- TOP HD-F 0. 653 D9
- #4. 02- TOP HD-L 0. 648 D9
- #4. 03- TOP HD-BK 0. 662 D9
- #4. 04- TOP HD-R 0. 656 D9



DA-590

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BSFGS227
NATIONAL BOARD #	NONE
DATE BUILT	2004
DESIGN P & T	150 PSIG @ 100°F
NOTE	CRN # DH 6510.2 NO 'U' STAMP

CAL BLK=75°F		VESSEL=90°F	
BUSINESS UNIT	FMC TECHNOLOGIES	COMPLETION	
EQ/CIRC ID #	LH0004-FGS		
EQUIP NAME	FUEL GAS SCRUBBER		
LOCATION	DN LH-0004 SKID		
DWG #	LH0004-FGS		

DESC: FUEL GAS SCRUBBER
DWG#: LH0004-FGS-2.01-4.04

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: 10/12/2018

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

Unit: LH-0004

Eq/Circ ID: LH0004-FGS

Eq Type: VESSEL

Class:

CM RBI:

Design Code: S8/D1

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

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

Summary: Group Name:

Insp. Due Date = 09/11/2019

Pred. Ret. Date = 10/04/2306

Group Description:

RCR = 0.1 MPY

Rem. Life (from last survey 09/11/2018) = 288.1 Yrs

0 C.A. Status: NO

Total Caution TMLs = 0

TML No	Location	Ctn TML	First Survey Thick	First Survey Nt	First Date	Previous Survey Thick	Previous Survey Nt	Previous Date	Last Survey Thick	Last Survey Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
2.01	BTM SH-FRONT	N *	0.313 TC	02/04/2012	0.304 TC	0.321 D9	0.321 D9	11/10/2017	0.321 D9	0.321 D9	09/11/2018	0	0	0	13.0	0.282 U	0.1	09/14/2408	09/11/2019
2.02	BTM SH-LEFT	N	0.320 TC	02/04/2012	0.322 TC	0.335 D9	0.335 D9	11/10/2017	0.335 D9	0.335 D9	09/11/2018	0	0	0	18.3	0.282 U	0.1	09/15/2548	09/11/2019
2.03	BTM SH-BACK	N *	0.331 TC	02/04/2012	0.318 TC	0.326 D9	0.326 D9	11/10/2017	0.326 D9	0.326 D9	09/11/2018	0	0.8	1.2	8.5	0.282 U	0.8	09/11/2073	09/11/2019
2.04	BTM SH-RIGHT	N	0.333 TC	02/04/2012	0.325 TC	0.340 D9	0.340 D9	11/10/2017	0.340 D9	0.340 D9	09/11/2018	0	0	0	11.0	0.282 U	0.1	09/15/2598	09/11/2019
3.01	TOP SH-FRONT	N *	0.325 TC	02/04/2012	0.320 TC	0.324 D9	0.324 D9	11/10/2017	0.324 D9	0.324 D9	09/11/2018	0	0.2	0.9	10.2	0.282 U	0.2	09/13/2228	09/11/2019
3.02	TOP SH-LEFT	N *	0.305 TC	02/04/2012	0.302 TC	0.312 D9	0.312 D9	11/10/2017	0.312 D9	0.312 D9	09/11/2018	0	0	0	6.8	0.282 U	0.1	09/14/2318	09/11/2019
3.03	TOP SH-BACK	N *	0.306 TC	02/04/2012	0.305 TC	0.317 D9	0.317 D9	11/10/2017	0.317 D9	0.317 D9	09/11/2018	0	0	0	2.1	0.282 U	0.1	09/14/2368	09/11/2019
3.04	TOP SH-RIGHT	N	0.327 TC	02/04/2012	0.320 TC	0.334 D9	0.334 D9	11/10/2017	0.334 D9	0.334 D9	09/11/2018	0	0	0	8.0	0.282 U	0.1	09/15/2538	09/11/2019
4.01	TOP HD-F	N	0.656 NM	06/01/2004		0.653 D9	0.653 D9	N/A	0.653 D9	0.653 D9	09/11/2018	N/A	0.2	N/A	0.2	0.394 U	0.2	09/21/3313	09/11/2019
4.02	TOP HD-L	N *	0.656 NM	06/01/2004		0.648 D9	0.648 D9	N/A	0.648 D9	0.648 D9	09/11/2018	N/A	0.6	N/A	0.6	0.394 U	0.6	01/14/2442	09/11/2019
4.03	TOP HD-BK	N	0.656 NM	06/01/2004		0.662 D9	0.662 D9	N/A	0.662 D9	0.662 D9	09/11/2018	N/A	0	N/A	0	0.394 U	0.1	09/26/4018	09/11/2019
4.04	TOP HD-R	N	0.656 NM	06/01/2004		0.656 D9	0.656 D9	N/A	0.656 D9	0.656 D9	09/11/2018	N/A	0	N/A	0	0.394 U	0.1	09/26/4018	09/11/2019

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

Report Date: 10/12/2018

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

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

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

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

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 :
(B) -- Default Corrosion Rate : Varies
: 0.1 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 :
(B) -- Average Max 25.0% of TMLs, Min of 2 :
(C) -- Formula Corrosion Rate (Sigma = 1.28) :
(D) -- Default Corrosion Rate :
Representative Corrosion Rate = 0.1 MPY

: Not Used.
: Not Used.
: Not Used.
: 0.1 MPY

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

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

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

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

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

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

Eq/Circ ID Estimated life = 288.1 years from the most recent survey date.
(Estimated life based on the ave of the earliest 25% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 10/04/2306

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

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 0 Caution TMLs in this Eq/Circ ID.



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

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH0004-C1 - Line Heater Coil 1	
Remaining Life: 9.5 YRS	Date of this Report: 09/11/2018
Rep. Corrosion Rate: 100.4 MPY	Next UT: 09/11/2019 Next VT: 09/11/2019
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03A
Date Built: 2005	National Board #: None
Alberta registration #: 514075	Canadian Registration #: ALD-05-001

FMC Technologies Completion - LH-0004 Line Heater Coil 1



PRESSURE VESSEL INVENTORY

☒Code ☐Code-invalidated ☐Non-Code ☐Unknown ☐Code-Exempt

☐High Consequence (HCO) ☐Medium Consequence (MCO) ☐Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-C1
Equipment Name/Service : Line Heater
Physical Location : In Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Horizontal Line Heater

Vessel Size:

Operating Pressure Range (psig):

Operating Temperature Range (°F):

Does the vessel have Internal Access? ☒Yes ☐No

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

Vessel is located: ☐Inside ☒Outside ☐Under Roof

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam? ☐Yes ☐No

Any stamping pertaining to materials of construction? ☐Yes ☐No

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____psi

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

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

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

A-NUMBER	(A) 514075
SERIAL No.	BS10K2MM-03A
JOB No.	10252-P
DESIGN PRESSURE	10000 PSI
M.A.W.P.	10000 PSI
DESIGN TEMP. MINIMUM	-40°F
CORROSION ALLOWANCE	0.125 IN.
DESIGN TEMP. MAXIMUM	180°F
CRN No.	LD-05-001
YEAR BUILT	2005
TEAM COIL M.A.W.P.	

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms
☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Robert W. Menke

Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-C1
Equipment Name/Service: Line Heater-Coil 1	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-03A
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514075	National Board Number: None

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access: 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: Bundle removed from heater. Front plate in acceptable condition.

Condition of Steel Supports, Saddles and Bolting: Angle iron supports have heavy corrosion/scaling buildup.

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

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. Coils were pulled out of the Line Heater. There was no piping bolted.

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.

If Equipment has Anomalous Data, did the Inspector check it? N/A

Is There a PSV on the Vessel? No

If Yes, is it set at or below the MAWP?

Date PSV last tested (if there is a tag on the valve)

Comments:

Coils have heavy corrosion with scaling. Pitting as deep at 1/16". Angle iron under tubes has come loose.





Recommendations:

Repair angle iron under tube bundle.

Repairs Needed:

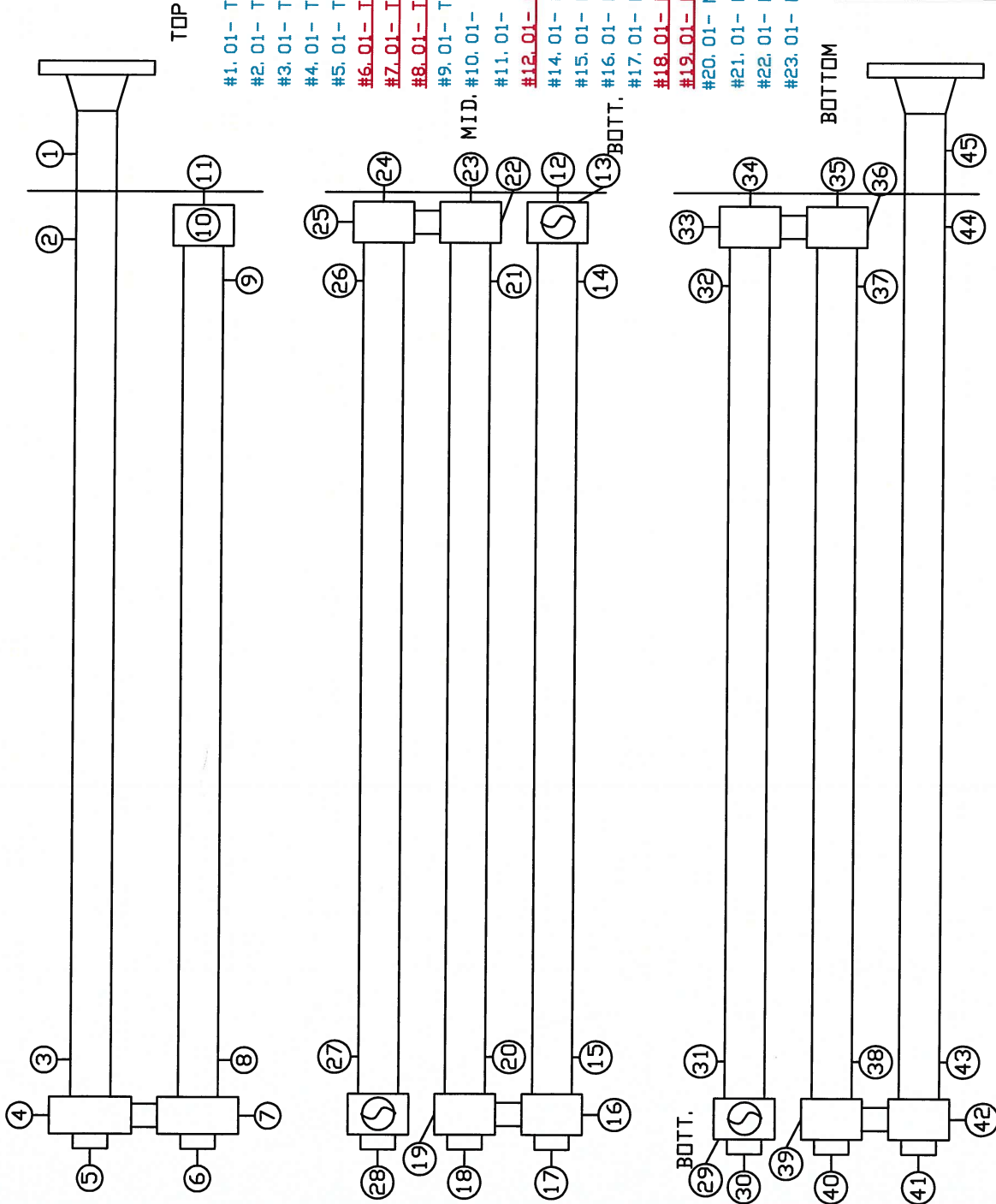
Michael J. York
API 510 Inspector Signature

66475
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 3/12/2028
NEXT INSPECTION IS DUE: 9/11/2019

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BS10K2MM-03A
A NUMBER	514075
DATE BUILT	2005
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # ALD-05-001



#1. 01- TOP-T 1.006 D9	#24. 01- MID 2.718 D2	DA-590
#2. 01- TOP-R 0.991 D9	#25. 01- MID 1.971 D2	
#3. 01- TOP-L 0.991 D9	#26. 01- MID-R 0.975 D9	
#4. 01- TOP 2.675 D9	#27. 01- MID-T 0.988 D9	
#5. 01- TOP 3.229 D9	#28. 01- MID 2.755 D2	
#6. 01- TOP 2.674 D2	#29. 01- MID 3.170 D2	
#7. 01- TOP 2.205 D2	#30. 01- TURN 2.711 D9	
#8. 01- TOP-T 0.993 D2	#31. 01- BTM-L 0.996 D9	
#9. 01- TOP-BT 0.995 D9	#32. 01- BTM-T 1.006 D9	
#10. 01- TOP-TURN 1.565 D9	#33. 01- BTM-TURN 1.715 D2	
#11. 01- TOP 0.000 NT	#34. 01- BTM-TURN 0.000 NT	
#12. 01- MID 0.000 NT	#37. 01- BTM-T 1.036 D9	
#14. 01- MID-R 0.997 D9	#38. 01- BTM-T 1.036 D9	
#15. 01- MID-T 0.987 D9	#39. 01- BTM-TURN 2.644 D9	
#16. 01- MID-TURN 0.000 NT	#40. 01- TURN 3.229 D2	
#17. 01- MID 3.351 D9	#41. 01- BTM 2.708 D2	
#18. 01- MID 2.671 D2	#42. 01- BTM-T 0.000 NT	
#19. 01- MID 3.098 D2	#43. 01- BTM-R 1.003 D9	
#20. 01- MID-L 1.030 D9	#44. 01- BTM-B 1.035 D9	
#21. 01- MID-T 1.024	#45. 01- BTM-BT 1.007 D9	
#22. 01- MID 0.000 NT	#46. 01- MID 0.000 NT	
#23. 01- MID 3.300 D9		

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0004-C1
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0004-C1

DESC: COIL 1 ON LINE HEATER 1
DWG#: LH0004-C1-1.01-46.01

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: 10/12/2018

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

Unit: LH-0004

Eq/Circ ID: LH0004-C1

Eq Type: VESSEL

Class:

CM RBI:

Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/12/2028

Group Description:
RCR = 100.4 MPY
Rem. Life (from last survey 09/11/2018) = 9.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 14

TML No	Location	Ctn TML	First Survey Thick	First Nt	First Date	Previous Survey Thick	Previous Nt	Previous Date	Last Survey Thick	Last Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	TOP-T	N	1.032		06/14/2007	0.968 RR		11/10/2017	0.980 RR		09/11/2018	0	4.6	6.1	547.9	0.750 U	4.6	09/11/2068	09/11/2019
2.01	TOP-R	N	1.034		06/14/2007	0.912 RR		11/10/2017	0.971 RR		09/11/2018	0	5.6	9.4	36.5	0.750 U	5.6	02/27/2058	09/11/2019
3.01	TOP-L	N	0.995		06/14/2007	0.960 RR		11/10/2017	0.970 RR		09/11/2018	0	2.2	3.4	17.8	0.750 U	2.2	09/12/2118	09/11/2019
4.01	TOP	N	2.391		06/14/2007	2.648 TC		11/10/2017	2.648 RR		09/11/2018	0	0	0	46.0	1.000 U	0.1	09/26/4018	09/11/2019
5.01	TOP	N	2.821		06/14/2007	3.185 TC		11/10/2017	3.185 RR		09/11/2018	0	0	0	27.6	1.000 U	0.1	09/26/4018	09/11/2019
6.01	TOP	Y	3.413		06/14/2007	2.626 TC		11/10/2017	2.626 RR		09/11/2018	0	70.0	72.4	212.1	1.000 U	70.0	12/03/2041	09/11/2019
7.01	TOP	Y *	2.863		06/14/2007	2.095 RR		11/10/2017	2.119 RR		09/11/2018	0	66.2	65.7	96.0	1.000 U	66.2	08/07/2035	09/11/2019
8.01	TOP-T	Y *	1.029		06/14/2007	0.831 TC		11/10/2017	0.831 RR		09/11/2018	0	17.6	18.2	141.9	0.750 U	17.6	04/19/2023	09/11/2019
9.01	TOP-BT	N	1.020		06/14/2007	0.968 RR		11/10/2017	0.988 RR		09/11/2018	0	2.8	4.9	46.9	0.750 U	2.8	09/12/2103	09/11/2019
10.01	TOP-TURN	N	1.598		02/04/2012	1.521 TC		11/10/2017	1.521 RR		09/11/2018	0	11.7	12.3	53.9	1.000 U	11.7	03/24/2063	09/11/2019
11.01	TOP	N	3.224		06/14/2007	3.172 RR		10/25/2016	3.199 TC		11/10/2017	0	2.4	4.5	28.8	1.000 U	2.4	02/16/2934	11/10/2018
12.01	MID	Y	2.762		06/14/2007	2.442 TC		10/25/2016	2.440 TC		11/10/2017	1.9	30.9	31.0	248.0	1.000 U	30.9	06/17/2064	11/10/2018
14.01	MID-R	N	1.031		06/14/2007	0.954 TC		11/10/2017	0.954 RR		09/11/2018	0	6.8	8.1	29.9	0.750 U	6.8	09/10/2048	09/11/2019
15.01	MID-T	N	0.998		06/14/2007	0.972 RR		11/10/2017	0.975 RR		09/11/2018	0	2.0	2.6	10.3	0.750 U	2.0	03/14/2131	09/11/2019
16.01	MID-TURN	N	1.563		06/14/2007	1.610 TC		10/25/2016	1.610 TC		11/10/2017	0	0	0	37.8	1.000 U	0.1	11/25/4017	11/10/2018
17.01	MID	N	3.328		06/14/2007	3.311 TC		11/10/2017	3.311 RR		09/11/2018	0	1.5	2.1	655.2	1.000 U	1.5	05/25/3559	09/11/2019
18.01	MID	Y	2.726		06/14/2007	2.259 TC		11/10/2017	2.259 RR		09/11/2018	0	41.6	41.5	314.7	1.000 U	41.6	12/13/2048	09/11/2019
19.01	MID	Y	2.500 NM		02/24/2005	2.007 TC		11/10/2017	2.007 RR		09/11/2018	0	36.4	37.4	38.8	1.000 U	36.4	05/12/2046	09/11/2019
20.01	MID-L	N	1.043		06/14/2007	0.941 TC		11/10/2017	0.941 RR		09/11/2018	0	9.1	9.2	29.7	0.750 U	9.1	09/07/2039	09/11/2019
21.01	MID-T	N	1.013		06/14/2007	0.952 TC		11/10/2017	0.952 RR		09/11/2018	0	5.4	5.0	34.5	0.750 U	5.4	02/07/2056	09/11/2019

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: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1
Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F
Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/12/2028

Group Description:
RCR = 100.4 MPY
Rem. Life (from last survey 09/11/2018) = 9.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 14

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
22.01	MID	N	2.817	06/14/2007	2.782	08/28/2014	2.782	TC	0	4.3	4.3	4.5	1.000	4.3	01/24/2430	08/21/2016
23.01	MID	N	3.352	06/14/2007	3.241	TC	3.241	RR	0	9.9	10.2	39.9	1.000	9.9	01/23/2245	09/11/2019
24.01	MID	Y *	2.687	06/14/2007	1.915	RR	1.936	RR	0	66.8	82.8	325.6	1.000	66.8	09/15/2032	09/11/2019
25.01	MID	Y *	2.123	06/14/2007	2.064	RR	1.971	D9	111.4	13.5	11.1	1086.6	1.000	111.4	05/31/2027	09/11/2019
26.01	MID-R	N	0.990	06/14/2007	0.937	TC	0.937	RR	0	4.7	5.5	31.9	0.750	4.7	06/25/2058	09/11/2019
27.01	MID-T	N	1.026	06/14/2007	0.970	RR	0.973	RR	0	4.7	5.3	28.9	0.750	4.7	02/21/2066	09/11/2019
28.01	MID	Y *	2.500	NM	3.122	TC	2.755	D9	439.5	0	0	439.5	1.000	439.5	09/09/2022	09/11/2019
29.01	MID	Y	2.500	NM	2.069	TC	2.069	RR	0	31.8	32.7	33.9	1.000	31.8	04/23/2052	09/11/2019
30.01	TURN	N	2.500	NM	2.631	TC	2.631	RR	0	0	0	0	1.000	0.1	09/26/4018	09/11/2019
31.01	BTM-L	N	1.053	06/14/2007	0.930	RR	0.937	RR	0	10.3	11.5	40.8	0.750	10.3	11/06/2036	09/11/2019
32.01	BTM-T	N	1.000	06/14/2007	0.928	TC	0.928	RR	0	6.4	8.1	40.7	0.750	6.4	07/05/2046	09/11/2019
33.01	BTM-TURN	Y	1.724	06/14/2007	1.520	TC	1.520	RR	0	18.1	21.6	122.1	1.000	18.1	06/04/2047	09/11/2019
34.01	BTM-TURN	N	1.625	NM		N/A	1.610	TC	N/A	1.2	N/A	1.2	1.000	1.2	03/16/2526	11/10/2018
37.01	BTM-T	N	1.026	06/14/2007	0.981	RR	0.984	RR	0	3.7	4.9	17.0	0.750	3.7	12/09/2081	09/11/2019
38.01	BTM-T	N	1.031	06/14/2007	0.934	RR	0.946	RR	0	7.6	9.1	46.7	0.750	7.6	06/26/2044	09/11/2019
39.01	BTM-TURN	N	2.500	NM	2.636	TC	2.636	RR	0	0	0	0	1.000	0.1	09/26/4018	09/11/2019
40.01	TURN	Y	3.240	TC	3.168	TC	3.168	RR	0	38.3	39.6	69.0	1.000	38.3	04/20/2075	09/11/2019
41.01	BTM	Y	2.829	06/14/2007	2.584	RR	2.588	RR	0	21.4	22.5	98.5	1.000	21.4	11/25/2092	09/11/2019
42.01	BTM-T	Y *	2.500	NM	2.082	TC	1.976	TC	101.6	41.2	39.0	101.6	1.000	101.6	06/20/2027	11/10/2018
43.01	BTM-R	N	1.013	06/14/2007	0.943	RR	0.956	RR	0	5.1	7.3	56.9	0.750	5.1	02/01/2059	09/11/2019
44.01	BTM-B	N	1.045	06/14/2007	0.975	TC	0.975	RR	0	6.2	6.9	39.9	0.750	6.2	12/26/2054	09/11/2019

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:10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

Summary: Group Name:
Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/12/2028

Group Description:
RCR = 100.4 MPY

Rem. Life (from last survey 09/11/2018) = 9.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 14

TML No	Location	Ctn TML	First Survey Thick	First Survey Nt	First Date	Previous Survey Thick	Previous Survey Nt	Previous Date	Last Survey Thick	Last Survey 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
45.01	ETM-BT	N	1.026		06/14/2007	0.960 TC	0.960 TC	11/10/2017	0.960 RR	0.960 RR	09/11/2018	0	5.9	6.8	34.9	0.750 U	5.9	04/15/2054	09/11/2019
46.01	MTD	N	2.500 NM		02/24/2005			N/A	2.636 TC	2.636 TC	11/10/2017	N/A	0	N/A	0	1.000 U	0.1	11/25/4017	11/10/2018

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: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: COIL 1 ON LINE HEATER 1, SN:BS10K2MW-03A

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 0.1 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.00 : 28.3 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 100.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 33.8 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 100.4 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 = 9.5 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 03/12/2028

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

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 14 Caution TMLs in this Eq/Circ ID.



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

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH0004-C2 - Line Heater Coil 2	
Remaining Life: 12.5 YRS	Date of this Report: 09/11/2018
Rep. Corrosion Rate: 95.5 MPY	Next UT: 09/11/2019 Next VT: 09/11/2019
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03B
Date Built: 2005	National Board #: None
Alberta registration #: 514076	Canadian Registration #: ALD-05-001

FMC Technologies Completion - LH-0004 Line Heater Coil 2



PRESSURE VESSEL INVENTORY

☒ Code ☐ Code-invalidated ☐ Non-Code ☐ Unknown ☐ Code-Exempt

☐ High Consequence (HCO) ☐ Medium Consequence (MCO) ☐ Low Consequence (LCO)

VESSEL ID INFORMATION

Company Name : Pure Energy Services (USA) Inc.
Facility/Location Name : Grand Junction District
Field Name :
Equipment Number : LH-0004
Eq/Circ. ID : LH0004-C2
Equipment Name/Service : Line Heater
Physical Location : In Grand Junction Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Horizontal Line Heater

Vessel Size:

Operating Pressure Range (psig):

Operating Temperature Range (°F):

Does the vessel have Internal Access? ☒ Yes ☐ No

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

Vessel is located: ☐ Inside ☒ Outside ☐ Under Roof

MISCELLANEOUS VESSEL INFORMATION: (IF VESSEL HAS NO NAMEPLATE, PLEASE OBTAIN AS MUCH OF THE FOLLOWING AS POSSIBLE FOR WORST CASE TMIN CALCULATIONS, *may have to check with operations personnel*).

Is there a Long Seam? ☐ Yes ☐ No

Any stamping pertaining to materials of construction? ☐ Yes ☐ No

****Diameter****(strap equipment): _____

Pressure (highest the equip. sees in the process and/or check PSV setting if available) _____psi

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

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

Any other pertinent information: _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

RTI W HT	MANUFACTURED & CERTIFIED BY: BLUESTAR WELDING
GRANDE PRAIRIE, AB., CANADA 1-780-532-1160	
A-NUMBER	④514076
SERIAL No.	BSC 10K2MM-035
JOB No.	10252-P
DESIGN PRESSURE	10000 PSI
M.A.W.P.	10000 PSI
DESIGN TEMP. MINIMUM	-40°F
CORROSION ALLOWANCE	0.125 IN.
DESIGN TEMP. MAXIMUM	180°F
CRN No.	LD-05-001
YEAR BUILT	2005
TEAM COIL M.A.W.P.	

09/1

VESSEL DOCUMENTATION

Manufacturer Data Sheets: ☐ ASME U-1 or U-1A Forms ☐ U2 or U4 Supplemental Forms
☐ Documentation relating to repair/alteration/rerating work: (R-1 form, calculations, revised drawings, inspection reports, etc.)

Name: Robert W. Menke

Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

Company Name: FMC Technologies Completion	
Field/Location: PA District	
Equipment Number: LH-0004	Eq/Circ. ID: LH0004-C2
Equipment Name/Service: Line Heater-Coil 2	
Physical Location: In FMC Yard	
Manufacturer: Blue Star Welding	Manufacturer Serial Number: BS10K2MM-03B
Year Built: 2005	CRN: ALD-05-001
Alberta Registration Number: 514076	National Board Number: None

Is Vessel in-service? No

Reason for Inspection: Scheduled API-510 External Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached.

Internal Access: Bundles must be removed.

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: The bundle was removed from the heater. Front plate is inacceptable condition.

Condition of Steel Supports, Saddles and Bolting: Angle iron supports have heavy surface corrosion/scale buildup.

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

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in good condition. Coils were pulled out of the Line Heater. There was no piping attached.

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.

If Equipment has Anomalous Data, did the Inspector check it? N/A

Is There a PSV on the Vessel? No

If Yes, is it set at or below the MAWP?

Date PSV last tested (if there is a tag on the valve)

Comments:

Coils have heavy corrosion with scaling.

Pipe support on skid is rotted out and bent.





Drain has broken fitting.



Pitting as deep as 1/16" found.





Recommendations:

Repair pipe support and drain fitting as well as the angle iron shoe on the coil.

Repairs Needed:

None

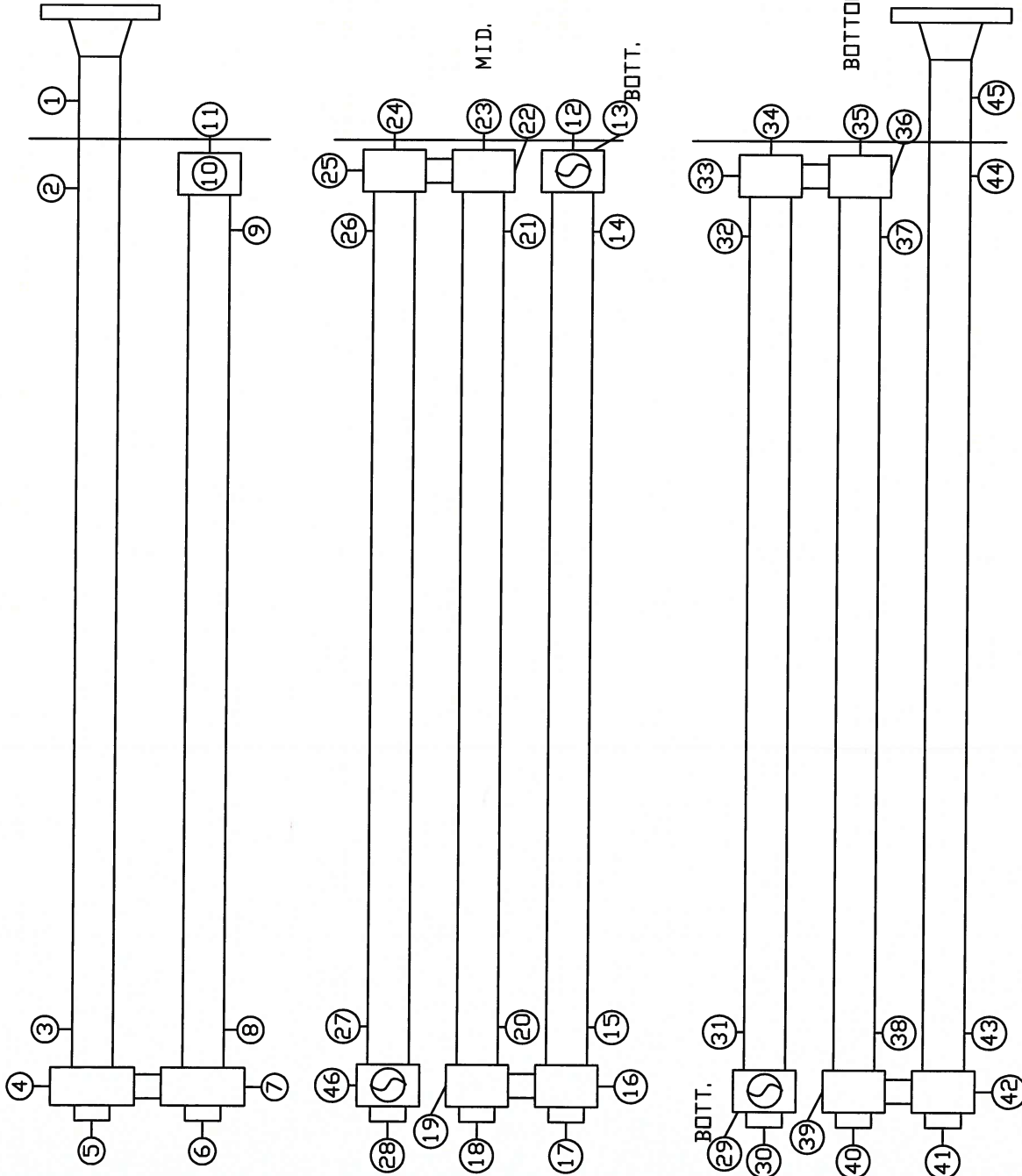
Michael J. York
API 510 Inspector Signature

66475
API 510 Inspector Number

09/11/2018
Date

EQUIP RETIREMENT DATE: 3/22/2031
NEXT INSPECTION IS DUE: 9/11/2019

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



TOP

MID.

BOTT.

BOTTOM

#1. 01- TOP-L 1.001 D9	#23. 01- TURN 3.292 D9	DA-590
#2. 01- TOP-T 1.020 D9	#24. 01- TURN 2.597 D2	
#3. 01- TOP-R 1.012 D9	#25. 01- MID 2.083 D9	
#4. 01- TOP 2.665 D9	#26. 01- MID-R 0.992 D9	
#5. 01- TOP 0.000 NT	#27. 01- MID-R 0.974 D9	
#6. 01- TOP 2.725 D2	#28. 01- MID 2.653 D2	
#7. 01- TOP 2.395 D2	#29. 01- TOP 0.000 NT	
#8. 01- TOP-T 1.005 D9	#30. 01- BTM 2.717 D2	
#9. 01- TOP-T 0.974 D9	#31. 01- BTM-T 1.019 D9	
#10. 01- TOP 1.631 D9	#32. 01- BTM-R 1.022 D9	
#11. 01- TOP 0.000 NT	#33. 01- TURN 1.587 D2	
#12. 01- MID 0.000 NT	#34. 01- MID 0.000 NT	
#14. 01- MID-L 0.993 D9	#35. 01- MID 0.000 NT	
#15. 01- MID-L 0.979 D9	#37. 01- BTM-R 1.022 D9	
#16. 01- MID 1.487 D2	#38. 01- BTM-R 0.970 D9	
#17. 01- MID 0.000 NT	#39. 01- TURN 2.700 D9	
#18. 01- MID 2.706 D9	#41. 01- BTM 3.290 D2	
#19. 01- MID 3.326 D9	#42. 01- BTM 2.742 D9	
#20. 01- MID-R 1.048 D9	#43. 01- BTM-L 1.046 D9	
#21. 01- MID-R 1.038 D9	#44. 01- BTM-L 0.996 D9	
#22. 01- BTM 0.000 NT	#45. 01- BTM-L 0.977 D9	
CAL BLK=75°F		
PIPE=90°F		

BUSINESS UNIT	FMC TECHNOLOGIES
EQ/CIRC ID #	COMPLETION
EQUIP NAME	LH0004-C2
DWG #	LINE HEATER (WITH 2 COILS)
	LH0004-C2

DESC: COIL 2 ON LINE HEATER 1
DWG#: LH0004-C2-1.01-46.01

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/22/2031

Group Description:
RCR = 95.5 MPY
Rem. Life (from last survey 09/11/2018) = 12.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 13

TML No	Location	Ctn TML	First Survey Thick	First Survey Nt	First Date	Previous Survey Thick	Previous Survey Nt	Previous Date	Last Survey Thick	Last Survey Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	TOP-L	N	1.019		06/14/2007	0.970 TC	0.970 TC	11/10/2017	0.970 RR	RR	09/11/2018	0	4.4	5.3	26.9	0.750 U	4.4	09/10/2068	09/11/2019
2.01	TOP-T	N	1.006		06/14/2007	0.924 TC	0.924 TC	11/10/2017	0.924 RR	RR	09/11/2018	0	7.3	7.7	38.3	0.750 U	7.3	07/13/2042	09/11/2019
3.01	TOP-R	N	1.004		06/14/2007	0.968 TC	0.968 TC	11/10/2017	0.968 RR	RR	09/11/2018	0	3.2	3.2	25.9	0.750 U	3.2	10/27/2086	09/11/2019
4.01	TOP	N	2.325		06/14/2007	2.564 RR	2.564 RR	11/10/2017	2.654 RR	RR	09/11/2018	0	0	0	1.9	1.000 U	0.1	09/26/4018	09/11/2019
5.01	TOP	N	2.837		06/14/2007	2.610 RR	2.610 RR	10/25/2016	3.282 RR	RR	11/10/2017	0	0	0	269.1	1.000 U	0.1	11/25/4017	11/10/2018
6.01	TOP	Y	3.300		06/14/2007	2.597 TC	2.597 TC	11/10/2017	2.597 RR	RR	09/11/2018	0	62.5	61.6	337.3	1.000 U	62.5	03/31/2044	09/11/2019
7.01	TOP	Y	2.827		06/14/2007	2.292 TC	2.292 TC	11/10/2017	2.292 RR	RR	09/11/2018	0	47.6	44.8	78.8	1.000 U	47.6	11/02/2045	09/11/2019
8.01	TOP-T	N	1.002		06/14/2007	0.930 RR	0.930 RR	11/10/2017	0.968 RR	RR	09/11/2018	0	3.0	6.2	26.3	0.750 U	3.0	05/12/2091	09/11/2019
9.01	TOP-T	N	0.995		06/14/2007	0.967 TC	0.967 TC	11/10/2017	0.967 RR	RR	09/11/2018	0	2.5	2.8	13.0	0.750 U	2.5	07/01/2105	09/11/2019
10.01	TOP	N	1.615		06/14/2007	1.463 TC	1.463 TC	11/10/2017	1.463 RR	RR	09/11/2018	0	13.5	11.7	162.0	1.000 U	13.5	12/28/2052	09/11/2019
11.01	TOP	Y	3.325		06/14/2007	3.110 RR	3.110 RR	10/25/2016	3.154 TC	TC	11/10/2017	0	16.4	20.8	84.6	1.000 U	16.4	03/15/2149	11/10/2018
12.01	MID	N	2.766		06/14/2007	2.658 TC	2.658 TC	10/25/2016	2.658 RR	RR	11/10/2017	0	10.4	9.7	28.4	1.000 U	10.4	04/14/2177	11/10/2018
14.01	MID-L	N *	1.032		06/14/2007	0.937 TC	0.937 TC	11/10/2017	0.937 RR	RR	09/11/2018	0	8.4	9.4	48.4	0.875 U	8.4	01/28/2026	09/11/2019
15.01	MID-L	N *	1.023		06/14/2007	0.933 RR	0.933 RR	11/10/2017	0.958 RR	RR	09/11/2018	0	5.8	8.3	63.9	0.875 U	5.8	01/02/2033	09/11/2019
16.01	MID	Y	1.674		06/14/2007	1.444 TC	1.444 TC	11/10/2017	1.444 RR	RR	09/11/2018	0	20.5	22.2	39.7	0.875 U	20.5	06/14/2046	09/11/2019
17.01	MID	Y	3.447		06/14/2007	3.223 RR	3.223 RR	10/25/2016	3.222 TC	TC	11/10/2017	1.0	21.6	22.5	48.9	1.000 U	21.6	09/24/2120	11/10/2018
18.01	MID	N	2.723		06/14/2007	2.661 RR	2.661 RR	11/10/2017	2.667 RR	RR	09/11/2018	0	5.0	6.4	20.5	1.000 U	5.0	02/07/2352	09/11/2019
19.01	MID	N	3.248		06/14/2007	3.272 TC	3.272 TC	11/10/2017	3.272 RR	RR	09/11/2018	0	0	0	79.8	1.000 U	0.1	09/26/4018	09/11/2019
20.01	MID-R	N *	1.015		06/14/2007	0.894 TC	0.894 TC	11/10/2017	0.894 RR	RR	09/11/2018	0	10.8	11.3	77.7	0.750 U	10.8	01/11/2032	09/11/2019
21.01	MID-R	N	1.012		06/14/2007	0.978 RR	0.978 RR	11/10/2017	0.988 RR	RR	09/11/2018	0	2.1	3.5	18.3	0.750 U	2.1	01/12/2132	09/11/2019

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: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/22/2031

Group Description:
RCR = 95.5 MPY
Rem. Life (from last survey 09/11/2018) = 12.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 13

TML No	Location	Ctn	First Survey Thick	First Survey Nt	First Date	Previous Survey Thick	Previous Survey Nt	Previous Date	Last Survey Thick	Last Survey 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	
22.01	BTM	N	2.500	NM	02/24/2005			N/A	2.382	TC	11/10/2017	N/A	9.3	N/A	9.3	1.000	U	9.3	06/19/2166	11/10/2018
23.01	TURN	Y	3.357	TC	10/25/2016	3.236	TC	11/10/2017	3.236	RR	09/11/2018	0	64.4	66.5	116.0	1.000	U	64.4	06/01/2053	09/11/2019
24.01	TURN	Y *	2.712	TC	10/25/2016	2.549	TC	11/10/2017	2.549	RR	09/11/2018	0	86.8	89.6	156.3	1.000	U	86.8	07/16/2036	09/11/2019
25.01	MID	N	2.188		06/14/2007	2.034	TC	11/10/2017	2.034	RR	09/11/2018	0	13.7	13.7	1141.5	1.000	U	13.7	03/03/2094	09/11/2019
26.01	MID-R	N	1.023		06/14/2007	0.960	TC	11/10/2017	0.960	RR	09/11/2018	0	5.6	6.6	30.5	0.750	U	5.6	03/12/2056	09/11/2019
27.01	MID-R	N	1.005		06/14/2007	0.951	RR	11/10/2017	0.967	RR	09/11/2018	0	3.4	5.1	23.0	0.750	U	3.4	07/09/2082	09/11/2019
28.01	MID	Y	3.253		06/14/2007	2.718	RR	11/10/2017	2.653	D9	09/11/2018	77.8	53.4	50.9	162.8	1.000	U	77.8	12/10/2039	09/11/2019
29.01	TOP	Y	2.500	NM	02/24/2005			N/A	1.991	TC	11/10/2017	N/A	40.1	N/A	40.1	1.000	U	40.1	07/29/2042	11/10/2018
30.01	BTM	Y	2.944		06/14/2007	2.641	RR	11/10/2017	2.665	RR	09/11/2018	0	24.8	27.4	95.6	1.000	U	24.8	10/31/2085	09/11/2019
31.01	BTM-T	N	1.016		06/14/2007	0.932	TC	11/10/2017	0.932	RR	09/11/2018	0	7.5	8.4	49.9	0.750	U	7.5	12/17/2042	09/11/2019
32.01	BTM-R	N	1.006		06/14/2007	0.943	TC	11/10/2017	0.943	RR	09/11/2018	0	5.6	6.4	248.0	0.750	U	5.6	02/27/2053	09/11/2019
33.01	TURN	Y *	1.595	TC	10/25/2016	1.520	TC	11/10/2017	1.520	RR	09/11/2018	0	39.9	41.2	77.6	0.750	U	39.9	12/29/2037	09/11/2019
34.01	MID	N	2.500	NM	02/24/2005			N/A	3.285	TC	11/10/2017	N/A	0	N/A	0	1.000	U	0.1	11/25/4017	11/10/2018
35.01	MID	N	2.500	NM	02/24/2005			N/A	2.327	TC	11/10/2017	N/A	13.6	N/A	13.6	1.000	U	13.6	06/09/2115	11/10/2018
37.01	BTM-R	N	1.017		06/14/2007	0.970	RR	11/10/2017	0.976	RR	09/11/2018	0	3.6	4.2	27.2	0.750	U	3.6	06/22/2081	09/11/2019
38.01	BTM-R	N	1.023		06/14/2007	0.952	RR	11/10/2017	0.954	RR	09/11/2018	0	6.1	7.6	57.0	0.750	U	6.1	02/20/2052	09/11/2019
39.01	TURN	N	2.669	TC	10/25/2016	2.658	TC	11/10/2017	2.658	RR	09/11/2018	0	5.9	6.0	10.5	1.000	U	5.9	09/19/2299	09/11/2019
41.01	BTM	Y	2.851		06/14/2007	2.537	TC	11/10/2017	2.537	RR	09/11/2018	0	27.9	25.0	180.2	1.000	U	27.9	10/13/2073	09/11/2019
42.01	BTM	N	2.225		06/14/2007	2.183	TC	11/10/2017	2.183	RR	09/11/2018	0	3.7	4.5	37.6	1.000	U	3.7	06/07/2338	09/11/2019
43.01	BTM-L	N	0.998		06/14/2007	0.958	TC	11/10/2017	0.958	RR	09/11/2018	0	3.6	4.0	35.6	0.750	U	3.6	06/21/2076	09/11/2019
44.01	BTM-L	N	1.002		06/14/2007	0.956	RR	11/10/2017	0.981	RR	09/11/2018	0	1.9	4.0	27.5	0.750	U	1.9	04/11/2140	09/11/2019

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: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: S8/D1

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 03/22/2031

Group Description:
RCR = 95.5 MPY

Rem. Life (from last survey 09/11/2018) = 12.5 yrs

0 C.A. Status: NO
Total Caution TMLs = 13

TML No	Location	Ctn	First Survey TML Thick	First Survey Nt	First Survey Date	Previous Survey Thick	Previous Survey Nt	Previous Survey Date	Last Survey Thick	Last Survey Nt	Last Survey Date	Shrt Term Rate	Long Term Rate	Best Rate	Max CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date	
45.01	BTM-L	N	1.035		06/14/2007	0.953	RR	11/10/2017	0.962	RR	09/11/2018	0	6.5	8.6	33.9	0.750	U	6.5	04/24/2051	09/11/2019
46.01	MID-T	Y *	1.000	NM	02/24/2005	3.099	TC	10/25/2016	2.595	TC	11/10/2017	483.2	0	0	483.2	0.750	U	483.2	09/05/2021	11/10/2018

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Phone 307-789-3540 FAX 307-789-2822

Report Date: 10/12/2018

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

Unit: LH-0004
Eq/Circ ID: LH0004-C2
Design Code: S8/D1
Eq Type: VESSEL
Class:
CM RBI:

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

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

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00
(B) -- Default Corrosion Rate

:
:
Varies
0.1 MPY

Representative Corrosion Rate is the Maximum of:

(A) -- Average Corrosion Rate x 1.00 : 27.4 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 95.5 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 32.7 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 95.5 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 = 12.5 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 03/22/2031

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

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 13 Caution TMLs in this Eq/Circ ID.

API 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: Associated piping with LH-0004	
Size/Sched. Of Pipe: 1" - 3.0625"	Eq/Circ. ID: LH0004-P
Service/System: 1503 Pipe 3.0625"	Piping Class ☐ 1 ☐ 2 ☒ 3 ☐ Other
Design Pressure: 10000 psi	Materials: ☒ CS ☐ SS ☐ Other
Design Temperature: 180°F	Note Stamping (If Any)
P&ID#:	Flange Rating:

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

☒ Scheduled API-570 External Inspection. ☐ Other:

Testing Performed:

☒ Visual ☒ UT ☐ PT ☐ MT ☐ Other:

Comments: Info is for both coils

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

Coating Condition:	Comments:
☐ Good ☒ Fair, Some Blistering/Peeling ☒ Corrosion Present (Describe) ☐ Other ☐ No Issues	Coating has minor chipping and peeling.

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

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

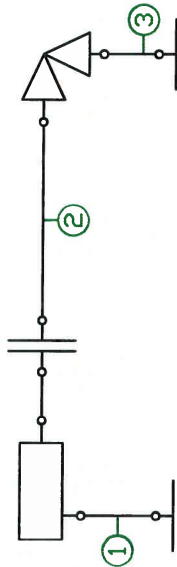
Relief Device:	Comments:
☐ PSV ☒ No PSV ☐ Rupture Disk ☐ Atmospheric ☐ No Relief Device Identified For This Equipment ☐ Tag Secure and Legible ☐ Set Pressure At Or Below MAWP ☐ Block Valve Not Locked/Car Sealed In Open Position ☐ Improper Drain Hole/Weather Cap On Atmos. Discharge ☐ Obstruction (i.e.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

Supports/Hangers:	Comments:
☐ In Serviceable Condition ☐ Foundation Is Damaged ☐ Additional Support Needed ☐ Hanger/Support Is Distorted/Broken/Missing ☐ Pipe Slide Or Shoe Is Off Of The Support ☐ Makeshift Support ☐ Loose Support Needed To Be Tightened ☐ Fireproofing Missing Or Damaged ☐ Support/Hanger Is Corroded ☐ Other ☒ No Issues	Pipe supports are not in use at this time.

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

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

EQUIP RETIREMENT DATE: 11/29/2786
NEXT INSPECTION IS DUE: 9/11/2019



- #1. 01- STR-T 0. 989 FH
- #2. 01- STR-BT 0. 957 FH
- #3. 01- STR-R 0. 824 FH

CAL BLK=75° F		PIPE=90° F	
BUSINESS UNIT	FMC TECHNOLOGIES	COMPLETION	
EQ/CIRC ID #	LH-0004		
EQUIP NAME	LH0004-P		
DWG #	LH0004-P		

FH2E-D

DESC: ASSOCIATED PIPING ON LINE HEATER 1
DWG#: LH0004-P-1.01-3.01

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 10/12/2018

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

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

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: ASSOCIATED PIPING ON LINE HEATER 1

Summary: Group Name: Insp. Due Date = 09/11/2019
Pred. Ret. Date = 11/29/2786

Group Description:
RCR = 3.7 MPY
Rem. Life (from last survey 09/11/2018) = 768.2 yrs

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

TML No	Location	Ctn TML	First Survey Thick	First Survey Nt	First Date	Previous Survey Thick	Previous Survey Nt	Previous Date	Last Survey Thick	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	STR-T	N *	0.835	RP	10/26/2016			N/A	0.835	RR	N/A	0	N/A	2.9	0.260	0.1	09/26/4018	09/11/2019
2.01	STR-BT	N *	0.724		06/14/2007	0.681	FH	10/26/2016	0.681	RR	0	3.8	3.9	22.0	0.260	3.8	06/13/2129	09/11/2019
3.01	STR-R	N *	0.732		06/14/2007	0.694	RR	10/26/2016	0.706	RR	0	2.3	3.4	14.6	0.260	2.3	07/20/2212	09/11/2019

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

Report Date: 10/12/2018

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

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

Flange Rating: 5734 lb/in²
Design Pressure: 10000 lb/in²
Design Temperature: 180 °F

Description: ASSOCIATED PIPING ON LINE HEATER 1

TML Corrosion Rates are each the Maximum of:
(A) -- Calculated Corrosion Rates x 1.00 :
(B) -- Default Corrosion Rate : Varies
0.1 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.00 : 2.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 3.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 3.7 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 3.7 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 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 = 768.2 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 11/29/2786

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

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 0 Caution TMLs in this Eq/Circ ID.