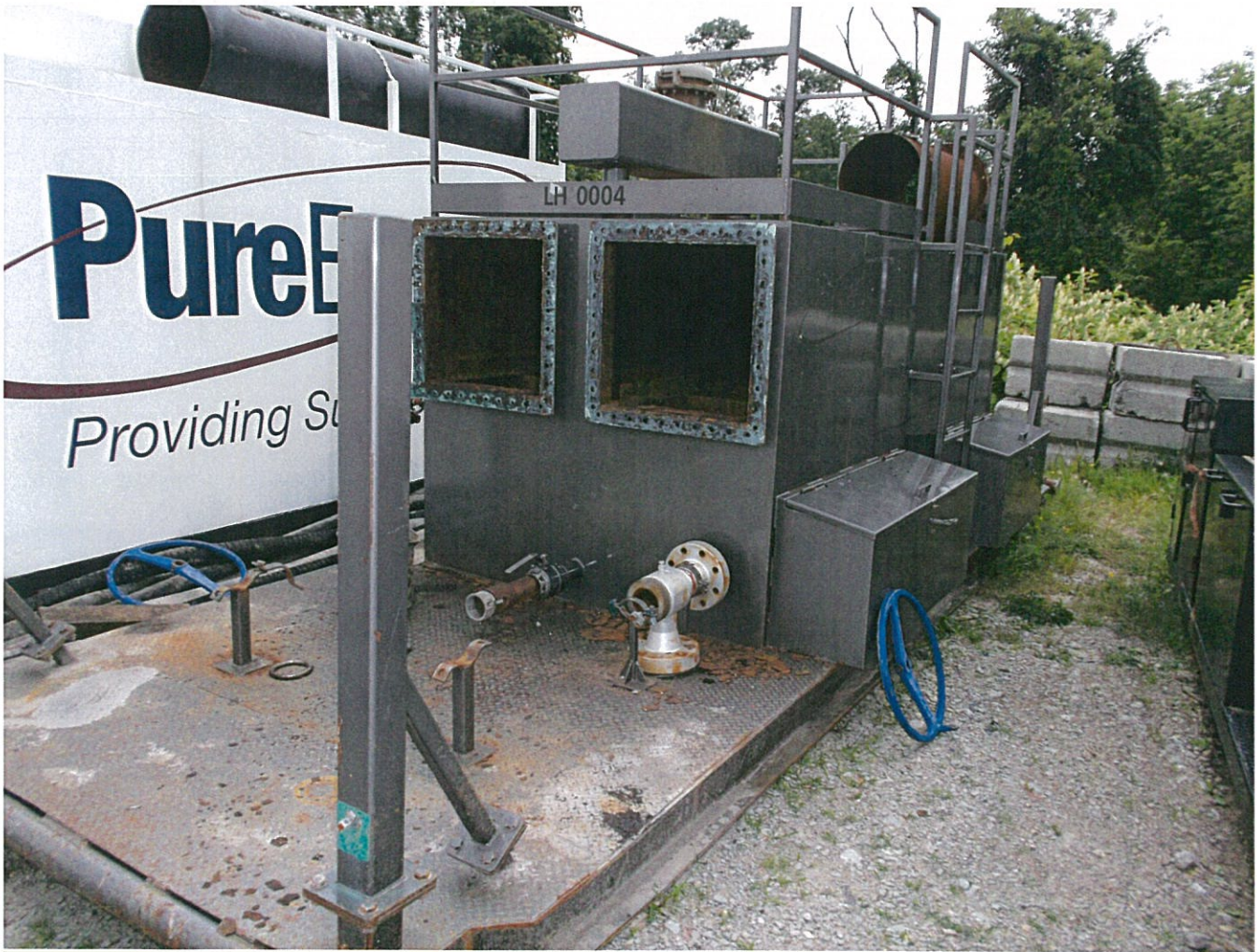




1595 So. Hwy 150, Suite F
Evanston, WY 82930

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH-0004 C1-C2	
Remaining Life: 1.3 YRS	Date of this Report: 08/28/2014
Representative Corrosion Rate: 102.4 MPY	Next Inspection Due Date: 08/28/2015
Manufacturer: Blue Star Welding	Mfg Serial #: BS10K2MM-03A/B
Date Built: 2005	National Board #: None
Alberta registration #: 514075/ 514076	Canadian Registration #: ALD-05-001

FMC Technologies Completion LH-0004 Line Heater



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/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:

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

Nameplate Coil #1

RTI W HT	MANUFACTURED & CERTIFIED BY: BLUESTAR WELDING 
GRANDE PRAIRIE, AB., CANADA  1-780-532-1160	
A-NUMBER	④ 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	150°F
CRN No.	ALC-05-001
YEAR BUILT	2005
STEAM COIL M.A.W.P.	@ °F

Coil #1



Coil # 2



Nameplate Coil #2

RTI W HT	MANUFACTURED & CERTIFIED BY:	
	BLUESTAR	
	WELDING	
		
GRANDE PRAIRIE, AB., CANADA		
1-780-532-1160		
A-NUMBER	A514076	
SERIAL No.	PSC 10K2MM-03B	
JOB No.	10252-P	
DESIGN PRESSURE	10000 PSI	
M.A.W.P.	10000 PSI	
DESIGN TEMP. MINIMUM	-40°F	
CORROSION ALLOWANCE	0.025 IN.	
DESIGN TEMP. MAXIMUM	150°F	
CRN No.	PSC-05-001	
YEAR BUILT	2005	
STEAM COIL M.A.W.P.		@ °F

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

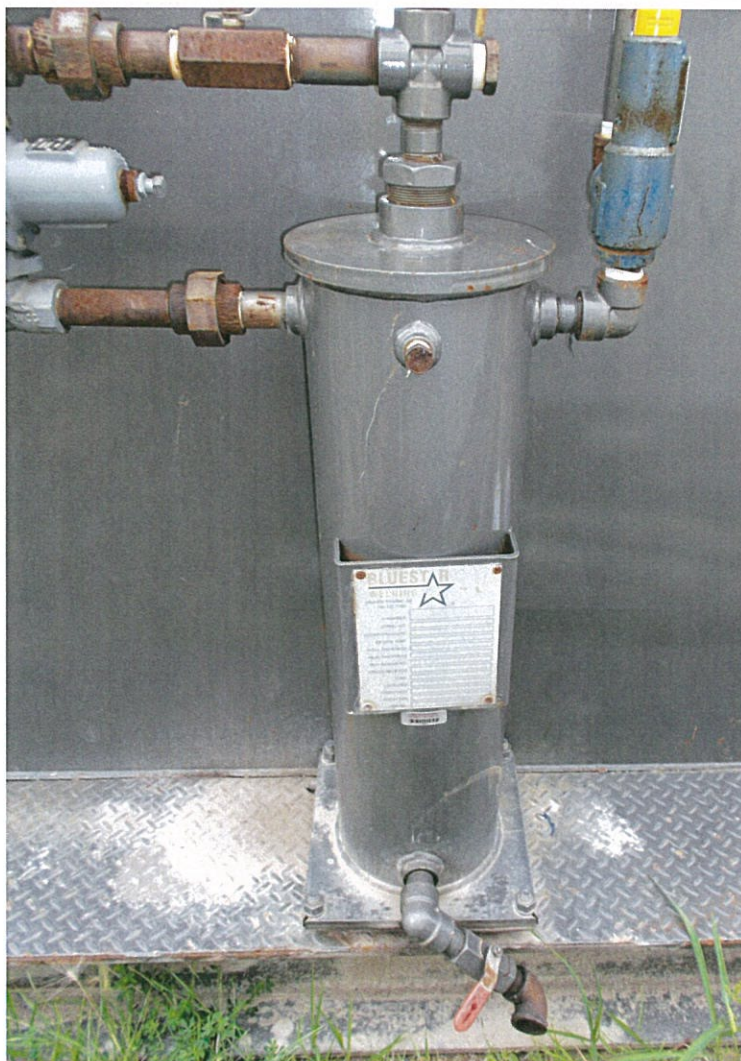
Date: 02/04/2012



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: 13.7 YRS	Date of this Report: 08/28/2014
Representative Corrosion Rate: 0.1 MPY	Next Inspection Due Date: 08/28/2015
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
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
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	NO
DERATED	
HYDRO TEST	
INSPECTOR	
CRN NO.	

SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

Repaired By _____

Date of Repair _____

Nat'l Bd. R-Certification No. _____

Other Stamping Information: _____

VESSEL DOCUMENTATION

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

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

Name: Eric Crandall

Date: 02/04/2012

API 510 PRESSURE VESSEL EXTERNAL INSPECTION REPORT

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

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. Nameplate is in acceptable condition.

Internal Access?: No

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

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

Condition of Foundation and Anchor Bolts: Anchor bolts are in place and secure. Vessel has a flat bottom head which also serves as a baseplate anchored to another baseplate welded to the skid. All (4) anchor bolt nuts are in place and secure.

Condition of Steel Supports, Saddles, and Bolting: All support welds appear sound.

Condition of Paint and/or Insulation: The paint is in good condition with no chipping or peeling. Vessel coating is in acceptable condition.

Condition of Nozzles, Flanges, Repads, and Weepholes: All threaded connection. Threaded coupling attachment welds appear sound.

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? Yes, Set at 150 psi

Date PSV last tested (if there is a tag on the valve): On test date 04/2014.

Comments:

None.

Recommendations:

None.

Repairs Needed:

None.

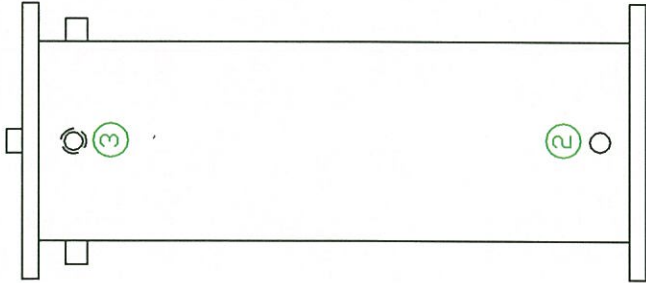
API 510 Inspector Signature
Robert W. Menke/EAC

API 510 Inspector Number
0131

Date
08/28/2014

EQUIP RETIREMENT DATE: 5/8/2028
NEXT INSPECTION IS DUE: 8/28/2015

- #2.01- BTM SH-FRONT 0.300 TC
- #2.02- BTM SH-LEFT 0.319 TC
- #2.03- BTM SH-BACK 0.321 TC
- #2.04- BTM SH-RIGHT 0.319 TC
- #3.01- TDP SH-FRONT 0.324 TC
- #3.02- TDP SH-LEFT 0.304 TC
- #3.03- TDP SH-BACK 0.305 TC
- #3.04- TDP SH-RIGHT 0.319 TC



TC-560

NAMEPLATE INFO	
MFG	BLUESTAR WELDING
SERIAL NUMBER	BSFGS227
NATIONAL BOARD #	NONE
DATE BUILT	2004
DESIGN P & T	150 PSIG @ 100°F
NOTE	CRN # DH 6510.2 NO "U" STAMP

CAL =	VESSEL =
BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0004-FGS
EQUIP NAME	FUEL GAS SCRUBBER
LOCATION	DN LH-0004 IN YARD
DWG #	LH0004-FGS

DESC: FUEL GAS SCRUBBER
DWG#: LH0004-FGS-2.01-3.04

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 09/03/2014

(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 Description:

Insp. Due Date = 08/28/2015
Pred. Ret. Date = 05/08/2028

RCR = 0.1 MPY

Rem. Life (from last survey 08/28/2014) = 13.7 yrs

0 C.A. Status: No
Total Caution TMLs = 1

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
2.01	BTM SH-FRONT	Y *	0.313 TC	02/04/2012	0.313 TC	08/27/2013	0.300 TC	08/28/2014	13.0	5.1	4.6	13.0	0.282 U	13.0	01/16/2016	08/28/2015
2.02	BTM SH-LEFT	N	0.320 TC	02/04/2012	0.319 TC	08/27/2013	0.319 TC	08/28/2014	0	0.4	0.4	0.6	0.282 U	0.4	02/28/2107	08/28/2015
2.03	BTM SH-BACK	N *	0.331 TC	02/04/2012	0.326 TC	08/27/2013	0.321 TC	08/28/2014	5.0	3.9	3.8	5.0	0.282 U	5.0	06/16/2022	08/28/2015
2.04	BTM SH-RIGHT	N *	0.333 TC	02/04/2012	0.330 TC	08/27/2013	0.319 TC	08/28/2014	11.0	5.5	5.2	11.0	0.282 U	11.0	01/08/2018	08/28/2015
3.01	TOP SH-FRONT	N *	0.325 TC	02/04/2012	0.325 TC	08/27/2013	0.324 TC	08/28/2014	1.0	0.4	0.4	1.0	0.282 U	1.0	08/28/2056	08/28/2015
3.02	TOP SH-LEFT	N	0.305 TC	02/04/2012	0.304 TC	08/27/2013	0.304 TC	08/28/2014	0	0.4	0.4	2.2	0.282 U	0.4	08/28/2069	08/28/2015
3.03	TOP SH-BACK	N *	0.306 TC	02/04/2012	0.306 TC	08/27/2013	0.305 TC	08/28/2014	1.0	0.4	0.4	2.1	0.282 U	1.0	08/28/2037	08/28/2015
3.04	TOP SH-RIGHT	N *	0.327 TC	02/04/2012	0.327 TC	08/27/2013	0.319 TC	08/28/2014	8.0	3.1	2.8	8.0	0.282 U	8.0	04/13/2019	08/28/2015

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

Report Date: 09/03/2014

(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 : Not Used.
(B) -- Average Max 25.0% of TMLs, Min of 2 : Not Used.
(C) -- Formula Corrosion Rate (Sigma = 1.28) : Not Used.
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 0.1 MPY

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

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

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

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

TML Inspection Interval is:

(A) -- 1.00 years.

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

Eq/Circ ID Estimated life = 13.7 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 05/08/2028

Recommended Eq/Circ UT/RT Inspection Date is 08/28/2015
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 1 Caution TMLs in this Eq/Circ ID.

API 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: LH-0004 C1-C2	
Size/Sched. Of Pipe: 4.500"	Eq/Circ. ID:
Service/System:	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:

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

Coating Condition:	Comments:
☐ Good ☒ Fair, Some Blistering/Peeling ☒ Corrosion Present (Describe) ☒ Other ☒ No Issues	Coils have no coating with minor corrosion and scaling present.

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 issues found.

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 could not fully be observed due to scale build up, but are in overall good condition.

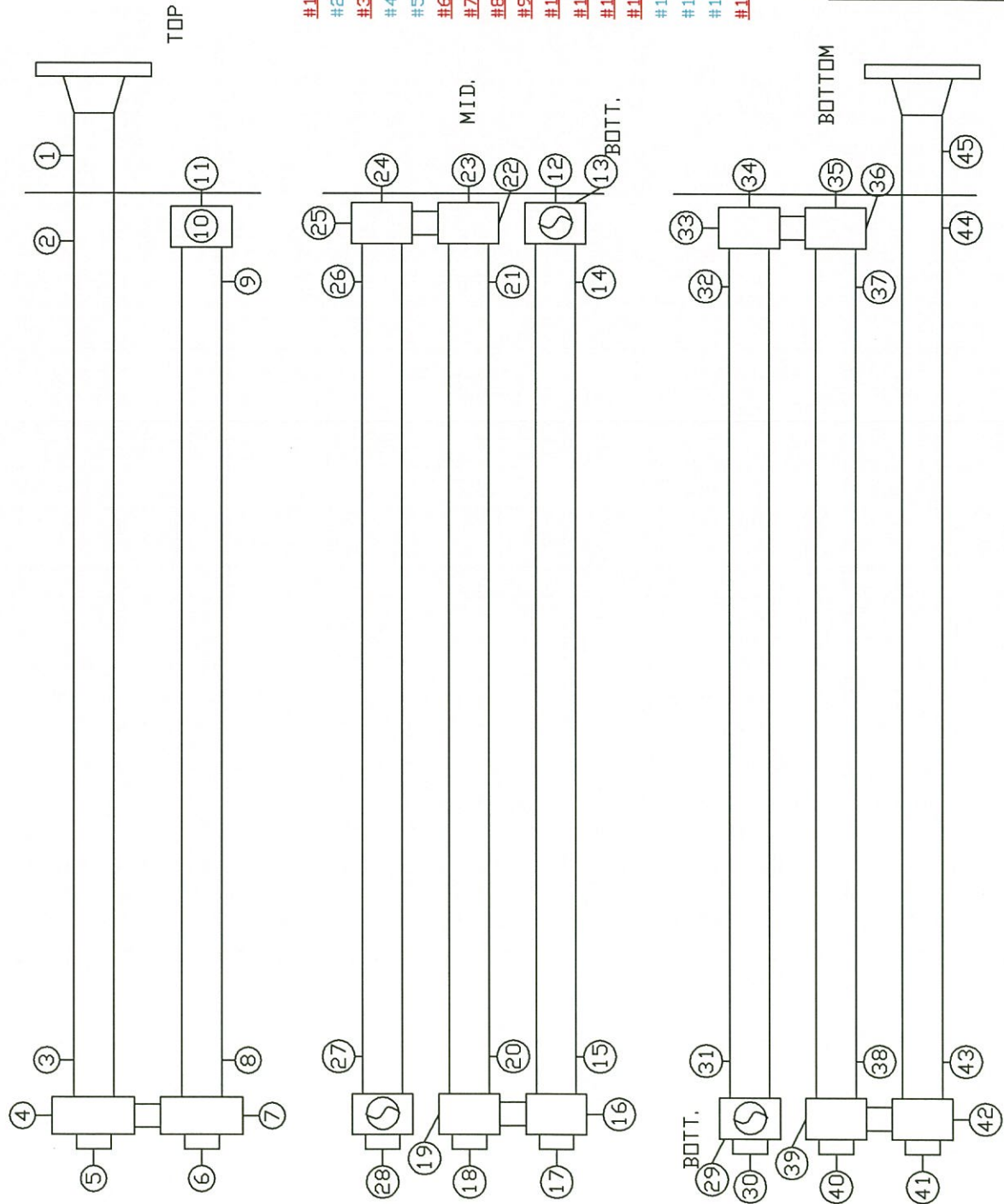
Relief Device:	Comments:
☐ PSV ☐ No PSV ☐ Rupture Disk ☐ Atmospheric ☐ No Relief Device Identified For This Equipment ☐ Tag Secure and Legible ☐ Set Pressure At Or Below MAWP ☐ Block Valve Not Locked/Car Sealed In Open Position ☐ Improper Drain Hole/Weather Cap On Atmos. Discharge ☐ Obstruction (i.e.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

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	Supports are in good condition with minor scale build up.

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	Flanges are in good overall condition with minor surface corrosion.

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	

EQUIP RETIREMENT DATE: 12/20/2015
NEXT INSPECTION IS DUE: 8/28/2015



#1.01- TOP-T 0.975
#2.01- TOP-T 0.981
#3.01- TOP-T 0.984
#4.01- TOP 2.663
#5.01- TOP 3.210
#6.01- TOP 2.785
#7.01- TOP 2.237
#8.01- TOP-T 0.909
#9.01- TOP-T 0.962
#10.01- TOP 1.536
#11.01- TOP 0.000 NT
#12.01- MID 0.000 NT
#14.01- MID-R 1.001
#15.01- MID-T 0.992
#16.01- MID 1.639
#17.01- MID 3.405
#18.01- MID 2.608

#20.01- MID-T 1.022
#21.01- MID-BTM 1.013
#22.01- MID 2.782
#23.01- MID 3.247
#24.01- MID 2.270
#25.01- MID 2.060
#26.01- MID 0.985
#27.01- MID-T 0.967
#31.01- BTM-R 1.001
#32.01- BTM-T 0.975
#33.01- BTM 1.642
#37.01- BTM-R 1.002
#38.01- BTM-T 1.002
#41.01- BTM 2.700
#43.01- BTM-R 0.952
#44.01- BTM 0.973
#45.01- BTM-BTM 0.972

CAL=

PIPE=

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

DESC: COIL 1 ON LINE HEATER 1
DWG#: LH0004-C1-1.01-45.01

TC-560

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: 09/03/2014

(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

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

Summary:

Group Description:

Insp. Due Date = 08/28/2015
Pred. Ret. Date = 12/20/2015

RCR = 102.4 MPY

Rem. Life (from last survey 08/28/2014) = 1.3 yrs

0 C.A. Status: No

Total Caution TMLs = 22

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	TOP-T	Y	1.032	06/14/2007	1.006	08/27/2013	0.975	08/28/2014	30.9	7.9	6.5	30.9	0.875 U	30.9	11/22/2017	08/28/2015
2.01	TOP-T	N	1.034	06/14/2007	0.986	08/27/2013	0.981	08/28/2014	5.0	7.4	7.5	7.9	0.875 U	7.4	12/24/2028	08/28/2015
3.01	TOP-T	Y	0.995	06/14/2007	1.000	08/27/2013	0.984	08/28/2014	16.0	1.5	0.7	16.0	0.875 U	16.0	06/20/2021	08/28/2015
4.01	TOP	N	2.391	06/14/2007	2.368	08/27/2013	2.368 RR	08/28/2014	0	3.2	3.3	10.9	2.000 U	3.2	08/29/2129	08/28/2015
5.01	TOP	N	2.821	06/14/2007	2.758	08/27/2013	2.758 RR	08/28/2014	0	8.7	9.1	27.6	2.000 U	8.7	10/14/2101	08/28/2015
6.01	TOP	Y	3.413	06/14/2007	2.667	08/27/2013	2.667 RR	08/28/2014	0	103.5	109.0	212.1	2.000 U	103.5	02/06/2021	08/28/2015
7.01	TOP	Y	2.863	06/14/2007	2.310 RR	08/27/2013	2.237	08/28/2014	72.9	86.9	88.3	96.0	2.000 U	86.9	05/20/2017	08/28/2015
8.01	TOP-T	Y *	1.029	06/14/2007	1.022	08/27/2013	0.909	08/28/2014	112.8	16.7	11.0	112.8	0.875 U	112.8	12/16/2014	08/28/2015
9.01	TOP-T	Y *	1.020	06/14/2007	1.009	08/27/2013	0.962	08/28/2014	46.9	8.0	5.8	46.9	0.875 U	46.9	07/06/2016	08/28/2015
10.01	TOP	Y	1.598	02/04/2012	1.590	08/27/2013	1.536	08/28/2014	53.9	24.2	22.5	53.9	0.875 U	53.9	12/02/2026	08/28/2015
11.01	TOP	Y	3.224	06/14/2007	3.224 RR	02/04/2012	3.179	08/27/2013	28.8	7.3	5.6	28.8	2.000 U	28.8	08/04/2054	08/27/2014
12.01	MID	Y	2.762	06/14/2007	2.762 RR	02/04/2012	2.734	08/27/2013	17.9	4.5	3.5	17.9	2.000 U	17.9	08/29/2054	08/27/2014
14.01	MID-R	Y	1.031	06/14/2007	1.031	08/27/2013	1.001	08/28/2014	29.9	4.2	2.6	29.9	0.875 U	29.9	11/14/2018	08/28/2015
15.01	MID-T	N	0.998	06/14/2007	0.982	08/27/2013	0.982 RR	08/28/2014	0	2.2	2.3	10.3	0.875 U	2.2	04/17/2063	08/28/2015
16.01	MID	N	1.563	06/14/2007	1.504	08/27/2013	1.504 RR	08/28/2014	0	8.2	8.5	37.8	0.875 U	8.2	05/13/2091	08/28/2015
17.01	MID	N	3.328	06/14/2007	3.370	08/27/2013	3.370 RR	08/28/2014	0	0	0	0	2.000 U	0.1	09/12/4014	08/28/2015
18.01	MID	Y	2.726	06/14/2007	2.667	08/27/2013	2.608	08/28/2014	58.9	16.4	13.7	58.9	2.000 U	58.9	12/23/2024	08/28/2015
20.01	MID-T	N	1.043	06/14/2007	1.011	08/27/2013	1.011 RR	08/28/2014	0	4.4	4.7	5.5	0.875 U	4.4	07/26/2045	08/28/2015
21.01	MID-BTM	N	1.013	06/14/2007	0.993	08/27/2013	0.993 RR	08/28/2014	0	2.8	3.0	3.5	0.875 U	2.8	10/19/2056	08/28/2015
22.01	MID	N	2.500 NM	02/24/2005	2.817	06/14/2007	2.782	08/28/2014	4.9	0	0	4.9	2.000 U	4.9	04/02/2174	08/28/2015

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: 09/03/2014

(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 = 08/28/2015
Pred. Ret. Date = 12/20/2015

Group Description:

RCR = 102.4 MPY
Rem. Life (from last survey 08/28/2014) = 1.3 yrs

0 C.A. Status: NO
Total Caution TMLs = 22

TM L 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	TM L Retirement Date	TM L Inspection Date
23.01	MID	Y	3.352		06/14/2007	3.287 RR		08/27/2013	3.247		08/28/2014	39.9	14.6	13.2	39.9	2.000 U	39.9	11/28/2045	08/28/2015
24.01	MID	Y *	2.687		06/14/2007	2.554 RR		08/27/2013	2.270		08/28/2014	283.4	57.9	44.8	283.4	2.000 U	283.4	08/11/2015	08/28/2015
25.01	MID	Y *	2.123		06/14/2007	2.123		08/27/2013	2.060		08/28/2014	62.9	8.7	5.6	62.9	2.000 U	62.9	08/11/2015	08/28/2015
26.01	MID	Y	0.990		06/14/2007	1.017		08/27/2013	0.985		08/28/2014	31.9	0.7	0	31.9	0.875 U	31.9	02/07/2018	08/28/2015
27.01	MID-T	Y	1.026		06/14/2007	0.996		08/27/2013	0.967		08/28/2014	28.9	8.2	7.0	28.9	0.875 U	28.9	11/03/2017	08/28/2015
31.01	BTM-R	N	1.053		06/14/2007	1.003 RR		08/27/2013	1.001		08/28/2014	2.0	7.2	7.6	8.7	0.875 U	7.2	02/27/2032	08/28/2015
32.01	BTM-T	Y	1.000		06/14/2007	1.006		08/27/2013	0.975		08/28/2014	30.9	3.5	1.9	30.9	0.875 U	30.9	11/22/2017	08/28/2015
33.01	BTM	N	1.724		06/14/2007	1.641		08/27/2013	1.641 RR		08/28/2014	0	11.5	12.0	49.3	1.300 U	11.5	04/22/2044	08/28/2015
37.01	BTM-R	Y	1.026		06/14/2007	1.026 RR		08/27/2013	1.009		08/28/2014	17.0	2.4	1.5	17.0	0.875 U	17.0	07/16/2022	08/28/2015
38.01	BTM-T	N	1.031		06/14/2007	1.003		08/27/2013	1.002		08/28/2014	1.0	4.0	4.2	4.7	0.875 U	4.0	05/29/2046	08/28/2015
41.01	BTM	Y	2.829		06/14/2007	2.702		08/27/2013	2.700		08/28/2014	2.0	17.9	18.9	21.2	2.000 U	17.9	10/06/2053	08/28/2015
43.01	BTM-R	Y *	1.013		06/14/2007	1.009		08/27/2013	0.952		08/28/2014	56.9	8.5	5.6	56.9	0.875 U	56.9	01/04/2016	08/28/2015
44.01	BTM	Y *	1.045		06/14/2007	1.013 RR		08/27/2013	0.973		08/28/2014	39.9	10.0	8.3	39.9	0.875 U	39.9	02/10/2017	08/28/2015
45.01	BTM-BTM	Y	1.026		06/14/2007	1.007		08/27/2013	0.972		08/28/2014	34.9	7.5	5.9	34.9	0.875 U	34.9	06/08/2017	08/28/2015

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

Report Date: 09/03/2014

Unit: LH-0004
Eq/Circ ID: LH0004-C1
Design Code: S8/D1
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: COIL 1 ON LINE HEATER 1, SN:BS10K2MM-03A

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 : 38.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 102.4 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 46.5 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 102.4 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).

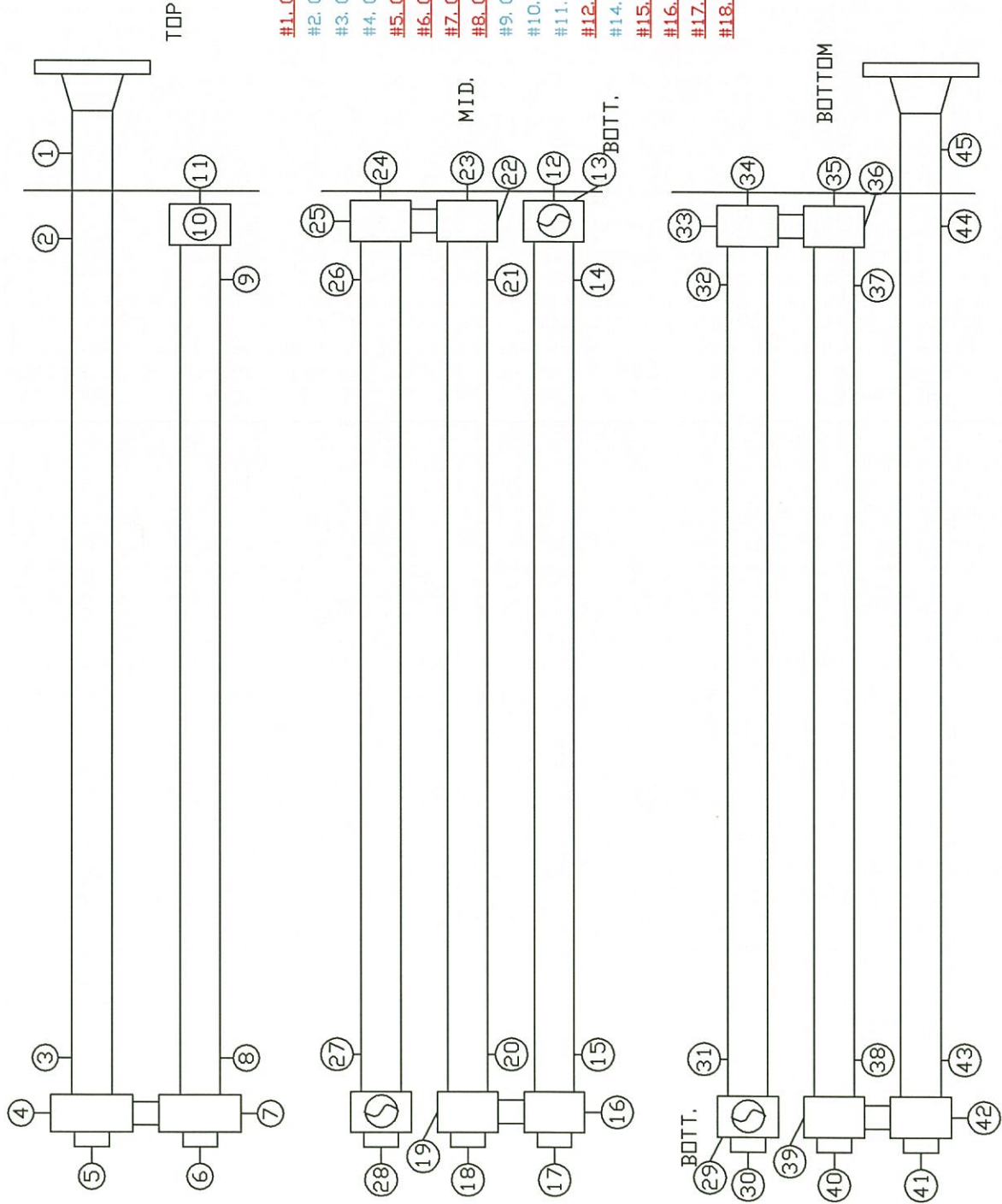
Eq/Circ ID Estimated life = 1.3 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 12/20/2015

Recommended Eq/Circ UT/RT Inspection Date is 08/28/2015
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 22 Caution TMLs in this Eq/Circ ID.

EQUIP RETIREMENT DATE: 12/18/2017
NEXT INSPECTION IS DUE: 8/28/2015



#1. 01- TOP-B 0.992
#2. 01- TOP-T 1.001
#3. 01- TOP-L 0.996
#4. 01- TOP 2.315
#5. 01- TOP 2.610
#6. 01- TOP 2.360
#7. 01- TOP 2.363
#8. 01- TOP-T 0.976
#9. 01- TOP-T 0.981
#10. 01- TOP 1.624
#11. 01- TOP 0.000 NT
#12. 01- MID 0.000 NT
#14. 01- MID-T 1.001
#15. 01- MID-L 0.933
#16. 01- MID 1.509
#17. 01- MID 3.229
#18. 01- MID 2.674

#19. 01- MID 3.271
#20. 01- MID-L 1.022
#21. 01- MID-T 0.997
#25. 01- MID 2.110
#26. 01- MID-R 1.024
#27. 01- MID-R 0.977
#28. 01- MID 2.786
#30. 01- BTM 3.136
#31. 01- BTM-L 1.024
#32. 01- BTM-T 0.989
#37. 01- BTM-T 1.023
#38. 01- BTM-T 1.019
#41. 01- BTM 2.683
#42. 01- BTM 2.245
#43. 01- BTM-T 1.033
#44. 01- BTM-R 1.017
#45. 01- BTM-L 0.993

CAL=

PIPE=

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

DESC: COIL 2 ON LINE HEATER 1
DWG#: LH0004-C2-1.01-45.01

TC-560

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: 09/03/2014

(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

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

Summary:

Group Name:

Insp. Due Date = 08/28/2015
Pred. Ret. Date = 12/18/2017

Group Description:

RCR = 93.9 MPY
Rem. Life (from last survey 08/28/2014) = 3.3 yrs

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

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

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-B	Y *	1.019		06/14/2007	1.019		08/27/2013	0.992		08/28/2014	26.9	3.7	2.4	26.9	0.875	U	26.9	01/03/2019	08/28/2015
2.01	TOP-T	N	1.006		06/14/2007	1.006		08/27/2013	1.001		08/28/2014	5.0	0.7	0.4	5.0	0.875	U	5.0	11/09/2039	08/28/2015
3.01	TOP-L	N	1.004		06/14/2007	1.004		08/27/2013	0.996		08/28/2014	8.0	1.1	0.7	8.0	0.875	U	8.0	10/12/2029	08/28/2015
4.01	TOP	N	2.325		06/14/2007	2.314	RR	08/27/2013	2.315		08/28/2014	0	1.4	1.5	1.9	2.000	U	1.4	08/30/2239	08/28/2015
5.01	TOP	Y	2.837		06/14/2007	2.417		08/27/2013	2.417	RR	08/28/2014	0	58.3	60.4	269.1	2.000	U	58.3	10/23/2021	08/28/2015
6.01	TOP	Y *	3.300		06/14/2007	2.698		08/27/2013	2.360		08/28/2014	337.3	130.4	118.9	337.3	2.000	U	337.3	09/22/2015	08/28/2015
7.01	TOP	Y	2.827		06/14/2007	2.373		08/27/2013	2.363		08/28/2014	10.0	64.4	68.1	78.8	2.000	U	64.4	04/17/2020	08/28/2015
8.01	TOP-T	Y *	1.002		06/14/2007	0.994		08/27/2013	0.976		08/28/2014	18.0	3.6	2.7	18.0	0.875	U	18.0	04/07/2020	08/28/2015
9.01	TOP-T	N	0.995		06/14/2007	0.994		08/27/2013	0.981		08/28/2014	13.0	1.9	1.3	13.0	0.875	U	13.0	10/23/2022	08/28/2015
10.01	TOP	N	1.615		06/14/2007	1.615		08/27/2013	1.615	RR	08/28/2014	0	0	0	0	1.300	U	0.1	09/12/4014	08/28/2015
11.01	TOP	N	2.500	NM	02/24/2005	3.325		06/14/2007	3.278		08/27/2013	7.6	0	0	7.6	2.000	U	7.6	10/25/2181	08/27/2014
12.01	MID	Y	2.500	NM	02/24/2005	2.766		06/14/2007	2.634		02/04/2012	28.4	0	0	28.4	2.000	U	28.4	06/02/2034	02/03/2013
14.01	MID-T	N	1.032		06/14/2007	1.005		08/27/2013	1.001		08/28/2014	4.0	4.3	4.3	5.1	0.875	U	4.3	12/17/2043	08/28/2015
15.01	MID-L	Y *	1.023		06/14/2007	0.997		08/27/2013	0.933		08/28/2014	63.9	12.5	9.5	63.9	0.875	U	63.9	07/26/2015	08/28/2015
16.01	MID	Y	1.674		06/14/2007	1.538		08/27/2013	1.509		08/28/2014	28.9	22.9	22.4	38.4	0.875	U	28.9	08/05/2036	08/28/2015
17.01	MID	Y	3.447		06/14/2007	3.278		08/27/2013	3.229		08/28/2014	48.9	30.3	29.3	48.9	1.300	U	48.9	02/07/2054	08/28/2015
18.01	MID	Y	2.723		06/14/2007	2.691		08/27/2013	2.674		08/28/2014	17.0	6.8	6.1	20.5	2.000	U	17.0	04/21/2054	08/28/2015
19.01	MID	Y	3.248		06/14/2007	3.351		08/27/2013	3.271		08/28/2014	79.8	0	0	79.8	2.000	U	79.8	08/01/2030	08/28/2015
20.01	MID-L	N	1.015		06/14/2007	1.030		08/27/2013	1.022		08/28/2014	8.0	0	0	8.0	0.875	U	8.0	01/11/2033	08/28/2015
21.01	MID-T	N	1.012		06/14/2007	1.012		08/27/2013	0.997		08/28/2014	15.0	2.1	1.3	15.0	0.875	U	15.0	10/16/2022	08/28/2015

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: 09/03/2014

(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 = 08/28/2015
Pred. Ret. Date = 12/18/2017

Group Description:

RCR = 93.9 MPY
Rem. Life (from last survey 08/28/2014) = 3.3 yrs

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

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
25.01	MID	N	2.188		06/14/2007	2.117		08/27/2013	2.110		08/28/2014	7.0	10.8	11.0	22.4	1.300	U	08/28/2089	08/28/2015
26.01	MID-R	N	1.023		06/14/2007	1.004		08/27/2013	1.004	RR	08/28/2014	0	2.6	2.7	9.6	0.875	U	04/09/2064	08/28/2015
27.01	MID-R	Y *	1.005		06/14/2007	1.000		08/27/2013	0.977		08/28/2014	23.0	3.9	2.8	23.0	0.875	U	02/03/2019	08/28/2015
28.01	MID	Y	3.253		06/14/2007	2.789		08/27/2013	2.786		08/28/2014	3.0	64.8	68.9	80.0	2.000	U	10/14/2026	08/28/2015
30.01	BTM	Y	2.944		06/14/2007	2.707		08/27/2013	2.707	RR	08/28/2014	0	32.9	34.9	38.7	2.000	U	02/23/2036	08/28/2015
31.01	BTM-L	N	1.016		06/14/2007	1.013		08/27/2013	1.013	RR	08/28/2014	0	0.4	0.4	0.5	0.875	U	08/31/2359	08/28/2015
32.01	BTM-T	N	1.006		06/14/2007	0.998		08/27/2013	0.989		08/28/2014	9.0	2.4	2.0	9.0	0.875	U	04/28/2027	08/28/2015
37.01	BTM-T	N	1.017		06/14/2007	1.001		08/27/2013	1.001	RR	08/28/2014	0	2.2	2.4	2.8	0.875	U	12/06/2071	08/28/2015
38.01	BTM-T	N	1.023		06/14/2007	1.003		08/27/2013	1.003	RR	08/28/2014	0	2.8	3.0	3.4	0.875	U	05/15/2060	08/28/2015
41.01	BTM	Y	2.851		06/14/2007	2.702		08/27/2013	2.683		08/28/2014	19.0	23.3	23.7	25.0	2.000	U	23.3	08/28/2015
42.01	BTM	Y	2.225		06/14/2007	2.278		08/27/2013	2.245		08/28/2014	32.9	0	0	32.9	2.000	U	02/07/2022	08/28/2015
43.01	BTM-T	N	0.998		06/14/2007	1.015		08/27/2013	1.015	RR	08/28/2014	0	0	0	0	0.875	U	09/08/3414	08/28/2015
44.01	BTM-R	N	1.002		06/14/2007	1.012		08/27/2013	1.012	RR	08/28/2014	0	0	0	0	0.875	U	09/07/3384	08/28/2015
45.01	BTM-L	Y *	1.035		06/14/2007	1.027		08/27/2013	0.993		08/28/2014	33.9	5.8	4.2	33.9	0.875	U	02/19/2018	08/28/2015

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

Report Date: 09/03/2014

Unit: LH-0004
 Eq/Circ ID: LH0004-C2
 Design Code: SS/D1
 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: COIL 2 ON LINE HEATER 1, SN:BS10K2MM-03B

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

Representative Corrosion Rate is the Maximum of:
 (A) -- Average Corrosion Rate x 1.00 : 31.6 MPY
 (B) -- Average Max 25.0% of TMLs, Min of 2 : 93.9 MPY
 (C) -- Formula Corrosion Rate (Sigma = 1.28) : 38.5 MPY
 (D) -- Default Corrosion Rate : 0.1 MPY
 Representative Corrosion Rate = 93.9 MPY

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

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

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

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

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

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

Eq/Circ ID Estimated life = 3.3 years from the most recent survey date.
 (Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 12/18/2017

Recommended Eq/Circ UT/RT Inspection Date is 08/28/2015
 UT/RT Inspection Interval is 1.00 years.

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
 There are 17 Caution TMLs in this Eq/Circ ID.