



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

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH-0032	
Remaining Life: 15 YRS	Date of this Report: 08/27/2013
Average Corrosion Rate: 102 MPY	Next Inspection Due Date: 08/27/2014
Manufacturer: DynaCorp Fabricators, INC.	Mfg Serial #: 6J111049
Date Built: 2012	National Board #: None
Alberta registration #: 617015	Canadian Registration #: T9862.2

FMC Technologies Completion LH-0032 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 : FMC Technologies Completion
Facility/Location Name : PA District
Field Name : N/A
Equipment Number : LH-0032
Eq/Circ. ID : LH0032-C1/ LH032-C2
Equipment Name/Service : LH032 Line Heater (w/two coils)
Physical Location : Canonsburg Yard
GPS Coordinates :

VESSEL DESCRIPTION AND SERVICE CONDITIONS

Type of Vessel: Horizontal Line Heater

Vessel Size: Coils are 4.500"

Operating Pressure Range (psig): Not in service

Operating Temperature Range (°F): Not on service

Does the vessel have Internal Access? ☒ Yes ☐ No

Specify type of internal access, if available: When coils removed (only internal access).

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) _____

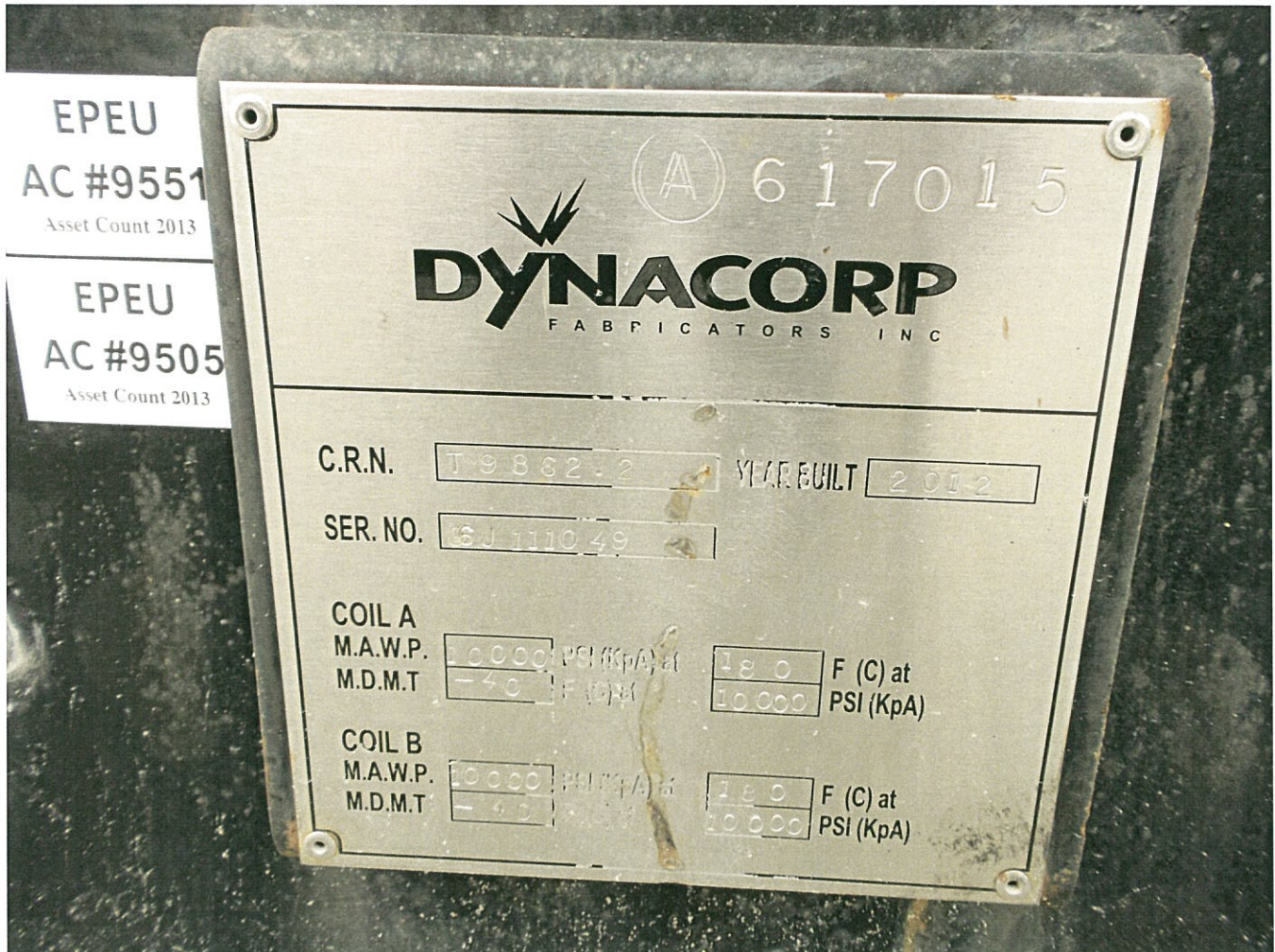
Approximate Date built or installed (check associated equipment or info at facility) _____

Any other pertinent information: _____

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

Nameplate Coils # 1 and Coils # 2



Coil # 1 and Coil # 2



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: 08/27/2013

API 510 PRESSURE VESSEL EXTERNAL INSPECTION

Company Name: FMC Technologies Completion	
Facility/Location Name: PA District	
Equipment Number: LH-0032	Eq/Circ. ID: LH0032 C1 /C2
Equipment Name/Service: Line Heater	
Physical Location: Canonsburg Yard	
Manufacturer: DynaCorp Fabricators, INC.	Manufacturer Serial Number: 6J111049
Year Built: 2012	National Board Number: None
Alberta Registration #: 617015	Canadian Registration # T9862.2

Reason for Inspection: Initial API-510 Stream Inspection

Condition of Nameplate and/or Bracket: Nameplate is intact and legible. The nameplate bracket is securely attached. Nameplate is in new condition, no surface corrosion present.

Internal Access: Yes, when coils removed (only internal access).

Corrosion Monitoring Locations (CMLs) and baseline thickness data established: CMLs and baseline thickness data will be established as part of this inspection.

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

Condition of Foundation and Anchor Bolts: There are no anchor bolts. Line heater is welded directly to the skid. All attachment welds appear sound.

Condition of Steel Supports, Saddles, and Bolting: N/A

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

Condition of Nozzles, Flanges, Repads, and Weepholes: Nozzles and flanges are in new condition. There is no evidence of flange leaks or leaks at any of the threaded connections. There is no evidence of leaks at any of the threaded connections. All Line Heater flanges in new condition with no surface corrosion present.

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: 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? Overpressure protection is on the associated piping

If yes, is it set at or below the MAWP? N/A

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

Comments:

Fire tube is in acceptable condition with light scale surface corrosion present

Recommendations:

Repairs Needed:

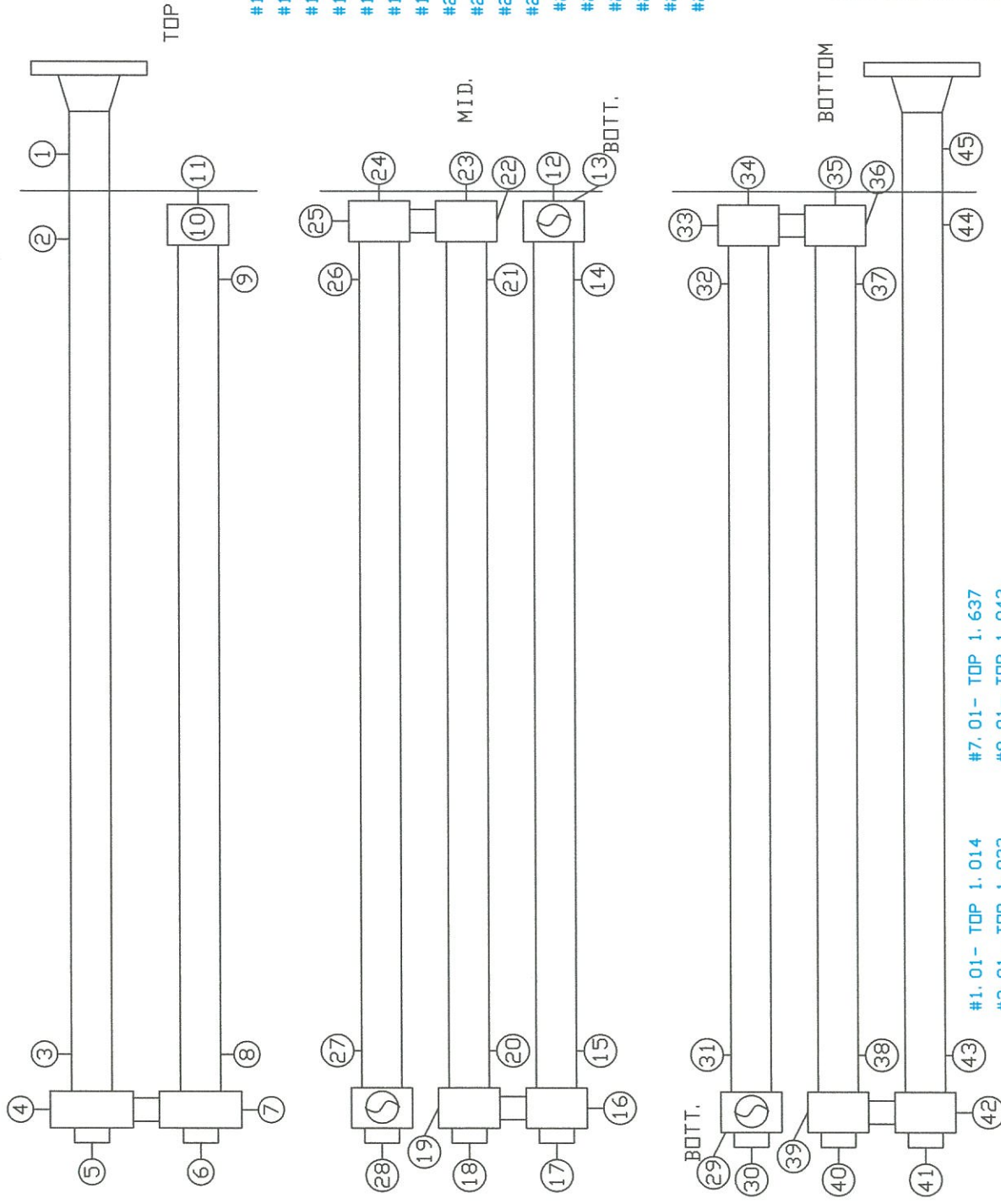
API 510 Inspector Signature
Robert W. Menke/EAC

API 510 Inspector Number
0131

Date
08/27/2013

EQUIP RETIREMENT DATE: 5/6/2039
NEXT INSPECTION IS DUE: 8/27/2014

NAMEPLATE INFO	
MFG	DYNACORP
SERIAL NUMBER	6J111049
A NUMBER	617015
DATE BUILT	2012
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # T9862-2



- | | |
|----------------------|-------------------|
| #13.01- MID 1.633 | #30.01- BTM 2.493 |
| #14.01- MID 0.997 | #31.01- BTM 0.994 |
| #15.01- MID 0.997 | #32.01- BTM 0.996 |
| #16.01- MID 2.526 | #33.01- BTM 2.497 |
| #17.01- MID 1.662 | #34.01- BTM 1.612 |
| #18.01- MID 2.487 | #35.01- BTM 2.484 |
| #19.01- MID 1.700 | #36.01- BTM 1.657 |
| #20.01- MID 1.039 | #37.01- BTM 1.035 |
| #21.01- MID 1.002 | #38.01- BTM 0.994 |
| #22.01- MID 0.000 NT | #39.01- BTM 1.824 |
| #23.01- MID 1.646 | #40.01- BTM 2.491 |
| #24.01- MID 2.498 | #41.01- BTM 1.656 |
| #25.01- MID 1.618 | #42.01- BTM 2.516 |
| #26.01- MID 0.982 | #43.01- BTM 1.020 |
| #27.01- MID 1.013 | #44.01- BTM 1.025 |
| #28.01- MID 1.619 | #45.01- BTM 1.028 |
| #29.01- BTM 1.620 | |

CAL= PIPE=

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0032-C1
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0032-C1

- | | |
|------------------|-------------------|
| #1.01- TOP 1.014 | #7.01- TOP 1.637 |
| #2.01- TOP 1.022 | #8.01- TOP 1.043 |
| #3.01- TOP 1.013 | #9.01- TOP 0.999 |
| #4.01- TOP 2.502 | #10.01- TOP 1.765 |
| #5.01- TOP 1.614 | #11.01- TOP 1.892 |
| #6.01- TOP 2.503 | #12.01- MID 2.522 |

DESC: COIL 1 ON LH-0032 HTR, SN:6J111049
DWG#: LH0032-C1-1.01-45.01

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date: 10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 A ON LINE HEATER; SN: 6J111049

Summary: Group Name: Insp. Due Date = 08/27/2014
Pred. Ret. Date = 05/06/2039

Group Description:
RCR = 7.9 MPY
Rem. Life (from last survey 08/27/2013) = 25.7 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
1.01	TOP	N	1.000 NM		06/15/2012			N/A	1.014		08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/08/3403	08/27/2014
2.01	TOP	N	1.000 NM		06/15/2012			N/A	1.022		08/27/2013	N/A	0	N/A	0.6	0.875 U	0.1	09/08/3483	08/27/2014
3.01	TOP	N	1.000 NM		06/15/2012			N/A	1.013		08/27/2013	N/A	0	N/A	1.3	0.875 U	0.1	09/06/3393	08/27/2014
4.01	TOP	N	2.500 NM		06/15/2012			N/A	2.502		08/27/2013	N/A	0	N/A	0	2.000 U	0.1	09/11/4013	08/27/2014
5.01	TOP	N *	1.625 NM		06/15/2012			N/A	1.614		08/27/2013	N/A	9.2	N/A	11.7	1.300 U	9.2	10/14/2047	08/27/2014
6.01	TOP	N	2.500 NM		06/15/2012			N/A	2.503		08/27/2013	N/A	0	N/A	72.5	2.000 U	0.1	09/11/4013	08/27/2014
7.01	TOP	N	1.625 NM		06/15/2012			N/A	1.637		08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
8.01	TOP	N	1.000 NM		06/15/2012			N/A	1.043		08/27/2013	N/A	0	N/A	3.9	0.875 U	0.1	09/08/3693	08/27/2014
9.01	TOP	N	1.000 NM		06/15/2012			N/A	0.999		08/27/2013	N/A	0.8	N/A	11.1	0.875 U	0.8	08/28/2168	08/27/2014
10.01	TOP	N	1.625 NM		06/15/2012			N/A	1.765		08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
11.01	TOP	N	1.625 NM		06/15/2012			N/A	1.892		08/27/2013	N/A	0	N/A	507.0	1.300 U	0.1	09/11/4013	08/27/2014
12.01	MID	N	2.500 NM		06/15/2012			N/A	2.522		08/27/2013	N/A	0	N/A	0	2.000 U	0.1	09/11/4013	08/27/2014
13.01	MID	N	1.625 NM		06/15/2012			N/A	1.633		08/27/2013	N/A	0	N/A	723.0	1.300 U	0.1	09/11/4013	08/27/2014
14.01	MID	N	1.000 NM		06/15/2012			N/A	0.997		08/27/2013	N/A	2.5	N/A	252.0	0.875 U	2.5	06/15/2062	08/27/2014
15.01	MID	N	1.000 NM		06/15/2012			N/A	0.997		08/27/2013	N/A	2.5	N/A	2.5	0.875 U	2.5	06/15/2062	08/27/2014
16.01	MID	N	2.500 NM		06/15/2012			N/A	2.526		08/27/2013	N/A	0	N/A	0	2.000 U	0.1	09/11/4013	08/27/2014
17.01	MID	N	1.625 NM		06/15/2012			N/A	1.662		08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
18.01	MID	N	2.500 NM		06/15/2012			N/A	2.487		08/27/2013	N/A	10.8	N/A	723.8	2.000 U	10.8	09/30/2058	08/27/2014
19.01	MID	N	1.625 NM		06/15/2012			N/A	1.700		08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
20.01	MID	N	1.000 NM		06/15/2012			N/A	1.039		08/27/2013	N/A	0	N/A	1253.4	0.875 U	0.1	09/08/3653	08/27/2014

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:10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 A ON LINE HEATER; SN:6J111049

Summary: Group Name:
Insp. Due Date = 08/27/2014
Pred. Ret. Date = 05/06/2039

Group Description:
RCR = 7.9 MPY
Rem. Life (from last survey 08/27/2013) = 25.7 yrs

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

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
21.01	MID	N	1.000 NM	06/15/2012		N/A	1.002	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/06/3283	08/27/2014
22.01	MID	N		N/A		N/A	1.000 NM	06/15/2012	N/A	N/A	N/A	0	0.875 U	0.1	06/25/3262	06/15/2013
23.01	MID	N	1.625 NM	06/15/2012		N/A	1.646	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
24.01	MID	N	1.625 NM	06/15/2012		N/A	2.498	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
25.01	MID	N	1.000 NM	06/15/2012		N/A	1.618	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/11/4013	08/27/2014
26.01	MID	N *	1.000 NM	06/15/2012		N/A	0.982	08/27/2013	N/A	15.0	N/A	536.2	0.875 U	15.0	10/14/2020	08/27/2014
27.01	MID	N	1.000 NM	06/15/2012		N/A	1.013	08/27/2013	N/A	0	N/A	510.3	0.875 U	0.1	09/06/3393	08/27/2014
28.01	MID	N	1.625 NM	06/15/2012		N/A	1.619	08/27/2013	N/A	5.0	N/A	5.0	1.300 U	5.0	06/15/2077	08/27/2014
29.01	BTM	N	1.625 NM	06/15/2012		N/A	1.620	08/27/2013	N/A	4.2	N/A	4.2	1.300 U	4.2	11/05/2089	08/27/2014
30.01	BTM	N	2.500 NM	06/15/2012		N/A	2.493	08/27/2013	N/A	5.8	N/A	58.4	2.000 U	5.8	08/27/2098	08/27/2014
31.01	BTM	N *	1.000 NM	06/15/2012		N/A	0.994	08/27/2013	N/A	5.0	N/A	1253.4	0.875 U	5.0	06/15/2037	08/27/2014
32.01	BTM	N	1.000 NM	06/15/2012		N/A	0.996	08/27/2013	N/A	3.3	N/A	1254.2	0.875 U	3.3	04/28/2050	08/27/2014
33.01	BTM	N	2.500 NM	06/15/2012		N/A	2.497	08/27/2013	N/A	2.5	N/A	2.5	2.000 U	2.5	06/17/2212	08/27/2014
34.01	BTM	N *	1.625 NM	06/15/2012		N/A	1.612	08/27/2013	N/A	10.8	N/A	118.4	1.300 U	10.8	07/18/2042	08/27/2014
35.01	BTM	N *	2.500 NM	06/15/2012		N/A	2.484	08/27/2013	N/A	13.3	N/A	174.3	2.000 U	13.3	01/17/2050	08/27/2014
36.01	BTM	N	1.625 NM	06/15/2012		N/A	1.657	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
37.01	BTM	N	1.000 NM	06/15/2012		N/A	1.035	08/27/2013	N/A	0	N/A	496.2	0.875 U	0.1	09/08/3613	08/27/2014
38.01	BTM	N *	1.000 NM	06/15/2012		N/A	0.994	08/27/2013	N/A	5.0	N/A	5.0	0.875 U	5.0	06/15/2037	08/27/2014
39.01	BTM	N	1.000 NM	06/15/2012		N/A	1.824	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/11/4013	08/27/2014
40.01	BTM	N	1.625 NM	06/15/2012		N/A	2.491	08/27/2013	N/A	0	N/A	5.8	1.300 U	0.1	09/11/4013	08/27/2014
41.01	BTM	N	1.625 NM	06/15/2012		N/A	1.656	08/27/2013	N/A	0	N/A	703.8	1.300 U	0.1	09/11/4013	08/27/2014

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: 10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 A ON LINE HEATER; SN: 6J111049

Summary: Group Name:
Insp. Due Date = 08/27/2014
Pred. Ret. Date = 05/06/2039

Group Description:
RCR = 7.9 MPY
Rem. Life (from last survey 08/27/2013) = 25.7 yrs

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

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thick Nt	Rep TML CR	TML Retirement Date	TML Inspection Date
42.01	BTM	N	2.500 NM	06/15/2012			2.516	08/27/2013	N/A	0	N/A	1220.8	2.000 U	0.1	09/11/4013	08/27/2014
43.01	BTM	N	1.000 NM	06/15/2012			1.020	08/27/2013	N/A	0	N/A	1.8	0.875 U	0.1	09/08/3463	08/27/2014
44.01	BTM	N	1.000 NM	06/15/2012			1.025	08/27/2013	N/A	0	N/A	2.2	0.875 U	0.1	09/08/3513	08/27/2014
45.01	BTM	N	1.000 NM	06/15/2012			1.028	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/09/3543	08/27/2014

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

Report Date: 10/21/2013

Unit: LH-0032
Eq/Circ ID: LH0032-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 A ON LINE HEATER; SN:6J111049

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

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.00 : 2.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 7.9 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 2.6 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 7.9 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 = 25.7 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 05/06/2039

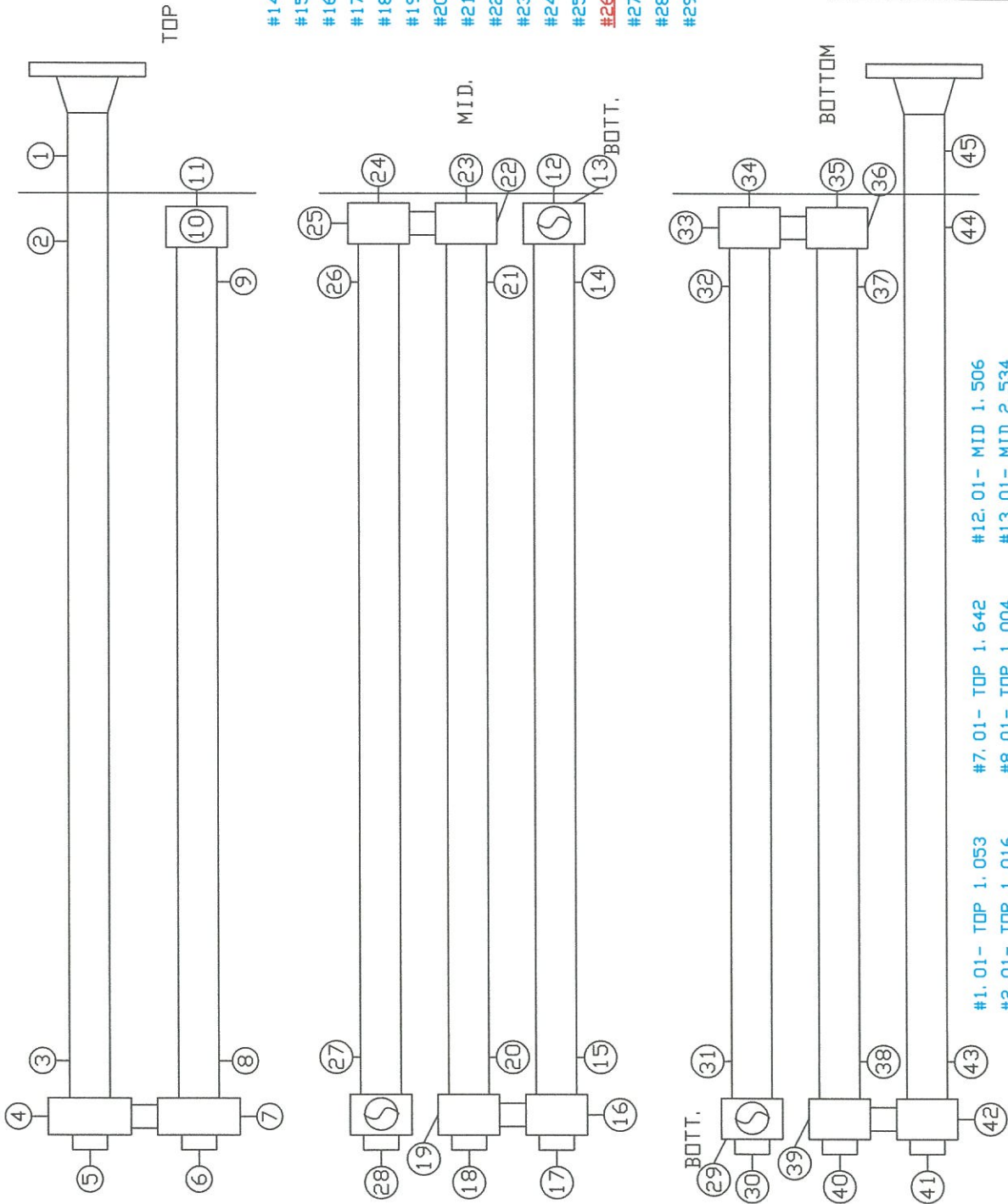
Recommended Eq/Circ UT/RT Inspection Date is 08/27/2014
UT/RT Inspection Interval is 1.00 years.

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.

EQUIP RETIREMENT DATE: 10/6/2017
NEXT INSPECTION IS DUE: 8/27/2014

NAMEPLATE INFO

MFG	DYNACORP
SERIAL NUMBER	6J111049
A NUMBER	617015
DATE BUILT	2012
DESIGN P & T	10,000 psi @ 180°F
NOTE	CRN # T9862-2



#14. 01- MID 0. 991
#15. 01- MID 1. 003
#16. 01- MID 2. 541
#17. 01- MID 1. 682
#18. 01- MID 1. 632
#19. 01- MID 0. 000 NT
#20. 01- MID 0. 997
#21. 01- MID 1. 001
#22. 01- MID 0. 000 NT
#23. 01- MID 1. 673
#24. 01- MID 1. 674
#25. 01- MID 1. 747
#26. 01- MID 0. 993
#27. 01- MID 1. 032
#28. 01- MID 1. 698
#29. 01- BTM 1. 035

#30. 01- BTM 2. 430
#31. 01- BTM 0. 997
#32. 01- BTM 1. 021
#33. 01- BTM 2. 579
#34. 01- BTM 1. 483
#35. 01- BTM 2. 291
#36. 01- BTM 2. 560
#37. 01- BTM 1. 030
#38. 01- BTM 1. 020
#39. 01- BTM 1. 783
#40. 01- BTM 2. 493
#41. 01- BTM 2. 524
#42. 01- BTM 1. 036
#43. 01- BTM 1. 019
#44. 01- BTM 1. 028
#45. 01- BTM 1. 013

PIPE=

CAL=

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0032-C2
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH0032-C2

#1. 01- TOP 1. 053
#2. 01- TOP 1. 016
#3. 01- TOP 1. 044
#4. 01- TOP 2. 500
#5. 01- TOP 1. 611
#6. 01- TOP 2. 483

#7. 01- TOP 1. 642
#8. 01- TOP 1. 004
#9. 01- TOP 1. 002
#10. 01- TOP 1. 743
#11. 01- TOP 2. 494

#12. 01- MID 1. 506
#13. 01- MID 2. 534

DESC: COIL 2 ON LH-0032 HTR, SN:6J111049
DWG#: LH0032-C2-1.01-45.01

Corrosion Monitoring Eq/Circ ID Analysis Report

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

Report Date:10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 B ON LINE HEATER; SN:6J111049

Summary: Group Name: Insp. Due Date = 08/27/2014
Pred. Ret. Date = 10/06/2017

Group Description:
RCR = 198.0 MPY
Rem. Life (from last survey 08/27/2013) = 4.1 yrs

0 C.A. Status: No
Total Caution TMLs = 5

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	N	1.000	NM	06/15/2012			N/A	1.053		08/27/2013	N/A	0	N/A	0	0.875	U	0.1	09/09/3793	08/27/2014
2.01	TOP	N	1.000	NM	06/15/2012			N/A	1.016		08/27/2013	N/A	0	N/A	0.6	0.875	U	0.1	09/08/3423	08/27/2014
3.01	TOP	N	1.000	NM	06/15/2012			N/A	1.044		08/27/2013	N/A	0	N/A	1.3	0.875	U	0.1	09/10/3703	08/27/2014
4.01	TOP	N	2.500	NM	06/15/2012			N/A	2.500		08/27/2013	N/A	0	N/A	0	2.000	U	0.1	09/11/4013	08/27/2014
5.01	TOP	N	1.625	NM	06/15/2012			N/A	1.611		08/27/2013	N/A	11.7	N/A	11.7	1.300	U	11.7	03/27/2040	08/27/2014
6.01	TOP	N	2.500	NM	06/15/2012			N/A	2.483		08/27/2013	N/A	14.2	N/A	72.5	2.000	U	14.2	09/02/2047	08/27/2014
7.01	TOP	N	1.625	NM	06/15/2012			N/A	1.642		08/27/2013	N/A	0	N/A	0	1.300	U	0.1	09/11/4013	08/27/2014
8.01	TOP	N	1.000	NM	06/15/2012			N/A	1.004		08/27/2013	N/A	0	N/A	3.9	0.875	U	0.1	09/07/3303	08/27/2014
9.01	TOP	N	1.000	NM	06/15/2012			N/A	1.002		08/27/2013	N/A	0	N/A	11.1	0.875	U	0.1	09/06/3283	08/27/2014
10.01	TOP	N	1.625	NM	06/15/2012			N/A	1.743		08/27/2013	N/A	0	N/A	0	1.300	U	0.1	09/11/4013	08/27/2014
11.01	TOP	N	2.500	NM	06/15/2012			N/A	2.494		08/27/2013	N/A	5.0	N/A	5.0	2.000	U	5.0	06/16/2112	08/27/2014
12.01	MID	N	1.000	NM	06/15/2012			N/A	1.506		08/27/2013	N/A	0	N/A	0	0.875	U	0.1	09/11/4013	08/27/2014
13.01	MID	N	2.500	NM	06/15/2012			N/A	2.534		08/27/2013	N/A	0	N/A	0	2.000	U	0.1	09/11/4013	08/27/2014
14.01	MID	N *	1.000	NM	06/15/2012			N/A	0.991		08/27/2013	N/A	7.5	N/A	252.0	0.875	U	7.5	02/13/2029	08/27/2014
15.01	MID	N	1.000	NM	06/15/2012			N/A	1.003		08/27/2013	N/A	0	N/A	0	0.875	U	0.1	09/05/3293	08/27/2014
16.01	MID	N	2.500	NM	06/15/2012			N/A	2.541		08/27/2013	N/A	0	N/A	0	2.000	U	0.1	09/11/4013	08/27/2014
17.01	MID	N	1.625	NM	06/15/2012			N/A	1.682		08/27/2013	N/A	0	N/A	0	1.300	U	0.1	09/11/4013	08/27/2014
18.01	MID	N	1.625	NM	06/15/2012			N/A	1.632		08/27/2013	N/A	0	N/A	80.0	1.300	U	0.1	09/11/4013	08/27/2014
19.01	MID	N			N/A			N/A	1.625	NM	06/15/2012	N/A	N/A	N/A	0	1.300	U	0.1	06/30/4012	06/15/2013
20.01	MID	N	1.000	NM	06/15/2012			N/A	0.997		08/27/2013	N/A	2.5	N/A	278.6	0.875	U	2.5	06/15/2062	08/27/2014

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:10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 B ON LINE HEATER; SN:6J111049

Summary: Group Name: Insp. Due Date = 08/27/2014
Pred. Ret. Date = 10/06/2017

Group Description:
RCR = 198.0 MPY
Rem. Life (from last survey 08/27/2013) = 4.1 yrs

0 C.A. Status: No
Total Caution TMLs = 5

TM# 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	TM# Retirement Date	TM# Inspection Date
21.01	MID	N	1.000 NM	06/15/2012		N/A	1.001	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/05/3273	08/27/2014
22.01	MID	N		N/A		N/A	1.000 NM	06/15/2012	N/A	N/A	N/A	0	0.875 U	0.1	06/25/3262	06/15/2013
23.01	MID	N	1.625 NM	06/15/2012		N/A	1.673	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
24.01	MID	N	1.625 NM	06/15/2012		N/A	1.674	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
25.01	MID	N	1.625 NM	06/15/2012		N/A	1.747	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
26.01	MID	Y *	1.625 NM	06/15/2012		N/A	0.993	08/27/2013	N/A	527.0	N/A	527.0	1.300 U	527.0	01/26/2013	08/27/2014
27.01	MID	N	1.000 NM	06/15/2012		N/A	1.032	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/09/3583	08/27/2014
28.01	MID	N	1.625 NM	06/15/2012		N/A	1.698	08/27/2013	N/A	0	N/A	0	1.300 U	0.1	09/11/4013	08/27/2014
29.01	BTM	N	1.000 NM	06/15/2012		N/A	1.035	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/08/3613	08/27/2014
30.01	BTM	Y *	2.500 NM	06/15/2012		N/A	2.430	08/27/2013	N/A	58.4	N/A	58.4	2.000 U	58.4	01/06/2021	08/27/2014
31.01	BTM	Y *	2.500 NM	06/15/2012		N/A	0.997	08/27/2013	N/A	1253.4	N/A	1253.4	2.000 U	1253.4	11/08/2012	08/27/2014
32.01	BTM	N	1.000 NM	06/15/2012		N/A	1.021	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/07/3473	08/27/2014
33.01	BTM	N	1.000 NM	06/15/2012		N/A	2.579	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/11/4013	08/27/2014
34.01	BTM	Y *	1.625 NM	06/15/2012		N/A	1.483	08/27/2013	N/A	118.4	N/A	118.4	1.300 U	118.4	03/15/2015	08/27/2014
35.01	BTM	Y *	2.500 NM	06/15/2012		N/A	2.291	08/27/2013	N/A	174.3	N/A	174.3	2.000 U	174.3	04/29/2015	08/27/2014
36.01	BTM	N	2.500 NM	06/15/2012		N/A	2.560	08/27/2013	N/A	0	N/A	0	2.000 U	0.1	09/11/4013	08/27/2014
37.01	BTM	N	1.000 NM	06/15/2012		N/A	1.030	08/27/2013	N/A	0	N/A	0.2	0.875 U	0.1	09/09/3563	08/27/2014
38.01	BTM	N	1.000 NM	06/15/2012		N/A	1.020	08/27/2013	N/A	0	N/A	0.5	0.875 U	0.1	09/08/3463	08/27/2014
39.01	BTM	N	1.000 NM	06/15/2012		N/A	1.783	08/27/2013	N/A	0	N/A	0	0.875 U	0.1	09/11/4013	08/27/2014
40.01	BTM	N	2.500 NM	06/15/2012		N/A	2.493	08/27/2013	N/A	5.8	N/A	5.8	2.000 U	5.8	08/27/2098	08/27/2014
41.01	BTM	N	2.500 NM	06/15/2012		N/A	2.524	08/27/2013	N/A	0	N/A	0	2.000 U	0.1	09/11/4013	08/27/2014

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: 10/21/2013

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

Unit: LH-0032
Eq/Circ ID: LH0032-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 B ON LINE HEATER; SN: 6J111049

Summary: Group Name: Insp. Due Date = 08/27/2014
Pred. Ret. Date = 10/06/2017

Group Description:
RCR = 198.0 MPY
Rem. Life (from last survey 08/27/2013) = 4.1 yrs

0 C.A. Status: No
Total Caution TMLs = 5

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	
42.01	BTM	N	1.000	NM	06/15/2012			N/A	1.036		08/27/2013	N/A	0	N/A	0	0.875	U	0.1	09/09/3623	08/27/2014
43.01	BTM	N	1.000	NM	06/15/2012			N/A	1.019		08/27/2013	N/A	0	N/A	1.8	0.875	U	0.1	09/07/3453	08/27/2014
44.01	BTM	N	1.000	NM	06/15/2012			N/A	1.028		08/27/2013	N/A	0	N/A	2.2	0.875	U	0.1	09/09/3543	08/27/2014
45.01	BTM	N	1.000	NM	06/15/2012			N/A	1.013		08/27/2013	N/A	0	N/A	0	0.875	U	0.1	09/06/3393	08/27/2014

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

Report Date: 10/21/2013

Unit: LH-0032
Eq/Circ ID: LH0032-C2
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 B ON LINE HEATER; SN:6J111049

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 : 48.5 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 198.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 57.8 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 198.0 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 = 4.1 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 10/06/2017

Recommended Eq/Circ UT/RT Inspection Date is 08/27/2014
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 5 Caution TMLs in this Eq/Circ ID.

API 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: Coil # 1 & 2 LH-0032 Alberta # 617015	
Size/Sched. Of Pipe: 4.500"	Eq/Circ. ID:
Service/System:	Piping Class ☐ 1 ☒ 2 ☐ 3 ☐ Other
Design Pressure: 10,000 psi	Materials: ☒ CS ☐ SS ☐ Other
Design Temperature: 180° F	Note Stamping (If Any)
P&ID#:	Flange Rating: 1000 #

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:

- ☐ Serviceable
- ☒ Not Insulated
- ☐ Missing/Damaged
- ☐ CUI Identification
- ☐ Corrosion Present (Describe)
- ☐ Other
- ☒ No Issues

Comments:

Coating Condition:

- ☒ Good
- ☐ Fair, Some Blistering/Peeling
- ☒ Corrosion Present (Describe)
- ☐ Other
- ☒ No Issues

Comments:

Piping coils are in new condition with light surface corrosion present. Only light flaking was observed.

Loss of Containment:

- ☐ 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

Comments:

Line

heater was no in service during this inspection.

Condition of Welds:

- ☒ 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

Comments:

All associated welds appear smooth with a good weld profile.

Relief Device:

- ☐ 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

Comments:

On associated equipment

Supports/Hangers:

- ☒ 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 Needs To Be Tightened
- ☐ Fireproofing Missing Or Damaged
- ☐ Support/Hanger Is Corroded
- ☐ Other
- ☒ No Issues

Comments:

Tubesheets are in good condition, all attachment welds appear sound.

Flanged Connections:

- ☒ 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

Comments:

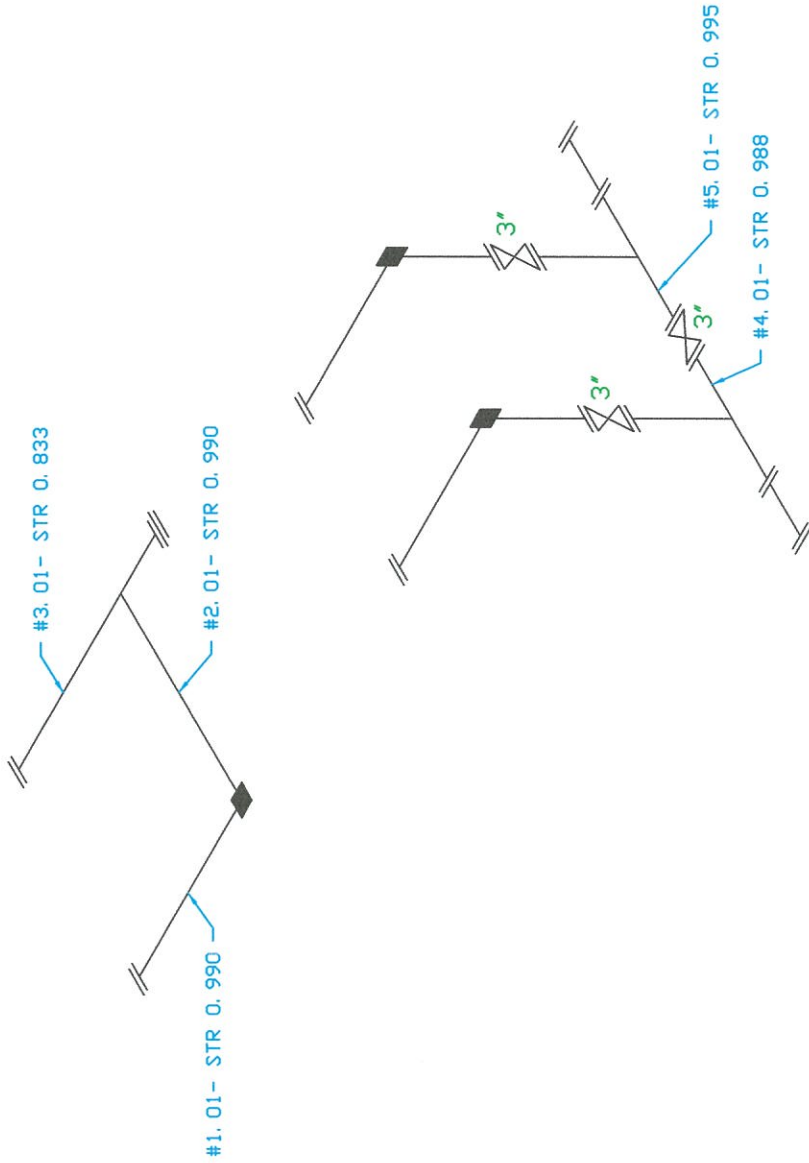
All flanges are in good condition with no surface corrosion present.

Mechanical Observations:

- ☐ 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

Comments:

EQUIP RETIREMENT DATE: 9/11/4013
NEXT INSPECTION IS DUE: 8/27/2014



CAL= 70°F

PIPE= 70°F

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH0032-P
EQUIP NAME	LH0032-P
DWG #	LH0032

DESC: ASSOCIATED PIPING ON LH-0032 LINE HTR
DWG#: LH0032-P-1.01-5.01

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: 10/21/2013

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

Unit: LH-0032

Eq/Circ ID: LH0032-P

Eq Type: PIPING

Class:

CM RBI:

Design Code: B31.3

Summary: Group Name:

Insp. Due Date = 08/27/2014

Pred. Ret. Date = 09/11/4013

Group Description:

RCR = 0.2 MPY

Rem. Life (from last survey 08/27/2013) = 2000.0 yrs

0 C.A. Status: No

Total Caution TMLs = 0

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

Description: ASSOCIATED PIPING ON LINE HEATER 2

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	STR	N *			N/A			N/A	0.990		08/27/2013	N/A	N/A	N/A	1.1	0.260	0.1	09/11/4013	08/27/2014
2.01	STR	N *			N/A			N/A	0.990		08/27/2013	N/A	N/A	N/A	0.2	0.260	0.1	09/11/4013	08/27/2014
3.01	STR	N *			N/A			N/A	0.833		08/27/2013	N/A	N/A	N/A	0	0.260	0.1	09/11/4013	08/27/2014
4.01	STR	N *			N/A			N/A	0.988		08/27/2013	N/A	N/A	N/A	0.5	0.260	0.1	09/11/4013	08/27/2014
5.01	STR	N *			N/A			N/A	0.995		08/27/2013	N/A	N/A	N/A	0.2	0.260	0.1	09/11/4013	08/27/2014

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

Report Date: 10/21/2013

Unit: LH-0032
Eq/Circ ID: LH0032-P
Design Code: B31.3
Eq Type: PIPING
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 2

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

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.00 : 0.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 0.1 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 0.2 MPY
(D) -- Default Corrosion Rate : 0.1 MPY
Representative Corrosion Rate = 0.2 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 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 = 2000.0 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 0% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 09/11/4013

Recommended Eq/Circ UT/RT Inspection Date is 08/27/2014
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.