



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

Inspections Performed for: FMC Technologies Completion	
Inspection Report for: LH-0011-C1/C2 Line Heater	
Remaining Life: 3.4 YRS	Date last Inspected: 09/22/2014
Representative Corrosion Rate: 0.1 MPY	Next Inspection Due Date: 09/22/2015
Manufacturer: Tara Oilfield Services, LTD.	Mfg Serial #: 05-129C
Date Built: 2006	National Board #: N/A
Alberta registration #: 537501	Canadian Registration #: T5045.2

FMC Technologies Completion LH-0011 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
Facility/Location Name : Grand Junction, CO
Field Name :
Equipment Number : LH-0011
Eq/Circ. ID : LH0011-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: 3.5" O.D. Coils

Operating Pressure Range (psig): Not in service

Operating Temperature Range (°F): Not in service

Does the vessel have Internal Access? Yes

Specify type of internal access, if available: Into Heater shell will coil bundle removed.

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) _____ 2006 _____

Any other pertinent information: _____ Design data with mfg. data reports provided. _____

PRESSURE VESSEL INVENTORY

ORIGINAL VESSEL NAMEPLATE/STAMPING INFORMATION

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



SUPPLEMENTAL VESSEL NAMEPLATE/STAMPING INFORMATION

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

Repaired By _____

Date of Repair _____

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: Robert W. Menke

Date: 03/22/2012

API 570 Piping External Inspection

Company Name: FMC Technologies Completion	Facility Name: PA District
Line Name/Number: LH-0011 C1-C2	
Size/Sched. Of Pipe: 3.500"	Eq/Circ. ID:
Service/System:	Piping Class ☐ 1 ☐ 2 ☐ 3 ☐ Other
Design Pressure: 5000 psi	Materials: ☒ CS ☐ SS ☐ Other
Design Temperature: 392°F	Note Stamping (If Any)
P&ID#:	Flange Rating: 2500#

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 heavy surface corrosion present, but no pitting located.

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	Vessel was not in-service during this inspection.

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	Heavy surface corrosion was present on some welds.

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 was located, vessel was not in-service during this inspection.

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	There are (2) vertical supports. Welds are full with a good weld profile.

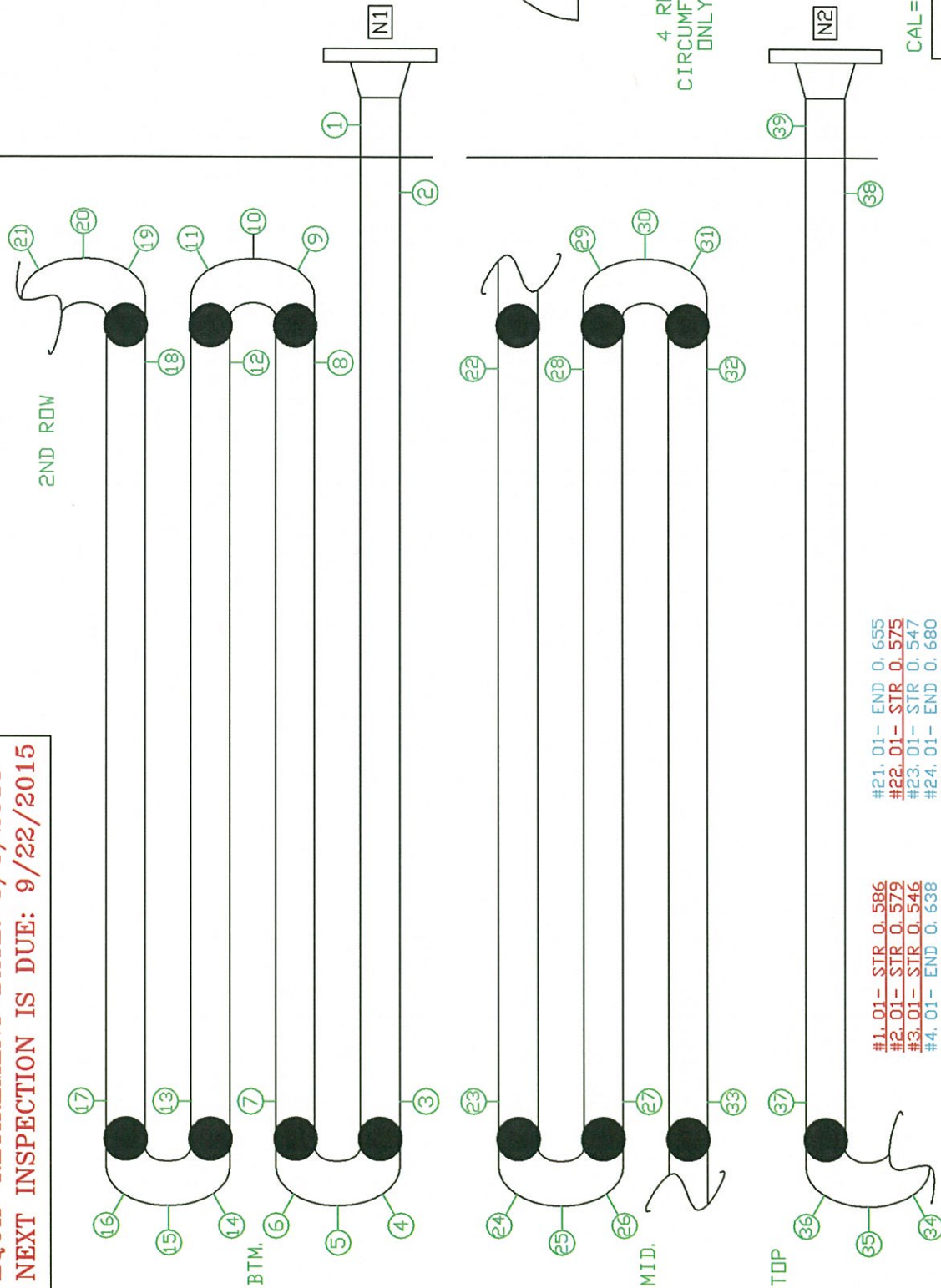
Flanged Connections:	Comments:
☒ Bolting Serviceable ☐ Short, Missing Or Damaged Bolting ☐ Nuts Lack Full Engagement ☒ Flanges Serviceable ☐ Flange Material Or Rating Inconsistent For System ☐ Flanges Deformed Or Damaged ☒ Corrosion Present (Describe) ☐ Gaskets ☐ Flange Rating Issues ☐ Other ☒ No Issues	Surface corrosion is present on bolting.

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: 3/3/2018
NEXT INSPECTION IS DUE: 9/22/2015

NAMEPLATE INFO	
MFG	TARA OILFIELD SERVICES LTD.
SERIAL NUMBER	05-129C
ALBERTA REG. #	537501
DATE BUILT	2006
DESIGN P & T	5000 psi @ 392°F
NOTE	CRN # T5045, 2

DM-401



#1.01- STR 0.586	#21.01- END 0.655
#2.01- STR 0.579	#22.01- STR 0.575
#3.01- STR 0.546	#23.01- STR 0.547
#4.01- END 0.638	#24.01- END 0.680
#5.01- END 0.608	#25.01- END 0.585
#6.01- END 0.701	#26.01- END 0.655
#7.01- STR 0.557	#27.01- STR 0.670
#8.01- STR 0.572	#28.01- STR 0.558
#9.01- END 0.665	#29.01- END 0.682
#10.01- END 0.598	#30.01- END 0.577
#11.01- END 0.580	#31.01- END 0.642
#12.01- STR 0.612	#32.01- STR 0.572
#13.01- STR 0.577	#33.01- STR 0.542
#14.01- END 0.644	#34.01- END 0.660
#15.01- END 0.594	#35.01- END 0.599
#16.01- END 0.689	#36.01- END 0.652
#17.01- STR 0.577	#37.01- STR 0.546
#18.01- STR 0.570	#38.01- STR 0.576
#19.01- END 0.656	#39.01- STR 0.576
#20.01- END 0.605	

CAL = 2 PT .500 - .750' VESSEL =

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH-0011-C1
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH-0011-C1

DESC: COIL 1 ON LINE HEATER
DWG#: LH0011-C1-1.01-39.01

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:10/16/2014

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

Unit: LH-0011
Eq/Circ ID: LH0011-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: B31.3

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Description: LH-0011 COIL 1; SN:05-129C

Summary: Group Name:
Insp. Due Date = 09/22/2015
Pred. Ret. Date = 03/03/2018

Group Description:
RCR = 0.1 MPY
Rem. Life (from last survey 09/22/2014) = 3.4 yrs

O C.A. Status: No
Total Caution TMLs = 20

TML No	Location	Ctn TML	First Survey Thick Nt	First Date	Previous Survey Thick Nt	Previous Date	Last Survey Thick Nt	Last Date	Shrt Term Rate	Long Term Rate	Best Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
1.01	STR	Y	0.602	03/08/2011	0.600	11/18/2013	0.586	09/22/2014	16.6	4.5	0.8	16.6	0.401 P	16.6	11/12/2025	09/22/2015
2.01	STR	Y *	0.576	03/08/2011	0.609	11/18/2013	0.579	09/22/2014	35.6	0	0	35.6	0.401 P	35.6	09/21/2019	09/22/2015
3.01	STR	Y *	0.580	03/08/2011	0.601	11/18/2013	0.546	09/22/2014	65.2	9.6	4.8	65.2	0.401 P	65.2	12/12/2016	09/22/2015
4.01	END	N	0.672	03/08/2011	0.639	11/18/2013	0.638	09/22/2014	1.2	9.6	8.3	9.6	0.401 P	9.6	05/28/2039	09/22/2015
5.01	END	N	0.631	03/08/2011	0.617	11/18/2013	0.608	09/22/2014	10.7	6.5	6.3	10.7	0.401 P	10.7	01/23/2034	09/22/2015
6.01	END	N	0.712	03/08/2011	0.656	11/18/2013	0.701	09/22/2014	0	3.1	1.4	3.1	0.401 P	3.1	06/22/2111	09/22/2015
7.01	STR	Y *	0.579	03/08/2011	0.607	11/18/2013	0.557	09/22/2014	59.3	6.2	1.8	59.3	0.401 P	59.3	05/09/2017	09/22/2015
8.01	STR	Y *	0.597	03/08/2011	0.610	11/18/2013	0.572	09/22/2014	45.1	7.1	3.1	45.1	0.401 P	45.1	07/07/2018	09/22/2015
9.01	END	N	0.706	03/08/2011	0.619	11/18/2013	0.665	09/22/2014	0	11.6	12.1	12.1	0.401 P	11.6	06/23/2037	09/22/2015
10.01	END	Y	0.623	03/08/2011	0.615	11/18/2013	0.598	09/22/2014	20.2	7.1	5.7	20.2	0.401 P	20.2	06/21/2024	09/22/2015
11.01	END	Y *	0.689	03/08/2011	0.656	11/18/2013	0.580	09/22/2014	90.1	30.8	22.7	90.1	0.401 P	90.1	09/16/2016	09/22/2015
12.01	STR	N	0.589	03/08/2011	0.600	11/18/2013	0.612	09/22/2014	0	0	0	0	0.401 P	0.1	10/07/4014	09/22/2015
13.01	STR	N	0.609	03/08/2011	0.564	11/18/2013	0.577	09/22/2014	0	9.0	7.0	9.0	0.401 P	9.0	04/09/2034	09/22/2015
14.01	END	N	0.693	03/08/2011	0.644	11/18/2013	0.644	09/22/2014	0	13.8	9.3	13.8	0.401 P	13.8	04/29/2032	09/22/2015
15.01	END	Y *	0.653	03/08/2011	0.629	11/18/2013	0.594	09/22/2014	41.5	16.7	12.1	41.5	0.401 P	41.5	05/17/2019	09/22/2015
16.01	END	N	0.705	03/08/2011	0.645	11/18/2013	0.689	09/22/2014	0	4.5	2.3	4.5	0.401 P	4.5	09/15/2078	09/22/2015
17.01	STR	N	0.596	03/08/2011	0.587	11/18/2013	0.577	09/22/2014	11.9	5.4	5.3	11.9	0.401 P	11.9	07/04/2029	09/22/2015
18.01	STR	N	0.595	03/08/2011	0.572	11/18/2013	0.570	09/22/2014	2.4	7.1	7.4	7.4	0.401 P	7.1	07/07/2038	09/22/2015
19.01	END	Y	0.727	03/08/2011	0.662	11/18/2013	0.656	09/22/2014	7.1	20.0	13.7	20.0	0.401 P	20.0	06/21/2027	09/22/2015
20.01	END	Y	0.630	03/08/2011	0.627	11/18/2013	0.605	09/22/2014	26.1	7.1	3.7	26.1	0.401 P	26.1	07/16/2022	09/22/2015

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: 10/16/2014

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

Unit: LH-0011
Eq/Circ ID: LH0011-C1
Eq Type: VESSEL
Class:
CM RBI:
Design Code: B31.3

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Description: LH-0011 COIL 1; SN:05-129C

Summary:

Group Description:

Insp. Due Date = 09/22/2015
Pred. Ret. Date = 03/03/2018

RCR = 0.1 MPY
Rem. Life (from last survey 09/22/2014) = 3.4 yrs

0 C.A. Status: No
Total Caution TMLs = 20

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	Best Rate	Max CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Date
21.01	END	N	0.659		03/08/2011	0.635		11/18/2013	0.655		09/22/2014	0	1.1	0.8	1.1	0.401	P	1.1 07/22/2245 09/22/2015
22.01	STR	Y	0.576		03/08/2011	0.602		11/18/2013	0.575		09/22/2014	32.0	0.3	0	0.401	P	32.0 02/28/2020 09/22/2015	
23.01	STR	N	0.587		03/08/2011	0.553		11/18/2013	0.547		09/22/2014	7.1	11.3	12.0	0.401	P	11.3 08/21/2027 09/22/2015	
24.01	END	N	0.719		03/08/2011	0.663		11/18/2013	0.680		09/22/2014	0	11.0	6.7	0.401	P	11.0 01/30/2040 09/22/2015	
25.01	END	Y *	0.607		03/08/2011	0.622		11/18/2013	0.585		09/22/2014	43.9	6.2	3.5	0.401	P	43.9 11/30/2018 09/22/2015	
26.01	END	N	0.657		03/08/2011	0.665		11/18/2013	0.655		09/22/2014	11.9	0.6	0	0.401	P	11.9 01/23/2036 09/22/2015	
27.01	STR	N	0.560		03/08/2011	0.581		11/18/2013	0.670		09/22/2014	0	0	0	0.401	P	0.1 10/07/4014 09/22/2015	
28.01	STR	Y	0.551		03/08/2011	0.581		11/18/2013	0.558		09/22/2014	27.3	0	0	0.401	P	27.3 06/21/2020 09/22/2015	
29.01	END	N	0.693		03/08/2011	0.671		11/18/2013	0.682		09/22/2014	0	3.1	0.2	0.401	P	3.1 05/05/2105 09/22/2015	
30.01	END	Y	0.627		03/08/2011	0.606		11/18/2013	0.577		09/22/2014	34.4	14.1	10.9	0.401	P	34.4 11/03/2019 09/22/2015	
31.01	END	N	0.643		03/08/2011	0.621		11/18/2013	0.642		09/22/2014	0	0.3	1.5	0.401	P	0.3 10/09/2817 09/22/2015	
32.01	STR	N	0.597		03/08/2011	0.580		11/18/2013	0.572		09/22/2014	9.5	7.1	6.9	0.401	P	9.5 09/18/2032 09/22/2015	
33.01	STR	Y *	0.567		03/08/2011	0.593		11/18/2013	0.542		09/22/2014	60.5	7.1	2.6	0.401	P	60.5 01/20/2017 09/22/2015	
34.01	END	Y	0.717		03/08/2011	0.600		11/18/2013	0.660		09/22/2014	0	16.1	13.8	0.401	P	16.1 10/22/2030 09/22/2015	
35.01	END	Y	0.661		03/08/2011	0.619		11/18/2013	0.599		09/22/2014	23.7	17.5	13.4	0.401	P	23.7 01/28/2023 09/22/2015	
36.01	END	Y *	0.670		03/08/2011	0.704		11/18/2013	0.652		09/22/2014	61.7	5.1	0	0.401	P	61.7 10/16/2018 09/22/2015	
37.01	STR	Y *	0.588		03/08/2011	0.580		11/18/2013	0.546		09/22/2014	40.3	11.9	8.9	0.401	P	40.3 04/27/2018 09/22/2015	
38.01	STR	Y	0.594		03/08/2011	0.591		11/18/2013	0.576		09/22/2014	17.8	5.1	3.7	0.401	P	17.8 07/20/2024 09/22/2015	
39.01	STR	N	0.610		03/08/2011	0.587		11/18/2013	0.576		09/22/2014	13.0	9.6	7.6	0.401	P	13.0 03/06/2028 09/22/2015	

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

Report Date: 10/16/2014

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

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Unit: LH-0011
Eq/Circ ID: LH0011-C1
Design Code: B31.3
Eq Type: VESSEL
Class:
CM RBI:

Description: LH-0011 COIL 1; SN:05-129C

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 1.10 : 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).

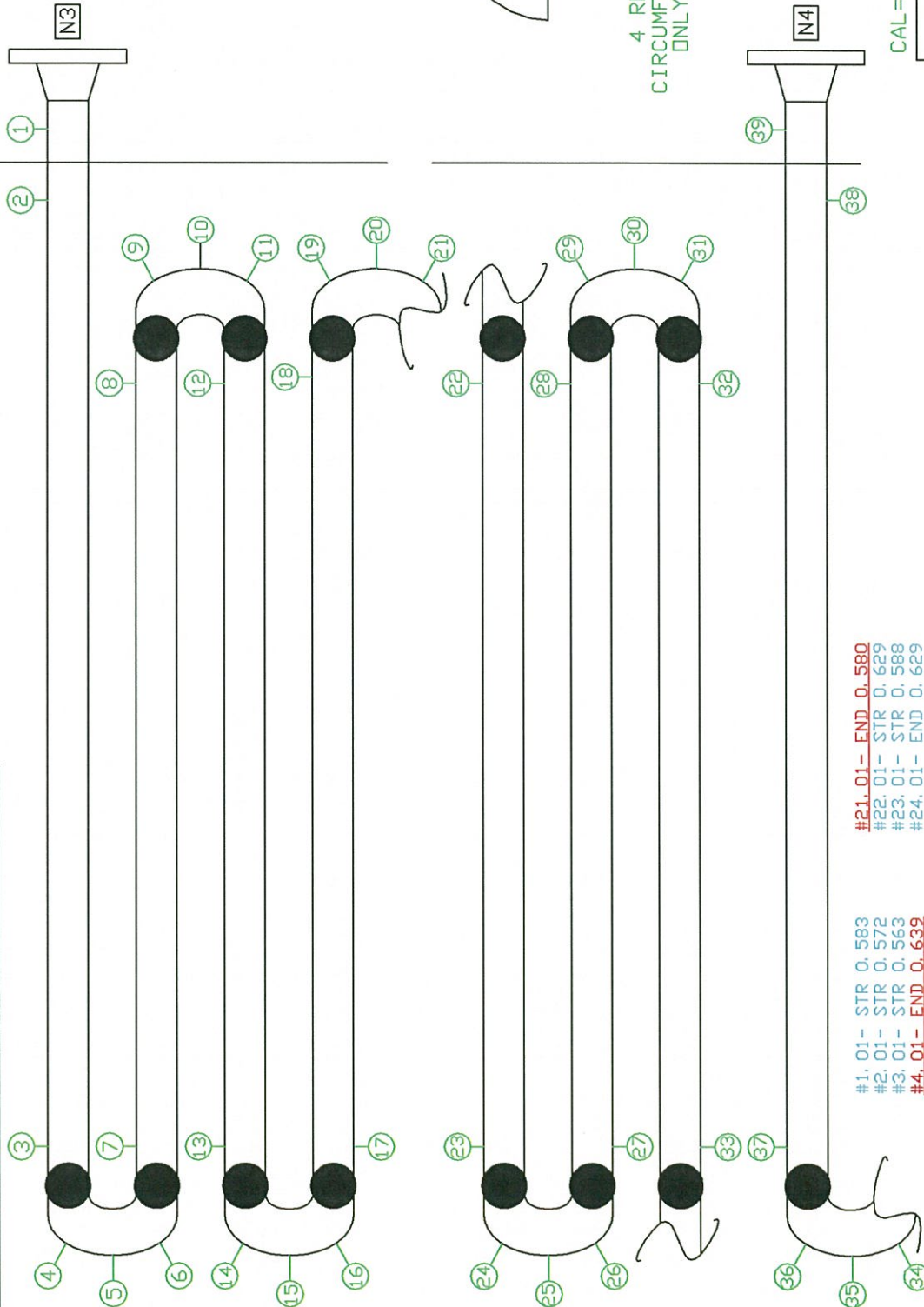
Eq/Circ ID Estimated life = 3.4 years from the most recent survey date.
(Estimated Life based on the ave of the earliest 25% (Min 6) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 03/03/2018

Recommended Eq/Circ UT/RT Inspection Date is 09/22/2015
UT/RT Inspection Interval is 1.00 years.

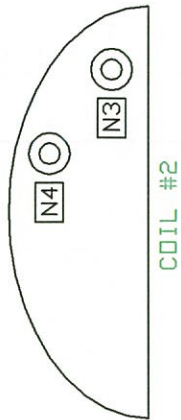
Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 3.00 Years.
There are 20 Caution TMLs in this Eq/Circ ID.

EQUIP RETIREMENT DATE: 7/10/2022
NEXT INSPECTION IS DUE: 9/22/2015



NAMEPLATE INFO	
MFG	TARA DILFIELD SERVICES LTD.
SERIAL NUMBER	05-129C
ALBERTA REG. #	537501
DATE BUILT	2006
DESIGN P & T	5000 psi @ 392°F
NOTE	CRN # T5045, 2

DM-401



4 READINGS TAKEN AROUND THE CIRCUMFERENCE OF THE STRAIGHT PIPE. ONLY THE LOWEST WAS RECORDED.

#1. 01- STR 0.583
#2. 01- STR 0.572
#3. 01- STR 0.563
#4. 01- END 0.639
#5. 01- END 0.581
#6. 01- END 0.602
#7. 01- STR 0.577
#8. 01- STR 0.618
#9. 01- END 0.633
#10. 01- END 0.571
#11. 01- END 0.571
#12. 01- STR 0.671
#13. 01- STR 0.556
#14. 01- END 0.600
#15. 01- END 0.581
#16. 01- END 0.586
#17. 01- STR 0.590
#18. 01- STR 0.585
#19. 01- END 0.630
#20. 01- END 0.580
#21. 01- END 0.580
#22. 01- STR 0.629
#23. 01- STR 0.588
#24. 01- END 0.629
#25. 01- END 0.601
#26. 01- END 0.611
#27. 01- STR 0.574
#28. 01- STR 0.575
#29. 01- END 0.636
#30. 01- END 0.600
#31. 01- END 0.569
#32. 01- STR 0.600
#33. 01- STR 0.569
#34. 01- END 0.580
#35. 01- END 0.563
#36. 01- END 0.580
#37. 01- STR 0.571
#38. 01- STR 0.569
#39. 01- STR 0.575

CAL = CAL - 2 PT .500 - .750" VESSEL =

BUSINESS UNIT	FMC TECHNOLOGIES COMPLETION
EQ/CIRC ID #	LH-0011-C2
EQUIP NAME	LINE HEATER (WITH 2 COILS)
DWG #	LH-0011-C2

DESC: COIL 2 ON LINE HEATER
DWG#: LH0011-C2-1.01-39.01

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: 10/21/2014

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

Unit: LH-0011
Eq/Circ ID: LH0011-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: B31.3

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Description: LH-0011 COIL 2; SN:05-129C

Summary: Group Name:
Insp. Due Date = 09/22/2015
Pred. Ret. Date = 07/10/2022

Group Description:
RCR = 0.1 MPY
Rem. Life (from last survey 09/22/2014) = 7.8 yrs

0 C.A. Status: No
Total Caution TMLs = 12

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	N	0.585		03/08/2011	0.584		11/18/2013	0.583	09/22/2014	1.2	0.6	0.7	1.2	0.401	P	04/27/2166	09/22/2015
2.01	STR	N	0.570		03/08/2011	0.569		11/18/2013	0.572	09/22/2014	0	0	0	0.4	0.401	P	11/07/3723	09/22/2015
3.01	STR	N	0.568		03/08/2011	0.563	DC	11/18/2013	0.563	09/22/2014	0	1.4	0.3	15.8	0.401	P	05/18/2130	09/22/2015
4.01	END	Y	0.660		03/08/2011	0.654		11/18/2013	0.639	09/22/2014	17.8	5.9	4.7	17.8	0.401	P	02/03/2028	09/22/2015
5.01	END	N	0.588		03/08/2011	0.579	DC	11/18/2013	0.581	09/22/2014	0	2.0	3.1	19.3	0.401	P	09/06/2104	09/22/2015
6.01	END	N	0.622		03/08/2011	0.611	DC	11/18/2013	0.602	09/22/2014	10.7	5.6	6.1	37.8	0.401	P	07/02/2033	09/22/2015
7.01	STR	N	0.602		03/08/2011	0.589		11/18/2013	0.577	09/22/2014	14.2	7.1	3.7	14.2	0.401	P	02/11/2027	09/22/2015
8.01	STR	N	0.605		03/08/2011	0.599		11/18/2013	0.618	09/22/2014	0	0	0	2.2	0.401	P	10/07/4014	09/22/2015
9.01	END	N	0.648		03/08/2011	0.593		11/18/2013	0.633	09/22/2014	0	4.2	0.8	20.4	0.401	P	12/10/2069	09/22/2015
10.01	END	N	0.599		03/08/2011	0.581		11/18/2013	0.571	09/22/2014	11.9	7.9	5.5	11.9	0.401	P	01/01/2029	09/22/2015
11.01	END	Y *	0.632		03/08/2011	0.564		11/18/2013	0.571	09/22/2014	0	17.2	15.3	25.2	0.401	P	08/08/2024	09/22/2015
12.01	STR	N	0.590		03/08/2011	0.610		11/18/2013	0.671	09/22/2014	0	0	0	0	0.401	P	10/07/4014	09/22/2015
13.01	STR	N	0.557		03/08/2011	0.559		11/18/2013	0.556	09/22/2014	3.6	0.3	3.6	3.6	0.401	P	10/03/2057	09/22/2015
14.01	END	Y *	0.737		03/08/2011	0.605		11/18/2013	0.600	09/22/2014	5.9	38.7	29.1	48.9	0.401	P	11/12/2019	09/22/2015
15.01	END	N	0.593		03/08/2011	0.578		11/18/2013	0.581	09/22/2014	0	3.4	4.1	7.5	0.401	P	08/22/2067	09/22/2015
16.01	END	Y *	0.653		03/08/2011	0.588		11/18/2013	0.586	09/22/2014	2.4	18.9	12.6	24.1	0.401	P	07/04/2024	09/22/2015
17.01	STR	N	0.597		03/08/2011	0.593	DC	11/18/2013	0.590	09/22/2014	3.6	2.0	0.1	17.6	0.401	P	03/14/2067	09/22/2015
18.01	STR	N	0.600		03/08/2011	0.596		11/18/2013	0.585	09/22/2014	13.0	4.2	3.2	13.0	0.401	P	11/14/2028	09/22/2015
19.01	END	N	0.640		03/08/2011	0.595		11/18/2013	0.630	09/22/2014	0	2.8	4.6	18.9	0.401	P	06/23/2096	09/22/2015
20.01	END	N	0.609		03/08/2011	0.572		11/18/2013	0.580	09/22/2014	0	8.2	7.8	13.7	0.401	P	07/11/2036	09/22/2015

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: 10/21/2014

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

Unit: LH-0011
Eq/Circ ID: LH0011-C2
Eq Type: VESSEL
Class:
CM RBI:
Design Code: B31.3

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Description: LH-0011 COIL 2; SN:05-129C

Summary: Group Name: O C.A. Status: No
Insp. Due Date = 09/22/2015 RCR = 0.1 MPY Total Caution TMLs = 12
Pred. Ret. Date = 07/10/2022 Rem. Life (from last survey 09/22/2014) = 7.8 yrs

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
21.01	END	Y *	0.656	0.604	03/08/2011	0.604	0.580	11/18/2013	0.580	09/22/2014	28.5	21.5	17.6	28.5	0.401 P	28.5	01/01/2021	09/22/2015
22.01	STR	N	0.579	0.593	03/08/2011	0.593	0.629	11/18/2013	0.629	09/22/2014	0	0	0	0	0.401 P	0.1	10/07/4014	09/22/2015
23.01	STR	N	0.597	0.593	03/08/2011	0.593	0.588	11/18/2013	0.588	09/22/2014	5.9	2.5	2.1	14.9	0.401 P	5.9	05/28/2046	09/22/2015
24.01	END	N	0.622	0.623	03/08/2011	0.623	0.629	11/18/2013	0.629	09/22/2014	0	0	0	0	0.401 P	0.1	10/07/4014	09/22/2015
25.01	END	N	0.603	0.578	03/08/2011	0.578	0.601	11/18/2013	0.601	09/22/2014	0	0.6	0	9.3	0.401 P	0.6	12/01/2347	09/22/2015
26.01	END	Y	0.661	0.624	03/08/2011	0.624	0.611	11/18/2013	0.611	09/22/2014	15.4	14.1	6.6	15.4	0.401 P	15.4	05/10/2028	09/22/2015
27.01	STR	N	0.574	0.571 DC	03/08/2011	0.571 DC	0.574	11/18/2013	0.574	09/22/2014	0	0	0	1.1	0.401 P	0.1	11/07/3743	09/22/2015
28.01	STR	Y *	0.580	0.591	03/08/2011	0.591	0.575	11/18/2013	0.575	09/22/2014	19.0	1.4	1.0	19.0	0.401 P	19.0	11/17/2023	09/22/2015
29.01	END	N	0.602	0.610	03/08/2011	0.610	0.636	11/18/2013	0.636	09/22/2014	0	0	0	0	0.401 P	0.1	10/07/4014	09/22/2015
30.01	END	N	0.611	0.579	03/08/2011	0.579	0.600	11/18/2013	0.600	09/22/2014	0	3.1	2.4	12.0	0.401 P	3.1	11/21/2078	09/22/2015
31.01	END	N	0.622	0.580 DC	03/08/2011	0.580 DC	0.569	11/18/2013	0.569	09/22/2014	13.0	15.0	12.6	16.1	0.401 P	15.0	12/02/2025	09/22/2015
32.01	STR	Y *	0.603	0.619	03/08/2011	0.619	0.600	11/18/2013	0.600	09/22/2014	22.5	0.8	0	22.5	0.401 P	22.5	07/26/2023	09/22/2015
33.01	STR	N	0.593	0.580	03/08/2011	0.580	0.569	11/18/2013	0.569	09/22/2014	13.0	6.8	2.9	13.0	0.401 P	13.0	08/23/2027	09/22/2015
34.01	END	Y *	0.684	0.569	03/08/2011	0.569	0.580	11/18/2013	0.580	09/22/2014	0	29.4	23.2	42.6	0.401 P	29.4	10/23/2020	09/22/2015
35.01	END	N	0.595	0.570	03/08/2011	0.570	0.563	11/18/2013	0.563	09/22/2014	8.3	9.0	7.0	9.3	0.401 P	9.0	09/18/2032	09/22/2015
36.01	END	N	0.596	0.589	03/08/2011	0.589	0.580	11/18/2013	0.580	09/22/2014	10.7	4.5	4.0	10.7	0.401 P	10.7	06/12/2031	09/22/2015
37.01	STR	Y *	0.628	0.580 DC	03/08/2011	0.580 DC	0.571	11/18/2013	0.571	09/22/2014	10.7	16.1	13.3	23.0	0.401 P	16.1	04/12/2025	09/22/2015
38.01	STR	Y *	0.596	0.593	03/08/2011	0.593	0.569	11/18/2013	0.569	09/22/2014	28.5	7.6	4.1	28.5	0.401 P	28.5	08/13/2020	09/22/2015
39.01	STR	Y *	0.599	0.598 DC	03/08/2011	0.598 DC	0.575	11/18/2013	0.575	09/22/2014	27.3	6.8	4.1	27.3	0.401 P	27.3	02/04/2021	09/22/2015

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

Report Date: 10/21/2014

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

Flange Rating: 5295 lb/in²
Design Pressure: 5000 lb/in²
Design Temperature: 392 °F

Unit: LH-0011
Eq/Circ ID: LH0011-C2
Design Code: B31.3
Eq Type: VESSEL
Class:
CM RBI:

Description: LH-0011 COIL 2; SN:05-129C

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 = 7.8 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 07/10/2022

Recommended Eq/Circ UT/RT Inspection Date is 09/22/2015
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 12 Caution TMLs in this Eq/Circ ID.

TIAL ☐

A# 537501.

Manufactured By: TARA Oilfield Services Ltd. P.O. Box 1389 Didsbury, AB T0M 0W0
 Manufactured For: Canadian Sub-Surface Energy Services #600, 505 - 8th Avenue S.W. Calgary, AB T2P 1G2
 Ultimate Owner: Canadian Sub-Surface Energy Services #600, 505 - 8th Ave. S.W. Calgary AB
 Location of Installation: Portable

Manufacturer's Serial No.	Construction Drawing No.	CODE: ASME B31.3	Year Built
05-129C	05-129-BDLS-1 Rev.1	Edition 2004 Addenda N/A	2006

CONSTRUCTION

Coil ID/Purpose	Design Pressure	Design Temp	Design Minimum Temp	Corrosion Allowance	Registered Drawing No.	CRN
a UPSTREAM COIL	34,475 kPa	200° C	-29° C	0.0625"	05-129-BDLS-1 Rev.1	T5045.2
b DOWNSTREAM COIL	34,475 kPa	200° C	-29° C	0.0625"	05-129-BDLS-1 Rev.1	T5045.2
c						
d						
e						

COIL

Tubes			End Closures				Openings		
Mat'l Spec.	Diameter	Thickness	Return Bend	Flanges	Mat'l Spec.	Rating	Mat'l Spec.	Size/Type	Rating
a SA333-6 / SA106-B	3" NPS	.600"	SA234 GR. WPB	.600"	N/A	N/A			
b SA333-6 / SA106-B	3" NPS	.600"	SA234 GR. WPB	.600"	N/A	N/A			
c									
d									
e									

HEADERS/MANIFOLDS

HEADERS/MANIFOLDS										
f	Purpose	Size	Shell	Thickness	Ends			Openings		
			Mat'l Spec.		Mat'l Spec.	Thickness	No	Mat'l Spec	Size/Type	Rating
g										

TEST PRESSURE, NDE, POSTWELD HEAT TREATMENT AND SIZE

Hydrostatic Test Pressure	Radiography (100% or % Random)	Other NDE (MT) (PT) (UT)	Postweld Heat Treatment		Overall Length	Heating Surface	Volume
			Temp.	Time			
a 51,710 kPa	100%	-	621° C	1 Hour	18 ft 7 in	-	0.4 m3
b 51,710 kPa	100%	-	621° C	1 Hour	18 ft 7 in	-	0.4 m3
c							
d							
e							
f							
g							

IMPACT TESTING: N/A

REMARKS: INDIRECT HEATER COIL SPECIFICATIONS ONLY UP TO HEAD PLATE. FLANGES NOT INCLUDED IN THIS DESIGN.

TOTAL VOLUME: 0.8 m3 FABRICATION DRAWING 05-129C-BDLS-1. REV 2.

CERTIFICATE OF COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this coil bundle are in accordance with the above Provincial Registered Design.

Date March 1, 2006 Signed

(Representative)

For TARA OILFIELD SERVICES LTD.

(Manufacturer)

CERTIFICATE OF SHOP INSPECTION

The undersigned, a duly authorized Safety Codes Officer employed by ABSA has inspected the above Heater Coils and state that, to the best of my knowledge and if, the construction is in accordance with the Alberta Safety Codes Act and Regulations

Date March 1, 2006

Signed

[Signature] 14-17-08

MANUFACTURER'S DATA REPORT FOR INDIRECT FIRED HEATER COILS

AB-28 2005-12

TIAL ☐

A# 537501.

Manufactured By: TARA Oilfield Services Ltd. P.O. Box 1389 Didsbury, AB T0M 0W0
 Manufactured For: Canadian Sub-Surface Energy Services #600, 505 - 8th Avenue S.W. Calgary, AB T2P 1G2
 Ultimate Owner: Canadian Sub-Surface Energy Services #600, 505 - 8th Ave. S.W. Calgary AB
 Location of Installation: Portable

Manufacturer's Serial No.	Construction Drawing No.	CODE: ASME B31.3	Year Built
05-129C	05-129-BDLS-1 Rev.1	Edition 2004 Addenda N/A	2006

CONSTRUCTION

Coil ID/Purpose	Design Pressure	Design Temp	Design Minimum Temp	Corrosion Allowance	Registered Drawing No.	CRN
a UPSTREAM COIL	34,475 kPa	200° C	-29° C	0.0625"	05-129-BDLS-1Rev.1	T5045.2
b DOWNSTREAM COIL	34,475 kPa	200° C	-29° C	0.0625"	05-129-BDLS-1Rev.1	T5045.2
c						
d						
e						

COIL

Tubes			End Closures				Openings		
Mat'l Spec.	Diameter	Thickness	Return Bend	Flanges	Mat'l Spec.	Rating	Mat'l Spec.	Size/Type	Rating
a SA333-6 / SA106-B	3" NPS	.600"	SA234 GR. WPB	.600"	N/A	N/A			
b SA333-6 / SA106-B	3" NPS	.600"	SA234 GR. WPB	.600"	N/A	N/A			
c									
d									
e									

HEADERS/MANIFOLDS

HEADERS/MANIFOLDS									
f	Purpose	Size	Shell	Thickness	Ends			Openings	
			Mat'l Spec.		Mat'l Spec.	Thickness	No	Mat'l Spec	Size/Type
g									

TEST PRESSURE, NDE, POSTWELD HEAT TREATMENT AND SIZE

Hydrostatic Test Pressure	Radiography (100% or % Random)	Other NDE (MT) (PT) (UT)	Postweld Heat Treatment		Overall Length	Heating Surface	Volume
			Temp.	Time			
a 51,710 kPa	100%	-	621° C	1 Hour	18 ft 7 in	-	0.4 m3
b 51,710 kPa	100%	-	621° C	1 Hour	18 ft 7 in	-	0.4 m3
c							
d							
e							
f							
g							

IMPACT TESTING: N/A

REMARKS: INDIRECT HEATER COIL SPECIFICATIONS ONLY UP TO HEAD PLATE. FLANGES NOT INCLUDED IN THIS DESIGN.

TOTAL VOLUME: 0.8 m3 FABRICATION DRAWING 05-129C-BDLS-1. REV 2.

CERTIFICATE OF COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this coil bundle are in accordance with the above Provincial Registered Design.

Date March 1, 2006 Signed

(Representative)

For TARA OILFIELD SERVICES LTD.

(Manufacturer)

CERTIFICATE OF SHOP INSPECTION

The undersigned, a duly authorized Safety Codes Officer employed by ABSA has inspected the above Heater Coils and state that, to the best of my knowledge and if, the construction is in accordance with the Alberta Safety Codes Act and Regulations

Date March 1, 2006

Signed

ABS Sears

ALTA #58