

FRCP CRITICAL PIPING SPOOL INSPECTION AT OGDCL QADIRPUR GAS FIELD

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Inspection Report



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|---------------------------------|---|---|---|
| Client | : | Oil and Gas Development Company Limited | |
| Client Ref | : | Contract No._PROC – SERVICES / CB / CORR – 3184 / 769007 / 2018 | |
| Client Contact Person | : | Mr. Safdar Ali Chana – Manager Corrosion | |
| SGS Ref. No. | : | 5007268 | |
| Inspected by | : | Mr. Ali Nawaz API-570 Inspector and NDT team | |
| Site | : | OGDCL Qadirpur Gas field | |
| Equipment Identification | : | Mentioned in Respective Reports | |
| Survey Date & Time | : | 13 th to 30 th May,2019 | |
| Particulars | | Prepared By | Reviewed By |
| Signature | |  |  |
| Name | | Ali Nawaz | Mehboob Alam Ansari |
| Date: | | 11-06-2019 | 11-06-2019 |

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Introduction:

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| Project Title: | <u>FRCP Critical Piping Spools Inspection at Qadirpur Gas Field.</u> |
| Client: | <u>Oil & Gas Development Company Limited</u> |
| Location: | <u>OGDCL Qadirpur Gas Field</u> |
| Inspection Date: | <u>13th to 30th May, 2019</u> |
| Inspected by: | <u>Ali Nawaz (API-570), Ali Uzair (UTG), M.Tanveer (PAUT), M.Yar Alvi (PAUT)</u> |

Inspection Activities:

- Detail external visual inspection as per guideline of API 570.
- Preparation of piping sketches.
- Ultrasonic thickness gauging of piping spool.
- Phased array Ultrasonic testing of selected weld joints.
- Mechanical integrity assessment of piping as per API-570.

Scope of Work:

Below are the inspected FRCP critical piping spools at Qadirpur Gas Field,

Train-A

- Inter Cooler discharge line # NG-01-027-12"-6C20
- Inter Cooler discharge line # NG-01-027-12"-6C20A
- After Cooler Discharge Line # NG-01-033-10"-6C20
- After Cooler Discharge Line # 10"-G-DA2-10006

Train-B

- Inter Cooler discharge line # NG-01-029-12"-6C20
- Inter Cooler discharge line # NG-01-027-12"-6C20B
- After Cooler Discharge Line # NG-01-034-10"-6C20
- After Cooler Discharge Line # 10"-G-DA2-10007

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Inspection Preliminary Report - Ref: IND-QMS-FOR- 121 Rev: 00

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Train-C

- Inter Cooler discharge line # NG-01-031-12"-6C20
- Inter Cooler discharge line # NG-01-032-12"-6C20B
- After Cooler Discharge Line # NG-01-035-10"-6C20
- After Cooler Discharge Line # 10"-G-DA2-10008

- Common Discharge Header Line# 18-G-DA2-10009
- Valve Assembly area at F.E.C Suction/Discharge Header Lines (26"-G-DA2-10000, 26"-G-DA2-10001, 24"-G-DA2-13029, 42"-G-DA2-50011)
- QICP+PRCP Main Fuel Gas Line (6"-G-DA2-40000A)
- Compressed raw Gas line to Inlet Separators PT-1 V-9000-A (16"-G-DA2-90001,30"-G-DA2-90000)
- Compressed raw gas line to Inlet Separators PT-1 V-9000-B (16"-G-DA2-90011)
- P.M Train-1 product/sale gas line (14"-G-DA1-26016)
- P.M Train-2 product/sale gas line (14"-G-DA1-2641)
- P.M Train-3 product/sale gas line (10"-G-DA2-96119)
- Gas Flare line from Sale gas header line (6"-G-DA1-30002)
- Gas Flare line from sale gas header U/S and D/S of BDV (2"-G-DA1-30002, 6"-FL-AB-30005)
- Fuel Gas Line from Sale Gas Header to V-6300 (2"-G-DA1-90076)
- Fuel gas Line from Sale Gas Header to V-5300 (2"-G-DA1-30007)
- Fuel Gas Out line from V-6300 (3-FG-BA1-90082)
- Fuel Gas Out Line from V-5300 through 2" line (2"-FG-BA1-53003)
- Flare PCV-92201 U/S and D/S lines (06")
- Flare BDV-151 U/S and D/S lines (6"-G-DA2-20012)
- U/S T Joint of PCV-9085 near Valve assembly of F.E. (6"-G-DA2)
- 14" Connecting sales gas header to FECP+QICP fuel gas line. (14")
- Lines at U/S of PCV-102/92112(2 Nos) (24"-G-DA1-30003, 24"-G-DA1-92364)
- Sale gas Header and metering legs lines (16" Legs,24" Header)

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Visual Inspection:

Visual inspections were carried out in order to check the integrity of the piping as per API 570. Minor anomalies were observed during external visual inspection. These anomalies will be mentioned in visual inspection report along with the recommendation.

Thickness Measurement:

Ultrasonic thickness gauging was carried out on FRCP critical piping spools. However, some locations were not inspected through UTG cause of limited access. Thickness gauging were carried out in each accessible piping and fitting for corrosion rate monitoring, evaluation & next inspection interval determination. Detailed report of thickness measurement will be shared in final report.

Following are the piping segment in which severe metal loss observed.

Train-A

Ultrasonic Thickness Gauging was performed on Train-A piping. Following piping were observed severe metal loss.

➤ **Inter Cooler discharge line # NG-01-027-12"-6C20:**

Severe metal loss was observed at 12" diameter SCH. 30 pipe. Minimum thickness was recorded 4.04 mm at TML # 09, however the original thickness was 8.38 mm.

➤ **After Cooler Discharge Line # NG-01-033-10"-6C20:**

Severe metal loss observed at 10" diameter SCH. 40 pipe. Minimum thickness was recorded 4.75 mm at TML # 14. However original thickness was 9.27 mm.

Train-B

UTG was performed on Train-B. Following piping was observed Severe metal loss.

➤ **After Cooler Discharge Line # NG-01-034-10"-6C20:**

Thickness gauging was carried out at after cooler discharge line. It was observed that in some location found greater thickness from previous thickness i-e (TML# 14 ~18) which result show that current section was replaced with new one. However, no inspection history was available at the time of inspection.

Major wall loss observed at 10" diameter SCH 40 pipe. Minimum thickness was recorded 5.25 mm at TML # 78, however original thickness was 9.27 mm.

Sr.# 16 (U/S T Joint of PCV-9085 near Valve assembly of F.E)

Severe metal loss observed in U/S T Joint of PCV-9085 near Valve assembly of F.E. Metal loss recorded at 06" diameter. SCH 80 pipe, minimum thickness was recorded 4.24 mm, however the original thickness was 10.97 mm at TML # 02.

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Phased Array Ultrasonic Testing:

Randomly PAUT were performed on selected weld joints based on weld profile to assess the weld integrity. A detail report of PAUT will be shared in final report.

Following are the PAUT weld joints result in which abnormalities were observed.

| Weld # | Length (mm) | Depth (mm) | Nature of Defect |
|---|----------------------|------------|---------------------|
| Train-A | | | |
| Inter cooler Discharge Line # NG-01-027-12"-6C20 | | | |
| PAUT-1 | 197~308 | 5.88 | Lack of root fusion |
| PAUT-2 | 114~332, 544~823 | 6.72 | Lack of root fusion |
| PAUT-3 | 700~720 | .53~2.96 | Lack of fusion |
| PAUT-4 | 0~880 | .50~4.85 | Lack of root fusion |
| After cooler Discharge Line # NG-01-033-10"-6C20 | | | |
| PAUT-3 | 430~490 | 5.63~7.8 | Lack of root fusion |
| PAUT-4 | 0~50, 220~345, 700~0 | 0.7~3.9 | Lack of fusion |
| Train-B | | | |
| After cooler Discharge Line # NG-01-034-10"-6C20 | | | |
| PAUT-8 | 0~271, 376~794 | 5.05 | Lack of root fusion |
| PAUT-9 | 0~380, 495~745 | 5.25 | Lack of root fusion |
| Train-C | | | |
| After Cooler discharge line # NG-01-035-10"-6C20 | | | |
| PAUT-5 | 0~870 | 5.50 | Lack of fusion |
| After Cooler discharge line # 10"-G-DA2-10008 | | | |
| PAUT-2 | 494~503, 615~655 | 11.50 | Lack of root fusion |

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Design Data / Calculation:

As per the calculation / evaluation of FRCP critical piping spools, the following piping segment is rejected, detailed are as in table -01

Table-01

| Sr.# | Description | Train/Piping Spool | Pipe Dia./SCH. | Design/Operating Pressure (psig) | Design/Operating Temperature (°F) | Remaining Life (years) | Next Inspection Interval |
|------|---|--------------------|----------------|----------------------------------|-----------------------------------|------------------------|--------------------------|
| 1 | NG-01-027-12"-6C20 | Train-A | 12"/30 | 910/549 | 170/117 | -3.06 | Rejected |
| | NG-01-033-10"-6C20 | | 10"/40 | 910/747 | 170/130 | -0.70 | Rejected |
| 2 | NG-01-034-10"-6C20 | | 10"/40 | 910/747 | 170/130 | 0.71 | *See Recommendation |
| 3 | U/S T Joint of PCV-9085 near Valve assembly of F.E. | Sr.# 16 | 6/80 | 1100/712 | 180/121 | -0.34 | Rejected |

Recommendation / Conclusion:

Train-A

➤ **Inter Cooler discharge line # NG-01-027-12"-6C20**

Severe metal loss observed at 12" diameter SCH30 (8.38 mm). Minimum thickness was recorded 4.04 mm at TML # 09. Minimum required thickness for 12" diameter to hold design parameters is 5.81 mm.

PAUT result shows that severe root erosion in weld joints which remaining thickness of weld joints is less than minimum required thickness.

It is strongly recommended that current piping segment shall be replaced with new one to increase the safety and reliability of piping with continue safe operation.

➤ **After Cooler Discharge Line # NG-01-033-10"-6C20**

Severe metal loss observed at 10" diameter SCH40 (9.27 mm). Minimum thickness was recorded 4.75 mm at TML # 14. Minimum required thickness for 10" diameter to hold design parameters is 4.90 mm.

PAUT result shows that construction & service defect is recorded. It is strongly recommended that current piping shall be replaced with new one to increase the safety and reliability of piping.

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Train-B

➤ After Cooler Discharge Line # NG-01-034-10"-6C20

Major wall loss observed at 10" diameter SCH.40 (9.27 mm). Minimum thickness was recorded 5.25 mm at TML # 78. Minimum required thickness for 10" diameter to hold design parameters is 4.90 mm.

PAUT result shows that severe root erosion in weld joints which remaining thickness of weld joints is just above the minimum required thickness.

It is recommended that piping segment, deteriorated weld joints should be repaired or monitor after **6 Month** with same techniques, if deteriorated would be increased in base or weld metal then segment shall be replaced with new one to increase the safety and reliability of piping with continue safe operation.

Train-C

➤ After Cooler discharge line # NG-01-035-10"-6C20

PAUT results show that construction defects is recorded. Welds should be examine at the time of construction work. However, as per ASME B 31.3 Table 341.3.2-C weld should be repaired or monitor after **6 Month** with same techniques to increase the safety and reliability of piping with continue safe operation.

➤ After Cooler discharge line # 10"-G-DA2-10008

PAUT results show that weld is eroded with recorded remaining thickness 11.50 mm at 10" diameter SCH.80. Minimum required thickness for hold to design pressure is 6.10 mm. It is recommended that current piping segment deteriorated weld joints should be repaired or monitor after **6 Month** with same techniques to increase the safety and reliability of piping with continue safe operation.

Sr.# 16 (U/S T Joint of PCV-9085 near Valve assembly of F.E)

FRCP Critical piping spool was observed Severe metal loss in U/S T Joint of PCV-9085 near Valve assembly of F.E, metal loss was recorded at 06" diameter SCH80 (10.97 mm), Minimum thickness was recorded 4.24 mm at TML # 02. Minimum required thickness for 06" diameter to hold design parameters is 4.53 mm.

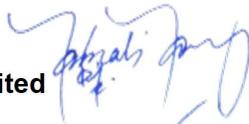
It is strongly recommended that current piping shall be replaced with new one to increase the safety and reliability of piping.

NOTE:

Remaining piping spool were inspected through UTG/PAUT. No major abnormalities were recorded. All finding, observation and conclusion will be detailed in final inspection report

Ali Nawaz

SGS Pakistan Pvt. Limited



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