SHAMS POWER COMPANY

ENGINEERING DIVISION

INSPECTION & CORROSION SECTION

SHAMS 1

LOCATION : R1HAE11BB010
KKS : R1HAE11BB010

CERTIFICATE OF INSPECTION

The equipment detailed below was examined in accordance with the SHAMS code of practice for plant inspection,

ITEM : Steam drum 1 **Location : SHAMS Plant**

Type of Inspection : Major **Date of Inspection : March, 2020**

Place of Inspection : In-Situ **Date of Last Inspection : Jan, 2019**

Report :

1.0. Summary

The above pressure vessel was taken off line, isolated, opened, vented & cleaned for major external & internal inspections.

2.0. Subject

2.1. This is a horizontal, cylindrical, carbon steel tank with one inlet from super heater and 6 outlets connected to steam header and 8 down comers from both sides of drum.

Size	
Design pressure	119.5 bar-g
Design temperature	324 c
Operation pressure	90bar-g
Operation temperature	310 c maximum
Fluid characteristics @ 141 c	
Material	Shell: A516 Gr.70 Heads : A516 Gr.70
Piping	A314
Shell thickness	95 mm
Head thickness	90 mm

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The above equipment is/ ~~is not~~ considered suitable for further service under the present operating conditions

NEXT MAJOR INSPECTION DUE : January 2023 **INSPECTED: Osman Ismail**

ENDORSEMENT: 48 MONTHS

REVIEWED: Ali Al Masabai

3.0 History

This tank was commissioned in 2013. Periodical inspection records since Oct.'2014 are available.

4.0. Scope of Inspection

4.1 Visual inspection.
4.2 Ultrasonic thickness measurement

5.0. Conditions Found

5.1. **External**

5.1.1 All insulation found intact without any evidence of any damage for insulation or insulation cover aluminum sheet.
5.1.3 All ladders, stairways and handrails found in satisfactory condition.
5.1.4 All concrete support found in satisfactory condition without evidence of cracking or spalling.
5.1.5 All grounding found in place

5.2. **Internal**

5.2.1 All internals found in satisfactory condition without evidence of fallen down, damage or corrosion. It found with black magnetite layer in the lower half of the drum apart from hematite layer in the upper half of the drum
5.2.2 All internal surfaces of shell and heads found in satisfactory condition with black magnetite layer in the lower half of the drum apart from hematite layer in the upper half of the drum .
5.2.3 All welds of shell and heads found in satisfactory condition without evidence of corrosion.
5.2.4 All internal surfaces of connected nozzles and manway found in satisfactory condition without evidence of sever corrosion.
5.2.5 All thermos wells found in satisfactory condition
5.2.6 Manways, nozzle, cover and lock bolts found in satisfactory condition.
5.2.7 There are some iron oxide deposits scattered on upper half of the drum.

5.8.1. Ultrasonic Testing

Ultrasonic thickness measurement was carried out on the internal shell courses and heads surfaces found satisfactory. Thickness measurement report available.

6.0 Conclusion

- Hematite (Fe_2O_3) is favored at high oxygen levels can be red and is a binding agent and tends to hold over materials in deposition. This is an indication of active corrosion occurring within the boiler/feed system

- Magnetite (Fe_3O_4) a smooth black tenacious, dense magnetite layer normally grows on boiler waterside surfaces. Taken to indicate good corrosion protection as it forms in low oxygen levels and is susceptible to acidic attack

7.0. Recommendations

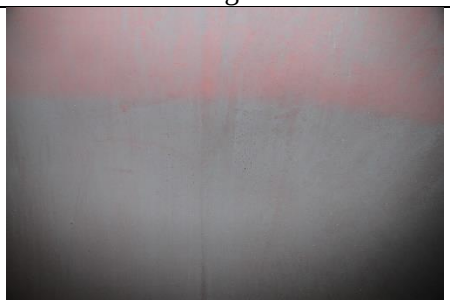
- Review BFW deaerating process to assure absence of oxygen and mitigate any oxygen further corrosion.
- It is recommended to open steam drum -1 after 4 years as per SHAMS Code of Practice.

8. <u>Inspection Grade and Interval</u>

In accordance with the latest revision of SHAMS Code of Practice, this **Steam Drum** was endorsed for 48 months for next Major Inspection.

Frequency : 48 Months
Endorsement : 48 Months
Next Major Insp. due : March, 2024

Photos

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Steam drum general view</td><td>Ladder, stairways and handrail</td></tr>
<tr><td>  </td><td>  </td></tr>
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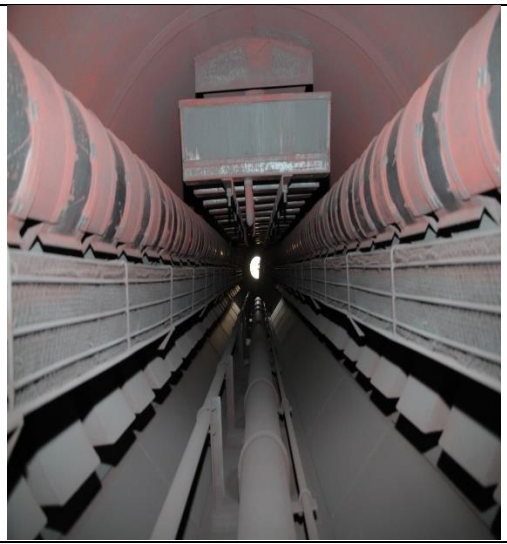
<tr><td>  </td><td>  </td></tr>
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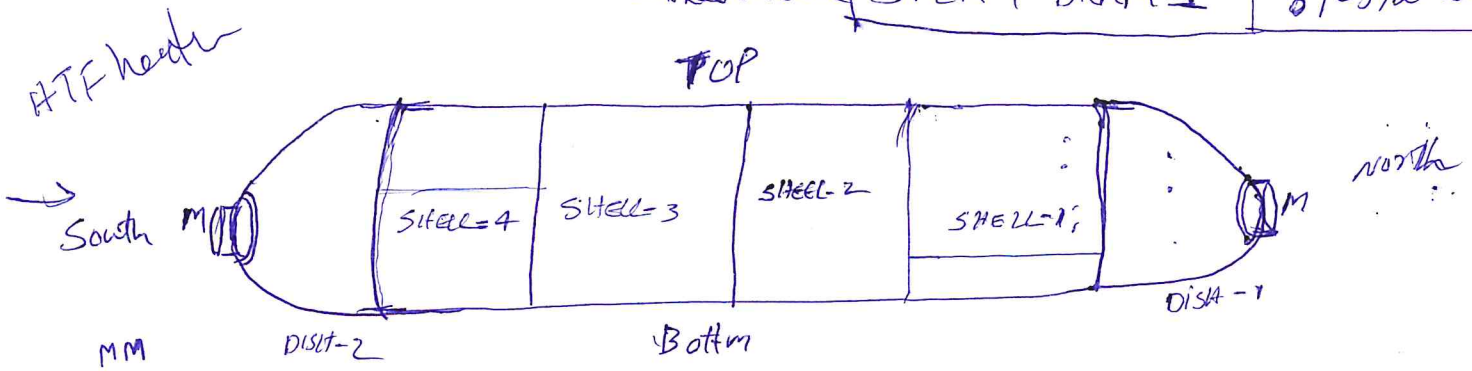
Manways


Internals

~~STEAM~~ DRUM | STEAM DRAM-1 | 8/03/2020



Dish North side-1

Top = 111.40
E = 112.0
Bottm = 111.41
W = 112.0

SHELL-1

Top = 96.73
E = 97.00
Bottm = 96.97
W = 96.40.

SHELL-2

Top = 96.94
W = 96.81
E = 96.96
Bottm = N/A

SHELL-3

W = 95.66, 95.95
E = 95.71, 95.80
Top = 96.01
Bottm = N/A

SHELL-4

Top = 96.12
W = 95.74
Bottm = 96.10
E = 95.90

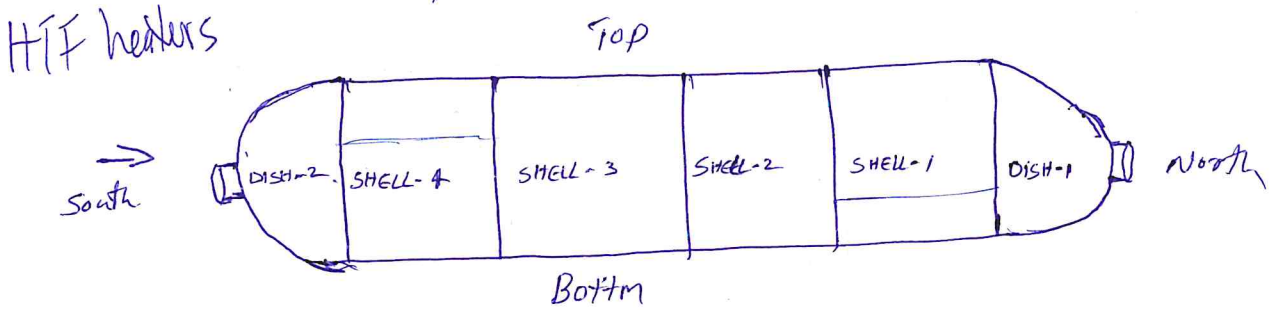
Dish-2 South side

Top = 114.6
E = 112.10
Bottm = 114.4
W = 113.4

STEAM DRAM-2

8/3/20

HTF heaters



DISH-1

Top = 112.7
E = 113.2
Bottm = 111.6
W = 113.9

SHELL-1

Top = 95.45
E = 95.60
Bottm = 95.60
West = 95.35

SHELL-2

W = 96.30
E = 96.45
Top = 96.12
Bottm = N/A

SHELL-3

W = 96.82
Top = 97.31
E = 96.85
Bottm = N/A

SHELL-4

Top = 96.20
W = 96.30
E = 95.75
Bottm = 95.28

DISH-2

Top = 112.2
W = 110.9
E = 112.1
Bottm = 112.8

(4) P

DPT | 08/03/2020

(1) PT done on. Drain valve joints J1, J2.
HTF-R1JB99-BR-001

(2) PT done on Drain valve joints J1, J2, J3
HTF.
R1JB70-BR-001

(3) PT done on ~~Dra~~ Valve joints
STEAM DRAM – 4 nos. joints.
R1HAE12-BR707.

(4) PT done on – Valve joints
STEAM DRAM – 2 joints.
R1HAE11-BR707.