

Gulf Coast Cogen Facility

PROJECT SUMMARY REPORT

**HIGH VELOCITY OIL FLUSH SERVICES
ABB STAL VAX STEAM TURBINE**



SFM
Reliability
Solutions

Lubrication Based Reliability Consulting

INTRODUCTION

This report documents the High Velocity Oil Flush performed on the ABB STAL VAX Steam Turbine at Gulf Coast Cogen Facility.

OBJECTIVE:

Provide a safe and efficient Flush of these systems, satisfying all customer requirements.

RESULTS:

- **255 Man Hours worked with ZERO incidents or injuries**
 - **SFM Reliability Solutions (SFM RS) commitment to safety, demonstrated by its safety record, provides plant owners, construction companies, and OEM's peace of mind and safety assurance**
- **Mutually developed a comprehensive flush plan with all related parties and executed the Flush meeting or exceeding customer requirements**
 - **Comprehensive and properly developed flush plan provided peace of mind and assurance that all flush requirements were satisfied, including properly draining and purging all system piping**
 - **SFM RS executed the flush utilizing purpose-built equipment and superior technical expertise. This helped the customer avoid schedule extensions during the outage.**
- **Provided documentation of flush procedures confirming SFM RS guarantee that all customer criteria were met.**

Filtration

In addition to one-micron nominal "full flow" filtration used on the inlet side of the flush, mobile heater/ filter units were used to constantly control oil heat and cleanliness to OEM oil cleanliness.

Project Time-Line Overview:

Date	Man Hours	Activity
11/25	11.5	Completed site safety requirements. Staged equipment and finalized jumper installation. Completed pre-flush walk down.
11/26	38	Staged generator; electrical hook-up, staged tanker, started heating oil on reservoir only; circulate on reservoir over night
11/27	39	Staged PVDOPS, started PVDOPS on reservoir-pulled 4 gallons of water; started filling system with Heater Unit @ 17:00 and HVOF @ 18:00; pulled screens @ 19:00; started coarse flush @ 20:00; monitored system all night and swapped filters/coolers every 2 hours
11/28	37.5	Continued coarse flushing. Dumped approx. 10 gallons of water from PVDOPS; swap coolers and filters every 2 hrs.
11/29	36	Continued coarse flush; thermal cycle system for 3 hrs; oil sample @ 18:00 – ISO 18/15/12; all water has been removed from system, will leave the PVDOPS on-line until morning
11/30	34	Continued flushing; installed inspection screens 0740-0940 (pass all screens); 2 nd set of screens installed and ran 0950-1050 (Passed all screens) Final oil count was 14/12/7; removed oil from system and stored in tanker, completed @ 1400; started circulating on tanker with Heater Unit
12/1	33	Circulating on tanker with PVD-pulled 2 gallons of water; obtained CSE permit for reservoir clean out
12/2	21	Circulating on tanker with PVDOPS-pulled 5 gallons of water with PVDOPS
12/3	5	Loaded up all equipment not needed; took oil samples to ship to lab for testing
12/4	-	Stand-by waiting on sample results
12/5	-	Stand-by waiting on sample results
12/6	-	Stand-by waiting on sample results
Total Days - 12	Total Hours - 255	

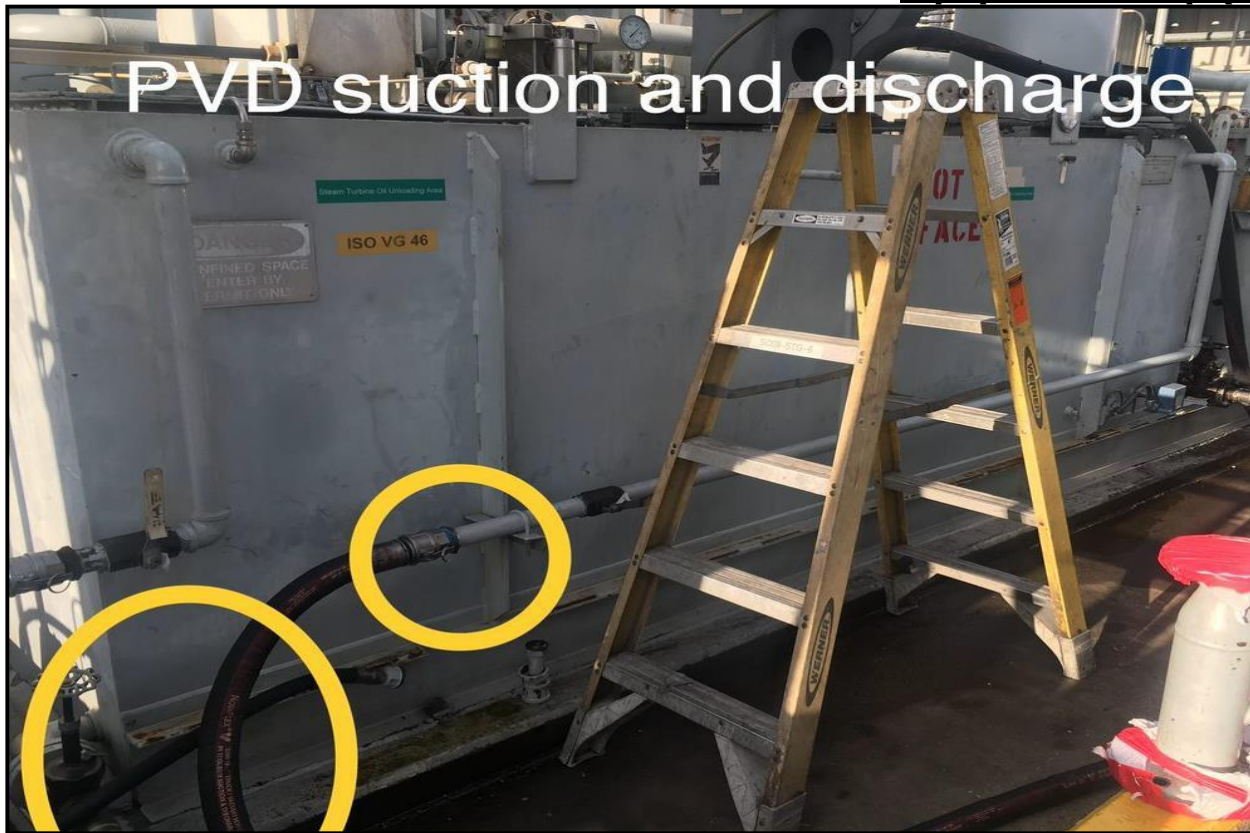
The following pages detail and photo-document the project, including completion of objectives.

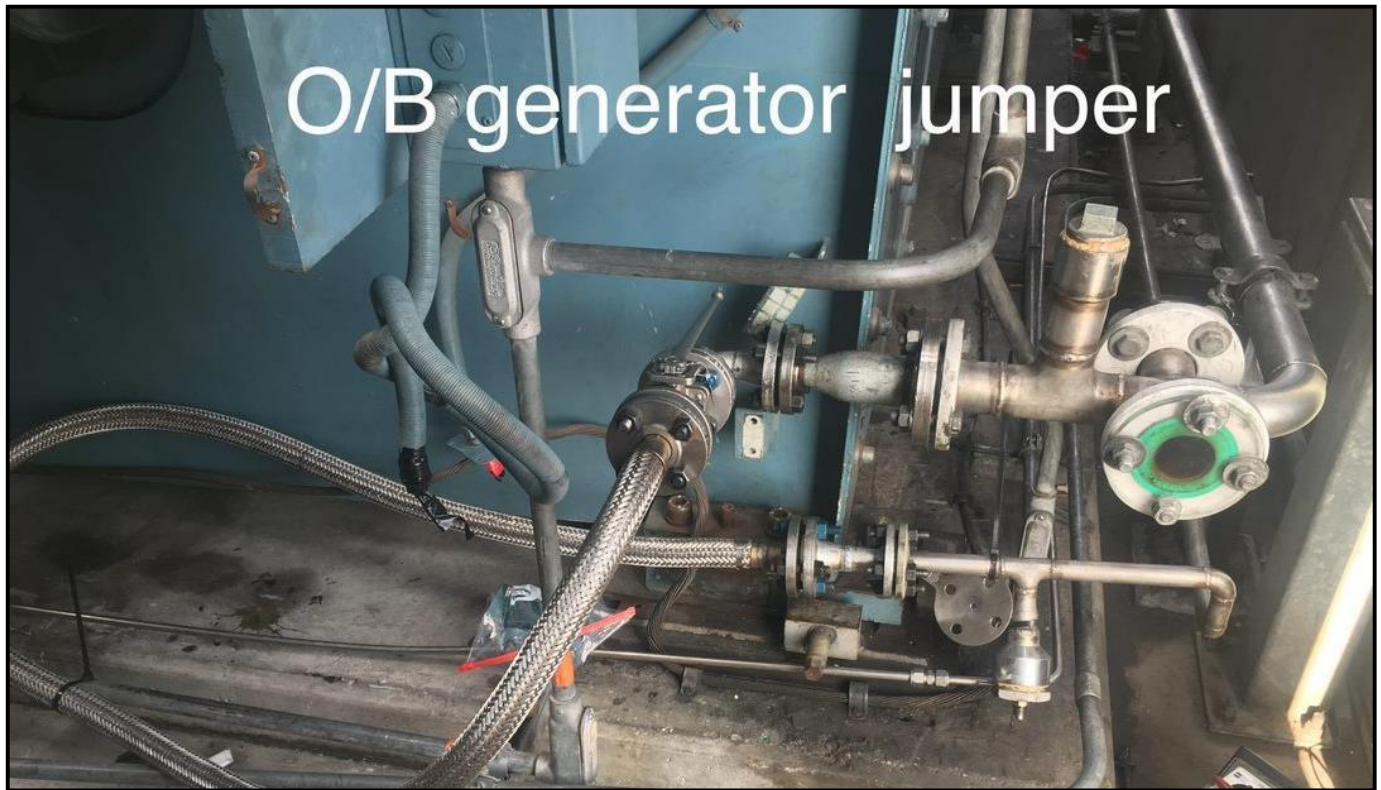
The engine piping and components were flushed to the required specification, cleanliness and acceptance criteria were verified, witnessed and documented. The “Final Flush Acceptance” documents for the system, detailed flushing logs, and photo documentation are included in this report. These documents indicate time duration during various phases of the project, along with the on-site cleanliness level, photo documentation of various aspects of the flush.

Equipment Setup



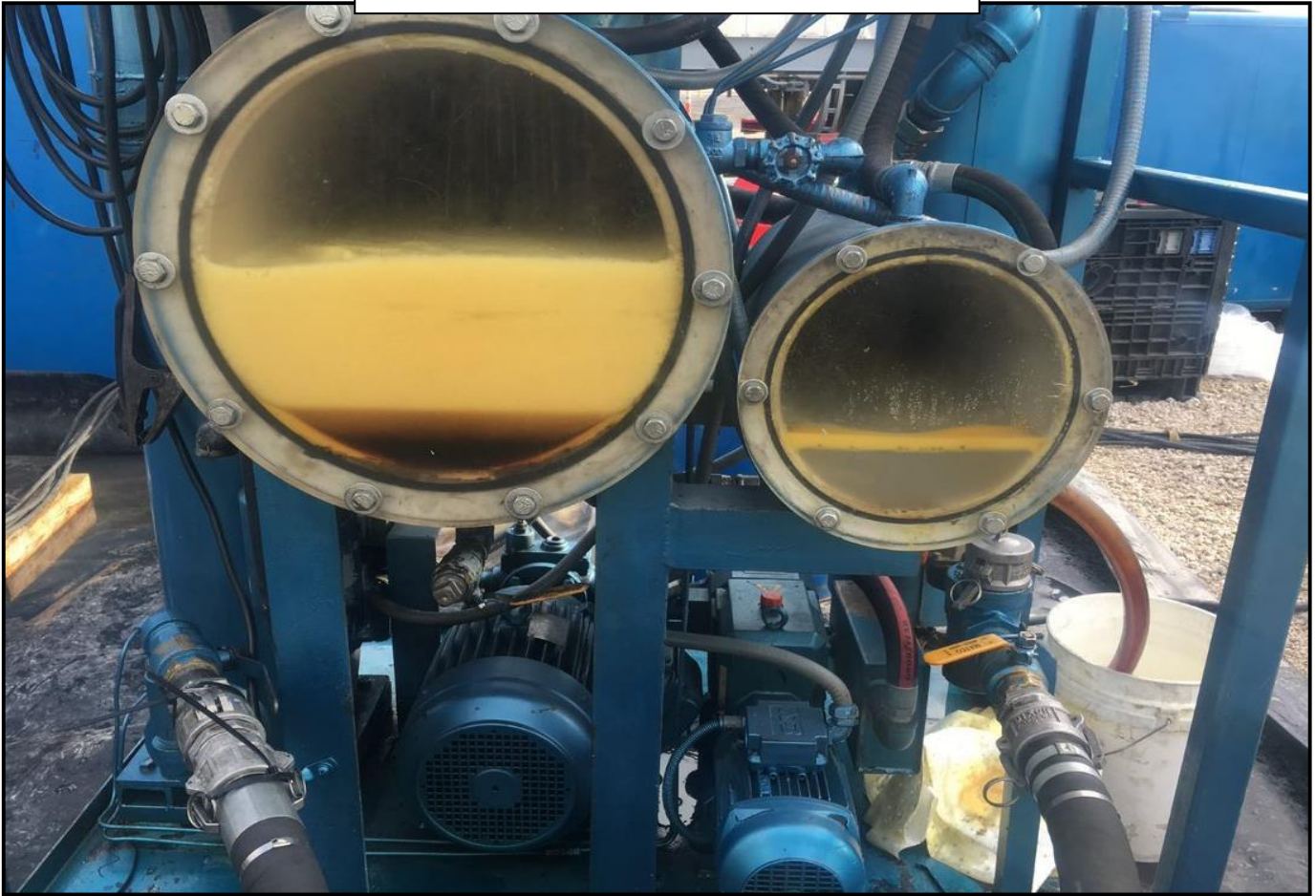
Equipment Setup (Cont'd)







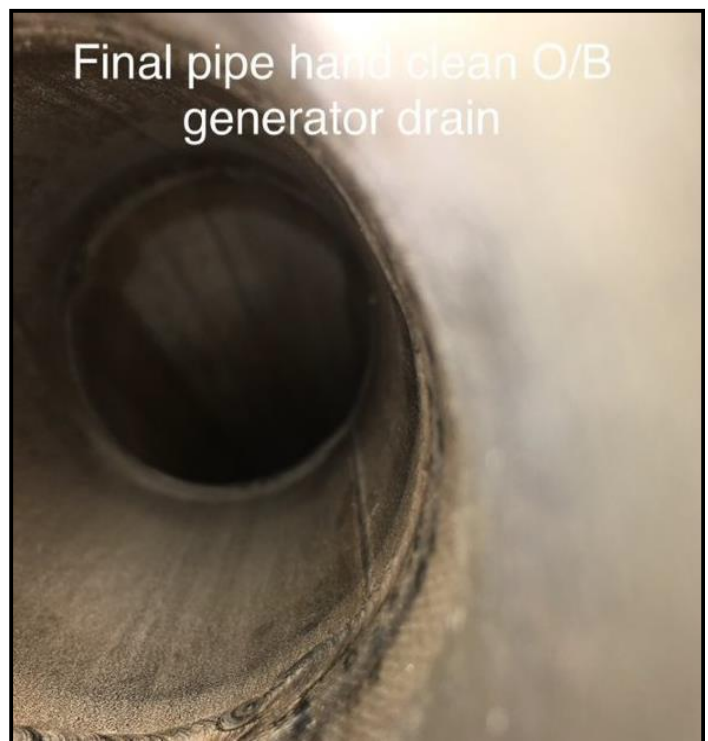
Vacuum Dehydrator Water Removal -
VDOPS



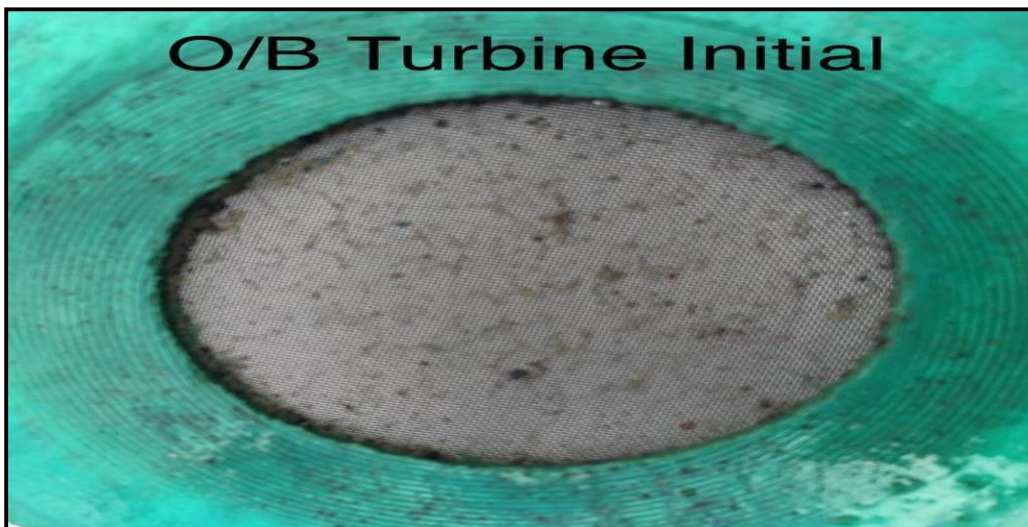
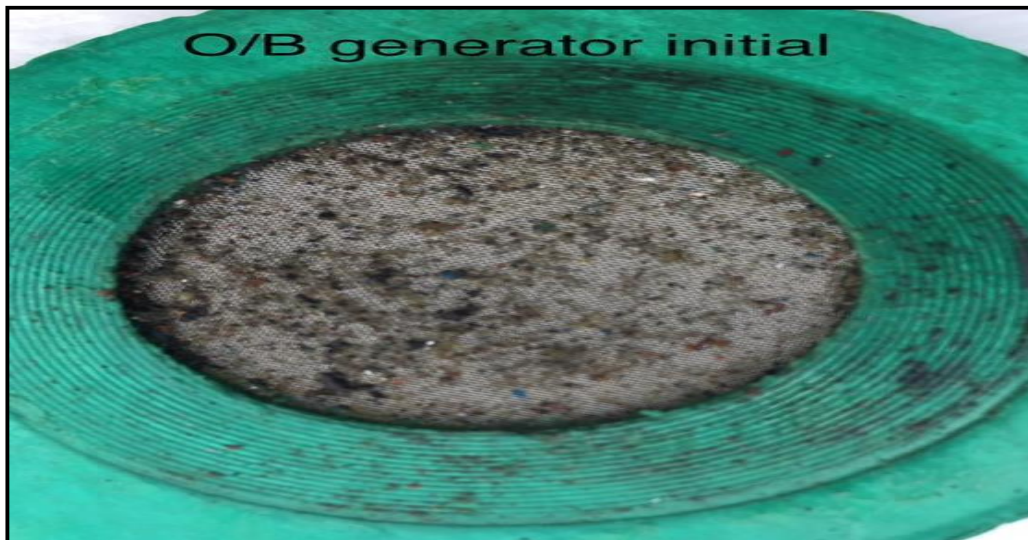
Initial generator drain pipe
inspection

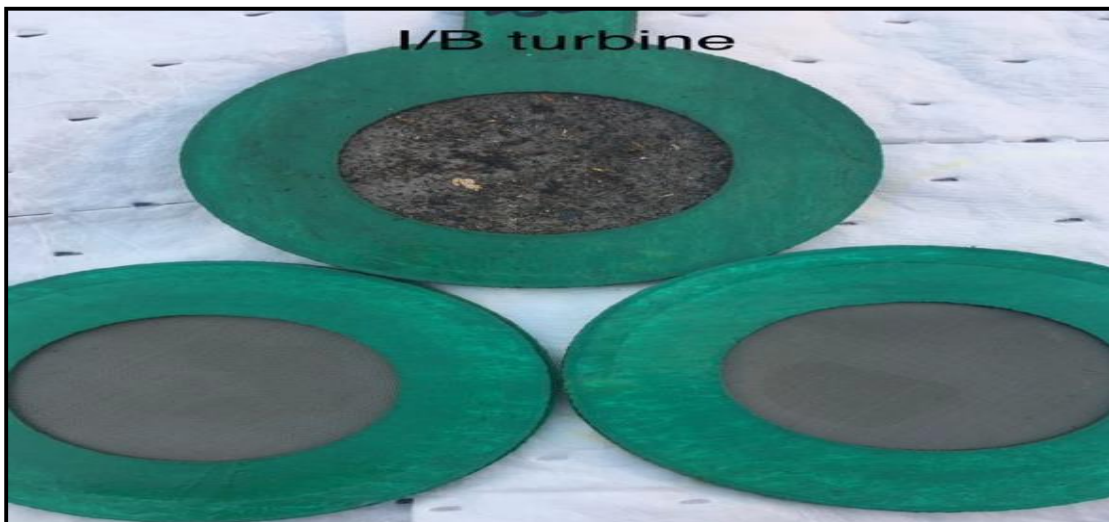


Final pipe hand clean O/B
generator drain

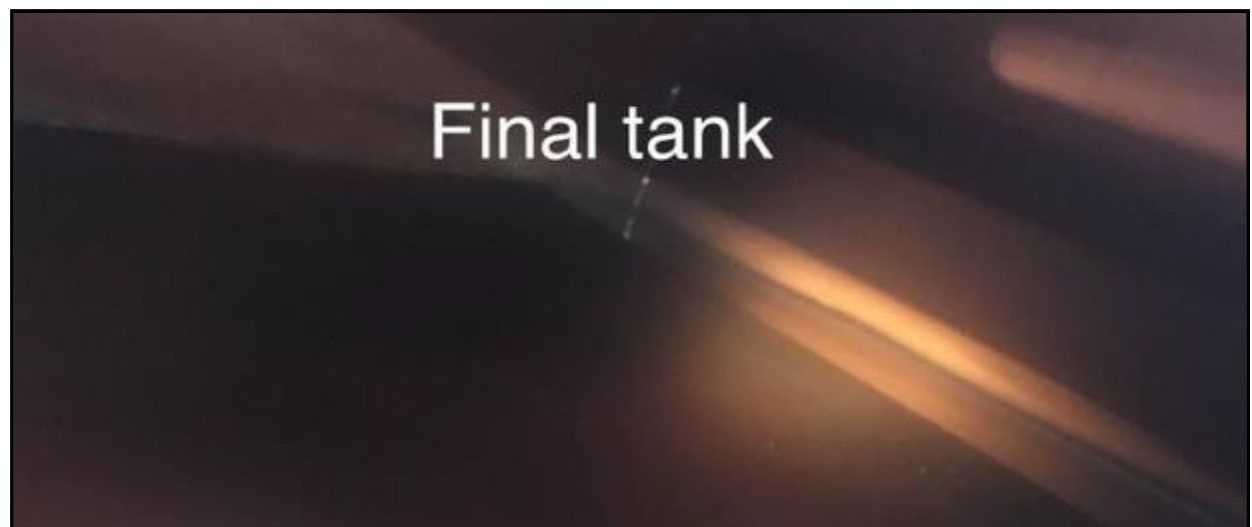
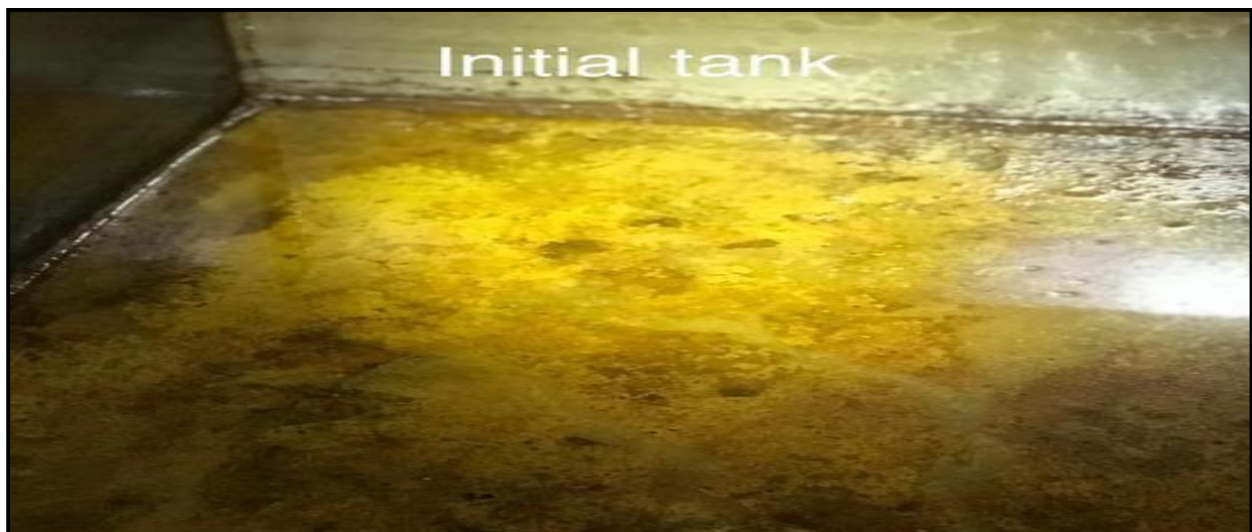


Inspection Screen photos





Tank photos



Particle Count PhotosPODS
OIL SAMPLE REPORTSample: SABINE POW.1
Remarks: STG INITIALTime: 08:11:50
Volume: 10 mL/RUN
Viscosity: 163.5 cSt
Serial #: 150443201
Sample Mode: BOTTLE
Flowrate: 38 mL/min
Oil Temp: 57.2 FReported Concentration: Parts/1 ml
ISO Code: 25/24/23 ($4\mu\text{m}/6\mu\text{m}/14\mu\text{m}$) ($\mu\text{m}(c)$)

SIZES	RUN1	RUN2	RUN3	AVG
4.0 μm	161707.90	161948.20	161645.50	161767.20
4.6 μm	159720.60	159988.40	159670.00	159793.00
6.0 μm	146180.90	146431.10	146059.80	146223.93
9.8 μm	100797.90	100879.20	100531.00	100736.03
14.0 μm	68612.90	68438.30	68372.20	68474.47
21.2 μm	34220.00	33993.70	33840.60	34018.10
38.0 μm	3488.00	3448.50	3373.10	3436.53
68.0 μm	25.20	30.40	20.60	25.40

PODS
OIL SAMPLE REPORTSample: SABINE POW.7
Remarks: STG S COOLERTime: 07:34:28
Volume: 10 mL/RUN
Viscosity: 81.4 cSt
Serial #: 150443201
Sample Mode: BOTTLE
Flowrate: 50 mL/min
Oil Temp: 72.6 FReported Concentration: Parts/1 ml
ISO Code: 21/19/16 ($4\mu\text{m}/6\mu\text{m}/14\mu\text{m}$) ($\mu\text{m}(c)$)

SIZES	RUN1	RUN2	RUN3	AVG
4.0 μm	10416.20	10914.30	10782.00	10704.17
4.6 μm	7676.90	7661.20	7044.60	7460.90
6.0 μm	4048.20	3759.30	3047.70	3618.40
9.8 μm	1142.80	871.80	769.60	928.07
14.0 μm	634.40	541.70	501.90	559.33
21.2 μm	258.00	261.50	240.90	253.47
38.0 μm	39.60	44.40	38.80	40.93
68.0 μm	2.40	5.10	2.40	3.30

Particle Count Photos (Cont'd)**Final Particle Count**

Sample: SABINE POW.17

Remarks: STG

[REDACTED]

Serial #: 150443201

Time: 10:22:21

Sample Mode: BOTTLE

Volume: 10 mL/RUN

Flowrate: 50 mL/min

Viscosity: 72.5 cSt

Oil Temp: 77.0 F

Reported Concentration: Parts/1 mL

ISO Code: 14/12/7 (4 μ m/6 μ m/14 μ m)(μ m(c))

SIZES	RUN1	RUN2	RUN3	AVG
4.0 μ m	143.60	134.70	127.10	135.13
4.6 μ m	92.10	84.30	76.40	84.27
6.0 μ m	39.00	31.20	22.50	30.90
9.8 μ m	2.40	2.20	2.40	2.33
14.0 μ m	1.10	1.40	0.50	1.00
21.2 μ m	0.30	0.00	0.30	0.20
38.0 μ m	0.00	0.00	0.00	0.00
68.0 μ m	0.00	0.00	0.00	0.00

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