SFM Reliability Solutions

Lubrication Based Reliability Consulting

Texas Gulf Coast Refinery

PROJECT SUMMARY REPORT

HIGH VELOCITY OIL FLUSHING SERVICE

Jet Water Pump

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INTRODUCTION

This report documents the High Velocity Oil Flushing service performed on the Jet Pump at a Texas Gulf Coast Refinery facility during a large turnaround. This report documents the objectives, scope, performance, cleanliness specifications, flush logs, photo documentation, and safety while performing the flush. This flush was ongoing concurrently with another high velocity flush within the refinery.

Benefits:

- Peace of Mind that the lube oil systems have been cleaned to industry-accepted standards.
- Improved long-term reliability of oil systems due to cleaner systems via High Velocity Oil Flushing.

Primary Objectives:

- ***To complete all work focusing on Goal Zero with no Safety Incidents or Injuries!***
- To work with Refinery as a team to provide detailed planning and procedures in advance of service execution.
- To provide High Velocity Oil Flushing Services on Jet Pump lube oil system.
- To provide that the lubricating oil systems and Turbine Oil cSt 32 viscosity product meets the requirements set forth by Refinery.

Overall Scope:

- To provide Project Management, technical assistance, labor and equipment to perform the flushing service.
- To document that the oil and system cleanliness as required has been achieved.

PERFORMANCE DOCUMENTATION

All objectives were met as agreed upon. Approved T&M sheets, flush logs, signed procedures, particle counts and photo documentation will follow in this document.

High Velocity Oil Flushing Service

Safety

Management and technicians completed the service without any safety recordable.

General Equipment Used to Perform HVOF on Jet Pump

- One 150 gpm Heater/Filtration skid with 2 onboard filter housing, onboard heat, and onboard inspection filter location – equipped with emergency stop button.
- One 550-gallon SS storage tote.
- Temporary hoses to connect to equipment lube oil circuit (s) and bypass critical components as required.
- All Temporary Hoses accompanied by current pressure testing records.
- Temporary ball valves rated at 150# for temporary equipment.
- All Equipment with Pressure Relief Valves Installed per Refinery Policy

OIL CLEANLINESS PARTICLE COUNT FINAL RESULTS

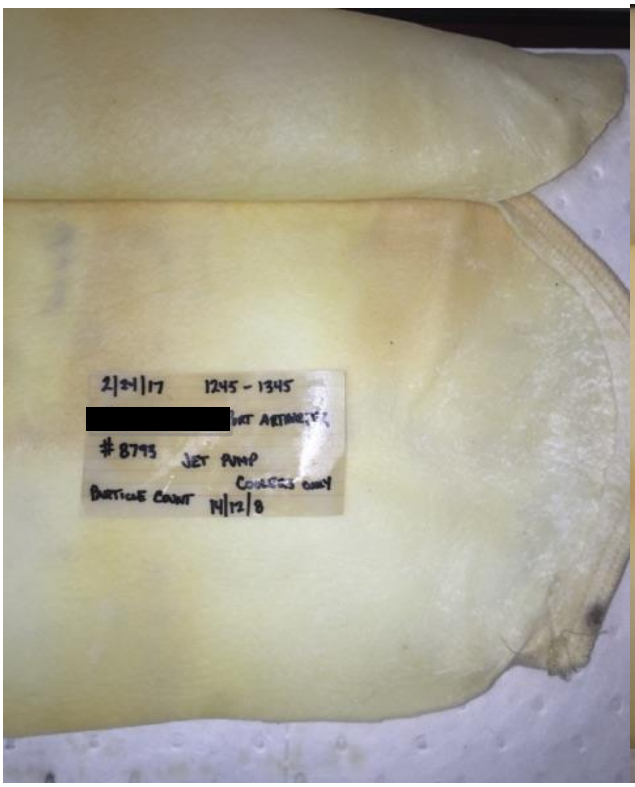
System	Oil Type	Oil Cleanliness Criteria	Final Oil Particle Count
Jet Pump	**Turbine Oil cSt 32 viscosity**	**ISO Code 16/14/11**	**ISO Code 14/12/7**

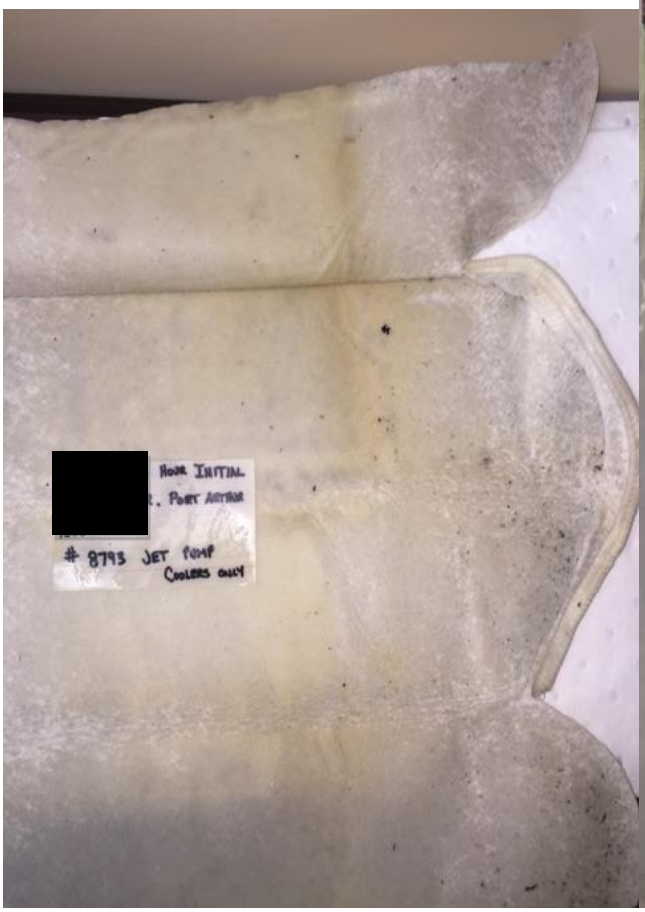
Particle count tickets are inserted in this report

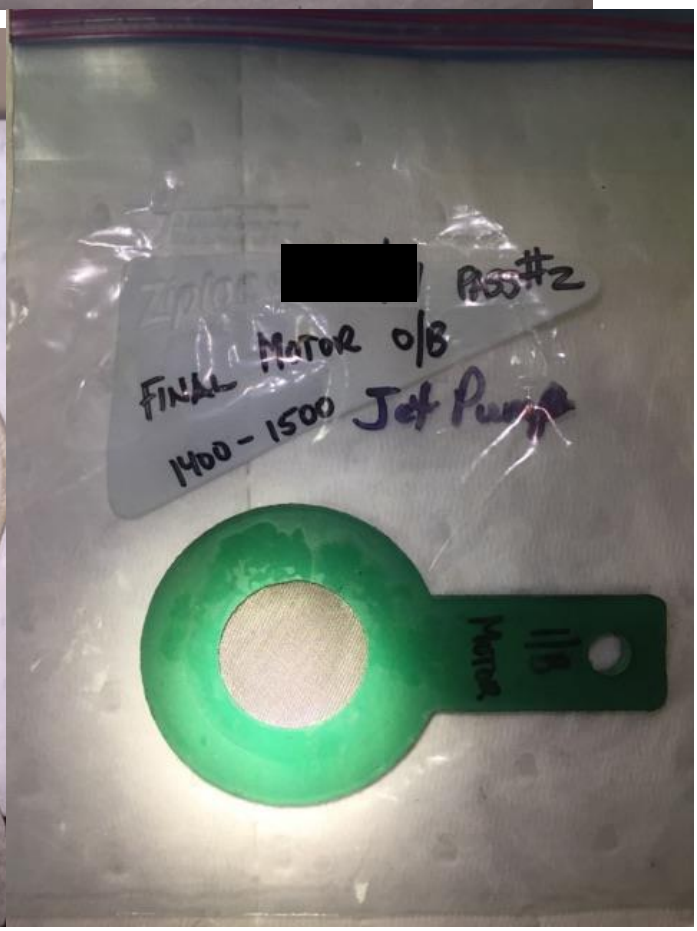
The entire project including set-up, Oil Flushing, final screening, and break down took 8 days.

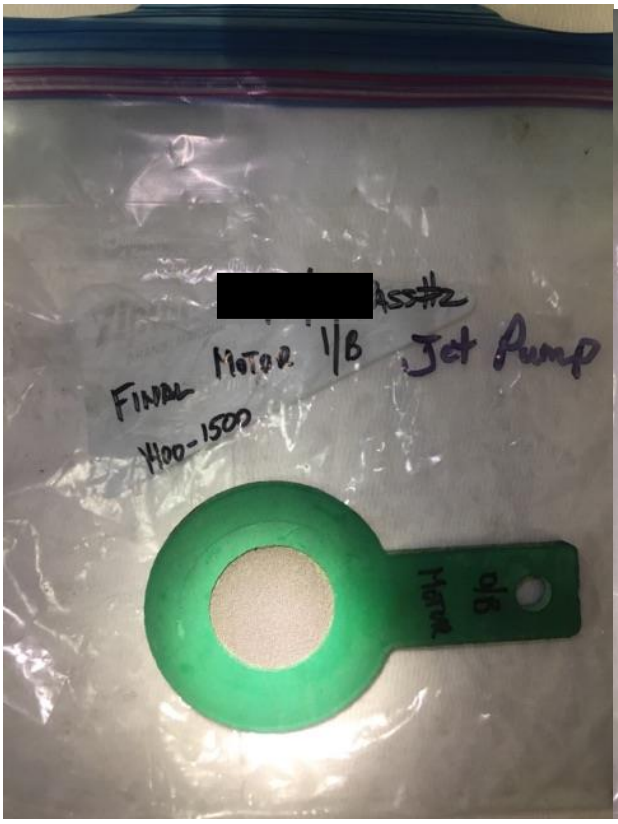
The Jet Pump lube oil system was flushed to specification and passed Refinery Representative's inspection as clean. The "Final Flush Acceptance" documents for the system, detailed flushing logs, procedure, particle counts, and photo documentation are included in this report.

Gulf Coast Texas Refinery
High Velocity Oil Flushing Service
Water Jet Pump





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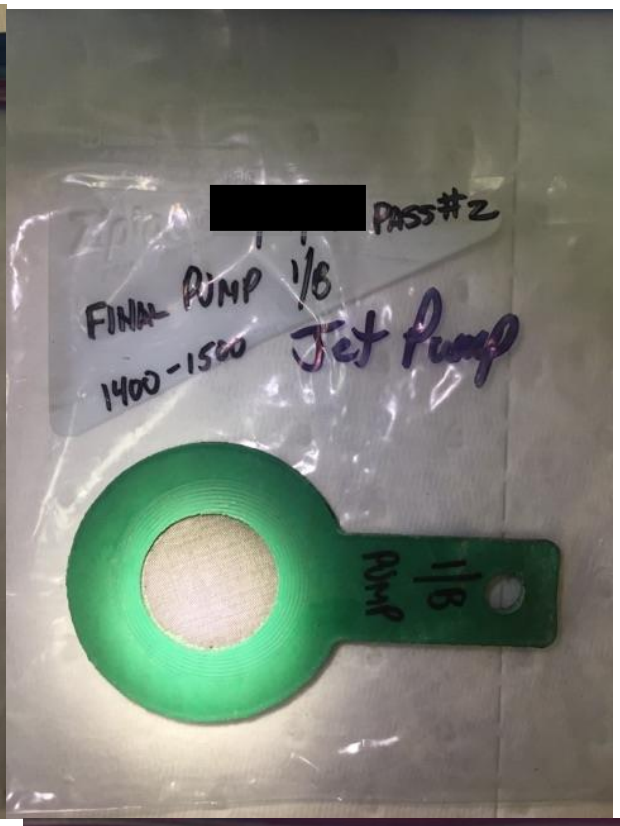
Final Motor 1/8 Jet Pump
1400-1500
Motor 1/8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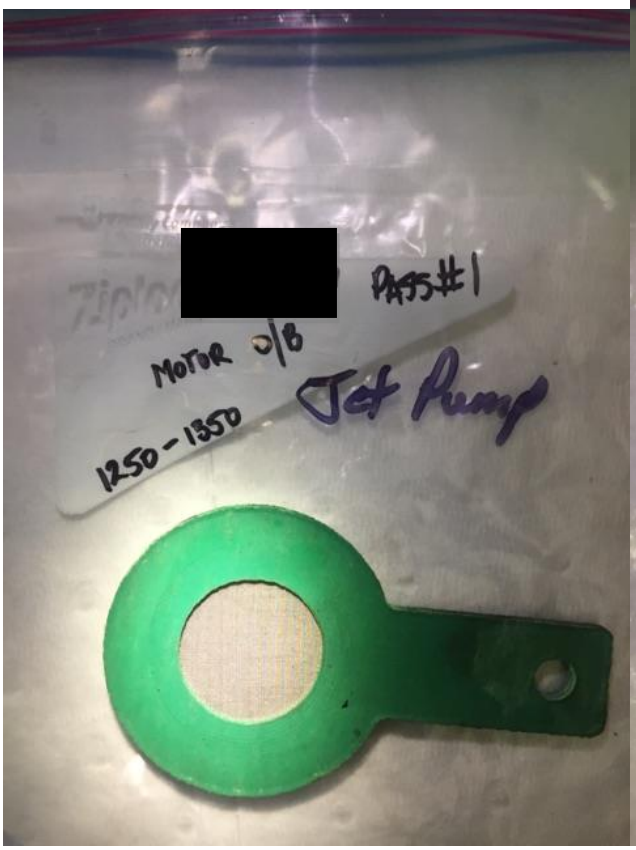
Final Pump 1/8
1400-1500 Jet Pump
Pump 1/8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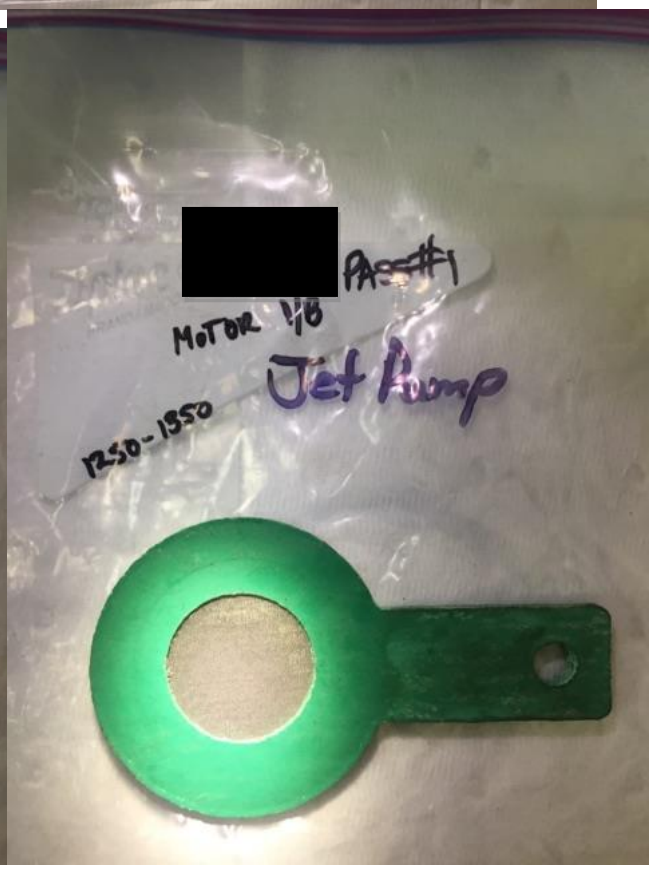
1250-1350 Jet Pump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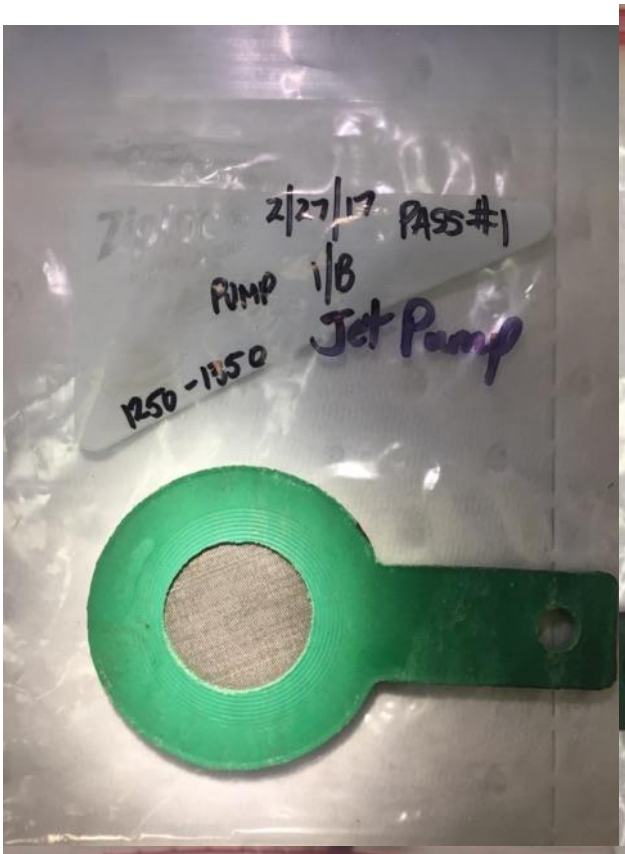
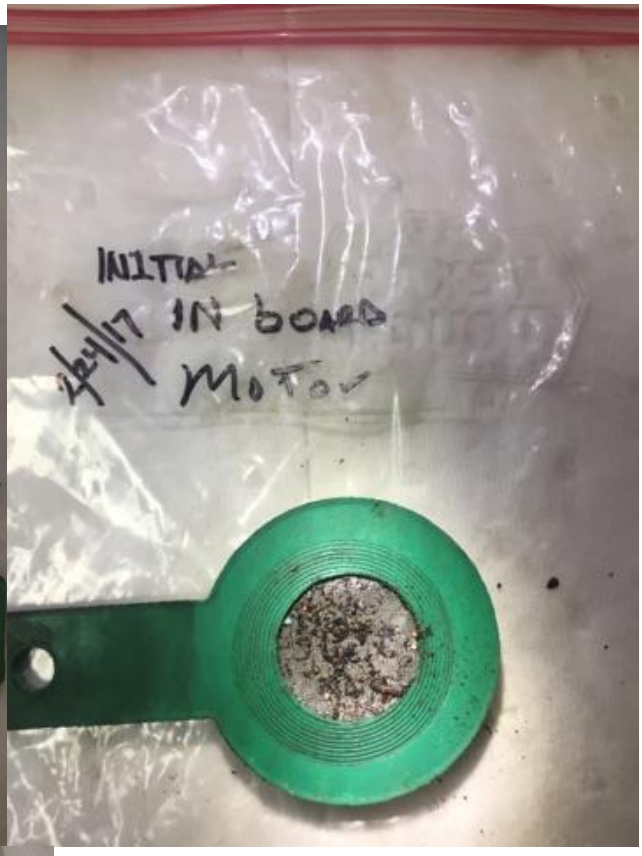
1250-1350 Jet Pump


2/27/17 PASS #1
PUMP 1/B
1250-1350 Jet Pump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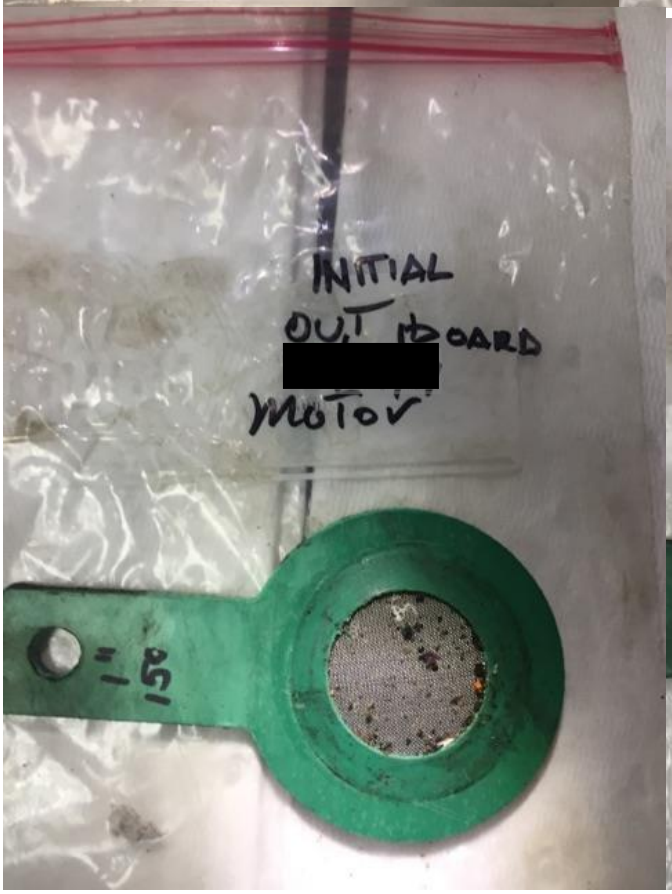
2/24/17 IN board
MOTOR


INITIAL
OUT BOARD
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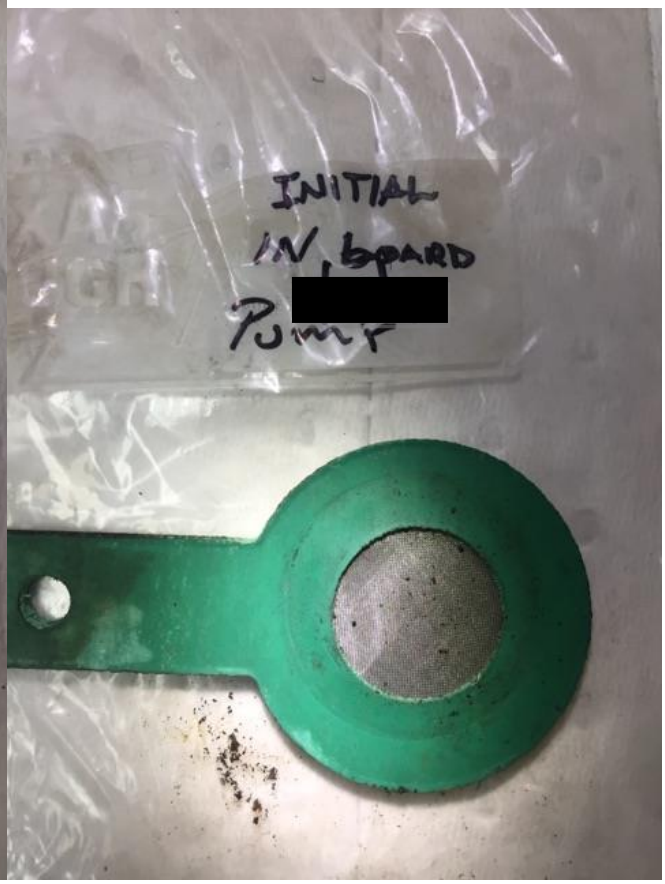
MOTOR


INITIAL
IN board
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PUMP

Initial Particle Count 22/20/13

Required Particle Count By Customer 16/14/11

Final Particle Count 14/2/7