CTG-1A Lube oil moisture issue
Problem Identification and Solution
Problem Definition and Observations

- It was reported on 19th April 2010 that the Lube oil moisture content of CTG-1A has crossed alarm limit. (250-275 ppm)
- It is observed that the moisture level is increasing during the rainy / high humidity days.
- Moisture is increasing with oil top up.

Report of Moisture levels from April—2010 to July-2012.
Probable Reasons

- Ingress through Lube oil Coolers
- Ingress through the bearing seals through atmospheric air.
  - Turbine Brg-1 and 2
- Through return oil pipe joints.
- Through Tank Explosion Doors.
- Through the top up oil.
- Through Generator Cooler.
Approach to Solution

- Discussed in depth on 23.04.12, during the outage
- Fish bone prepared
- Action plan prepared.
Air ingress from Bin 182

Gasket leak

PHE info.

Tube leakage X

Water draining from LLD.

H2 Purity (Du Pont).

Air ingress from Bin #1 & 2 deflectors

2) Time period.

3) Moisture level high APR-NO

Motion Cool

Generator

Complete cleaning of lube oil skirt bottom.

Inspection of Mist filters

Bin #1 clearance will be confirmed.

Bin #2 inspection is not planned.

Moisture LO

GT 1A

Note for Moisture level high APR-NO

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After implementation of Action Plan

- CTG-1A was synchronized on 13\textsuperscript{th} June 12
- Lube oil moisture content was 30 ppm
- It was thought that out of so many things done some thing has worked.
- CTG-1A was stopped on 16\textsuperscript{th} June
  - Vibration Issue
Problem Resurfaced

- On 5\textsuperscript{th} July Unit was started.
- On 09.07.12, moisture level was found increased to 200 ppm.
- Activities performed –
  - On 05.07.12 Unit was started and before startup 4 drums of oil was topped up.
  - Topping up was done by opening the explosion door.
Problem Resurfaced

- On 18.07.12, moisture level came down to 80 ppm.
- On 19\textsuperscript{th} Unit was stopped due to oil leakage. 15 drums oil was topped up.
- On 21\textsuperscript{st} Unit started.
- 23.07.12 – Moisture level 160 ppm.
- 25.07.12, moisture went up to 670 ppm
  - Rain fall was 33 mm
  - Centrifuging started.
Fresh Look / Approach

- Checking of remaining things was started.
- Atomizing air compressors are lubricated by the same lube oil and is returned to main lube oil tank.
- Atomizing air pressure is approx. at about 14kg/cm², while oil pressure is at 2 kg/cm².
In search of Solution

- Atomizing air temp. was checked and was found to be very low at 63 °C.
- Normally AAT is in bet’n 100 to 110 °C.
A A Cooling Circuit P&ID

Understanding the Problem
A Cooling Circuit P&ID

Understanding the Problem
In search of Solution

- On 30.07.12 AAT was raised to 90 °C, moisture level was in excess of 400 ppm.
- On 31.07.12 moisture level drastically reduced to 210 ppm and further down to 90 ppm next day.
Nailed down the problem

- To confirm the effect of AAT, it was decided to reverse the things.
- On 02.08.12 both the PHE’s were taken in service at 11.00hrs. (to clear the doubts regarding the 2\textsuperscript{nd} PHE) keeping AAT at 90 \textdegree C.
- Till evening moisture level was 50 ppm.
- At 20.00hrs AAT was reduced to 60\textdegree C.
Nailed down the problem

- Next Day - 03.08.12
- Sample was taken at 10.00hrs and moisture level was 290 ppm.
- AAT increased to 80 °C (due to part load) at 11.00hrs.
- At 16.00hrs oil sample was taken and moisture level was reduced to 90 ppm.

Problem was Identified
Further works planned for solution

- Auto Loop control for AAT
- Control valve bypass line orifice sizing issue – Taken up with GE Engg.
- Checking of Seals of Atomizing Air compressors
Generator stator windings got coated with corrosion dust. This has caused the generator minor overhaul to become major overhaul in recent shutdown of 1A.
Related Problems

- Lube oil Mist Eliminator fan-2 tripping on overload.
  - It was observed that the fan was getting filled up with water.
- Atomizing Air Compressor NRV Jamming.
Mist Eliminator Fan piping arrangement
Mist Eliminator Fan piping arrangement
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Provision for water draining
THANK YOU