



FLUID  LIFE
EQUIPMENT RELIABILITY SERVICES

Mining Haul Trucks

Condition Monitoring | Fluid Analysis Success Stories

Truck A – Faulty Engine Oil Pump

- *Truck A's used engine oil samples began to show a sharp rise in the amount of Iron present in the oil.*
- *The truck was kept in service with fresh oil while the change in wear condition was investigated.*
- *Complete failure of the engine oil pump could have resulted in a damaged engine, loss of engine core value and an in-field failure requiring recovery.*

Target Engine Replacement:

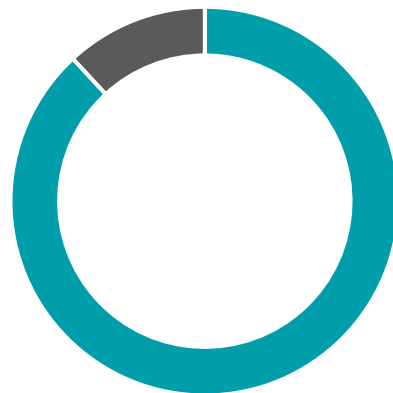
- 20,000 hrs

Engine Usage:

- 17,623 hrs

Component Life Remaining:

- 12%



■ Engine Hours ■ Remaining Life

Truck A – Faulty Engine Oil Pump

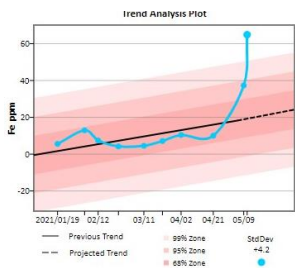
17,623 Engine Hours

Engine Oil Sample

Change engine oil, filter and makeup tank oil. Re-sample.

Iron readings in oil remain high. Input work notification to troubleshoot source of Iron.

 Issue Resolved



Advise of abnormally high Iron in engine oil.

Input work notification to change the oil and resample the fluid.



May 12

Iron readings continue to climb post oil change.

Input work notification for a resample to eliminate any uncertainty from residual carryover in the crankcase fluid.

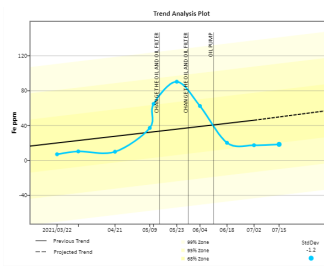


May 18

18,158 Engine Hours

FAULT: high iron in oil.
CAUSE: failing oil pump.
ACTION: pump replaced
reassembly completed.

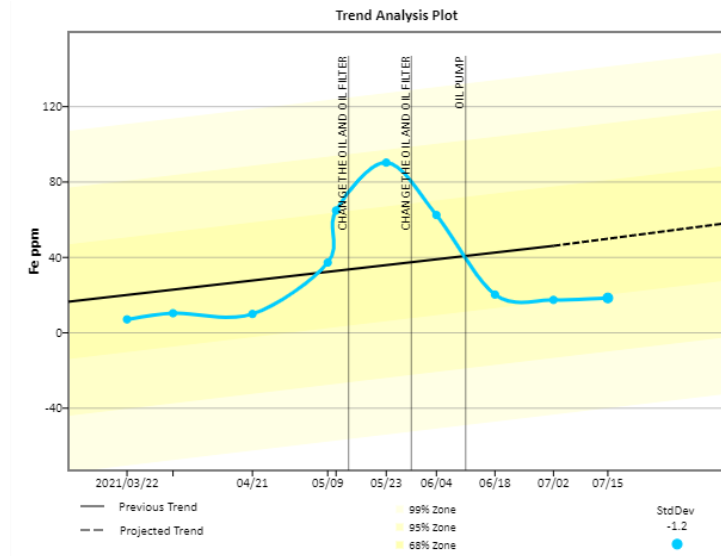
 **June 12**



Truck A – Faulty Engine Oil Pump

Value

- ✓ Issue validated and component health maintained.
- ✓ No in-field failure.
- ✓ Minimal downtime.
- ✓ Parts replacement instead of major component replacement.



Truck B – Fuel Dilution of the Engine Oil

- The May 20 engine oil sample showed the presence of diesel fuel for the first time ever in this engine's history.
- Time was taken to verify if this was a case of nuisance unburned fuel from leaking injectors or a more serious trending issue such as an internal fuel leak which could lead to severely diluted engine oil and subsequently damage to internal engine components.
- The lubricating oil was refreshed once to ensure unit could continue to operate without damaging internal components.

Target Engine Replacement:

- 20,000 hrs

Engine Usage:

- 6,899 hrs

Component Life Remaining:

- 66%



■ Engine Hours ■ Remaining Life

Truck B – Fuel Dilution of the Engine Oil



May 20

6,899 Engine Hours

Engine Oil Sample



May 31

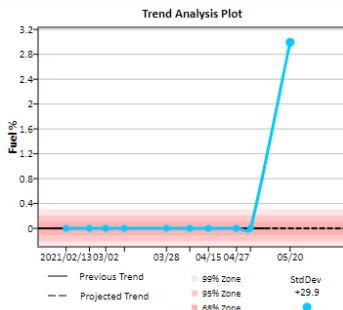
Persistent level of fuel present on resample. Input notification to change the oil and filters, and monitor resample result.



June 26

7,530 Engine Hours

Maintenance team dyed the fuel and ran the engine. Found the fuel pump input shaft seal to have failed, leaking fuel into the lube system. Fuel pump, engine oil & makeup tank oil, and filter spinner changed.



Advise of sudden fuel dilution of engine oil, with no previous history of fuel issues. Input work notification to get resample to track and manage the fuel dilution issue.

May 26

Re-sample confirms issue still trending up, input notification to troubleshoot source of fuel dilution.

June 21

Issue Resolved

Sample Date	Fuel %
2021/07/02	NT
2021/07/02	NT
2021/06/16	4.04
2021/05/31	3.67
2021/05/29	2.97
2021/05/20	2.99
2021/05/03	NT

Truck B – Fuel Dilution of the Engine Oil

Value

- ☑ Confirmed root cause, replaced only the problem component.
- ☑ Monitoring and fresh fluids ensured sufficient fluid viscosity was maintained to protect engine from damage.
- ☑ No in-field failure.
- ☑ Minimal downtime.

Sample Date	Fuel %
2021/07/02	NT
2021/07/02	NT
2021/06/16	4.04
2021/05/31	3.67
2021/05/29	2.97
2021/05/20	2.99
2021/05/03	NT

Truck C – Engine Burning Coolant

- *March 29 oil analysis indicated Truck C's engine had begun burning engine coolant.*
- *This issue was detected and rectified before any physical symptoms were present at the truck.*
- *Left unresolved, this could have resulted in severe engine damage from bent connecting rods or a hydro-locked engine which would require considerable downtime to repair.*

Target Engine Replacement:

- 20,000 hrs

Engine Usage:

- 10,532 hrs

Component Life Remaining:

- 47%



■ Engine Hours ■ Remaining Life

Truck C – Engine Burning Coolant



Mar 29

10,532 Engine Hours

Engine Oil Sample



April 2 - May 14

Monitored issue and provided updates to maintenance and reliability stakeholders.

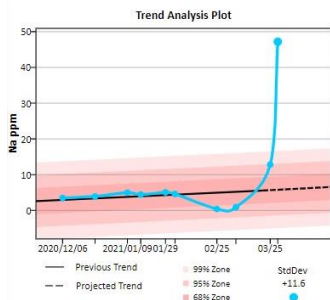


May 21

11,577 Engine Hours

Truck C CBM TROUBLESHOOT
COOLANT IN ENG OIL

Completed, Aftercooler replaced



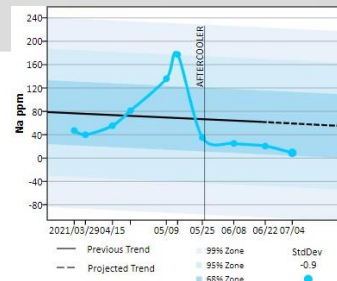
Fluid analysis results shows signs of coolant burning in cylinder, no hazardous wear at this time.

Advised maintenance teams.

April 2

Increasing amounts of Glycol and Sodium present in the newest oil sample. Escalated issue and input work notification to troubleshoot source of the coolant ingress

May 18

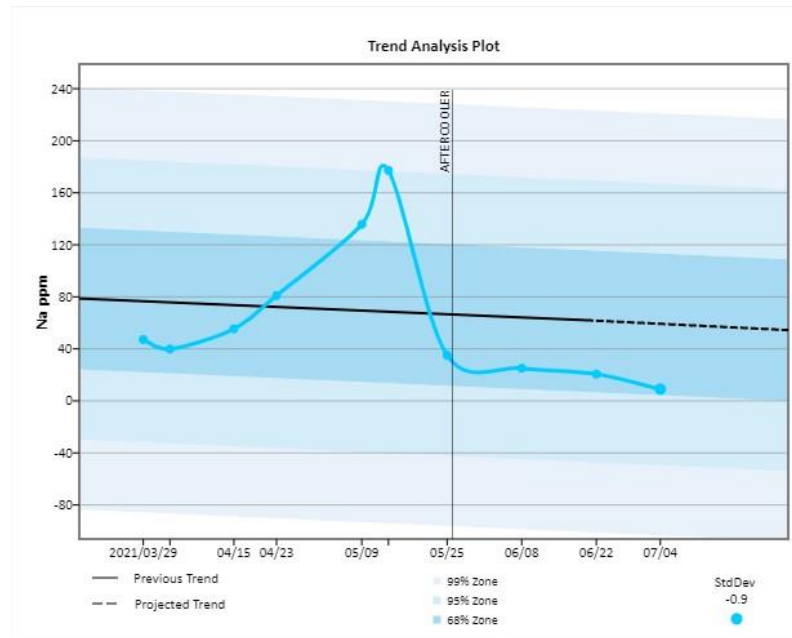


Issue Resolved

Truck C – Engine Burning Coolant

Value

- ✓ Issue validated and component health maintained.
- ✓ No in-field failure.
- ✓ Minimal downtime.
- ✓ Small repair instead of major component replacement.



Services Offered

Laboratory Services

Oils, Coolants, Diesel Fuels, Greases, Filter Debris, DEF, and SEM Analysis

Real Time Oil Condition Sensors

Fluid Property, Wear Debris and Particle Counters

Telematics Modules / ECU Data Collectors

Cycle Times, Geospatial Analysis, Fleet Management

Advanced Unified Condition Monitoring Platform

Expert Data Monitoring and Intervention Services

FLUID LIFE
EQUIPMENT RELIABILITY SERVICES



YOUR PARTNER IN EQUIPMENT RELIABILITY