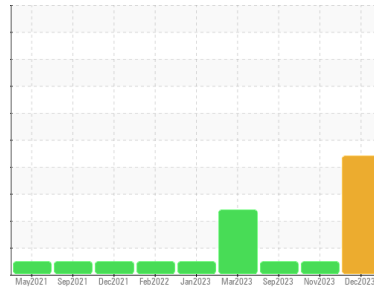




OIL ANALYSIS REPORT

Sample Rating Trend



DIRT



Machine Id
378M
Component
Diesel Engine
Fluid
PETRO CANADA DURON SHP 15W40 (--- GAL)

DIAGNOSIS

Recommendation

We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Wear

The copper level is abnormal. Valve wear is indicated. Elemental level of copper (Cu) probably due to leaching of copper from copper components (i.e. cooling core) by the oil additives.

Contamination

Fuel content negligible. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.

Fluid Condition

The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

SAMPLE INFORMATION

method	limit/base	current	history1	history2
Sample Number	Client Info	GFL0105658	GFL0101546	GFL0093185
Sample Date	Client Info	16 Dec 2023	17 Nov 2023	18 Sep 2023
Machine Age	hrs	0	13456	11550
Oil Age	hrs	0	11550	11394
Oil Changed	Client Info	Changed	Changed	Changed
Sample Status		ABNORMAL	NORMAL	NORMAL

CONTAMINATION

method	limit/base	current	history1	history2
Water	WC Method >0.2	NEG	NEG	NEG
Glycol	WC Method	NEG	NEG	NEG

WEAR METALS

method	limit/base	current	history1	history2
Iron	ppm ASTM D5185m >120	55	14	23
Chromium	ppm ASTM D5185m >20	2	<1	<1
Nickel	ppm ASTM D5185m >5	▲ 7	<1	0
Titanium	ppm ASTM D5185m >2	<1	<1	0
Silver	ppm ASTM D5185m >2	<1	0	0
Aluminum	ppm ASTM D5185m >20	▲ 13	5	5
Lead	ppm ASTM D5185m >40	0	<1	2
Copper	ppm ASTM D5185m >330	▲ 217	2	2
Tin	ppm ASTM D5185m >15	4	<1	<1
Vanadium	ppm ASTM D5185m	<1	0	0
Cadmium	ppm ASTM D5185m	0	<1	0

ADDITIVES

method	limit/base	current	history1	history2
Boron	ppm ASTM D5185m 0	92	0	2
Barium	ppm ASTM D5185m 0	<1	9	0
Molybdenum	ppm ASTM D5185m 60	107	64	61
Manganese	ppm ASTM D5185m 0	5	<1	<1
Magnesium	ppm ASTM D5185m 1010	740	929	870
Calcium	ppm ASTM D5185m 1070	1356	1110	1058
Phosphorus	ppm ASTM D5185m 1150	728	1020	953
Zinc	ppm ASTM D5185m 1270	885	1223	1218
Sulfur	ppm ASTM D5185m 2060	2073	2816	2698

CONTAMINANTS

method	limit/base	current	history1	history2
Silicon	ppm ASTM D5185m >25	▲ 70	5	5
Sodium	ppm ASTM D5185m	4	5	11
Potassium	ppm ASTM D5185m >20	33	9	6
Fuel	% ASTM D3524 >3.0	0.4	<1.0	<1.0

INFRA-RED

method	limit/base	current	history1	history2
Soot %	% *ASTM D7844 >4	0.7	0.8	0.8
Nitration	Abs/cm *ASTM D7624 >20	11.2	8.2	8.7
Sulfation	Abs/.1mm *ASTM D7415 >30	24.6	20.4	21.3

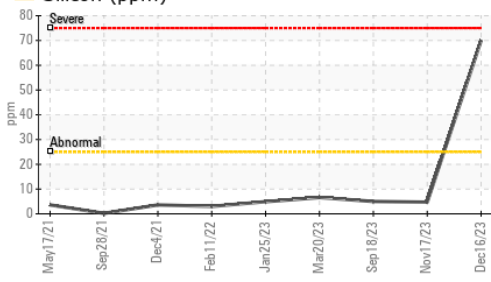
FLUID DEGRADATION

method	limit/base	current	history1	history2
Oxidation	Abs/.1mm *ASTM D7414 >25	24.0	15.7	17.4
Base Number (BN)	mg KOH/g ASTM D2896 9.8	6.4	8.0	6.1

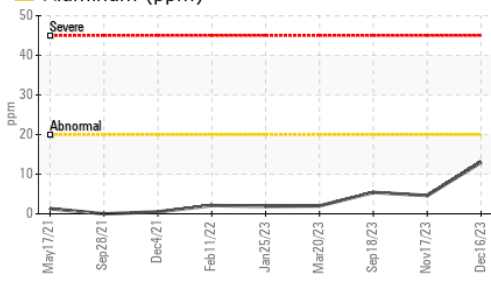


OIL ANALYSIS REPORT

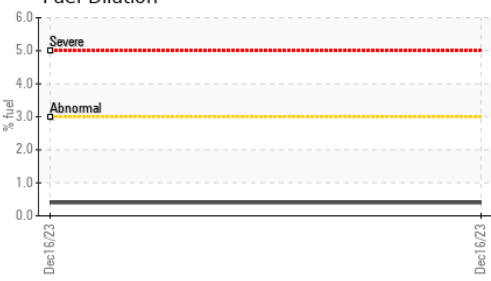
▲ Silicon (ppm)



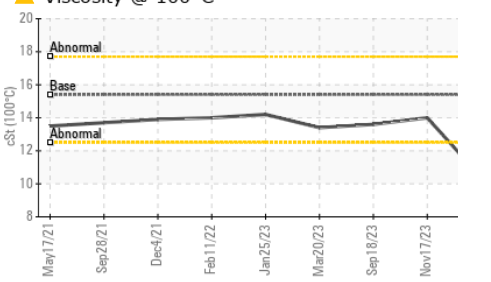
▲ Aluminum (ppm)



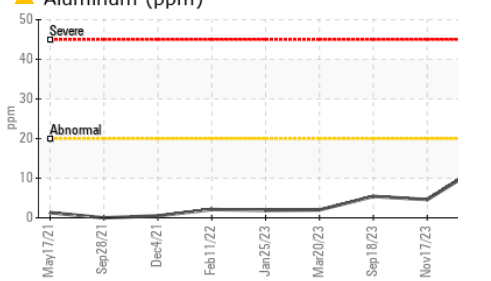
● Fuel Dilution



▲ Viscosity @ 100°C



▲ Aluminum (ppm)

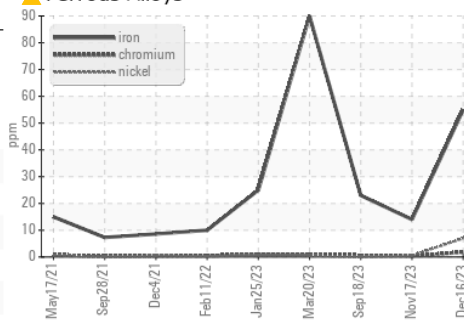


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

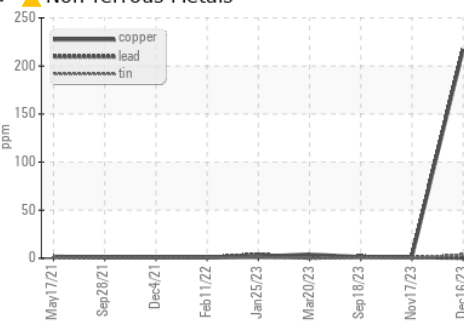
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4 ▲ 10.4	14.0	13.6

GRAPHS

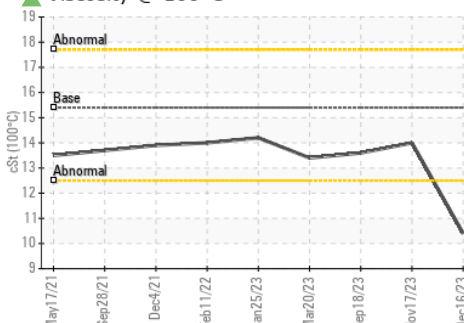
▲ Ferrous Alloys



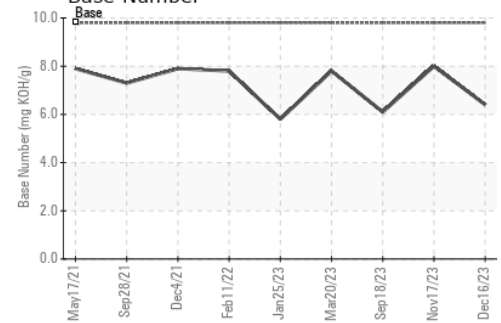
▲ Non-ferrous Metals



▲ Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : GFL0105658 **Received** : 19 Dec 2023
Lab Number : 06039101 **Diagnosed** : 23 Dec 2023
Unique Number : 10794330 **Diagnostician** : Don Baldrige
Test Package : FLEET (Additional Tests: FuelDilution, PercentFuel)

GFL Environmental - 415 - Michigan East
 6200 Elmridge
 Sterling Heights, MI
 US 48313
 Contact: Frank Wolak
 fwolak@gflenv.com
 T: (586)825-9514
 F:

To discuss this sample report, contact Customer Service at 1-800-237-1369.

* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)