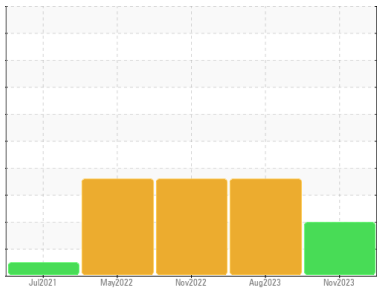
# OIL ANALYSIS REPORT

Sample Rating Trend




**DEGRADATION**

Machine Id
**425012**
Component
**Diesel Engine**
Fluid
**PETRO CANADA DURON SHP 15W40 (--- GAL)**

## DIAGNOSIS

**Recommendation**
We advise that you check for faulty combustion, plugged air filters, or aftercoolers. We recommend you service the filters on this component. Resample at the next service interval to monitor. NOTE: High solids (carbon/soot) in the sample have limited the accuracy of Infra-Red data including Total Base Number (TBN) value.

**Wear**
All component wear rates are normal.

**Contamination**
There is an abnormal amount of solids and carbon present in the oil.

**Fluid Condition**
The BN level is low.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **GFL0023441** | GFL0060409 | GFL0044784 |
| Sample Date | | Client Info | | **17 Nov 2023** | 09 Aug 2023 | 28 Nov 2022 |
| Machine Age | hrs | Client Info | | **35267** | 34842 | 33368 |
| Oil Age | hrs | Client Info | | **0** | 0 | 0 |
| Oil Changed | | Client Info | | **N/A** | Changed | Changed |
| Sample Status | | | | **ABNORMAL** | SEVERE | SEVERE |

| 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 | **18** | 25 | 27 |
| Chromium | ppm | ASTM D5185m | >20 | **0** | <1 | <1 |
| Nickel | ppm | ASTM D5185m | >5 | **0** | <1 | 0 |
| Titanium | ppm | ASTM D5185m | >2 | **0** | 0 | <1 |
| Silver | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >20 | **1** | 1 | 2 |
| Lead | ppm | ASTM D5185m | >40 | **0** | <1 | <1 |
| Copper | ppm | ASTM D5185m | >330 | **2** | 5 | 5 |
| Tin | ppm | ASTM D5185m | >15 | **0** | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | | **0** | 0 | 0 |
| Cadmium | ppm | ASTM D5185m | | **0** | 0 | 0 |

| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | 0 | **3** | <1 | 2 |
| Barium | ppm | ASTM D5185m | 0 | **0** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m | 60 | **51** | 55 | 49 |
| Manganese | ppm | ASTM D5185m | 0 | **0** | <1 | <1 |
| Magnesium | ppm | ASTM D5185m | 1010 | **808** | 900 | 785 |
| Calcium | ppm | ASTM D5185m | 1070 | **973** | 1034 | 1296 |
| Phosphorus | ppm | ASTM D5185m | 1150 | **920** | 954 | 926 |
| Zinc | ppm | ASTM D5185m | 1270 | **1095** | 1179 | 1229 |
| Sulfur | ppm | ASTM D5185m | 2060 | **3034** | 2732 | 3222 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >25 | **3** | 4 | 5 |
| Sodium | ppm | ASTM D5185m | | **0** | <1 | 1 |
| Potassium | ppm | ASTM D5185m | >20 | **2** | 1 | 0 |
| Fuel | % | ASTM D3524 | >3.0 | **<1.0** | <1.0 | <1.0 |

| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | *ASTM D7844 | >4 | ▲ **4.8** | ⬢ 7.1 | ⬢ 7.4 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | **9.7** | 14.7 | 20.2 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | **25.5** | 32.1 | 36.8 |

| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | **13.6** | 18.8 | 31.2 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | 9.8 | ▲ **0.0** | ▲ 0.0 | ▲ 0.0 |

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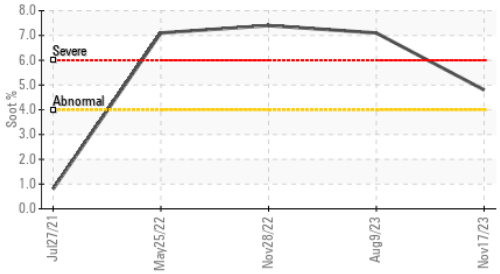
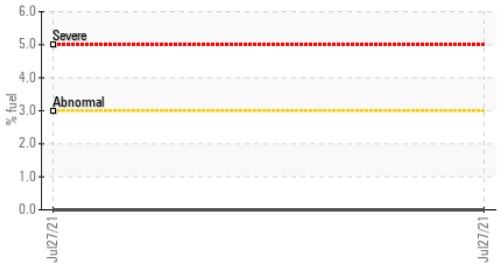
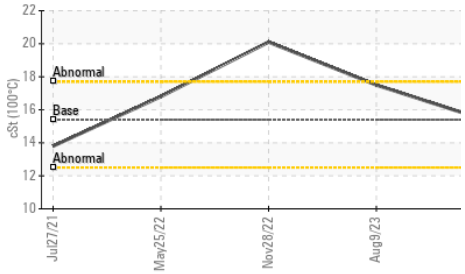
Soot %



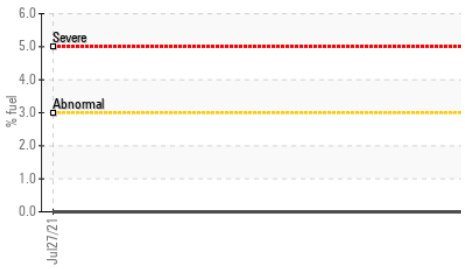

Fuel Dilution




Viscosity @ 100°C




Fuel Dilution

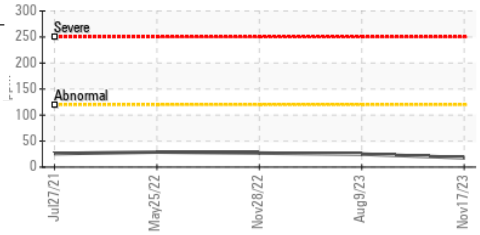



| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Precipitate | scalar | *Visual | NONE | **NONE** | NONE | NONE |
|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

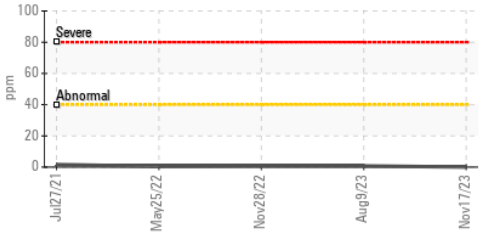
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 100°C | cSt | ASTM D445 | 15.4 | **15.4** | ▲ 17.5 | ▲ 20.1 |

## GRAPHS

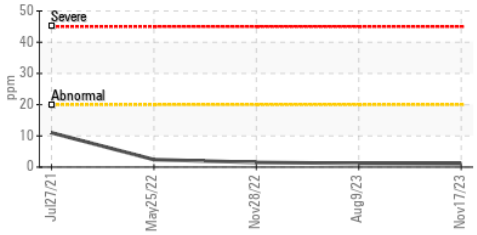
Iron (ppm)



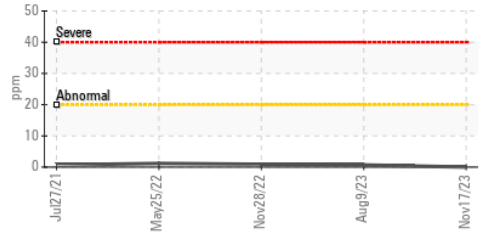

Lead (ppm)



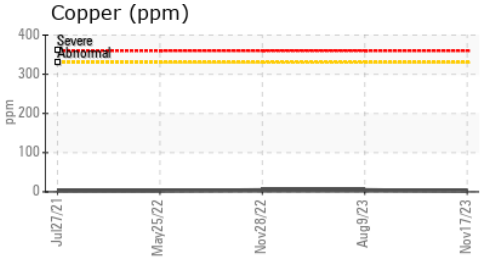

Aluminum (ppm)



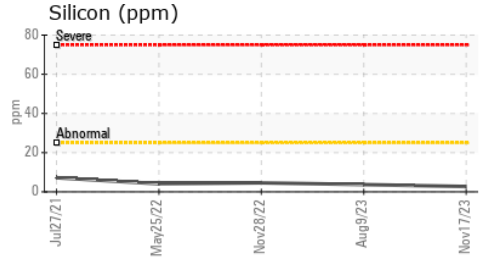

Chromium (ppm)



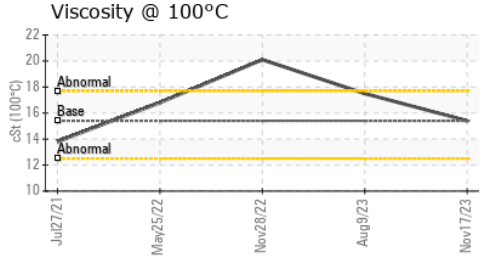

Copper (ppm)



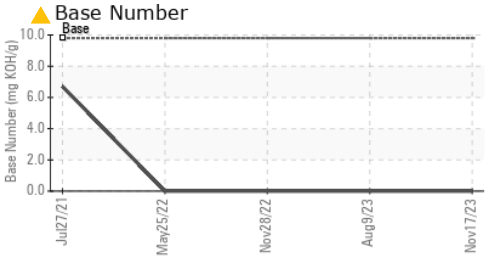

Silicon (ppm)




Viscosity @ 100°C




Base Number




Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : GFL0023441 **Recieved** : 13 Dec 2023
**Lab Number** : 06033321 **Diagnosed** : 18 Dec 2023
**Unique Number** : 10783112 **Diagnostician** : Jonathan Hester
**Test Package** : MOB1+ ( Additional Tests: FuelDilution )

**GFL Environmental - 660S - Roanoke**
2045 LEE HWY
Cloverdale, VA
US 24077
Contact: DELBERT BEASLEY

*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)*

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