

# **OIL ANALYSIS REPORT**

(YA130663) 2633

**Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (12 GAL)

# Sample Rating Trend DIRT

## **DIAGNOSIS**

#### Recommendation

Oil and filter change at the time of sampling has been noted. No corrective action is recommended at this time. Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

### Contamination

Fuel content negligible. Elemental level of silicon (Si) above normal indicating ingress of seal material.

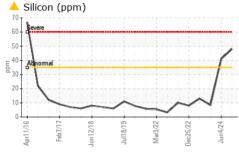
#### Fluid Condition

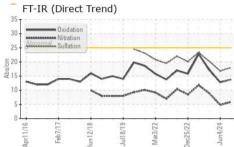
The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

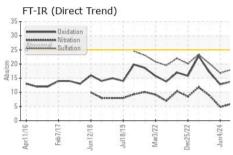
SAMPLE INFORMATION   method   limit/base   current   history1   history2	GAL)		pr2016 Fr	ab 2017 Jun 2018 Ju	ul2019 Mar2022 Dec2022	Jun2024	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         15527         15514         8775           Oil Age         hrs         Client Info         25         600         8775           Oil Changed         Client Info         Changed         Changed         N/A           Sample Status         BABNORMAL         ABNORMAL         NCPMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0         0.5         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Rico         NEG         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           WEAR METALS         method         limit/base         c	Sample Number		Client Info		GFL0123506	GFL0094485	GFL0058817
Oil Age         hrs         Client Info         25         600         8775           Oil Changed         Changed Changed ABNORMAL         N/A         N/A           Sample Status         Contanged         N/A         N/A           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0         0.5         <1.0           Water         WC Method         >3.0         <1.0         NEG         NEG         NEG           Glycol         WC Method         >0.0.2         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >165         17         17         12           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >165         17         17         12           Chromium         ppm         ASTM D5185m         >2         1         <1         <1           Lead         ppm         ASTM D518	Sample Date		Client Info		13 Jun 2024	04 Jun 2024	26 May 2023
Oil Changed Sample Status         Client Info         Changed ABNORMAL ABNORMAL ABNORMAL NORMAL         N/A           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0	Machine Age	hrs	Client Info		15527	15514	8775
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0	Oil Age	hrs	Client Info		25	600	8775
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0	Oil Changed		Client Info		Changed	Changed	N/A
Fuel         WC Method valuer         >3.0         <1.0	Sample Status				ABNORMAL	ABNORMAL	NORMAL
Water Glycol         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >165         17         17         12           Chromium         ppm         ASTM D5185m         >5         <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >165         17         17         12           Chromium         ppm         ASTM D5185m         >5         <1	Fuel		WC Method	>3.0	<1.0	0.5	<1.0
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >165         17         17         12           Chromium         ppm         ASTM D5185m         >5         <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >5         <1         <1         1           Nickel         ppm         ASTM D5185m         >4         <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel         ppm         ASTM D5185m         >4         <1         0         <1           Titanium         ppm         ASTM D5185m         >2         <1	Iron	ppm	ASTM D5185m	>165	17	17	12
Titanium	Chromium	ppm	ASTM D5185m	>5	<1	<1	1
Silver         ppm         ASTM D5185m         >2         0         0         <1           Aluminum         ppm         ASTM D5185m         >20         3         4         2           Lead         ppm         ASTM D5185m         >150         2         <1         <1           Copper         ppm         ASTM D5185m         >90         3         2         0           Tin         ppm         ASTM D5185m         >5         <1         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0         <1           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Boron         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         0         0         2         1         <1           Magnesium         ppm         ASTM D5185m         1010         994 <t< td=""><td>Nickel</td><td>ppm</td><td>ASTM D5185m</td><td>&gt;4</td><th>&lt;1</th><td>0</td><td>&lt;1</td></t<>	Nickel	ppm	ASTM D5185m	>4	<1	0	<1
Altuminum         ppm         ASTM D5185m         >20         3         4         2           Lead         ppm         ASTM D5185m         >150         2         <1	Titanium	ppm	ASTM D5185m	>2	<1	<1	<1
Lead         ppm         ASTM D5185m         >150         2         <1         <1           Copper         ppm         ASTM D5185m         >90         3         2         0           Tin         ppm         ASTM D5185m         >5         <1         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0         <1           Cadmium         ppm         ASTM D5185m         0         0         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         0         2         1         <1           Magnesium         ppm         ASTM D5185m         0         2         1         <1           Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1270         1344         12	Silver	ppm	ASTM D5185m	>2	0	0	<1
Copper         ppm         ASTM D5185m         >90         3         2         0           Tin         ppm         ASTM D5185m         >5         <1	Aluminum	ppm	ASTM D5185m	>20	3	4	2
Tin         ppm         ASTM D5185m         >5         <1         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         <1           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         0         0         2         0           Manganese         ppm         ASTM D5185m         0         2         1         <1           Magnesium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1070         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         35	Lead	ppm	ASTM D5185m	>150	2	<1	<1
Vanadium         ppm         ASTM D5185m         0         0         <1           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         0         0         2         0           Manganese         ppm         ASTM D5185m         0         2         1         <1           Magnesium         ppm         ASTM D5185m         1010         994         868         951           Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         hist	Copper	ppm	ASTM D5185m	>90	3	2	0
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         60         65         60         59           Manganese         ppm         ASTM D5185m         0         2         1         <1	Tin	ppm	ASTM D5185m	>5	<1	<1	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         60         65         60         59           Manganese         ppm         ASTM D5185m         0         2         1         <1	Vanadium	ppm	ASTM D5185m		0	0	<1
Boron         ppm         ASTM D5185m         0         6         8         10           Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         60         65         60         59           Manganese         ppm         ASTM D5185m         0         2         1         <1	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         2         0           Molybdenum         ppm         ASTM D5185m         60         65         60         59           Manganese         ppm         ASTM D5185m         0         2         1         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         65         60         59           Manganese         ppm         ASTM D5185m         0         2         1         <1           Magnesium         ppm         ASTM D5185m         1010         994         868         951           Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1150         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         7         4         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/b	Boron	ppm	ASTM D5185m	0	6	8	10
Manganese         ppm         ASTM D5185m         0         2         1         <1           Magnesium         ppm         ASTM D5185m         1010         994         868         951           Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1150         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM	Barium	ppm	ASTM D5185m	0	0	2	0
Magnesium         ppm         ASTM D5185m         1010         994         868         951           Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1150         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         *ASTM D7	Molybdenum	ppm	ASTM D5185m	60	65	60	59
Calcium         ppm         ASTM D5185m         1070         1199         1150         1181           Phosphorus         ppm         ASTM D5185m         1150         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >7.5         0.1         0.1         0.1           Nitration         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         limit/base	Manganese	ppm	ASTM D5185m	0	2	1	<1
Phosphorus         ppm         ASTM D5185m         1150         1027         959         1087           Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414	Magnesium	ppm	ASTM D5185m	1010	994	868	951
Zinc         ppm         ASTM D5185m         1270         1344         1240         1354           Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         48         41         8           Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/.mm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414	Calcium	ppm	ASTM D5185m	1070	1199	1150	1181
Sulfur         ppm         ASTM D5185m         2060         3741         3331         3510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         ▲ 48         ▲ 41         8           Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Phosphorus	ppm	ASTM D5185m	1150	1027	959	1087
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >35         ▲ 48         ▲ 41         8           Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Zinc	ppm	ASTM D5185m	1270	1344	1240	1354
Silicon         ppm         ASTM D5185m         >35         ▲ 48         ▲ 41         8           Sodium         ppm         ASTM D5185m         7         4         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Sulfur	ppm	ASTM D5185m	2060	3741	3331	3510
Sodium         ppm         ASTM D5185m         7         4         4           Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         2         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Silicon	ppm	ASTM D5185m	>35	<b>48</b>	<b>4</b> 1	8
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Sodium	ppm	ASTM D5185m		7	4	4
Soot %         %         *ASTM D7844 > 7.5         0.1         0.1         0.1           Nitration         Abs/cm         *ASTM D7624 > 20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415 > 30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 > 25         13.8         12.8         17.2	Potassium	ppm	ASTM D5185m	>20	2	3	3
Nitration         Abs/cm         *ASTM D7624         >20         5.9         4.8         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         18.0         16.8         20.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.8         12.8         17.2	Soot %	%	*ASTM D7844	>7.5	0.1	0.1	0.1
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     13.8     12.8     17.2	Nitration	Abs/cm	*ASTM D7624	>20	5.9	4.8	8.9
Oxidation Abs/.1mm *ASTM D7414 >25 <b>13.8</b> 12.8 17.2	Sulfation	Abs/.1mm	*ASTM D7415	>30	18.0	16.8	20.2
	FLUID DEGRAI	AOITAC	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	13.8	12.8	17.2
		mg KOH/g			9.2		

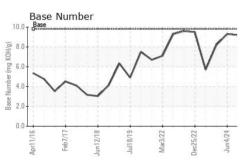


## **OIL ANALYSIS REPORT**





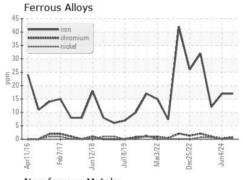


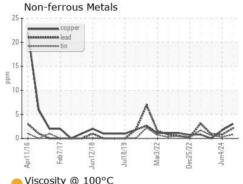


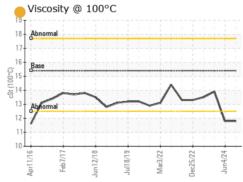
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

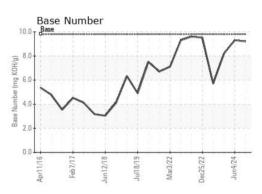
FLUID FROF	ELLIES	memod	IIIIII/Dase	current	HISTORY	HISTORYZ
Visc @ 100°C	cSt	ASTM D445	15.4	11.8	11.8	13.9

#### **GRAPHS**













Certificate 12367

Laboratory Sample No.

: GFL0123506 Lab Number : 06209831 Unique Number : 11082695 Test Package : FLEET

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 14 Jun 2024

: 15 Jun 2024 **Tested** Diagnosed : 17 Jun 2024 - Angela Borella

GFL Environmental - 019 - Greenville/TriEast 415 Staton Road

Greenville, NC US 27834

T: (800)207-6618

Contact: Spencer Liggon spencer.liggon@gflenv.com

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)

Report Id: GFL019 [WUSCAR] 06209831 (Generated: 06/17/2024 14:48:42) Rev: 1

Submitted By: SAM SETZER