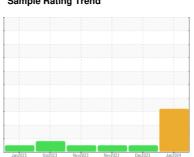


# **OIL ANALYSIS REPORT**

Sample Rating Trend



**GLYCOL** 



912014

Component **Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (--- 0

## **DIAGNOSIS**

#### Recommendation

Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

### Wear

Valve wear is indicated.

#### Contamination

Sodium and/or potassium levels are high. Test for glycol is negative.

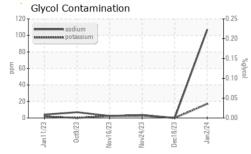
#### Fluid Condition

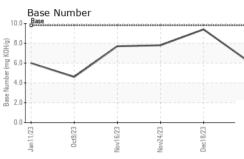
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.

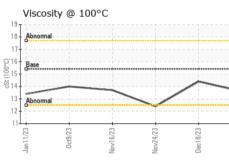
SAMPLE INFORMATION   method   limit/base   current   history1   history2	AL)		Jan 2023	0ct2023 Nov2023	Nov2023 Dec2023	Jan2024	
Sample Date         Client Info         02 Jan 2024         18 Dec 2023         24 Nov 2023           Machine Age         hrs         Client Info         4909         4806         4646           Oil Age         hrs         Client Info         4806         4646         4614           Oil Changed         Client Info         Changed         ABNORMAL         NORMAL         NORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         < 1.0	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Date	Sample Number		Client Info		GFL0108792	GFL0105737	GFL0089131
Oil Age         hrs         Client Info         4806         4646         4614           Oil Changed         Client Info         Changed         Not Changed         Not Changed           Sample Status         Client Info         Changed         Not Changed         Not Changed           Evel         WC Method         >5         <1.0         <1.0         0.6           Water         WC Method         >5         <1.0         <1.0         0.6           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >110         31         2         19           Chromium         ppm         ASTM D5185m         >4         2         <1         <1           Nickel         ppm         ASTM D5185m         >4         2         <1         <1           Silver         ppm         ASTM D5185m         >2         0         0         <1           Lead         ppm         ASTM D5185m         >2         0         0         <1           Copper         ppm         ASTM D5185m         >4         2         0         1           Vanadium         pp			Client Info		02 Jan 2024	18 Dec 2023	24 Nov 2023
Client Info	Machine Age	hrs	Client Info		4909	4806	4646
ABNORMAL   NORMAL   NORMAL   NORMAL	Oil Age	hrs	Client Info		4806	4646	4614
CONTAMINATION	Oil Changed		Client Info		Changed	Changed	Not Changd
Fuel	Sample Status				ABNORMAL	NORMAL	NORMAL
Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >110         31         2         19           Chromium         ppm         ASTM D5185m         >4         2         <1         <1           Nickel         ppm         ASTM D5185m         >2         8         0         4           Titanium         ppm         ASTM D5185m         >2         0         0         <1           Aluminum         ppm         ASTM D5185m         >2         0         0         <1           Aluminum         ppm         ASTM D5185m         >2         1         <1         2           Lead         ppm         ASTM D5185m         >2         5         1         <1         2           Lead         ppm         ASTM D5185m         >2         2         0         0         4           Vanadium         ppm         ASTM D5185m         >4         2         0         0           Cadmium         ppm         ASTM D5185m         0         4	CONTAMINATI	ON	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >110         31         2         19           Chromium         ppm         ASTM D5185m         >4         2         <1	Fuel		WC Method	>5	<1.0	<1.0	0.6
Iron	Water		WC Method	>0.2	NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >4         2         <1         <1           Nickel         ppm         ASTM D5185m         >2         ▲ 8         0         4           Titanium         ppm         ASTM D5185m         >2         ♠         8         0         4           Silver         ppm         ASTM D5185m         >2         ♠         0         <1	WEAR METALS	S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>110	31	2	19
STILD   STIM D5185m   STIM	Chromium	ppm	ASTM D5185m	>4	2	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>2	<u>^</u> 8	0	4
Aluminum         ppm         ASTM D5185m         >25         1         <1         2           Lead         ppm         ASTM D5185m         >45         <1	Titanium	ppm	ASTM D5185m		<1	0	0
Lead         ppm         ASTM D5185m         >45         <1         <1         0           Copper         ppm         ASTM D5185m         >85         3         0         40           Tin         ppm         ASTM D5185m         >4         2         0         1           Vanadium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         4         1         82           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         4         1         82           Barium         ppm         ASTM D5185m         0         65         56         68           Magnesium         ppm         ASTM D5185m         0         -1         0         1           Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1270         1101         943	Silver	ppm	ASTM D5185m	>2	0	0	<1
Copper         ppm         ASTM D5185m         >85         3         0         40           Tin         ppm         ASTM D5185m         >4         2         0         1           Vanadium         ppm         ASTM D5185m         <1	Aluminum	ppm	ASTM D5185m	>25	1	<1	2
Tin	Lead	ppm	ASTM D5185m	>45	<1	<1	0
Vanadium         ppm         ASTM D5185m         <1         <1         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         4         1         82           Barium         ppm         ASTM D5185m         0         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         60         65         56         68           Manganese         ppm         ASTM D5185m         0         <1         0         1           Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         curren	Copper	ppm	ASTM D5185m	>85	3	0	40
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         4         1         82           Barium         ppm         ASTM D5185m         0         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         65         56         68           Manganese         ppm         ASTM D5185m         0         <1	Tin	ppm	ASTM D5185m	>4	2	0	1
ADDITIVES	Vanadium	ppm	ASTM D5185m		<1	<1	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         65         56         68           Manganese         ppm         ASTM D5185m         0         <1         0         1           Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1070         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         "ASTM D5185m	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         65         56         68           Manganese         ppm         ASTM D5185m         0         <1         0         1           Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1150         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit	Boron	ppm	ASTM D5185m	0	4	1	82
Manganese         ppm         ASTM D5185m         0         <1         0         1           Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1150         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         17         0         3           Glycol         *ASTM D5185m         >20         17         0         3           Glycol         *ASTM D5185m         >20         NEG         NEG           INFRA-RED         method         limit/base         current         history1	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         955         868         826           Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1150         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624	Molybdenum	ppm	ASTM D5185m	60	65	56	68
Calcium         ppm         ASTM D5185m         1070         1101         943         1110           Phosphorus         ppm         ASTM D5185m         1150         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415	Manganese	ppm	ASTM D5185m	0	<1	0	1
Phosphorus         ppm         ASTM D5185m         1150         1001         911         958           Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         107         0         4           Potassium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7415	Magnesium	ppm	ASTM D5185m	1010	955	868	826
Zinc         ppm         ASTM D5185m         1270         1228         1115         1101           Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         107         0         4           Potassium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method </td <td>Calcium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>1070</td> <th>1101</th> <td>943</td> <td>1110</td>	Calcium	ppm	ASTM D5185m	1070	1101	943	1110
Sulfur         ppm         ASTM D5185m         2060         2557         2911         2683           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         >20         107         0         4           Potassium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D741	Phosphorus	ppm	ASTM D5185m	1150	1001	911	958
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         ▲ 107         0         4           Potassium         ppm         ASTM D5185m         >20         ▲ 17         0         3           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	Zinc	ppm	ASTM D5185m	1270	1228	1115	1101
Silicon         ppm         ASTM D5185m         >30         6         6         21           Sodium         ppm         ASTM D5185m         ▲ 107         0         4           Potassium         ppm         ASTM D5185m         >20         17         0         3           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	Sulfur	ppm	ASTM D5185m	2060	2557	2911	2683
Sodium         ppm         ASTM D5185m         ▲ 107         0         4           Potassium         ppm         ASTM D5185m         >20         ▲ 17         0         3           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         ▲ 17         0         3           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	Silicon	ppm	ASTM D5185m	>30	6	6	21
NEG   NEG	Sodium	ppm	ASTM D5185m		<u> </u>	0	4
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	Potassium	ppm	ASTM D5185m	>20	<u> </u>	0	3
Soot %         %         *ASTM D7844 >3         0.9         0.1         0.5           Nitration         Abs/cm         *ASTM D7624 >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415 >30         20.8         17.6         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         17.3         13.2         16.9	Glycol	%	*ASTM D2982		NEG	NEG	NEG
Nitration         Abs/cm         *ASTM D7624         >20         9.4         4.9         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         17.6         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.3         13.2         16.9	Soot %	%	*ASTM D7844	>3	0.9	0.1	0.5
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     17.3     13.2     16.9	Nitration	Abs/cm	*ASTM D7624	>20	9.4	4.9	7.7
Oxidation Abs/.1mm *ASTM D7414 >25 <b>17.3</b> 13.2 16.9	Sulfation	Abs/.1mm	*ASTM D7415	>30	20.8	17.6	21.4
	FLUID DEGRAD	ATION	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	17.3	13.2	16.9
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	6.3	9.4	7.8

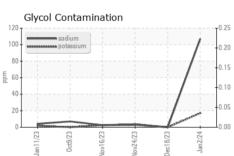


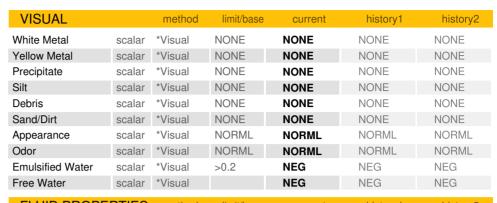
# **OIL ANALYSIS REPORT**





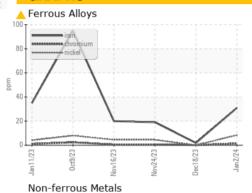


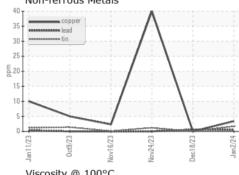


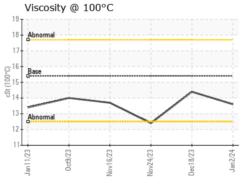


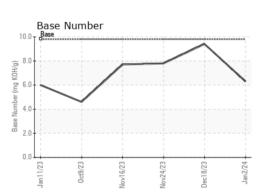
FLUID PROPI	ERITES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.6	14.4	12.4

#### **GRAPHS**













Laboratory Sample No.

Lab Number **Unique Number** 

: GFL0108792 : 06050584 : 10816533

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Recieved Diagnosed Diagnostician

: 04 Jan 2024 : 05 Jan 2024 : Jonathan Hester

Test Package : FLEET ( Additional Tests: Glycol )

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)

GFL Environmental - 415 - Michigan East

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

Report Id: GFL415 [WUSCAR] 06050584 (Generated: 01/08/2024 13:12:30) Rev: 1

Submitted By: Frank Wolak