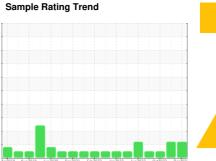


# **OIL ANALYSIS REPORT**







**422027-402279** 

Component

Diesel Engine

PETRO CANADA DURON SHP 15W40 (--- GAL)

## DIAGNOSIS

## Recommendation

We advise that you check the fuel injection system. Resample at the next service interval to monitor.

### Wear

All component wear rates are normal.

## Contamination

There is a moderate amount of fuel present in the oil.

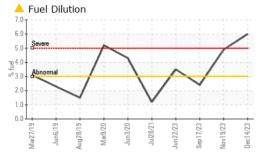
### ▲ Fluid Condition

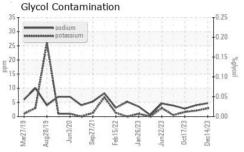
Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.

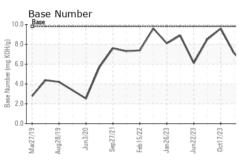
Sample Number   Client Info   GFL0086410   GFL0086400   GFL008638   Sample Date   Client Info   14 Dec 2023   19 Nov 2023   17 Oct 2023   365   23532   23532   235	N SHP 15W40 (	- GAL)	Mar2019 Aug2	019 Jun2020 Sep2021	Feb2022 Jan2023 Jun2023 Oct2	2023 Dec202:	
Sample Date	SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info	Sample Number		Client Info		GFL0086410	GFL0086400	GFL0086386
Oil Age         hrs         Client Info         0	Sample Date		Client Info		14 Dec 2023	19 Nov 2023	17 Oct 2023
Dil Changed   Client Info   N/A   ABNORMAL   ABNORMA	Machine Age	hrs	Client Info		23685	23532	23365
ABNORMAL   ABNORMAL   ABNORMAL   NORMAL	Oil Age	hrs	Client Info		0	0	0
CONTAMINATION	Oil Changed		Client Info		N/A	N/A	N/A
Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         13         9         7           Chromium         ppm         ASTM D5185m         >20         <1         <1         <1           Nickel         ppm         ASTM D5185m         >2         0         <1         <1           Silver         ppm         ASTM D5185m         >2         0         0         <1         <1           Aluminum         ppm         ASTM D5185m         >2         0         0         <1         <1           Aluminum         ppm         ASTM D5185m         >2         0         0         <1         <1           Lead         ppm         ASTM D5185m         >20         6         5         3         3           Lead         ppm         ASTM D5185m         >330         2         2         2         2           Copper         ppm         ASTM D5185m         >15         <1         <1         <1         <1         <1           Cada	Sample Status				ABNORMAL	ABNORMAL	NORMAL
WEAR METALS         method         limit/base         current         history1         history2           fron         ppm         ASTM D5185m         >120         13         9         7           Chromium         ppm         ASTM D5185m         >20         <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Pron	Water		WC Method	>0.2	NEG	NEG	NEG
Chromium	WEAR METAL	S	method	limit/base	current	history1	history2
Activation   Ac	ron	ppm	ASTM D5185m	>120	13	9	7
Distribution	Chromium	ppm	ASTM D5185m	>20	<1	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>5	<1	0	0
Aluminum ppm ASTM D5185m >20 6 5 3  Lead ppm ASTM D5185m >40 0 <1 <1  Copper ppm ASTM D5185m >330 2 2 2  Tin ppm ASTM D5185m >15 <1 <1 <1 <1  Cadmium ppm ASTM D5185m >15 <1 <1 <1 <1  Cadmium ppm ASTM D5185m >15 <1 0 <1 <1  Cadmium ppm ASTM D5185m >15 <1 0 <1 <1  Cadmium ppm ASTM D5185m >15 <1 0 <1 <1 <1 <1  Cadmium ppm ASTM D5185m	Titanium	ppm	ASTM D5185m	>2	0	<1	<1
Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >330         2         2         2           Fin         ppm         ASTM D5185m         >15         <1         <1         <1           Vanadium         ppm         ASTM D5185m         <1         <1         <1         <1           Cadmium         ppm         ASTM D5185m         <1         0         <1         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         3         6         19           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         <1         <1         <1         <1           Magnesium         ppm         ASTM D5185m         0         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper         ppm         ASTM D5185m         >330         2         2         2           Fin         ppm         ASTM D5185m         >15         <1	Aluminum	ppm	ASTM D5185m	>20	6	5	3
Tin	_ead	ppm	ASTM D5185m	>40	0	<1	<1
Vanadium         ppm         ASTM D5185m         <1         <1         <1         <1         <1         Cadmium         ppm         ASTM D5185m         <1         0         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1	Copper	ppm	ASTM D5185m	>330	2	2	2
Cadmium         ppm         ASTM D5185m         <1         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         3         6         19           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         <1         <1         <1           Manganese         ppm         ASTM D5185m         1010         724         787         780           Calcium         ppm         ASTM D5185m         1010         724         787         780           Calcium         ppm         ASTM D5185m         1070         1112         1230         1230           Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current	Γin	ppm	ASTM D5185m	>15	<1	<1	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         3         6         19           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         52         55         55           Magnesium         ppm         ASTM D5185m         1010         724         787         780           Calcium         ppm         ASTM D5185m         1070         1112         1230         1230           Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >	Vanadium	ppm	ASTM D5185m		<1	<1	<1
Boron	Cadmium	ppm	ASTM D5185m		<1	0	<1
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         52         55         55           Manganese         ppm         ASTM D5185m         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         52         55         55           Manganese         ppm         ASTM D5185m         0         <1	Boron	ppm	ASTM D5185m	0	3	6	19
Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         724         787         780           Calcium         ppm         ASTM D5185m         1070         1112         1230         1230           Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         724         787         780           Calcium         ppm         ASTM D5185m         1070         1112         1230         1230           Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Goldum         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Goldum         ppm         ASTM D5185m         >30	Molybdenum	ppm	ASTM D5185m	60	52	55	55
Calcium         ppm         ASTM D5185m         1070         1112         1230         1230           Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         5         4         3           Potassium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D3524         >3.0         6.0         4.9         <1.0	Manganese	ppm	ASTM D5185m	0	<1	<1	<1
Phosphorus         ppm         ASTM D5185m         1150         927         1023         1012           Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Glycol         %         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Glycol         %         *ASTM D5282         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1	Magnesium	ppm	ASTM D5185m	1010	724	787	780
Zinc         ppm         ASTM D5185m         1270         1123         1241         1216           Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Glycol         %         ASTM D5185m         >3.0         MEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         8.8	Calcium	ppm	ASTM D5185m	1070	1112	1230	1230
Sulfur         ppm         ASTM D5185m         2060         2883         3126         3094           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         5         4         3           Potassium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Glycol         %         ASTM D5185m         >3.0         ▲ 6.0         ▲ 4.9         <1.0	Phosphorus	ppm	ASTM D5185m	1150	927	1023	1012
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         8         6           Sodium         ppm         ASTM D5185m         5         4         3           Potassium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D5185m         >20         3         2         2           Silicon         %         ASTM D5185m         >20         NEG         NEG         NEG           NEG         NEG         NEG         NEG         NEG         NEG         NEG           Soot %         %         *ASTM D7844         >4         0.3         0.3         0.1           Nitration         Abs/.1mm         *ASTM D7415         >30         20.0         18.9         17.2 <td>Zinc</td> <td>ppm</td> <td>ASTM D5185m</td> <td>1270</td> <td>1123</td> <td>1241</td> <td>1216</td>	Zinc	ppm	ASTM D5185m	1270	1123	1241	1216
Silicon       ppm       ASTM D5185m       >25       8       8       6         Sodium       ppm       ASTM D5185m       5       4       3         Potassium       ppm       ASTM D5185m       >20       3       2       2         Fuel       %       ASTM D3524       >3.0       6.0       4.9       <1.0         Glycol       %       *ASTM D2982       NEG       NEG       NEG         INFRA-RED       method       limit/base       current       history1       history2         Soot %       %       *ASTM D7844       >4       0.3       0.3       0.1         Nitration       Abs/cm       *ASTM D7624       >20       8.8       8.5       8.1         Sulfation       Abs/.1mm       *ASTM D7415       >30       20.0       18.9       17.2         FLUID DEGRADATION method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       *ASTM D7414       >25       16.0       15.4       13.4	Sulfur	ppm	ASTM D5185m	2060	2883	3126	3094
Sodium         ppm         ASTM D5185m         5         4         3           Potassium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D3524         >3.0         ▲ 6.0         ▲ 4.9         <1.0	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         3         2         2           Fuel         %         ASTM D3524         >3.0         ▲ 6.0         ▲ 4.9         <1.0           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.3         0.3         0.1           Nitration         Abs/cm         *ASTM D7624         >20         8.8         8.5         8.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         18.9         17.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.4         13.4	Silicon	ppm	ASTM D5185m	>25	8	8	6
Fuel	Sodium	ppm	ASTM D5185m		5	4	3
NEG   Nitration   Nitration   Neg   Neg	Potassium	ppm	ASTM D5185m	>20	3	2	2
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.3         0.3         0.1           Nitration         Abs/cm         *ASTM D7624         >20         8.8         8.5         8.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         18.9         17.2           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.4         13.4	Fuel	%	ASTM D3524	>3.0	<b>△</b> 6.0	<b>4.9</b>	<1.0
Soot %         %         *ASTM D7844 >4         0.3         0.3         0.1           Nitration         Abs/cm         *ASTM D7624 >20         8.8         8.5         8.1           Sulfation         Abs/.1mm         *ASTM D7415 >30         20.0         18.9         17.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         16.0         15.4         13.4	Glycol	%	*ASTM D2982		NEG	NEG	NEG
Nitration         Abs/cm         *ASTM D7624         >20         8.8         8.5         8.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         18.9         17.2           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.4         13.4	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         18.9         17.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.4         13.4	Soot %	%	*ASTM D7844	>4	0.3	0.3	0.1
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     16.0     15.4     13.4	Nitration	Abs/cm	*ASTM D7624	>20	8.8	8.5	8.1
Oxidation Abs/.1mm *ASTM D7414 >25 <b>16.0</b> 15.4 13.4	Sulfation	Abs/.1mm	*ASTM D7415	>30	20.0	18.9	17.2
	FLUID DEGRA	DATION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 9.8 5.8 7.1 9.6	Oxidation	Abs/.1mm	*ASTM D7414	>25	16.0	15.4	13.4
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	5.8	7.1	9.6

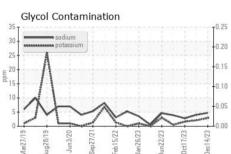


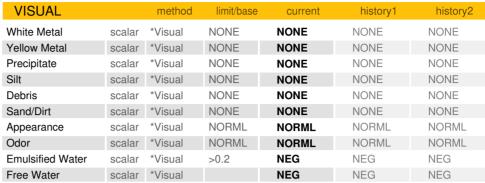
# **OIL ANALYSIS REPORT**





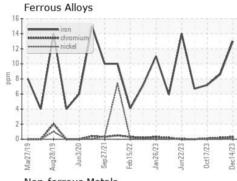


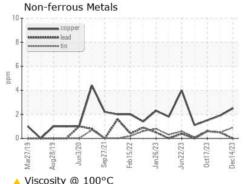


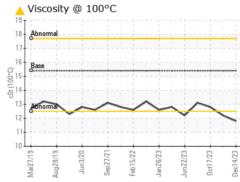


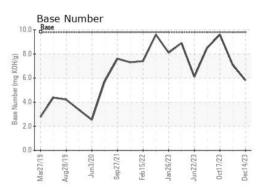
I LOID I HOI	LITTLO	method	IIIIII Dasc	Current	Thistory i	Thistory i
Visc @ 100°C	cSt	ASTM D445	15.4	<u> </u>	<b>▲</b> 12.2	12.8

### **GRAPHS**













Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** 

: 06036619

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : GFL0086410

: 10791848

: 15 Dec 2023 Recieved Diagnosed : 22 Dec 2023

Diagnostician : Jonathan Hester Test Package : FLEET ( Additional Tests: Glycol, PercentFuel )

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 - 816 - WCA of South Arkansas

3083 Smackover Hwy El Dorado, AR US 71730

Contact: Mike Howell mike.howell@gflenv.com

T: F:

Report Id: GFL816 [WUSCAR] 06036619 (Generated: 12/22/2023 18:58:13) Rev: 1

Submitted By: Nicole Walls