

# **PROBLEM SUMMARY**

## Sample Rating Trend

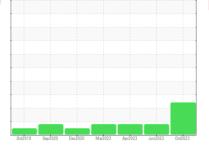
## **FUEL**



724016-310049

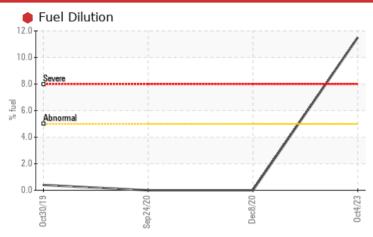
Component **Diesel Engine** 

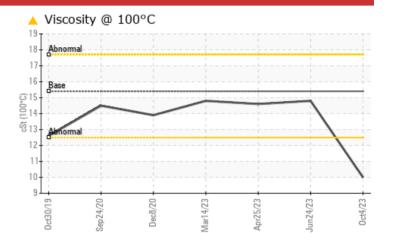
PETRO CANADA DURON SHP 15W40 (--- GAL)





**COMPONENT CONDITION SUMMARY** 





#### RECOMMENDATION

We advise that you check the fuel injection system. We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition.

PROBLEMAT	IC TES	T RESULT	S			
Sample Status				SEVERE	MARGINAL	ABNORMAL
Fuel	%	ASTM D3524	>5	<b>11.5</b>	<1.0	<1.0
Visc @ 100°C	cSt	ASTM D445	15.4	<b>10.0</b>	14.8	14.6

Customer Id: GFL821 Sample No.: GFL0090157 Lab Number: 05972513 Test Package: FLEET



To manage this report scan the QR code

To discuss the diagnosis or test data: Jonathan Hester +1 919-379-4092 x4092 ihester@wearcheckusa.com

To change component or sample information: Customer Service +1 1-800-237-1369 customerservice@wearcheck.com

RECOMMENDE	D ACTIONS			
Action	Status	Date	Done By	Description
Change Fluid			?	We recommend that you drain the oil and perform a filter service on this component if not already done.
Change Filter			?	We recommend that you drain the oil and perform a filter service on this component if not already done.
Resample			?	We recommend an early resample to monitor this condition.
Check Fuel/injector System			?	We advise that you check the fuel injection system.

### HISTORICAL DIAGNOSIS

#### 24 Jun 2023 Diag: Doug Bogart

WEAR



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. The chromium level is abnormal. All other component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.



#### 25 Apr 2023 Diag: Don Baldridge

WEAR



No corrective action is recommended at this time. Resample at the next service interval to monitor. The chromium level has decreased, but is still abnormal. All other component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.



#### 14 Mar 2023 Diag: Don Baldridge

WEAR



No corrective action is recommended at this time. Resample at the next service interval to monitor. The chromium level is abnormal. All other component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.





# **OIL ANALYSIS REPORT**

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# Sample Rating Trend FUEL



**724016-310049** 

Diesel Engine

Component

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

## DIAGNOSIS

#### Recommendation

We advise that you check the fuel injection system. We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition.

#### Wear

All component wear rates are normal.

#### Contamination

There is a high 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. The oil is no longer serviceable due to the presence of contaminants.

Sample Number   Client Info   GFL0090157   GFL0076785   GFL006540   Sample Date   Client Info   O4 Oct 2023   25 Apr 2023   2	N SHP 15W4U (	- GAL)	Oct2019	Sep2020 Dec2020	Mar2023 Apr2023 Jun2023	Oct2023	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         9271         8710         8604           Dil Age         hrs         Client Info         150         600         200           Dil Changed         Client Info         N/A         Changed         Not Changed           Sample Status         Boding         SEVERE         MARGINAL         ABNORMA           CONTAMINATION         method         Imitibase         current         history1         history2           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         Imitibase         current         history1         history2           Iron         ppm         ASTM DS185m         >5         <1         AS         A         7           Chromium         ppm         ASTM DS185m         >5         <1         AS         A         7           Chromium         ppm         ASTM DS185m         >5         <1         AS         A         7           Chromium         ppm         ASTM DS185m         >3         0         0         0         0           Chromium         ppm         ASTM DS185m         >30         <1         0	Sample Number		Client Info		GFL0090157	GFL0076785	GFL0065402
Dil Age	Sample Date		Client Info		04 Oct 2023	24 Jun 2023	25 Apr 2023
Dil Changed Sample Status	Machine Age	hrs	Client Info		9271	8710	8604
Several   Several   Several   Marginal   Abnormal	Oil Age	hrs	Client Info		150	600	200
CONTAMINATION	Oil Changed		Client Info		N/A	Changed	Not Changd
WEAR METALS	Sample Status				SEVERE	MARGINAL	ABNORMAL
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
Pron	Glycol		WC Method		NEG	NEG	NEG
Chromium	WEAR METAL	S	method	limit/base	current	history1	history2
ASTM D5185m   >2	ron	ppm	ASTM D5185m	>80	27	62	54
Description	Chromium	ppm	ASTM D5185m	>5	<1	<u>^</u> 8	<u>^</u> 7
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	0
Aluminum	Titanium	ppm	ASTM D5185m		0	0	0
Aluminum	Silver	ppm	ASTM D5185m	>3	0	0	0
Lead         ppm         ASTM D5185m         >30         <1         0         0           Copper         ppm         ASTM D5185m         >150         3         2         1           Tin         ppm         ASTM D5185m         >5         0         <1         0           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185m         0         5         3         4           Barium         ppm         ASTM D5185m         0         0         0         0           Malerium         ppm         ASTM D5185m         0         <1         1         1           Magnesium         ppm         ASTM D5185m         100         783         962         905           Calcium         ppm         ASTM D5185m         1070         847         1110         1036           Phosphorus         ppm         ASTM D5185m         1270         1062         1311	Aluminum		ASTM D5185m	>30	8	4	2
Copper         ppm         ASTM D5185m         >150         3         2         1           Tin         ppm         ASTM D5185m         >5         0         <1	Lead	ppm	ASTM D5185m	>30	<1	0	0
Trin	Copper		ASTM D5185m	>150	3	2	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         5         3         4           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         41         1         1           Manganese         ppm         ASTM D5185m         1010         783         962         905           Manganesium         ppm         ASTM D5185m         1070         847         1110         1036           Phosphorus         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5			ASTM D5185m	>5	0	<1	0
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         5         3         4           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         51         61         58           Manganese         ppm         ASTM D5185m         0         <1	Vanadium		ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Cadmium		ASTM D5185m			0	0
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         51         61         58           Manganese         ppm         ASTM D5185m         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         51         61         58           Manganese         ppm         ASTM D5185m         0         <1	Boron	ppm	ASTM D5185m	0	5	3	4
Manganese         ppm         ASTM D5185m         0         <1         1         1           Magnesium         ppm         ASTM D5185m         1010         783         962         905           Calcium         ppm         ASTM D5185m         1070         847         1110         1036           Phosphorus         ppm         ASTM D5185m         1150         851         1045         975           Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D5185m         >20         7         1         0           Soot %         %         *ASTM D5185m         >20<	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         783         962         905           Calcium         ppm         ASTM D5185m         1070         847         1110         1036           Phosphorus         ppm         ASTM D5185m         1150         851         1045         975           Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D5185m         >20         7         1         0           Soot %         %         *ASTM D7844         >3         0.9<	Molybdenum	ppm	ASTM D5185m	60	51	61	58
Calcium         ppm         ASTM D5185m         1070         847         1110         1036           Phosphorus         ppm         ASTM D5185m         1150         851         1045         975           Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0	Manganese	ppm	ASTM D5185m	0	<1	1	1
Phosphorus         ppm         ASTM D5185m         1150         851         1045         975           Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D524         >5         11.5         <1.0	Magnesium	ppm	ASTM D5185m	1010	783	962	905
Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0	Calcium	ppm	ΔSTM D5185m	1070	0.47		
Zinc         ppm         ASTM D5185m         1270         1062         1311         1199           Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0			AO IIVI DO IOOIII	1070	847	1110	1036
Sulfur         ppm         ASTM D5185m         2060         2908         3646         3439           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0	Phosphorus	ppm			_		
Silicon         ppm         ASTM D5185m         >20         8         5         4           Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         2.3         1.8           Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6			ASTM D5185m	1150	851	1045	975
Sodium         ppm         ASTM D5185m         39         1         2           Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         ■ 11.5         <1.0	Zinc	ppm	ASTM D5185m ASTM D5185m	1150 1270	851 1062	1045 1311	975 1199
Potassium         ppm         ASTM D5185m         >20         7         1         0           Fuel         %         ASTM D3524         >5         11.5         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         2.3         1.8           Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur	ppm	ASTM D5185m ASTM D5185m ASTM D5185m	1150 1270 2060	851 1062 2908	1045 1311 3646	975 1199
Fuel	Zinc Sulfur CONTAMINAN	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method	1150 1270 2060 limit/base	851 1062 2908 current	1045 1311 3646 history1	975 1199 3439 history2
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.9         2.3         1.8           Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur CONTAMINAN Silicon	ppm ppm ITS ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	1150 1270 2060 limit/base	851 1062 2908 current 8	1045 1311 3646 history1	975 1199 3439 history2
Soot %         %         *ASTM D7844         >3         0.9         2.3         1.8           Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ITS ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m ASTM D5185m	1150 1270 2060 limit/base >20	851 1062 2908 current 8 39	1045 1311 3646 history1 5	975 1199 3439 history2 4 2
Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ITS ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m	1150 1270 2060 limit/base >20	851 1062 2908 current 8 39 7	1045 1311 3646 history1 5 1	975 1199 3439 history2 4 2 0
Nitration         Abs/cm         *ASTM D7624         >20         7.6         8.4         6.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Fuel	ppm ppm ITS ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524	1150 1270 2060 limit/base >20 >20 >5	851 1062 2908 current 8 39 7	1045 1311 3646 history1 5 1 1 <1.0	975 1199 3439 history2 4 2 0
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.0         22.7         19.0           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.5         14.0         12.6	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ITS ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524	1150 1270 2060 limit/base >20 >20 >5 limit/base	851 1062 2908 current 8 39 7	1045 1311 3646 history1 5 1 1 <1.0	975 1199 3439 history2 4 2 0 <1.0
Oxidation	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot %	ppm ppm lTS ppm ppm ppm %	ASTM D5185m ASTM D5185m ASTM D5185m  method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524  method  *ASTM D7844	1150 1270 2060 limit/base >20 >20 >5 limit/base >3	851 1062 2908 current 8 39 7 11.5 current	1045 1311 3646 history1 5 1 <1.0 history1 2.3	975 1199 3439 history2 4 2 0 <1.0 history2
	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ITS ppm ppm ppm %	ASTM D5185m ASTM D5185m ASTM D5185m  method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524  method *ASTM D7844 *ASTM D7624	1150 1270 2060 limit/base >20 >5 limit/base >3 >20	851 1062 2908 current 8 39 7 11.5 current 0.9 7.6	1045 1311 3646 history1 5 1 <1.0 history1 2.3 8.4	975 1199 3439 history2 4 2 0 <1.0 history2 1.8 6.8
	Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ITS ppm ppm ppm %	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844 *ASTM D7624 *ASTM D76145	1150 1270 2060 limit/base >20 >5 limit/base >3 >20 >3	851 1062 2908 current 8 39 7 11.5 current 0.9 7.6 20.0	1045 1311 3646 history1 5 1 <1.0 history1 2.3 8.4 22.7	975 1199 3439 history2 4 2 0 <1.0 history2 1.8 6.8
Base Number (BN) mg KOH/g ASTM D2896 9.8 7.1 9.3 8.0	Zinc Sulfur  CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRAI	ppm ppm ppm ppm ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844 *ASTM D7624 *ASTM D7615 method	1150 1270 2060 limit/base >20 >20 >5 limit/base >3 >20 >3 limit/base	851 1062 2908  current 8 39 7 11.5  current 0.9 7.6 20.0  current	1045 1311 3646 history1 5 1 <-1.0 history1 2.3 8.4 22.7 history1	975 1199 3439 history2 4 2 0 <1.0 history2 1.8 6.8 19.0 history2



## OIL ANALYSIS REPORT







Laboratory Sample No. **Unique Number** 

Lab Number

: 05972513 : 10684463

16 () 15 () 14 ₹ 1:

> : WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 09 Oct 2023 : GFL0090157

Diagnosed : 11 Oct 2023 Diagnostician : Jonathan Hester

**Test Package**: FLEET (Additional Tests: FuelDilution, 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)

Viscosity @ 100°C

Mar14/23

GFL Environmental - 821 - Ozarks Hauling

33924 Olath Drive Lebanon, MO US 65536 Contact: Landen Johnson

NONE

NONE

NONE

NONE

NONE

NONE

**NORML** 

NORML

NEG

NEG

14.6

landen.johnson@gflenv.com

T: (417)664-0010

Base Number

(mg K0H/g)

0.0