

## **OIL ANALYSIS REPORT**

## Sample Rating Trend

NORMAL



# (DUX471) Machine Id 10669 Component

**Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (7 GAL)

## DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil.

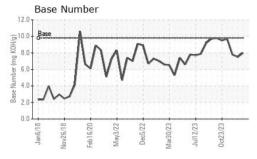
#### **Fluid Condition**

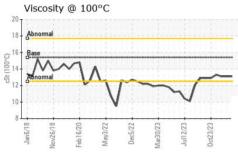
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION   method   limit/base   current   history1   history2	12018 Nov2018 Feb2020 May2022 Dec2022 Mar2023 Ju2023 Occ2023						
Sample Date         Client Info         22 Mar 2024         21 Feb 2024         30 Jan 2024           Machine Age         hrs         Client Info         41         50578         50438           Oil Age         hrs         Client Info         71         583         443           Oil Changed         Client Info         Not Changed         And Normal         ABNORMAL	SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         41         50578         50438           Oil Age         hrs         Client Info         71         583         443           Oil Changed         Client Info         Not Changd         Not Changd	Sample Number		Client Info		GFL0115762	GFL0112381	GFL0107174
Oil Age         hrs         Client Info         71         583         443           Oil Changed Sample Status         Client Info         Not Changed NoRMAL         Abnormal         Not Changed Changed ABNORMAL         Not Changed ABNORMAL         ABNORMAL         ABNORMAL           Fuel         WC Method         >3.0         <1.0			Client Info		22 Mar 2024	21 Feb 2024	30 Jan 2024
Oil Changed Sample Status         Client Info         Not Changed NORMAL         Changed ABNORMAL         Not Changed ABNORMAL         Not Changed ABNORMAL         ALO         CLO.	Machine Age	hrs	Client Info		41	50578	50438
Sample Status	Oil Age	hrs	Client Info		71	583	443
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0	Oil Changed		Client Info		Not Changd	Changed	Not Changd
Fuel	Sample Status				NORMAL	ABNORMAL	ABNORMAL
Water Glycol         WC Method Glycol         >0.2         NEG NEG         NEG NEG         NEG NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >75         13         44         37           Chromium         ppm         ASTM D5185m         >5         <1         2         1           Nickel         ppm         ASTM D5185m         >4         0         <1         0           Sliver         ppm         ASTM D5185m         >2         0         <1         <1           Sliver         ppm         ASTM D5185m         >2         0         <1         <1           Sliver         ppm         ASTM D5185m         >25         0         <1         <1           Sliver         ppm         ASTM D5185m         >25         0         <1         <1           Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >4         0         0         <1           Vanadium         ppm         ASTM D5185m         0         12	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS         method         Imitibase         current         history1         history2           Iron         ppm         ASTM D5185m         >75         13         44         37           Chromium         ppm         ASTM D5185m         >5         <1         2         1           Nickel         ppm         ASTM D5185m         >4         0         <1         <1           Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >2         0         0         0           Lead         ppm         ASTM D5185m         >10         6         46         36           Tin         ppm         ASTM D5185m         >4         0         0         1           Vanadium         ppm         ASTM D5185m         0         12         11         10           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >75         13         44         37           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         2         1           Nickel         ppm         ASTM D5185m         >4         0         <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel         ppm         ASTM D5185m         >4         0         <1         0           Titanium         ppm         ASTM D5185m         >2         0         <1	Iron	ppm	ASTM D5185m	>75	13	44	37
Titanium         ppm         ASTM D5185m         >2         0         <1         <1           Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >15         2         5         4           Lead         ppm         ASTM D5185m         >25         0         <1	Chromium	ppm	ASTM D5185m	>5	<1	2	1
Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >15         2         5         4           Lead         ppm         ASTM D5185m         >25         0         <1         <1           Copper         ppm         ASTM D5185m         >100         6         46         36           Tin         ppm         ASTM D5185m         >4         0         0         <1           Vanadium         ppm         ASTM D5185m         <1         0         0         <1           Cadmium         ppm         ASTM D5185m         0         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0         0           Magnesium         ppm         ASTM D5185m         0         41         <1         11           Magnesium         ppm         ASTM D5185m         1070	Nickel	ppm	ASTM D5185m	>4	0	<1	0
Aluminum         ppm         ASTM D5185m         >15         2         5         4           Lead         ppm         ASTM D5185m         >25         0         <1	Titanium	ppm	ASTM D5185m	>2	0	<1	<1
Lead         ppm         ASTM D5185m         >25         0         <1         <1           Copper         ppm         ASTM D5185m         >100         6         46         36           Tin         ppm         ASTM D5185m         >4         0         0         <1           Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         <1         <1         1           Magnesium         ppm         ASTM D5185m         0         <1         <1         <1         <1           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1270         1150 <t< td=""><td>Silver</td><td>ppm</td><td>ASTM D5185m</td><td>&gt;2</td><th>0</th><td>0</td><td>0</td></t<>	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper         ppm         ASTM D5185m         >100         6         46         36           Tin         ppm         ASTM D5185m         >4         0         0         <1	Aluminum	ppm	ASTM D5185m	>15	2	5	4
Tin         ppm         ASTM D5185m         >4         0         0         <1           Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1	Lead	ppm	ASTM D5185m	>25	0	<1	<1
Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         <1         <1         <1           Manganese         ppm         ASTM D5185m         0         <1         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         896         841         836           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         <	Copper	ppm	ASTM D5185m	>100	6	46	36
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1	Tin	ppm	ASTM D5185m	>4	0	0	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron         ppm         ASTM D5185m         0         12         11         10           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         896         841         836           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         70         494         451           Potassium         ppm         ASTM D5185m         2	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         63         74         71           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         896         841         836           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %	Boron	ppm	ASTM D5185m	0	12	11	10
Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         896         841         836           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D784	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         896         841         836           Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/:mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION         *ASTM D7	Molybdenum	ppm	ASTM D5185m	60	63	74	71
Calcium         ppm         ASTM D5185m         1070         1087         1033         980           Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm	Manganese	ppm	ASTM D5185m	0	<1	<1	<1
Phosphorus         ppm         ASTM D5185m         1150         981         890         943           Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Magnesium	ppm	ASTM D5185m	1010	896	841	836
Zinc         ppm         ASTM D5185m         1270         1150         1079         1118           Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >25         6         14         13           Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/.mm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm<	Calcium	ppm	ASTM D5185m	1070	1087	1033	980
Sulfur         ppm         ASTM D5185m         2060         3374         2510         2694           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         >20         1         11         10           Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Phosphorus	ppm	ASTM D5185m	1150	981	890	943
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         70         ▲ 494         ▲ 451           Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Zinc	ppm	ASTM D5185m	1270	1150	1079	1118
Silicon         ppm         ASTM D5185m         >25         6         14         13           Sodium         ppm         ASTM D5185m         70         494         451           Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Sulfur	ppm	ASTM D5185m	2060	3374	2510	2694
Sodium         ppm         ASTM D5185m         70         ▲ 494         ▲ 451           Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         1         11         10           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Silicon	ppm	ASTM D5185m	>25	6	14	13
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	Sodium	ppm	ASTM D5185m		70	<b>494</b>	<u></u> 451
Soot %         %         *ASTM D7844 >6         0.6         1         1           Nitration         Abs/cm         *ASTM D7624 >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415 >30         19.1         22.0         21.4           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         13.5         17.1         16.1	Potassium	ppm	ASTM D5185m	>20	1	11	10
Nitration         Abs/cm         *ASTM D7624         >20         6.8         10.6         9.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         22.0         21.4           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.5         17.1         16.1	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415 >30         19.1         22.0         21.4           FLUID DEGRADATION method limit/base current history1 history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         13.5         17.1         16.1	Soot %	%	*ASTM D7844	>6	0.6	1	1
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     13.5     17.1     16.1	Nitration	Abs/cm	*ASTM D7624	>20	6.8	10.6	9.7
Oxidation Abs/.1mm *ASTM D7414 >25 <b>13.5</b> 17.1 16.1	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.1	22.0	21.4
	FLUID DEGRADATION method limit/base current history1 history2						
	Oxidation	Abs/.1mm	*ASTM D7414	>25	13.5	17.1	16.1
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	8.0	7.5	7.8



## **OIL ANALYSIS REPORT**

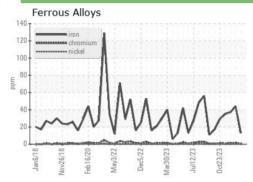


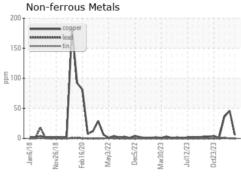


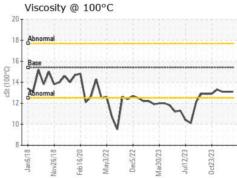
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

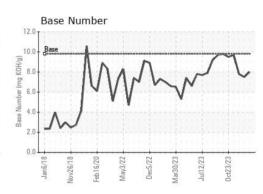
FLUID PROPI	ERTIES	method				history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.1	13.1	13.1

### **GRAPHS**













Certificate L2367

Laboratory Sample No.

: GFL0115762 Lab Number : 06129171 Unique Number: 10943322 Test Package : FLEET

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 26 Mar 2024 **Tested** 

: 27 Mar 2024 Diagnosed : 27 Mar 2024 - Wes Davis

GFL Environmental - 010 - Stockbridge

1280 Rum Creek Parkway Stockbridge, GA

US 30281 Contact: JOSHUA TINKER joshuatinker@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)

T:

F: