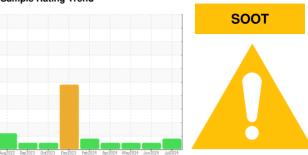


# **OIL ANALYSIS REPORT**

Sample Rating Trend



Machine Id

# 923028-260204.1

**Diesel Engine** 

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

## DIAGNOSIS

### Recommendation

We advise that you check for faulty combustion, plugged air filters, or aftercoolers. We recommend you service the filters on this component. Resample at the next service interval to monitor.

All component wear rates are normal.

## Contamination

There is an abnormal amount of solids and carbon present in the oil.

### **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)		Aug2022 Seg	2023 Oct2023 Dec2023	Feb2024 Apr2024 May2024 Jun20	124 Jul2024	
Sample Date         Client Info         08 Jul 2024         18 Jun 2024         28 May 2024           Machine Age         hrs         Client Info         5608         5476         0           Oil Age         hrs         Client Info         12989         12857         0           Oil Changed         Client Info         N/A         N/A         N/A         N/A           Sample Status         Client Info         N/A         N/A         N/A         N/A         N/A           CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         20         3         3         2           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         20         3         3         2           Uron         ppm         ASTM D5185m         20         3         3         2	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         5608         5476         0           Oil Age         hrs         Client Info         12989         12887         0           Oil Changed         Client Info         N/A         N/A         N/A         N/A           Sample Status         BABNORMAL         NCRMAL         NCRMAL         NCRMAL         NCRMAL           CONTAMINATION         method         limil/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limil/base         current         history1         history2           Iron         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >40         0         <1	Sample Number		Client Info		GFL0104858	GFL0123151	GFL0123158
Oil Age         hrs         Client Info         12989         12857         0           Oil Changed         Client Info         N/A         N/A         N/A         N/A         N/A           Sample Status         Client Info         N/A         N/A         N/A         N/A         N/A           CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         51         42         24           Chromium         ppm         ASTM D5185m         >20         3         3         2           Iron         ppm         ASTM D5185m         >20         3         3         2           Chromium         ppm         ASTM D5185m         >20         3         3         2           Iron         ppm         ASTM D5185m         >3         0         0         0           Chromium         ppm         ASTM D5185m         >20         5         4	Sample Date		Client Info		08 Jul 2024	18 Jun 2024	28 May 2024
Oil Changed Sample Status         Client Info         N/A ABNORMAL NORMAL NORMAL         N/A NORMAL NORMAL         N/A NORMAL NORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         51         42         24           Chromium         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >3         0         0         0           Alluminum         ppm         ASTM D5185m         >3         0         0         0           Alluminum         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >330         27         14         2           Tin         ppm         ASTM D5185m         >15         0 <td>Machine Age</td> <td>hrs</td> <td>Client Info</td> <td></td> <th>5608</th> <td>5476</td> <td>0</td>	Machine Age	hrs	Client Info		5608	5476	0
Sample Status	Oil Age	hrs	Client Info		12989	12857	0
CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         51         42         24           Chromium         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >4         0         0         0           Silver         ppm         ASTM D5185m         >4         0         0         0           Aluminum         ppm         ASTM D5185m         >40         0         <1	Oil Changed		Client Info		N/A	N/A	N/A
Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         Imitibase         current         history1         history2           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         51         42         24           Chromium         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >4         0         0         0           Silver         ppm         ASTM D5185m         >4         0         0         0           Silver         ppm         ASTM D5185m         >40         0         <1         <1           Silver         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >15         0         0         <1           Vanadium         ppm         ASTM D5185m         0         2         6         1	Sample Status				ABNORMAL	NORMAL	NORMAL
WEAR METALS	CONTAMINATI	ON	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         51         42         24           Chromium         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >4         0         0         0           Titanium         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >40         0         <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         3         3         2           Nickel         ppm         ASTM D5185m         >4         0         0         0           Titanium         ppm         ASTM D5185m         >3         0         0         0           Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >30         0         0         0           Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >15         0         0         <1         0           Caddium         ppm         ASTM D5185m         0         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         0	WEAR METALS	S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	51	42	24
Titanium	Chromium		ASTM D5185m	>20	3	3	2
Silver	Nickel	ppm	ASTM D5185m	>4	0	0	0
Aluminum         ppm         ASTM D5185m         >20         5         4         4           Lead         ppm         ASTM D5185m         >40         0         <1	Titanium	ppm	ASTM D5185m		<1	<1	<1
Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >330         27         14         2           Tin         ppm         ASTM D5185m         >15         0         0         <1           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         1           Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         0         0         <1         0           Manganese         ppm         ASTM D5185m         0         0         <1         0           Manganesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105 </td <td>Silver</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;3</td> <th>0</th> <td>0</td> <td>0</td>	Silver	ppm	ASTM D5185m	>3	0	0	0
Copper         ppm         ASTM D5185m         >330         27         14         2           Tin         ppm         ASTM D5185m         >15         0         0         <1	Aluminum	ppm	ASTM D5185m	>20	5	4	4
Tin ppm ASTM D5185m > 15 0 0 0 <1 Vanadium ppm ASTM D5185m	Lead	ppm	ASTM D5185m	>40	0	<1	<1
Vanadium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         2         6         1           Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         0         0         0         1           Manganese         ppm         ASTM D5185m         0         0         <1         0           Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         20         2455         2855         3224           CONTAMINANTS         method         limit/base         current         hist	Copper	ppm	ASTM D5185m	>330	27	14	2
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         2         6         1           Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         60         55         57         58           Manganese         ppm         ASTM D5185m         0         0         -1         0           Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         2	Tin	ppm	ASTM D5185m	>15	0	0	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         2         6         1           Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         0         0         -1         0           Manganese         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D5185m         >20	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron         ppm         ASTM D5185m         0         2         6         1           Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         60         55         57         58           Manganese         ppm         ASTM D5185m         10 0         0         <1         0           Magnesium         ppm         ASTM D5185m         10 10 0         850         920         877           Calcium         ppm         ASTM D5185m         10 70         10 52         1105         10 75           Phosphorus         ppm         ASTM D5185m         11 50         941         10 36         992           Zinc         ppm         ASTM D5185m         12 70         11 62         12 59         1209           Sulfur         ppm         ASTM D5185m         20 60         24 55         28 55         32 24           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         2         2         2         2           Fuel         %         A	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         0         1           Molybdenum         ppm         ASTM D5185m         60         55         57         58           Manganese         ppm         ASTM D5185m         0         0         <1         0           Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         55         57         58           Manganese         ppm         ASTM D5185m         0         0         <1         0           Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D7844         >3	Boron	ppm	ASTM D5185m	0	2	6	1
Manganese         ppm         ASTM D5185m         0         0         <1         0           Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         >20         2         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2         2           Fuel         %	Barium	ppm	ASTM D5185m	0	0	0	1
Magnesium         ppm         ASTM D5185m         1010         850         920         877           Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2         2           Fuel         %	Molybdenum	ppm	ASTM D5185m	60	55	57	58
Calcium         ppm         ASTM D5185m         1070         1052         1105         1075           Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         >20         2         2         2           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0	Manganese	ppm	ASTM D5185m	0	0	<1	0
Phosphorus         ppm         ASTM D5185m         1150         941         1036         992           Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0	Magnesium	ppm	ASTM D5185m	1010	850	920	877
Zinc         ppm         ASTM D5185m         1270         1162         1259         1209           Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0	Calcium	ppm	ASTM D5185m	1070	1052	1105	1075
Sulfur         ppm         ASTM D5185m         2060         2455         2855         3224           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0	Phosphorus	ppm	ASTM D5185m	1150	941	1036	992
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0	Zinc	ppm	ASTM D5185m	1270	1162	1259	1209
Silicon         ppm         ASTM D5185m         >25         6         8         5           Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         3.5         2.4         1           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	Sulfur	ppm	ASTM D5185m	2060	2455	2855	3224
Sodium         ppm         ASTM D5185m         7         6         1           Potassium         ppm         ASTM D5185m         >20         2         2         2           Fuel         %         ASTM D3524         >5         <1.0         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         ▲ 3.5         2.4         1           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         2         2         2         2           Fuel         %         ASTM D3524         >5         <1.0         <1.0         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         ▲ 3.5         2.4         1           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	Silicon	ppm	ASTM D5185m	>25	6	8	5
Fuel % ASTM D3524 >5 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	Sodium	ppm	ASTM D5185m		7	6	1
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         ▲ 3.5         2.4         1           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	Potassium	ppm	ASTM D5185m	>20	2	2	2
Soot %         %         *ASTM D7844 >3         ▲ 3.5         2.4         1           Nitration         Abs/cm         *ASTM D7624 >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415 >30         28.3         25.1         21.2           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         21.6         18.8         16.4	Fuel	%	ASTM D3524	>5	<1.0	<1.0	<1.0
Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	INFRA-RED		method	limit/base	current	history1	history2
Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.2         8.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	Soot %	%	*ASTM D7844	>3	<b>3.5</b>	2.4	1
Sulfation         Abs/.1mm         *ASTM D7415         >30         28.3         25.1         21.2           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         21.6         18.8         16.4	Nitration	Abs/cm	*ASTM D7624	>20		11.2	8.6
Oxidation Abs/.1mm *ASTM D7414 >25 <b>21.6</b> 18.8 16.4	Sulfation	Abs/.1mm	*ASTM D7415	>30			
	FLUID DEGRAD	ATION	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	21.6	18.8	16.4
		mg KOH/g		9.8			



## OIL ANALYSIS REPORT







Certificate 12367

Sample No.

Lab Number : 06234541 Unique Number : 11123375

: GFL0104858

Received : 12 Jul 2024 **Tested** : 15 Jul 2024 Diagnosed

: 15 Jul 2024 - Don Baldridge Test Package: FLEET (Additional Tests: FuelDilution, PercentFuel) To discuss this sample report, contact Customer Service at 1-800-237-1369.

 $^st$  - 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)

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3700 West 7th Street

Joplin, MO

US 64801