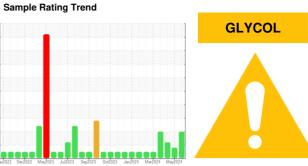


# **OIL ANALYSIS REPORT**



Machine Id 711011 Component

Diesel Engine

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

## DIAGNOSIS

#### Recommendation

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

# Wear

The aluminum level is abnormal. All other component wear rates are normal.

### Contamination

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

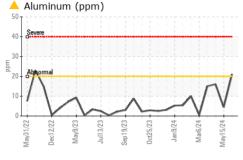
### **Fluid Condition**

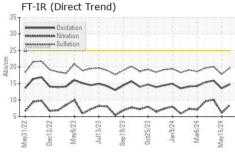
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.

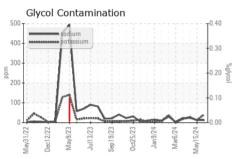
Sample Date	iAL)		ay2022 Dec20	22 May2023 Jul2023 Si	pp2023 Oct2023 Jan2024 Mar207	24 May2024	
Sample Date         Client Info         20 Jun 2024         15 May 2024         25 Mar 2024           Machine Age         hrs         Client Info         9125         8829         8552           Oil Age         hrs         Client Info         600         150         600           Oil Changed         Client Info         Changed         Not Changed         Changed ABNORMAL         ASMORMAL           Sample Status         Web         Immorbid         Immorbid         Immorbid         Immorbid           CONTAMINATION         method         Immorbid         Immorbid <t< th=""><th>SAMPLE INFORI</th><th>MATION</th><th>method</th><th>limit/base</th><th>current</th><th>history1</th><th>history2</th></t<>	SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Machine Age	Sample Number		Client Info		GFL0121539	GFL0105229	GFL0105112
Oil Age         hrs         Client Info         600         150         600           Oil Changed         Client Info         Changed ABNORMAL         Not Changed C	Sample Date		Client Info		20 Jun 2024	15 May 2024	25 Mar 2024
Client Info	Machine Age	hrs	Client Info		9125	8829	8552
ABNORMAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   MARGINAL   Marginat   Mistory2   Mistory3   Mistory3   Mistory3   Mistory4   Mistory4	Oil Age	hrs	Client Info		600	150	600
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0	Oil Changed		Client Info		Changed	Not Changd	Changed
Fuel	Sample Status				ABNORMAL	MARGINAL	ABNORMAL
Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         17         5         34           Chromium         ppm         ASTM D5185m         >20         1         <1         2           Nickel         ppm         ASTM D5185m         >4         <1         0         1           Silver         ppm         ASTM D5185m         >3         <1         <1         0           Aluminum         ppm         ASTM D5185m         >3         <1         <1         0           Aluminum         ppm         ASTM D5185m         >40         <1         0         1           Lead         ppm         ASTM D5185m         >40         <1         0         1           Copper         ppm         ASTM D5185m         >40         <1         0         1           Caladium         ppm         ASTM D5185m         <1         0         <1         0         <1           Calamium         ppm         ASTM D5185m         0         0         0 <td>CONTAMINAT</td> <td>ION</td> <td>method</td> <td>limit/base</td> <td>current</td> <td>history1</td> <td>history2</td>	CONTAMINAT	ION	method	limit/base	current	history1	history2
New Note	Fuel		WC Method	>5	<1.0	<u> </u>	<b>△</b> 5.4
Iron	Water		WC Method	>0.2	NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         1         <1         2           Nickel         ppm         ASTM D5185m         >4         <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	17	5	34
Nickel	Chromium	• • • • • • • • • • • • • • • • • • • •	ASTM D5185m	>20	1	<1	2
Titanium	Nickel			>4	<1	0	1
Silver	Titanium	ppm	ASTM D5185m		<1	0	<1
Aluminum         ppm         ASTM D5185m         >20         ▲ 21         4         16           Lead         ppm         ASTM D5185m         >40         <1         0         1           Copper         ppm         ASTM D5185m         >330         2         <1         2           Tin         ppm         ASTM D5185m         >15         <1         0         1           Vanadium         ppm         ASTM D5185m         <1         0         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         <1         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         2           Barium         ppm         ASTM D5185m         0         1         0         <1         1           Molybdenum         ppm         ASTM D5185m         0         1         <1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	Silver	ppm	ASTM D5185m	>3	<1	<1	0
Copper         ppm         ASTM D5185m         >330         2         -1         2           Tin         ppm         ASTM D5185m         >15         <1	Aluminum	• • • • • • • • • • • • • • • • • • • •	ASTM D5185m	>20	<u>^</u> 21	4	16
Tin ppm ASTM D5185m > 15 <1 0 1 Vanadium ppm ASTM D5185m	Lead	ppm	ASTM D5185m	>40	<1	0	1
Vanadium         ppm         ASTM D5185m         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         2           Barium         ppm         ASTM D5185m         0         1         0         <1           Molybdenum         ppm         ASTM D5185m         0         1         <1         1           Manganese         ppm         ASTM D5185m         0         1         <1         1           Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         120         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1	Copper	ppm	ASTM D5185m	>330	2	<1	2
Vanadium         ppm         ASTM D5185m         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         2           Barium         ppm         ASTM D5185m         0         1         0         <1           Molybdenum         ppm         ASTM D5185m         60         58         56         58           Manganese         ppm         ASTM D5185m         0         1         <1         1           Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1	• •				<1	0	1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         2           Barium         ppm         ASTM D5185m         0         1         0         <1	Vanadium	• • • • • • • • • • • • • • • • • • • •	ASTM D5185m		<1	0	<1
Boron         ppm         ASTM D5185m         0         0         0         2           Barium         ppm         ASTM D5185m         0         1         0         <1           Molybdenum         ppm         ASTM D5185m         60         58         56         58           Manganese         ppm         ASTM D5185m         0         1         <1         1           Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         >2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >	Cadmium	ppm	ASTM D5185m		<1	0	<1
Barium         ppm         ASTM D5185m         0         1         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         58         56         58           Manganese         ppm         ASTM D5185m         0         1         <1         1           Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >225         6         3         8           Sodium         ppm         ASTM D5185m         12         13         24           Potassium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         "ASTM D7844 <th< td=""><td>Boron</td><td>ppm</td><td>ASTM D5185m</td><td>0</td><td>0</td><td>0</td><td>2</td></th<>	Boron	ppm	ASTM D5185m	0	0	0	2
Manganese         ppm         ASTM D5185m         0         1         <1         1           Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         225         6         3         8           Sodium         ppm         ASTM D5185m         >20         41         12         27           Glycol         *ASTM D5185m         >20         41         12         27           Glycol         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         hi	Barium	ppm	ASTM D5185m	0	1	0	<1
Magnesium         ppm         ASTM D5185m         1010         880         935         882           Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844 </td <td>Molybdenum</td> <td>ppm</td> <td>ASTM D5185m</td> <td>60</td> <td>58</td> <td>56</td> <td>58</td>	Molybdenum	ppm	ASTM D5185m	60	58	56	58
Calcium         ppm         ASTM D5185m         1070         1027         1042         1067           Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D5185m         >20         A1         12         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         8.5         6.1         10.1	Manganese	ppm	ASTM D5185m	0	1	<1	1
Phosphorus         ppm         ASTM D5185m         1150         1048         1020         1086           Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D5185m         >20         A1         12         27           Glycol         %         *ASTM D5982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7415         >30	Magnesium	ppm	ASTM D5185m	1010	880	935	882
Zinc         ppm         ASTM D5185m         1270         1211         1230         1197           Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         >25         6         3         8           Potassium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D5185m         >20         A1         12         27           Glycol         %         *ASTM D5185m         >20         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415	Calcium	ppm	ASTM D5185m	1070	1027	1042	1067
Sulfur         ppm         ASTM D5185m         2060         3029         3610         3116           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         12         13         24           Potassium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25	Phosphorus	ppm	ASTM D5185m	1150	1048	1020	1086
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         12         13         24           Potassium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D2982         NEG         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	Zinc	ppm	ASTM D5185m	1270	1211	1230	1197
Silicon         ppm         ASTM D5185m         >25         6         3         8           Sodium         ppm         ASTM D5185m         12         13         24           Potassium         ppm         ASTM D5185m         >20         41         12         27           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	Sulfur	ppm	ASTM D5185m	2060	3029	3610	3116
Sodium         ppm         ASTM D5185m         12         13         24           Potassium         ppm         ASTM D5185m         >20         ▲ 41         12         27           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         ▲ 41         12         27           Glycol         %         *ASTM D2982         NEG         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	Silicon	ppm	ASTM D5185m	>25	6	3	8
NEG   NEG	Sodium	ppm	ASTM D5185m		12	13	24
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624         >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	Potassium	ppm	ASTM D5185m	>20	<b>41</b>	12	27
Soot %         %         *ASTM D7844 >3         0.8         0.3         1.2           Nitration         Abs/cm         *ASTM D7624 >20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415 >30         19.8         17.8         20.1           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         14.8         13.5         15.9	Glycol	%	*ASTM D2982		NEG	NEG	NEG
Nitration         Abs/cm         *ASTM D7624 > 20         8.5         6.1         10.1           Sulfation         Abs/.1mm         *ASTM D7415 > 30         19.8         17.8         20.1           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 > 25         14.8         13.5         15.9	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         17.8         20.1           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         13.5         15.9	Soot %	%	*ASTM D7844	>3	0.8	0.3	1.2
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     14.8     13.5     15.9	Nitration	Abs/cm	*ASTM D7624	>20	8.5	6.1	10.1
Oxidation Abs/.1mm *ASTM D7414 >25 <b>14.8</b> 13.5 15.9	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.8	17.8	20.1
	FLUID DEGRAD	DATION	method	limit/base	current	history1	history2
Base Number (BN)         mg KOH/g         ASTM D2896         9.8         8.5         8.3         7.8	Oxidation	Abs/.1mm	*ASTM D7414	>25	14.8	13.5	15.9
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	8.5	8.3	7.8

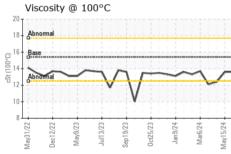


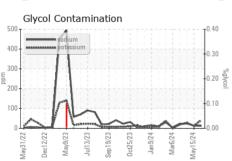
# **OIL ANALYSIS REPORT**

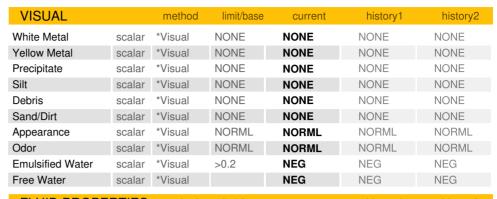






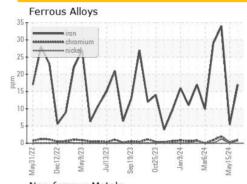


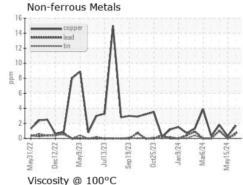


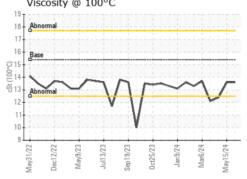


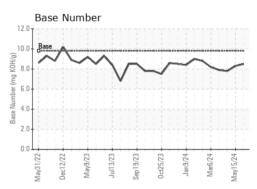
FLUID PROPE	ERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.6	13.6	<u> </u>

### **GRAPHS**













Laboratory Sample No.

Lab Number : 06219276

: GFL0121539

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 25 Jun 2024 **Tested** 

: 26 Jun 2024 Diagnosed : 26 Jun 2024 - Jonathan Hester

GFL Environmental - 821 - Ozarks Hauling 33924 Olath Drive Lebanon, MO US 65536

Contact: Landen Johnson

landen.johnson@gflenv.com

Submitted By: Gary Southard

Unique Number : 11097473 Test Package : FLEET ( Additional Tests: Glycol ) Certificate 12367

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)

T: (417)664-0010