

## **OIL ANALYSIS REPORT**

Sample Rating Trend

NORMAL



Machine Id 413028 Component

**Diesel Engine** Fluid

PETRO CANADA DURO

Sample Number Client Info GFL0103481 GFL0071667 GFL0064607	N SHP 15W40 (	- GAL)	ov2022 Dec202	22 Jan2023 Mar2023 Apr21	23 Jun2023 Jul2023 Oct2023 No	v2023 Nov202	
Sample Date     Client Info     29 Nov 2023     09 Nov 2023     08 Nov 2023     08 Nov 2023       Machine Age     hrs     Client Info     2611     2455     2455       Oil Age     hrs     Client Info     1127     0     971       Oil Changed     Client Info     Changed     Not Changd     N/A       Sample Status     O     NORMAL     ABNORMAL     NORMAL       CONTAMINATION     method     Imit/base     current     history1     history2       Fuel     WC Method     >0.2     NEG     NEG     NEG       WEAR METALS     method     imit/base     current     history1     history2       for     ppm     ASTM 05185m     >2.0     14     ▲ 123     9       Chromium     ppm     ASTM 05185m     >2.0     1     9     -1       Nickel     ppm     ASTM 05185m     >2.0     0     -1     1       Silver     ppm     ASTM 05185m     >2.0     4     15     4       Lead	SAMPLE INFORM	<b>NATION</b>	method	limit/base	current	history1	history2
Sample Date     Client Info     29 Nov 2023     09 Nov 2023     08 Nov 2023     09 Nov 2023     NA       Coll Changed     Client Info     1111     10     NORMAL     Norman </td <td>Sample Number</td> <td></td> <td>Client Info</td> <td></td> <th>GFL0103481</th> <td>GFL0071667</td> <td>GFL0064607</td>	Sample Number		Client Info		GFL0103481	GFL0071667	GFL0064607
Oil Age     Ins     Client Info     1127     0     971       Oil Changed     Client Info     Changed     Not Changed     NA       Sample Status     Method     >3.0     <1.0			Client Info		29 Nov 2023	09 Nov 2023	08 Nov 2023
Dil Changed Sample Status     Client Info     Changed NORMAL     Not Changd ABNORMAL     N/A ABNORMAL       CONTAMINATION     method     limit/base     current     history1     N/A NORMAL       CONTAMINATION     method     limit/base     current     history1     history2       Fuel     WC Method     >3.0     <1.0     <1.0     <1.0       Water     WC Method     >0.2     NEG     NEG     NEG       Silvor     method     limit/base     current     history1     history2       Onomium     ppm     ASTM D5185m     >120     14     123     9       Ohromium     ppm     ASTM D5185m     >20     1     9     <1       Vickel     ppm     ASTM D5185m     >20     1     0     <1       Aumium     ppm     ASTM D5185m     >20     4     15     4       Agad     ppm     ASTM D5185m     >20     4     15     4       Agad     ppm     ASTM D5185m     20     4     15	Machine Age	hrs	Client Info		2611	2455	2455
Sample Status     NORMAL     ABNORMAL     NORMAL     ABNORMAL     NORMAL       CONTAMINATION     method     imit/base     current     history1     history2       Fuel     WC Method     >3.0     <1.0	Dil Age	hrs	Client Info		1127	0	971
Sample Status     NORMAL     ABNORMAL     NORMAL     NORMAL       CONTAMINATION     method     imit/base     current     history1     history2       Fuel     WC Method     >3.0     <1.0	Oil Changed		Client Info		Changed	Not Changd	N/A
Fuel     WC Method     >3.0     <1.0     <1.0     <1.0     <1.0       Water     WC Method     >0.2     NEG     NEG     NEG       Glycol     WC Method     NEG     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >52     2     6     2       Chromium     ppm     ASTM D5185m     >52     2     6     2       Titanium     ppm     ASTM D5185m     >20     4     15     4       Lead     ppm     ASTM D5185m     >20     4     15     4       Lead     ppm     ASTM D5185m     >20     4     1     0       Copper     ppm     ASTM D5185m     >20     4     1     1     0       Copper     ppm     ASTM D5185m     >300     15     3     13     13       Tin     pASTM D5185m     >10     0     0     0	•				-	ABNORMAL	NORMAL
Water     WC Method     >0.2     NEG     NEG     NEG     NEG       Glycol     WC Method     Imit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >120     14     123     9       Chromium     ppm     ASTM D5185m     >5     2     6     2       Nickel     ppm     ASTM D5185m     >2     1     1     0       Silver     ppm     ASTM D5185m     >2     0     0     <1	CONTAMINATI	ON	method	limit/base	current	history1	history2
Glycol     WC Method     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >120     14     ▲ 123     9       Chromium     ppm     ASTM D5185m     >5     2     ▲ 6     2       Nickel     ppm     ASTM D5185m     >2     0     0     <1	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
WEAR METALS     method     limit/base     current     history1     history2       iron     ppm     ASTM D5185m     >120     14     4     123     9       Chromium     ppm     ASTM D5185m     >20     1     9     -1       Nickel     ppm     ASTM D5185m     >2     6     2       Titanium     ppm     ASTM D5185m     >2     7     1     0       Silver     ppm     ASTM D5185m     >2     0     0     <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron     ppm     ASTM D5185m     >120     14     ▲ 123     9       Chromium     ppm     ASTM D5185m     >20     1     9     <1	Glycol		WC Method		NEG	NEG	NEG
Chromium     ppm     ASTM D5185m     >20     1     9     <1       Nickel     ppm     ASTM D5185m     >5     2     ▲     6     2       Titanium     ppm     ASTM D5185m     >2     <1	WEAR METALS	S	method	limit/base	current	history1	history2
Nickel     ppm     ASTM D5185m     >5     2     A     6     2       Titanium     ppm     ASTM D5185m     >2     <1	ron	ppm	ASTM D5185m	>120	14	<b>1</b> 23	9
Titanium     ppm     ASTM D5185m     >2     <1     <1     0       Silver     ppm     ASTM D5185m     >2     0     0     <1	Chromium	ppm	ASTM D5185m	>20	1	9	<1
Silver     ppm     ASTM D5185m     >2     0     0     <1       Aluminum     ppm     ASTM D5185m     >20     4     15     4       Lead     ppm     ASTM D5185m     >20     4     15     4       Lead     ppm     ASTM D5185m     >330     15     3     13       Tin     ppm     ASTM D5185m     >15     1     <1     <1     <1       Vanadium     ppm     ASTM D5185m     >15     1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1     <1	Nickel	ppm	ASTM D5185m	>5	2	<b>6</b>	2
Aluminum     ppm     ASTM D5185m     >20     4     15     4       Lead     ppm     ASTM D5185m     >40     <1	Titanium	ppm	ASTM D5185m	>2	<1	<1	0
Lead     ppm     ASTM D5185m     >40     <1     1     0       Copper     ppm     ASTM D5185m     >330     15     3     13       Tin     ppm     ASTM D5185m     >15     1     <1	Silver	ppm	ASTM D5185m	>2	0	0	<1
Copper     ppm     ASTM D5185m     >330     15     3     13       Tin     ppm     ASTM D5185m     >15     1     <1	Aluminum	ppm	ASTM D5185m	>20	4	15	4
Tin     ppm     ASTM D5185m     >15     1     <1     <1     <1       Vanadium     ppm     ASTM D5185m     0     0     0     0       Cadmium     ppm     ASTM D5185m     0     2     1     3       Boron     ppm     ASTM D5185m     0     2     1     3       Barium     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     0     66     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Lead	ppm	ASTM D5185m	>40	<1	1	0
Tin     ppm     ASTM D5185m     >15     1     <1     <1     <1       Vanadium     ppm     ASTM D5185m     0     0     0     0       Cadmium     ppm     ASTM D5185m     0     2     1     3       Boron     ppm     ASTM D5185m     0     2     1     3       Barium     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     0     66     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Copper	ppm	ASTM D5185m	>330	15	3	13
Cadmium     ppm     ASTM D5185m     0     0     0       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     2     1     3       Barium     ppm     ASTM D5185m     0     0     0     0       Magnasese     ppm     ASTM D5185m     0     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Tin	ppm	ASTM D5185m	>15	1	<1	<1
ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     2     1     3       Barium     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     60     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron     ppm     ASTM D5185m     0     2     1     3       Barium     ppm     ASTM D5185m     0     0     0     0     0       Molybdenum     ppm     ASTM D5185m     60     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Cadmium	ppm	ASTM D5185m		0	0	0
Barium     ppm     ASTM D5185m     0     0     0     0     0       Molybdenum     ppm     ASTM D5185m     60     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum     ppm     ASTM D5185m     60     64     71     58       Manganese     ppm     ASTM D5185m     0     <1	Boron	ppm	ASTM D5185m	0	2	1	3
Manganese     ppm     ASTM D5185m     0     <1     1     <1       Magnesium     ppm     ASTM D5185m     1010     985     1111     909       Calcium     ppm     ASTM D5185m     1070     1048     1205     969       Phosphorus     ppm     ASTM D5185m     1150     1020     982     956       Zinc     ppm     ASTM D5185m     1270     1270     1394     1194       Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm<*ASTM D7624	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium     ppm     ASTM D5185m     1010     985     1111     909       Calcium     ppm     ASTM D5185m     1070     1048     1205     969       Phosphorus     ppm     ASTM D5185m     1150     1020     982     956       Zinc     ppm     ASTM D5185m     1270     1270     1394     1194       Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7	Molybdenum	ppm	ASTM D5185m	60	64	71	58
Calcium     ppm     ASTM D5185m     1070     1048     1205     969       Phosphorus     ppm     ASTM D5185m     1150     1020     982     956       Zinc     ppm     ASTM D5185m     1270     1270     1394     1194       Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     25     7     20     6       Sodium     ppm     ASTM D5185m     3     21     4       Potassium     ppm     ASTM D5185m     20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.tmm     *ASTM D7415     >30	Manganese	ppm	ASTM D5185m	0	<1	1	<1
Phosphorus     ppm     ASTM D5185m     1150     1020     982     956       Zinc     ppm     ASTM D5185m     1270     1270     1394     1194       Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.tmm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit	Magnesium	ppm	ASTM D5185m	1010	985	1111	909
Zinc     ppm     ASTM D5185m     1270     1270     1394     1194       Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.tmm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.tmm     *ASTM D7414	Calcium	ppm	ASTM D5185m	1070	1048	1205	969
Sulfur     ppm     ASTM D5185m     2060     2598     3121     2732       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.tmm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.tmm     *ASTM D7414     >25     15.3     20.4     15.2	Phosphorus	ppm	ASTM D5185m	1150	1020	982	956
CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>257206SodiumppmASTM D5185m3214PotassiumppmASTM D5185m>209158INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>40.32.30.3NitrationAbs/cm*ASTM D7624>208.112.77.6SulfationAbs/.1mm*ASTM D7415>3019.325.419.2FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2515.320.415.2	Zinc	ppm	ASTM D5185m	1270	1270	1394	1194
Silicon     ppm     ASTM D5185m     >25     7     20     6       Sodium     ppm     ASTM D5185m     >20     3     21     4       Potassium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Sulfur	ppm	ASTM D5185m	2060	2598	3121	2732
Sodium     ppm     ASTM D5185m     3     21     4       Potassium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium     ppm     ASTM D5185m     >20     9     15     8       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Silicon	ppm	ASTM D5185m	>25	7	20	6
INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Sodium	ppm	ASTM D5185m		3	21	4
Soot %     %     *ASTM D7844     >4     0.3     2.3     0.3       Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7615     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Potassium	ppm	ASTM D5185m	>20	9	15	8
Nitration     Abs/cm     *ASTM D7624     >20     8.1     12.7     7.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	INFRA-RED		method	limit/base	current	history1	history2
Sulfation     Abs/.1mm     *ASTM D7415     >30     19.3     25.4     19.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Soot %	%	*ASTM D7844	>4	0.3	2.3	0.3
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.3     20.4     15.2	Nitration	Abs/cm	*ASTM D7624	>20	8.1	12.7	7.6
Oxidation Abs/.1mm *ASTM D7414 >25 15.3 20.4 15.2	Sulfation	Abs/.1mm	*ASTM D7415	>30		25.4	19.2
	FLUID DEGRAD	ATION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 9.8 6.9 8.1 7.7	Oxidation	Abs/.1mm	*ASTM D7414	>25	15.3	20.4	15.2
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	6.9	8.1	7.7

## Recommendation

Resample at the next service interval to monitor. ( Customer Sample Comment: resample plus oil service)

### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil.

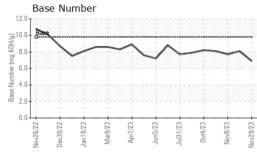
#### Fluid Condition

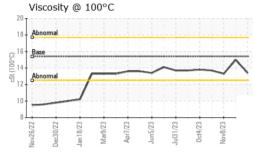
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.



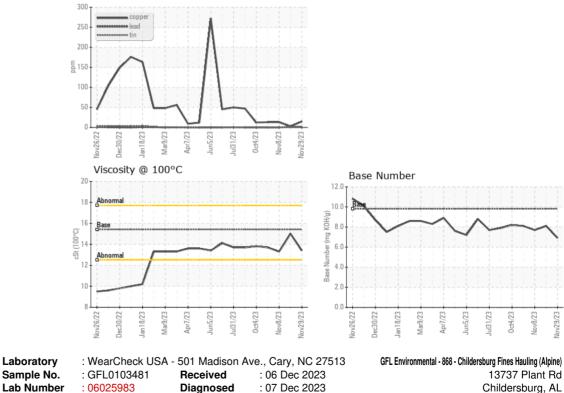
# **OIL ANALYSIS REPORT**

Non-ferrous Metals





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 PROPE	RTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.4	15.0	13.3
GRAPHS						
Ferrous Alloys						
140 iron						
120 - chromium			Å			
100-			A			
80			A			
60			1.4			
40						
20						
	$\searrow$	$\sim$	$\sim$			
Nov26/22 Dec30/22 Jan18/23 Mar9/23	Apr7/23 Jun5/23	Jul31/23 0ct4/23 Nov8/23	Nov29/23			
Nov Jan Ma	Ju Ju	No ON	Nov			



13737 Plant Rd : 07 Dec 2023 Childersburg, AL Diagnostician : Jonathan Hester US 35044 Contact: JONATHAN WILLIAMS To discuss this sample report, contact Customer Service at 1-800-237-1369. jonathan.williams@gflenv.com \* - 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)

Certificate L2367

Unique Number : 10775774

Test Package : FLEET

Jul31/23 0ct4/23

Т:

F:

lov8/73 w29/23