

# **PROBLEM SUMMARY**

Sample Rating Trend

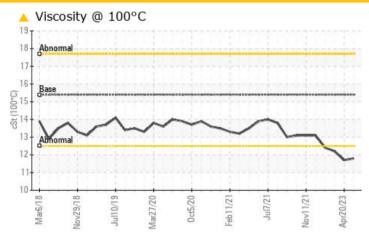


CUMMINS 10861

Component **Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (7 GAL)

## **COMPONENT CONDITION SUMMARY**



## RECOMMENDATION

No corrective action is recommended at this time. Resample at the next service interval to monitor.

PROBLEMATIC TEST RESULTS								
Sample Status				ATTENTION	ABNORMAL	ABNORMAL		
Visc @ 100°C	cSt	ASTM D445	15.4	<u> </u>	<u>▲</u> 11.7	<u>▲</u> 12.2		

Customer Id: GFL009 Sample No.: GFL0057573 Lab Number: 05899639 Test Package: FLEET



To manage this report scan the QR code

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

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

## **RECOMMENDED ACTIONS**

There are no recommended actions for this sample.

## HISTORICAL DIAGNOSIS

## 20 Apr 2023 Diag: Jonathan Hester

WEAR



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. The copper level is abnormal. In the absence of other significant wear metals, suspect copper due to sources other than wear (i.e. cooling core). Light fuel dilution occurring. The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.



## 27 Jan 2023 Diag: Don Baldridge

WEAR



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. The copper level is abnormal. In the absence of other significant wear metals, suspect copper due to sources other than wear (i.e. cooling core). All other component wear rates are normal. There is no indication of any contamination in the oil. The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.



### 09 Dec 2022 Diag: Doug Bogart

WEAR



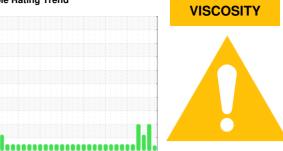
Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. The copper level is abnormal. In the absence of other significant wear metals, suspect copper due to sources other than wear (i.e. cooling core). All other component wear rates are normal. Light fuel dilution occurring. Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.





# **OIL ANALYSIS REPORT**

Sample Rating Trend



CUMMINS 10861

Component

**Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (7 GAL)

## DIAGNOSIS

#### Recommendation

No corrective action is recommended at this time. 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.

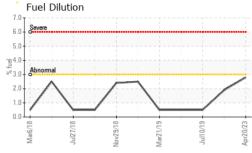
#### ▲ Fluid Condition

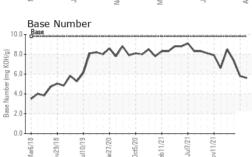
The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

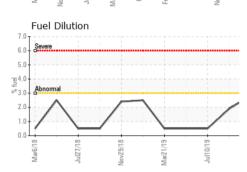
Sample Number         Client Info         GFL0057573 GFL0057650 GFL005768         GFL0057630 GFL0057630 GFL005763         GFL0057630 GFL005763 GFL0057630 GFL005	AL)		sr2018 Nov20	18 Jul2019 Mar2020 (	0ct2020 Feb2021 Jul2021 Nov2	021 Apr2023	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         13491         14234         14234         14234           Oil Age         hrs         Client Info         0         13305         14234           Oil Changed         Client Info         N/A         Changed         Changed           Sample Status         NEG         NEG           CONTAMINATION         method         limit/base         current         history1         history2           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >75         30         35         20           Chromium         ppm         ASTM D5185m         >5         2         2         2         <1           Silver         ppm         ASTM D5185m         >4         <1         0         0           Silver         ppm         ASTM D5185m         >15         5         3         4           Lead         ppm         ASTM D5185m         >10         76         192	Sample Number		Client Info		GFL0057573	GFL0057650	GFL0057634
Oil Age         hrs         Client Info         0         13305         14234           Oil Changed         Client Info         N/A         Changed         Changed           Sample Status         ATTENTION         ABNORMAL         ABNORMAL           CONTAMINATION         method         limit/base         current         history2           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         75         30         35         20           Chromium         ppm         ASTM D5185m         >5         2         2         2           Ciron         ppm         ASTM D5185m         >2         0         <1         <1           Chromium         ppm         ASTM D5185m         >2         0         <1         <1           Alluminum         ppm         ASTM D5185m         >2         0         <0         0           Copper         ppm         ASTM D5185m         >10         76         192         132           Tin         ppm         ASTM D5185m         0	Sample Date		Client Info		12 Jul 2023	20 Apr 2023	27 Jan 2023
Contamped   Client Info	Machine Age	hrs	Client Info		13491		14234
ATTENTION   ABNORMAL   ABNORMAL   CONTAMINATION   method   limit/base   current   history1   history2	Oil Age	hrs	Client Info		0	13305	14234
ATTENTION	-		Client Info		N/A	Changed	Changed
MEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >75         30         35         20           Chromium         ppm         ASTM D5185m         >5         2         2         2         -1           Nickel         ppm         ASTM D5185m         >4         <1         0         0           Titanium         ppm         ASTM D5185m         >2         0         <1         <1           Siliver         ppm         ASTM D5185m         >2         0         0         <1         <1           Aluminum         ppm         ASTM D5185m         >2         0         0         0            Lead         ppm         ASTM D5185m         >10         76         192         132         132           Tin         ppm         ASTM D5185m         >100         76         192         132         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         <	Sample Status				ATTENTION		ABNORMAL
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >75         30         35         20           Chromium         ppm         ASTM D5185m         >5         2         2         <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >5         2         2         <1           Nickel         ppm         ASTM D5185m         >4         <1	WEAR METAL	.S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>75	30	35	20
Titanium ppm ASTM D5185m >2 0 0 <1 <1 SIlver ppm ASTM D5185m >2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Chromium	ppm	ASTM D5185m	>5	2	2	<1
Silver	Nickel	ppm	ASTM D5185m	>4	<1	0	0
Aluminum   ppm   ASTM D5185m   >15   5   3   4   Lead   ppm   ASTM D5185m   >25   <1   <1   0   Copper   ppm   ASTM D5185m   >25   <1   <1   0   Copper   ppm   ASTM D5185m   >4   <1   <1   <1   Vanadium   ppm   ASTM D5185m   >4   <1   <1   <1   Vanadium   ppm   ASTM D5185m   0   0   0   Cadmium   ppm   ASTM D5185m   0   0   0   ADDITIVES   method   limit/base   current   history1   history2   Boron   ppm   ASTM D5185m   0   0   0   0   Molybdenum   ppm   ASTM D5185m   0   0   0   0   Molybdenum   ppm   ASTM D5185m   0   0   0   0   Magnesium   ppm   ASTM D5185m   0   <1   1   <1   Magnesium   ppm   ASTM D5185m   1070   1156   1131   1065   Phosphorus   ppm   ASTM D5185m   1270   1172   1179   1099   Sulfur   ppm   ASTM D5185m   2060   2806   2653   2395    CONTAMINANTS   method   limit/base   current   history1   history2   Sodium   ppm   ASTM D5185m   >20   11   1   1   1   3   Fuel   %   ASTM D5185m   >20   11   1   1   3   INFRA-RED   method   limit/base   current   history1   history2   Sulfation   Abs/cm   *ASTM D7415   >30   20.6   20.4   18.5    FLUID DEGRADATION   method   limit/base   current   history1   history2   Svidation   Abs/lmm   *ASTM D7415   >30   20.6   20.4   18.5    FLUID DEGRADATION   method   limit/base   current   history1   history2   Svidation   Abs/lmm   *ASTM D7414   >25   15.9   16.3   13.7	Titanium	ppm	ASTM D5185m	>2	0	<1	<1
Lead         ppm         ASTM D5185m         >25         <1         <1         0           Copper         ppm         ASTM D5185m         >100         76         ▲ 192         ▲ 132           Tin         ppm         ASTM D5185m         >4         <1         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         0           Boron         ppm         ASTM D5185m         0         0         0         0           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         100         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1270 <th< td=""><td>Silver</td><td>ppm</td><td>ASTM D5185m</td><td>&gt;2</td><td>0</td><td>0</td><td>0</td></th<>	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper         ppm         ASTM D5185m         >100         76         ▲ 192         ▲ 132           Tin         ppm         ASTM D5185m         >4         <1	Aluminum	ppm	ASTM D5185m	>15	5	3	4
Tin ppm ASTM D5185m >4 <1 <1 <1 <1	Lead	ppm	ASTM D5185m	>25	<1	<1	0
Trin	Copper	ppm	ASTM D5185m	>100	76	<b>△</b> 192	<u></u> 132
Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         8         5         9           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         72         70         62           Manganese         ppm         ASTM D5185m         0         <1         1         <1           Magnesium         ppm         ASTM D5185m         1010         825         847         750           Calcium         ppm         ASTM D5185m         1070         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1	Tin	ppm	ASTM D5185m	>4	<1	<1	<1
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         8         5         9           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         72         70         62           Manganese         ppm         ASTM D5185m         0         <1	Vanadium		ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Cadmium		ASTM D5185m		0		0
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         72         70         62           Manganese         ppm         ASTM D5185m         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         72         70         62           Manganese         ppm         ASTM D5185m         0         <1         1         <1           Magnesium         ppm         ASTM D5185m         1010         825         847         750           Calcium         ppm         ASTM D5185m         1070         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1150         936         960         931           Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >2	Boron	ppm	ASTM D5185m	0	8	5	9
Manganese         ppm         ASTM D5185m         0         <1         1         <1           Magnesium         ppm         ASTM D5185m         1010         825         847         750           Calcium         ppm         ASTM D5185m         1070         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1150         936         960         931           Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         825         847         750           Calcium         ppm         ASTM D5185m         1070         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1150         936         960         931           Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >	Molybdenum	ppm	ASTM D5185m	60	72	70	62
Calcium         ppm         ASTM D5185m         1070         1156         1131         1065           Phosphorus         ppm         ASTM D5185m         1150         936         960         931           Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Soot %         %         *ASTM D7844         >6         0.	Manganese	ppm	ASTM D5185m	0	<1	1	<1
Phosphorus         ppm         ASTM D5185m         1150         936         960         931           Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0	Magnesium	ppm	ASTM D5185m	1010	825	847	750
Zinc         ppm         ASTM D5185m         1270         1172         1179         1099           Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0	Calcium	ppm	ASTM D5185m	1070	1156	1131	1065
Sulfur         ppm         ASTM D5185m         2060         2806         2653         2395           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0	Phosphorus	ppm	ASTM D5185m	1150	936	960	931
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         <1	Zinc	ppm	ASTM D5185m	1270	1172	1179	1099
Silicon         ppm         ASTM D5185m         >25         5         7         6           Sodium         ppm         ASTM D5185m         <1         2         2           Potassium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0         2.8         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.9         0.8         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.9         9.5         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Sulfur	ppm	ASTM D5185m	2060	2806	2653	2395
Sodium         ppm         ASTM D5185m         <1         2         2           Potassium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         11         13         13           Fuel         %         ASTM D3524         >3.0         <1.0         ▲ 2.8         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.9         0.8         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.9         9.5         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Silicon	ppm	ASTM D5185m	>25	5	7	6
Fuel % ASTM D3524 >3.0 <1.0	Sodium	ppm	ASTM D5185m		<1	2	2
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.9         0.8         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.9         9.5         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Potassium	ppm	ASTM D5185m	>20	11	13	13
Soot %         *ASTM D7844         >6         0.9         0.8         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.9         9.5         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Fuel	%	ASTM D3524	>3.0	<1.0	▲ 2.8	<1.0
Nitration         Abs/cm         *ASTM D7624         >20         9.9         9.5         7.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Soot %	%	*ASTM D7844	>6	0.9	0.8	0.4
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.6         20.4         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         15.9         16.3         13.7	Nitration	Abs/cm	*ASTM D7624	>20	9.9	9.5	7.7
Oxidation Abs/.1mm *ASTM D7414 >25 <b>15.9</b> 16.3 13.7	Sulfation				20.6		
	FLUID DEGRAI	DATION	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	15.9	16.3	13.7
	Base Number (BN)				5.6	5.8	7.4



## **OIL ANALYSIS REPORT**



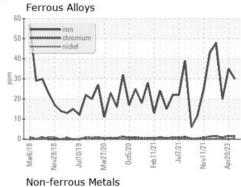


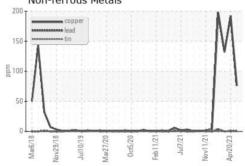


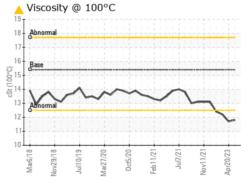
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

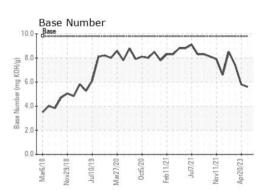
I LOID I HOI LI	ITILO	method	IIIIIII Dasc	Current	Thistory	History
Visc @ 100°C	cSt	ASTM D445	15.4	<u> </u>	<b>△</b> 11.7	12.2

## **GRAPHS**













Laboratory Sample No. Lab Number Unique Number

: GFL0057573 : 05899639 : 10560995

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 17 Jul 2023

Diagnosed : 19 Jul 2023 Diagnostician : Jonathan Hester

**Test Package**: FLEET (Additional Tests: FUELDILUTION) 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)

GFL Environmental - 009 - Fairburn

6905 Roosevelt Hwy Fairburn, GA US 30213

Contact: Eric Jones erjones@gflenv.com T: (678)630-9927