

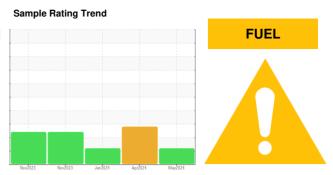
## **OIL ANALYSIS REPORT**



# (H917016) gfl knoxville 912107

Diesel Engine

PETRO CANADA DURON SHP 15W40 (11 GAL)



### **DIAGNOSIS**

#### Recommendation

We recommend that you drain the oil from the component if this has not already been done. We recommend an early resample to monitor this condition.

### Wear

All component wear rates are normal.

### Contamination

There is a moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil.

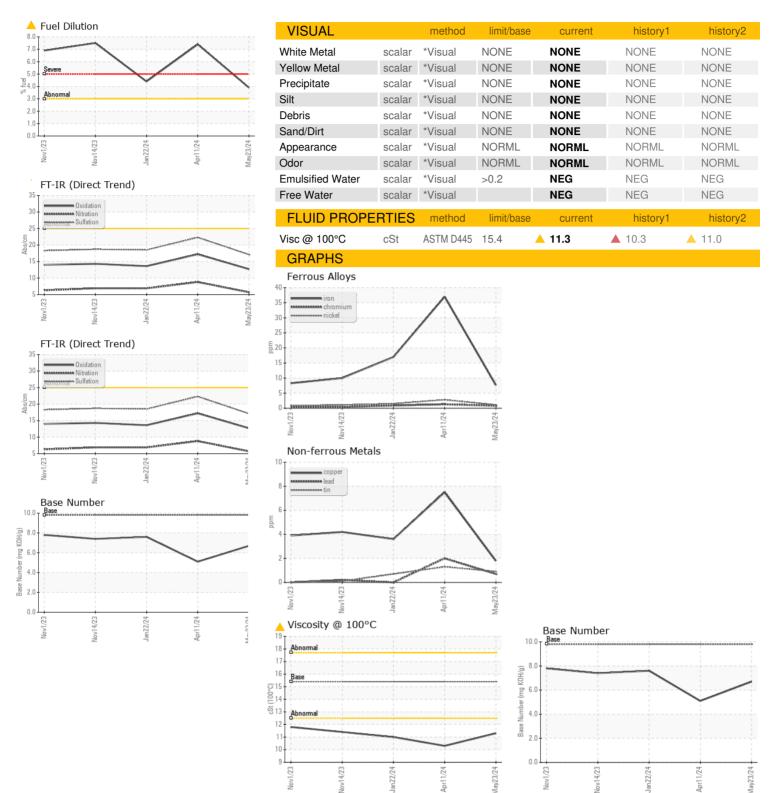
### ▲ Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. Fuel is present in the oil and is lowering the viscosity. The oil is no longer serviceable due to the presence of contaminants.

Sample Date         Client Info         23 May 2024         11 Apr 2024         22 Jan 2024           Machine Age         hrs         Client Info         5755         5570         5168           Oil Age         hrs         Client Info         136         100         536           Oil Changed         Client Info         Not Changd         Not Changd         Changed	N 3HP 13W40 (1	I GAL)	19092023	NOVZUZ3	Janzuz4 Aprzuz4	May2024	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         5755         5570         5168           Oil Age         hrs         Client Info         136         100         536           Oil Age         hrs         Client Info         Not Changd         Not Changd         Changed           Sample Status         Bear Control         Mathor Changd         SEVERE         ABNORMAL           CONTAMINATION         method         Imitibase         current         history1         history2           Water         WC Method         NEG         NEG         NEG         NEG           Glycol         WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM 05185m         >20         <1	Sample Number		Client Info		GFL0106935	GFL0106952	GFL0098798
Oil Age         hrs         Client Info         136         100         536           Oil Changed         Client Info         Not Changd         Not Changd         Changed           Sample Status         ABNORMAL         Not Changd         Changed         ABNORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         8         37         17           Chromium         ppm         ASTM D5185m         >20         <1         1         <1           Nickel         ppm         ASTM D5185m         >20         <1         1         <1           Silver         ppm         ASTM D5185m         >2         1         0         0           Copper         ppm         ASTM D5185m         >20         2         4         4           Lead         ppm         ASTM D5185m         >30         2         8         4           Copper         ppm	Sample Date		Client Info		23 May 2024	11 Apr 2024	22 Jan 2024
Colient Info	Machine Age	hrs	Client Info		5755	5570	5168
ABNORMAL   SEVERE   ABNORMAL   CONTAMINATION   method   limit/base   current   history1   history2   history2	Oil Age	hrs	Client Info		136	100	536
CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         8         37         17           Chromium         ppm         ASTM D5185m         >20         <1	Oil Changed		Client Info		Not Changd	Not Changd	Changed
Water         WC Method         >0.2         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         8         37         17           Chromium         ppm         ASTM D5185m         >20         <1         1         <1           Nickel         ppm         ASTM D5185m         >5         1         3         2           Silver         ppm         ASTM D5185m         >2         5         93         67           Silver         ppm         ASTM D5185m         >2         1         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         4           Lead         ppm         ASTM D5185m         >40         <1         2         0           Copper         ppm         ASTM D5185m         >33         2         8         4           Tin         ppm         ASTM D5185m         >40         <1         2         1           Calcium         ppm         ASTM D5185m         0         12         51	Sample Status				ABNORMAL	SEVERE	ABNORMAL
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         8         37         17           Chromium         ppm         ASTM D5185m         >20         <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         <1         1         <1           Nickel         ppm         ASTM D5185m         >5         1         3         2           Titianium         ppm         ASTM D5185m         >2         5         93         67           Siliver         ppm         ASTM D5185m         >2         1         0         0           Aluminum         ppm         ASTM D5185m         >2         2         4         4           Lead         ppm         ASTM D5185m         >40         <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>120	8	37	17
Silver	Chromium	ppm	ASTM D5185m	>20	<1	1	<1
Silver	Nickel	ppm	ASTM D5185m	>5	1	3	2
Aluminum	Titanium	ppm	ASTM D5185m	>2	5	93	67
Lead         ppm         ASTM D5185m         >40         <1         2         0           Copper         ppm         ASTM D5185m         >330         2         8         4           Tin         ppm         ASTM D5185m         >15         <1         1         <1         <1           Vanadium         ppm         ASTM D5185m         <1         1         <1         <1         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         12         51         100           Barium         ppm         ASTM D5185m         0         <1         0         0           Barium         ppm         ASTM D5185m         0         <1         0         0           Maleganesium         ppm         ASTM D5185m         0         <1         1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         737         550         432           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5	Silver	ppm	ASTM D5185m	>2	1	0	0
Copper         ppm         ASTM D5185m         >330         2         8         4           Tin         ppm         ASTM D5185m         >15         <1	Aluminum	ppm	ASTM D5185m	>20	2	4	4
Trin	Lead	ppm	ASTM D5185m	>40	<1	2	0
Vanadium         ppm         ASTM D5185m         <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         <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	Copper	ppm	ASTM D5185m	>330	2	8	4
Cadmium         ppm         ASTM D5185m         <1         <1         <1         <1         <1         ASTM D5185m         Current         history1         history2         history2           Boron         ppm         ASTM D5185m         0         12         51         100         0 <td>Tin</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;15</td> <td>&lt;1</td> <td>1</td> <td>&lt;1</td>	Tin	ppm	ASTM D5185m	>15	<1	1	<1
ADDITIVES  method limit/base current history1 history2  Boron ppm ASTM D5185m 0 12 51 100  Barium ppm ASTM D5185m 0 <10 0  Molybdenum ppm ASTM D5185m 0 <11 0 0  Molybdenum ppm ASTM D5185m 0 <11 1 <1 1  Magnesium ppm ASTM D5185m 1010 737 550 432  Calcium ppm ASTM D5185m 1070 922 1988 1459  Phosphorus ppm ASTM D5185m 1150 837 1202 925  Zinc ppm ASTM D5185m 1270 1016 1384 1117  Sulfur ppm ASTM D5185m 2060 2623 4282 3650  CONTAMINANTS method limit/base current history1 history2  Silicon ppm ASTM D5185m >25 6 21 9  Sodium ppm ASTM D5185m >20 3 6 3  Potassium ppm ASTM D5185m >20 3 6 3  Fuel % ASTM D5185m >20 3 6 3  Fuel % ASTM D5185m >20 5.7 8.8 6.9  Sulfration Abs/.1mm *ASTM D7415 >30 17.1 22.3 18.5  FLUID DEGRADATION method limit/base current history1 history2  Dxidation Abs/.1mm *ASTM D7415 >25 12.7 17.2 13.6	Vanadium	ppm	ASTM D5185m		<1	1	<1
Boron	Cadmium	ppm	ASTM D5185m		<1	<1	<1
Barium ppm ASTM D5185m 0 <1 0 0  Molybdenum ppm ASTM D5185m 60 54 24 18  Manganese ppm ASTM D5185m 0 <1 1 1 <1  Magnesium ppm ASTM D5185m 1010 737 550 432  Calcium ppm ASTM D5185m 1070 922 1988 1459  Phosphorus ppm ASTM D5185m 1150 837 1202 925  Zinc ppm ASTM D5185m 1270 1016 1384 1117  Sulfur ppm ASTM D5185m 2060 2623 4282 3650  CONTAMINANTS method limit/base current history1 history2  Silicon ppm ASTM D5185m 2 2 3 3  Potassium ppm ASTM D5185m >20 3 6 3  Fuel % ASTM D5185m >20 3 6 3  Fuel % ASTM D5185m >20 3 6 9  Nitration Abs/cm *ASTM D7844 >4 0.2 0.4 0.2  Nitration Abs/cm *ASTM D7844 >4 0.2 0.4 0.2  Nitration Abs/cm *ASTM D7844 >4 0.2 0.4 0.2  Nitration Abs/cm *ASTM D7844 >20 5.7 8.8 6.9  Sulfation Abs/lmm *ASTM D7415 >30 17.1 22.3 18.5  FLUID DEGRADATION method limit/base current history1 history2  Oxidation Abs/lmm *ASTM D7414 >25 12.7 17.2 13.6	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         54         24         18           Manganese         ppm         ASTM D5185m         0         <1         1         <1           Magnesium         ppm         ASTM D5185m         1010         737         550         432           Calcium         ppm         ASTM D5185m         1070         922         1988         1459           Phosphorus         ppm         ASTM D5185m         1150         837         1202         925           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D7844         <	Boron	ppm	ASTM D5185m	0	12	51	100
Manganese         ppm         ASTM D5185m         0         <1         1         <1           Magnesium         ppm         ASTM D5185m         1010         737         550         432           Calcium         ppm         ASTM D5185m         1070         922         1988         1459           Phosphorus         ppm         ASTM D5185m         1150         837         1202         925           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         25         6         21         9           Sodium         ppm         ASTM D5185m         20         3         6         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Soot %         *ASTM D5185m         >20	Barium	ppm	ASTM D5185m	0	<1	0	0
Magnesium         ppm         ASTM D5185m         1010         737         550         432           Calcium         ppm         ASTM D5185m         1070         922         1988         1459           Phosphorus         ppm         ASTM D5185m         1150         837         1202         925           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         2         3         3         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D544         >3.0	Molybdenum	ppm	ASTM D5185m	60	54	24	18
Calcium         ppm         ASTM D5185m         1070         922         1988         1459           Phosphorus         ppm         ASTM D5185m         1150         837         1202         925           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         >20         3         6         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         7.4         4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415 <td< td=""><td>Manganese</td><td>ppm</td><td>ASTM D5185m</td><td>0</td><td>&lt;1</td><td>1</td><td>&lt;1</td></td<>	Manganese	ppm	ASTM D5185m	0	<1	1	<1
Phosphorus         ppm         ASTM D5185m         1150         837         1202         925           Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         >20         3         6         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D3524         >3.0         3.9         7.4         4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/.1mm         *ASTM D7415	Magnesium	ppm	ASTM D5185m	1010	737	550	432
Zinc         ppm         ASTM D5185m         1270         1016         1384         1117           Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         2         3         3         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         7.4         4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/:nm         *ASTM D7415         >30	Calcium	ppm	ASTM D5185m	1070	922	1988	1459
Sulfur         ppm         ASTM D5185m         2060         2623         4282         3650           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         2         3         3         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D5185m         >20         3         7.4         4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/.1mm         *ASTM D7415         >30         17.1	Phosphorus	ppm	ASTM D5185m	1150	837	1202	925
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         21         9           Sodium         ppm         ASTM D5185m         2         3         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D3524         >3.0         3.9         ▲ 7.4         ▲ 4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	Zinc	ppm	ASTM D5185m	1270	1016	1384	1117
Silicon       ppm       ASTM D5185m       >25       6       21       9         Sodium       ppm       ASTM D5185m       2       3       3         Potassium       ppm       ASTM D5185m       >20       3       6       3         Fuel       %       ASTM D3524       >3.0       3.9       ▲ 7.4       ▲ 4.4         INFRA-RED       method       limit/base       current       history1       history2         Soot %       %       *ASTM D7844       >4       0.2       0.4       0.2         Nitration       Abs/cm       *ASTM D7624       >20       5.7       8.8       6.9         Sulfation       Abs/.1mm       *ASTM D7415       >30       17.1       22.3       18.5         FLUID DEGRADATION       method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       *ASTM D7414       >25       12.7       17.2       13.6	Sulfur	ppm	ASTM D5185m	2060	2623	4282	3650
Sodium         ppm         ASTM D5185m         2         3         3           Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D3524         >3.0         ▲ 3.9         ▲ 7.4         ▲ 4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         3         6         3           Fuel         %         ASTM D3524         >3.0         ▲ 3.9         ▲ 7.4         ▲ 4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	Silicon	ppm	ASTM D5185m	>25	6	21	9
Fuel         %         ASTM D3524         >3.0         ▲ 3.9         ▲ 7.4         ▲ 4.4           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	Sodium	ppm	ASTM D5185m		2	3	3
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	Potassium	ppm	ASTM D5185m	>20	3	6	3
Soot %         %         *ASTM D7844 >4         0.2         0.4         0.2           Nitration         Abs/cm         *ASTM D7624 >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415 >30         17.1         22.3         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         12.7         17.2         13.6	Fuel	%	ASTM D3524	>3.0	<b>△</b> 3.9	<b>▲</b> 7.4	<b>4.4</b>
Nitration         Abs/cm         *ASTM D7624         >20         5.7         8.8         6.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         17.1         22.3         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.7         17.2         13.6	Soot %	%	*ASTM D7844	>4	0.2	0.4	0.2
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.7 17.2 13.6	Nitration	Abs/cm	*ASTM D7624	>20	5.7	8.8	6.9
Oxidation Abs/.1mm *ASTM D7414 >25 <b>12.7</b> 17.2 13.6	Sulfation	Abs/.1mm	*ASTM D7415	>30	17.1	22.3	18.5
		ATION	una nebla a al	limit/bass		hiotonut	history2
	FLUID DEGRAL	JATION	method	iiiiii/base	current	HISTORY	HISTOLYZ



## **OIL ANALYSIS REPORT**







Laboratory

Sample No. : GFL0106935 Lab Number : 06191853 Unique Number : 11048605

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

: 28 May 2024 : 29 May 2024 Diagnosed

: 29 May 2024 - Wes Davis

GFL Environmental - 097 - Knoxville Hauling 1901 Sutherland Ave Knoxville, TN US 37921 Contact: Doug Weeden

dweeden@gflenv.com

Test Package : FLEET ( Additional Tests: PercentFuel ) 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)

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F: