

# **PROBLEM SUMMARY**

# Sample Rating Trend

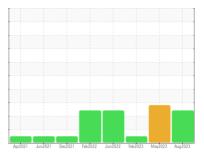




Machine Id **4634M** Component

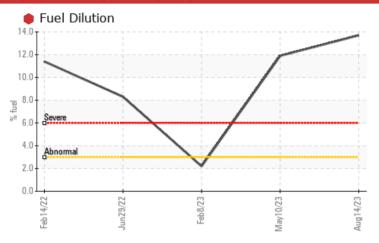
**Diesel Engine** 

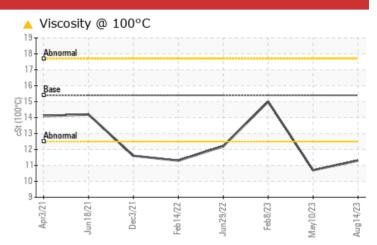
PETRO CANADA DURON SHP 15W40 (--- GAL)





# **COMPONENT CONDITION SUMMARY**





# RECOMMENDATION

We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

PROBLEMATIC TEST RESULTS									
Sample Status				SEVERE	SEVERE	NORMAL			
Fuel	%	ASTM D3524	>3.0	<b>13.7</b>	11.9	2.2			
Visc @ 100°C	cSt	ASTM D445	15.4	<b>11.3</b>	<b>1</b> 0.7	15.0			

Customer Id: GFL415 Sample No.: GFL0086662 Lab Number: 05925810 Test Package: FLEET



To manage this report scan the QR code

To discuss the diagnosis or test data: Wes Davis +1 905-569-8600 x223 wesd@wearcheck.ca

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

# Action Status Date Done By Description Resample --- ? We recommend an early resample to monitor this condition. Check Fuel/injector System --- ? We advise that you check the fuel injection system.

# HISTORICAL DIAGNOSIS

## 10 May 2023 Diag: Wes Davis

FUEL



We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition. All component wear rates are normal. There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. 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.



# 08 Feb 2023 Diag: Doug Bogart

NORMAL



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. All component wear rates are normal. Fuel content negligible. No other contaminants were detected in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.



# 29 Jun 2022 Diag: Jonathan Hester

FUEL



We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition. All component wear rates are normal. There is a high amount of fuel present in the oil. Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.





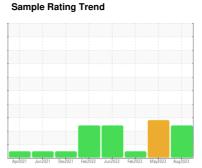
# **OIL ANALYSIS REPORT**



Machine Id 4634M Component

**Diesel Engine** 

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





# **DIAGNOSIS**

# Recommendation

We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

# Wear

All component wear rates are normal.

# Contamination

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

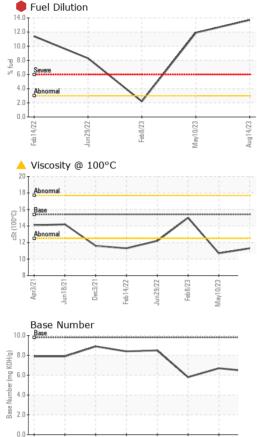
# ▲ Fluid Condition

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 INFORMATION         method         limit/base         current         history1         history2           Sample Number         Client Info         GFL0086662         GFL0081455         GFL0086699           Sample Date         Client Info         14 Aug 2023         10 Ray 2023         08 Feb 2023           Machine Age         hrs         Client Info         19401         18636         18019         16346           Oil Changed         Client Info         Changed	N SHP 15W4U (	- GAL)	Apr2021	Jun2021 Dec2021 Feb20	22 Jun2022 Feb2023 May2023	Aug2023	
Client Info	SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         19401         18636         18019         16346           Oil Age         hrs         Client Info         0         18019         16346           Oil Changed         Changed         Changed         Changed         Changed         NCRMAL           SEVERE         SEVERE         NCRMAL           CONTAMINATION         method         limit/base         current         history1         history2           Giycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >90         52         33         65           Chromium         ppm         ASTM D5185m         >20         2         2         3           Iron         ppm         ASTM D5185m         >20         2         1         0           Chromium         ppm         ASTM D5185m         >20         3         5         4           Lead         ppm         ASTM D5185m         >40         <1	Sample Number		Client Info		GFL0086662	GFL0081455	GFL0068699
Dil Age			Client Info		14 Aug 2023	10 May 2023	08 Feb 2023
Contained   Client Info   Changed   Severe   Severe   Changed   Severe   Severe   Normal	Machine Age	hrs	Client Info		19401	18636	18019
Severe	Oil Age	hrs	Client Info		0	18019	16346
CONTAMINATION	Oil Changed		Client Info		Changed	Changed	Changed
WEAR METALS	Sample Status				SEVERE	SEVERE	NORMAL
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >90         52         33         65           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >2         <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Port	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >2         <1	WEAR METAL	S	method	limit/base	current	history1	history2
Chromium	ron	ppm	ASTM D5185m	>90	52	33	65
ASTM D5185m   >2	Chromium		ASTM D5185m	>20	2	2	3
Salver	Nickel		ASTM D5185m	>2	<1	<1	0
Aluminum ppm ASTM D5185m >20 3 5 4  Lead ppm ASTM D5185m >40 <1 <1 2  Copper ppm ASTM D5185m >330 3 <1 2  Tin ppm ASTM D5185m >15 <1 <1 <1 <1  Vanadium ppm ASTM D5185m >15 <1 <1 <1 <0  Cadmium ppm ASTM D5185m 0 0 0 0  Cadmium ppm ASTM D5185m 0 0 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 60 48 50 64  Wanganese ppm ASTM D5185m 10 0 0 0 0  Walanganese ppm ASTM D5185m 10 0 0 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <	Гitanium		ASTM D5185m	>2	0	<1	0
Aluminum ppm ASTM D5185m >20 3 5 4  Lead ppm ASTM D5185m >40 <1 <1 2  Copper ppm ASTM D5185m >330 3 <1 2  Tin ppm ASTM D5185m >15 <1 <1 <1 <1  Cadmium ppm ASTM D5185m >0 0 <1 0  Cadmium ppm ASTM D5185m 0 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0  ADDITIVES method limit/base 50 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0 0  ADDITIVES method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0 0 0  ADDITIVES method limit/base current limit/base current limit/base lim	Silver			>2	0	0	0
Copper	Aluminum		ASTM D5185m	>20	3	5	4
Tin	_ead	ppm	ASTM D5185m	>40	<1	<1	2
Property	Copper		ASTM D5185m	>330	3	<1	2
Vanadium         ppm         ASTM D5185m         0         <1         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         3         2         1           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         48         50         64           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         821         787         973           Calcicium         ppm         ASTM D5185m         1150         859         851         1142           Phosphorus         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history	• •	ppm	ASTM D5185m	>15	<1	<1	<1
ADDITIVES  method limit/base current history1 history2  Boron ppm ASTM D5185m 0 0 0 0 0 0  Molybdenum ppm ASTM D5185m 0 0 0 0 0  Molybdenum ppm ASTM D5185m 0 0 0 0 0  Magnesium ppm ASTM D5185m 0 0 0 0 0 0  Magnesium ppm ASTM D5185m 1010 821 787 973  Calcium ppm ASTM D5185m 1070 859 887 1142  Phosphorus ppm ASTM D5185m 1150 859 851 1054  Zinc ppm ASTM D5185m 1270 1096 1072 1281  Sulfur ppm ASTM D5185m 2060 2910 2999 2591  CONTAMINANTS method limit/base current history1 history2  Silicon ppm ASTM D5185m >25 5 5 9  Sodium ppm ASTM D5185m >20 2 8 2  Fuel % ASTM D5185m >20 2 8 2  INFRA-RED method limit/base current history1 history2  INFRA-RED method limit/base current history1 history2  INFRA-RED method limit/base current history1 history2  Solifation Abs/cm "ASTM D7844 >6 1.5 0.8 1.3  Nitration Abs/cm "ASTM D7845 >30 24.2 21.2 27.5  FLUID DEGRADATION method limit/base current history1 history2  Dxidation Abs/1mm "ASTM D7415 >30 24.4 18.6 27.4	Vanadium		ASTM D5185m		0	<1	0
Boron	Cadmium		ASTM D5185m		0	0	0
Description	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         48         50         64           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         821         787         973           Calcium         ppm         ASTM D5185m         1070         859         887         1142           Phosphorus         ppm         ASTM D5185m         1150         859         851         1054           Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Godium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0	Boron	ppm	ASTM D5185m	0	3	2	1
Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         821         787         973           Calcium         ppm         ASTM D5185m         1070         859         887         1142           Phosphorus         ppm         ASTM D5185m         1150         859         851         1054           Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Godium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20 <td>Barium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>0</td> <th>0</th> <td>0</td> <td>0</td>	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         821         787         973           Calcium         ppm         ASTM D5185m         1070         859         887         1142           Phosphorus         ppm         ASTM D5185m         1150         859         851         1054           Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Solitan         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20         2         8         2	Molybdenum	ppm	ASTM D5185m	60	48	50	64
Calcium         ppm         ASTM D5185m         1070         859         887         1142           Phosphorus         ppm         ASTM D5185m         1150         859         851         1054           Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Golium         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/.mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         <	Manganese	ppm	ASTM D5185m	0	<1	<1	<1
Phosphorus         ppm         ASTM D5185m         1150         859         851         1054           Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D5185m         >20         2         8         2           Soot %         %         *ASTM D7844         >6         1.5 <t< td=""><td>Magnesium</td><td>ppm</td><td>ASTM D5185m</td><td>1010</td><th>821</th><td>787</td><td>973</td></t<>	Magnesium	ppm	ASTM D5185m	1010	821	787	973
Zinc         ppm         ASTM D5185m         1270         1096         1072         1281           Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         13.1         11.0 <td>Calcium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>1070</td> <th>859</th> <td>887</td> <td>1142</td>	Calcium	ppm	ASTM D5185m	1070	859	887	1142
Sulfur         ppm         ASTM D5185m         2060         2910         2999         2591           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         6         6         16           Potassium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25	Phosphorus	ppm	ASTM D5185m	1150	859	851	1054
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         6         6         16           Potassium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Zinc	ppm	ASTM D5185m	1270	1096	1072	1281
Silicon         ppm         ASTM D5185m         >25         5         5         9           Sodium         ppm         ASTM D5185m         6         6         16           Potassium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Sulfur	ppm	ASTM D5185m	2060	2910	2999	2591
Sodium         ppm         ASTM D5185m         6         6         16           Potassium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         2         8         2           Fuel         %         ASTM D3524         >3.0         13.7         11.9         2.2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Silicon	ppm	ASTM D5185m	>25	5	5	9
Fuel	Sodium	ppm	ASTM D5185m		6	6	16
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Potassium	ppm	ASTM D5185m	>20	2	8	2
Soot %         %         *ASTM D7844 > 6         1.5         0.8         1.3           Nitration         Abs/cm         *ASTM D7624 > 20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7415 > 30         24.2         21.2         27.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 > 25         24.4         18.6         27.4	Fuel	%	ASTM D3524	>3.0	13.7	11.9	2.2
Nitration         Abs/cm         *ASTM D7624         >20         13.1         11.0         14.0           Sulfation         Abs/.1mm         *ASTM D7615         >30         24.2         21.2         27.5           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Soot %	%	*ASTM D7844	>6	1.5	0.8	1.3
Sulfation         Abs/.1mm         *ASTM D7415         >30         24.2         21.2         27.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         24.4         18.6         27.4	Nitration						
Oxidation							
	FLUID DEGRA	NOITAC	method	limit/base	current	history1	history2
		Abs/.1mm	*ASTM D7414	>25	24.4	18.6	27.4



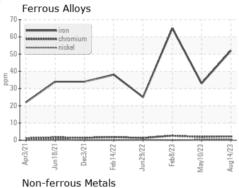
# **OIL ANALYSIS REPORT**



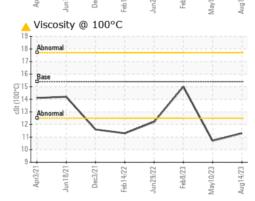
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	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

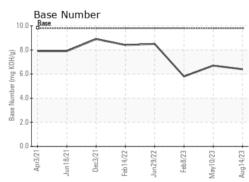
FLUID FROFI		memou	IIIIIII/Dase	Current	History	HISTOLYZ
Visc @ 100°C	cSt	ASTM D445	15.4	<u> </u>	10.7	15.0

# **GRAPHS**



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8 -	***************** lead					
_ 6-						
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2 -						/
0	- Comments of the	Principle of Street, or other Principles	The state of the s			hunny.
	pr3/2	ec3/2	29/22	sb8/23	10/23	14/23









Laboratory Sample No. Lab Number Unique Number : 10605757

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : GFL0086662 : 05925810

Received Diagnosed

: 16 Aug 2023 : 17 Aug 2023 Diagnostician : Wes Davis

Test Package : FLEET ( Additional Tests: PercentFuel ) 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.

GFL Environmental - 415 - Michigan East

6200 Elmridge Sterling Heights, MI US 48313 Contact: Frank Wolak fwolak@gflenv.com T: (586)825-9514

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)