

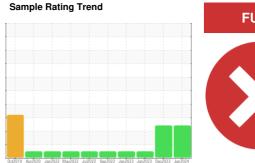
# **PROBLEM SUMMARY**



427087-402443

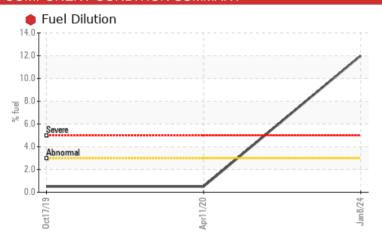
Component **Diesel Engine** 

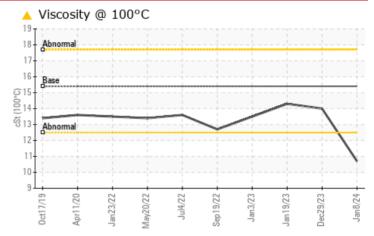
PETRO CANADA DURON SHP 15W40 (--- GAL)





### **COMPONENT CONDITION SUMMARY**





### RECOMMENDATION

We advise that you check the fuel injection system. We recommend that you drain the oil and perform a filter service on this component if not already done. Resample at the next service interval to monitor. ( Customer Sample Comment: Engine oil sample)

PROBLEMATIC TEST RESULTS									
Sample Status				SEVERE	ABNORMAL	NORMAL			
Fuel	%	ASTM D3524	>3.0	<b>12.0</b>	<1.0	<1.0			
Visc @ 100°C	cSt	ASTM D445	15.4	<b>10.7</b>	14.0	14.3			

Customer Id: GFL865 Sample No.: GFL0100552 Lab Number: 06059972 Test Package: FLEET



To manage this report scan the QR code

To discuss the diagnosis or test data:

Don Baldridge +1 don.b505@comcast.net

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

#### **RECOMMENDED ACTIONS** Action **Status** Date Done By Description We recommend that you drain the oil and perform a filter service on this Change Fluid ? component if not already done. We recommend that you drain the oil and perform a filter service on this Change Filter ? component if not already done. Check Fuel/injector ? We advise that you check the fuel injection system. System

### HISTORICAL DIAGNOSIS

### 29 Dec 2023 Diag: Jonathan Hester

GLYCOL



We advise that you check for the source of the coolant leak. Check for low coolant level. 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. Sodium and/or potassium levels are high. The BN result indicates that there is suitable alkalinity remaining in the oil.



### 19 Jan 2023 Diag: Wes Davis

NORMAL



Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. All component wear rates are normal. There is no indication of any contamination 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.



### 03 Jan 2023 Diag: Wes Davis

NORMAL



Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. All component wear rates are normal. There is no indication of any contamination 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.





## **OIL ANALYSIS REPORT**

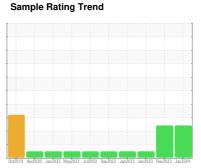


427087-402443

Component

Diesel Engine

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





### DIAGNOSIS

### Recommendation

We advise that you check the fuel injection system. We recommend that you drain the oil and perform a filter service on this component if not already done. Resample at the next service interval to monitor. (Customer Sample Comment: Engine oil sample)

### Wear

All component wear rates are normal.

### Contamination

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

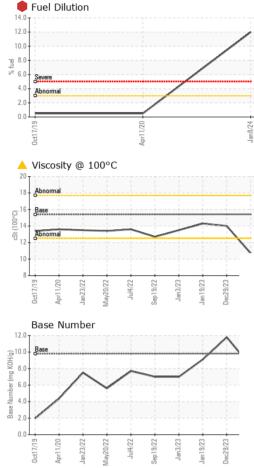
### ▲ Fluid Condition

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   Imitibase   current   Mistory1   Mistory2	N SHP 15W40 (	- GAL)	OctZ019 AprZ	020 Jan2022 May2022 Jul20	022 Sep2022 Jan2023 Jan2023 Dec2	023 Jan2024	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Sample Date	Sample Number		Client Info		GFL0100552	GFL0103951	GFL0065233
Machine Age         hrs         Client Info         18356         328962         326297           Oil Age         hrs         Client Info         Not Changed         A13           Oil Changed         Client Info         Not Changed         Changed         Changed           Sample Status         SEVERE         ABNORMAL         NORMAL           CONTAMINATION         method         Imitibase         current         history1         history2           Water         WC Method         NEG         NEG         NEG         NEG           Glycol         WC Method         Imitibase         current         history1         history2           Iron         ppm         ASTM 05185n         >20         0         0         <1			Client Info		08 Jan 2024	29 Dec 2023	19 Jan 2023
Dil Age	•	hrs			18356	328962	326297
Dil Changed   Changed   Changed   SEVERE   ABNORMAL   NORMAL		hrs	Client Info		18356	328962	413
Severe	-		Client Info		Not Changd	Changed	Changed
Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         5         19         8           Chromium         ppm         ASTM D5185m         >20         0         0         <1           Nickel         ppm         ASTM D5185m         >5         0         0         0           Silver         ppm         ASTM D5185m         >2         0         0         0           Silver         ppm         ASTM D5185m         >20         4         4         <1           Lead         ppm         ASTM D5185m         >40         <1         8         <1           Copper         ppm         ASTM D5185m         >330         12         51         2           Tin         ppm         ASTM D5185m         0         0         0         <1           Vanadium         ppm         ASTM D5185m         0         34         240         0           ADDITIVES					SEVERE	ABNORMAL	NORMAL
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >120         5         19         8           Chromium         ppm         ASTM D5185m         >20         0         0         <1	Water		WC Method	>0.2	NEG	NEG	NEG
Chromium	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         0         0         <1           Nickel         ppm         ASTM D5185m         >5         0         0         0           Titianium         ppm         ASTM D5185m         >2         0         0         0           Siliver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >2         0         0         0           Lead         ppm         ASTM D5185m         >40         <1         8         <1           Copper         ppm         ASTM D5185m         >40         <1         8         <1           Copper         ppm         ASTM D5185m         >41         0         0         <1           Vanadium         ppm         ASTM D5185m         0         0         0         <1         0         0           Cadmium         ppm         ASTM D5185m         0         34         240         0         0           Barium         ppm         ASTM D5185m <t< td=""><td>WEAR METAL</td><td>S</td><td>method</td><td>limit/base</td><td>current</td><td>history1</td><td>history2</td></t<>	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel	ron	ppm	ASTM D5185m	>120	5	19	8
Description	Chromium	ppm	ASTM D5185m	>20	0	0	<1
Silver	Nickel	ppm	ASTM D5185m	>5	0	0	0
Aluminum ppm ASTM D5185m >20 4 4 4 <1 Lead ppm ASTM D5185m >40 <1 8 <1 Copper ppm ASTM D5185m >330 12 51 2 Tin ppm ASTM D5185m >15 0 0 <1 Cadmium ppm ASTM D5185m >15 0 0 0 <1 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 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 history1 history2 Boron ppm ASTM D5185m 0 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 history1 history2  Boron ppm ASTM D5185m 10 0 0 0 0 0 0  ADDITIVES method limit/base current limit/base current limit/base current history1 history2  Boron ppm ASTM D5185m 20 0 23	Titanium	ppm	ASTM D5185m	>2	0	0	0
Lead         ppm         ASTM D5185m         >40         <1         8         <1           Copper         ppm         ASTM D5185m         >330         12         51         2           Tin         ppm         ASTM D5185m         >15         0         0         <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper         ppm         ASTM D5185m         >330         12         51         2           Tin         ppm         ASTM D5185m         >15         0         0         <1	Aluminum	ppm	ASTM D5185m	>20	4	4	<1
Tin	Lead	ppm	ASTM D5185m	>40	<1	8	<1
Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         34         240         0           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         0         0         0           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         >20         2866         3330 <td>Copper</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;330</td> <td>12</td> <td>51</td> <td>2</td>	Copper	ppm	ASTM D5185m	>330	12	51	2
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         34         240         0           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         55         100         62           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current </td <td>Tin</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;15</td> <td>0</td> <td>0</td> <td>&lt;1</td>	Tin	ppm	ASTM D5185m	>15	0	0	<1
ADDITIVES  method limit/base current history1 history2  Boron ppm ASTM D5185m 0 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 0 0 0 0  Magnesium ppm ASTM D5185m 1010 723 366 965  Calcium ppm ASTM D5185m 1070 1056 963 1089  Phosphorus ppm ASTM D5185m 1150 940 1009 1085  Zinc ppm ASTM D5185m 1270 1105 1209 1275  Sulfur ppm ASTM D5185m 2060 2866 3330 3225  CONTAMINANTS method limit/base current history1 history2  Silicon ppm ASTM D5185m 20 23  166 2  Fuel % ASTM D5185m >20 23  166 2  Fuel % ASTM D5185m >20 23  166 2  Fuel % ASTM D5185m >20 5.1 5.1 5.9  Sulfration Abs/.1mm *ASTM D7415 >30 17.6 20.1 18.2  FLUID DEGRADATION method limit/base current history1 history2  ELUID DEGRADATION method limit/base current history1 history2  Dxidation Abs/.1mm *ASTM D7415 >30 17.6 20.1 18.2	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         55         100         62           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         19         118         <1           Potassium         ppm         ASTM D5185m	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         55         100         62           Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D7844 <th< td=""><td>Boron</td><td>ppm</td><td>ASTM D5185m</td><td>0</td><td>34</td><td>240</td><td>0</td></th<>	Boron	ppm	ASTM D5185m	0	34	240	0
Manganese         ppm         ASTM D5185m         0         <1         <1         <1           Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         225         7         15         6           Sodium         ppm         ASTM D5185m         20         23         166         2           Fuel         %         ASTM D5185m         20         23         166         2           Fuel         %         ASTM D5185m         20         23         166         2           Fuel         %         *ASTM D5185m         20		ppm	ASTM D5185m	0	0	0	0
Magnesium         ppm         ASTM D5185m         1010         723         366         965           Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D3524         >3.0         12.0         <1.0	Molybdenum	ppm			55	100	62
Calcium         ppm         ASTM D5185m         1070         1056         963         1089           Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Solicon         ppm         ASTM D5185m         >25         7         15         6           Solicon         ppm         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D3524         >3.0         12.0         <1.0	Manganese	ppm	ASTM D5185m	0	<1	<1	<1
Phosphorus         ppm         ASTM D5185m         1150         940         1009         1085           Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D3524         >3.0         12.0         <1.0	Magnesium	ppm	ASTM D5185m	1010	723	366	965
Zinc         ppm         ASTM D5185m         1270         1105         1209         1275           Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D5185m         >20         23         166         2           Fuel         %         ASTM D3524         >3.0         12.0         <1.0	Calcium	ppm	ASTM D5185m	1070	1056	963	1089
Sulfur         ppm         ASTM D5185m         2060         2866         3330         3225           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         19         118         <1	Phosphorus	ppm	ASTM D5185m	1150	940	1009	1085
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         7         15         6           Sodium         ppm         ASTM D5185m         19         118         <1	Zinc	ppm	ASTM D5185m	1270	1105	1209	1275
Silicon       ppm       ASTM D5185m       >25       7       15       6         Sodium       ppm       ASTM D5185m       19       118       <1         Potassium       ppm       ASTM D5185m       >20       23       166       2         Fuel       %       ASTM D3524       >3.0       12.0       <1.0       <1.0         INFRA-RED       method       limit/base       current       history1       history2         Soot %       %       *ASTM D7844       >4       0.1       0.1       0.4         Nitration       Abs/cm       *ASTM D7624       >20       5.1       5.1       5.9         Sulfation       Abs/.1mm       *ASTM D7415       >30       17.6       20.1       18.2         FLUID DEGRADATION       method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       *ASTM D7414       >25       13.2       14.0       13.3	Sulfur	ppm	ASTM D5185m	2060	2866	3330	3225
Sodium	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         23         ▲ 166         2           Fuel         %         ASTM D3524         >3.0         12.0         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >4         0.1         0.1         0.4           Nitration         Abs/cm         *ASTM D7624         >20         5.1         5.1         5.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.6         20.1         18.2           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.2         14.0         13.3	Silicon	ppm	ASTM D5185m	>25	7	15	6
Fuel % ASTM D3524 >3.0	Sodium	ppm	ASTM D5185m		19	<u></u> 118	<1
INFRA-RED	Data a strong	nnm	ASTM D5185m	>20	23	A 166	2
Soot %         %         *ASTM D7844 >4         0.1         0.1         0.4           Nitration         Abs/cm         *ASTM D7624 >20         5.1         5.1         5.9           Sulfation         Abs/.1mm         *ASTM D7415 >30         17.6         20.1         18.2           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         13.2         14.0         13.3	Potassium	ppiii		/ = 0			
Nitration         Abs/cm         *ASTM D7624         >20         5.1         5.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.6         20.1         18.2           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.2         14.0         13.3			ASTM D3524		12.0		<1.0
Sulfation         Abs/.1mm         *ASTM D7415         >30         17.6         20.1         18.2           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.2         14.0         13.3	Fuel			>3.0		<1.0	
FLUID DEGRADATION method limit/base current history1 history2  Oxidation Abs/.1mm *ASTM D7414 >25 13.2 14.0 13.3	Fuel INFRA-RED	%	method	>3.0 limit/base	current	<1.0 history1	history2
Oxidation	Fuel INFRA-RED Soot %	%	method *ASTM D7844	>3.0 limit/base >4	current 0.1	<1.0 history1 0.1	history2
	Fuel INFRA-RED Soot % Nitration	% Abs/cm	method *ASTM D7844 *ASTM D7624	>3.0 limit/base >4 >20	current 0.1 5.1	<1.0 history1 0.1 5.1	history2 0.4 5.9
Base Number (BN)         mg KOH/g         ASTM D2896         9.8         8.3         11.8         9.1	Fuel INFRA-RED Soot % Nitration Sulfation	% Abs/cm Abs/.1mm	method  *ASTM D7844  *ASTM D7624  *ASTM D7415	>3.0 limit/base >4 >20 >30	current 0.1 5.1 17.6	<1.0 history1 0.1 5.1 20.1	history2 0.4 5.9 18.2
	Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRAE	% Abs/cm Abs/.1mm	method  *ASTM D7844  *ASTM D7624  *ASTM D7415  method	>3.0 limit/base >4 >20 >30 limit/base	current 0.1 5.1 17.6 current	<1.0 history1 0.1 5.1 20.1 history1	history2 0.4 5.9 18.2 history2



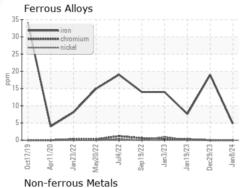
### **OIL ANALYSIS REPORT**

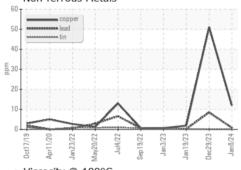


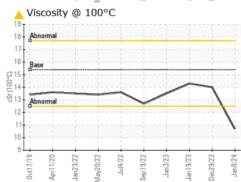
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

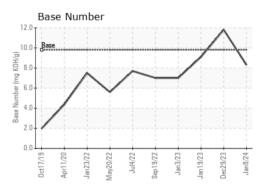
FLUID PROP	ERIIES	method	iiiiii/base	current	riistory i	nistoryz
Visc @ 100°C	cSt	ASTM D445	15.4	<b>10.7</b>	14.0	14.3

### **GRAPHS**













Laboratory Sample No. Lab Number Unique Number : 10831354

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : 06059972

: GFL0100552

Recieved Diagnosed

: 12 Jan 2024 : 16 Jan 2024

Diagnostician : Don Baldridge **Test Package**: FLEET (Additional Tests: FuelDilution, 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. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

GFL Environmental - 865 - East Mount Hauling

7213 East Mount Houston Road Houston, TX US 77050

Contact: Jose Gonzalez

jgonzalez2@gflenv.com

T: F: