

# **OIL ANALYSIS REPORT**

## Sample Rating Trend

um8021 De2021 Aug2022 Aug2023 Sep2023 Oct023 De2022 Jan2024

NORMAL



Machine Id **929089-205312** 

Component

**Diesel Engine** 

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

## DIAGNOSIS

## Recommendation

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.

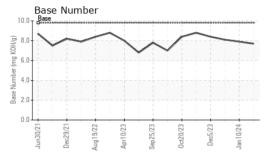
## **Fluid Condition**

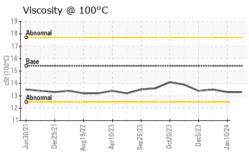
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION   method   imit/bass   current   history1   nistory2	GAL)		Jun2021 Dec	2021 Aug2022 Apr2023	Sep2023 Oct2023 Dec2023	Jan 2024		
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2	
Machine Age   hrs   Client Info   S80   526   400	Sample Number		Client Info		GFL0093537	GFL0048368	GFL0093563	
Oil Age         hrs         Client Info         580         526         400           Oil Changed Sample Status         Client Info         Changed Not Change	Sample Date		Client Info		18 Jan 2024	10 Jan 2024	27 Dec 2023	
Oil Changed   Sample Status   Changed   NORMAL   NORMAL   NORMAL   NORMAL	Machine Age	hrs	Client Info		22961	22907	22781	
Sample Status	Oil Age	hrs	Client Info		580	526	400	
CONTAMINATION	Oil Changed		Client Info		Changed	Not Changd	Not Changd	
Fuel	Sample Status				NORMAL	NORMAL	NORMAL	
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         >100         10         6         7           Chromium         ppm         ASTM D5185m         >20         <1         0         <1           Nickel         ppm         ASTM D5185m         >4         0         0         0           Silver         ppm         ASTM D5185m         >4         0         0         0           Aluminum         ppm         ASTM D5185m         >20         3         2         3           Lead         ppm         ASTM D5185m         >40         4         3         2           Copper         ppm         ASTM D5185m         >40         4         3         2           Tin         ppm         ASTM D5185m         >15         <1         0         <1           Vanadium         ppm         ASTM D5185m         >10         0         0            Cadmium	CONTAMINAT	ION	method	limit/base	current	history1	history2	
Silycol	Fuel		WC Method	>5	<1.0	<1.0	<1.0	
Iron	Water		WC Method	>0.2	NEG	NEG	NEG	
Iron	Glycol		WC Method		NEG	NEG	NEG	
Chromium         ppm         ASTM D5185m         ≥20         <1         0         <1           Nickel         ppm         ASTM D5185m         >4         0         0         0           Titanium         ppm         ASTM D5185m         9         8         8           Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         3         2         3           Lead         ppm         ASTM D5185m         >40         4         3         2           Copper         ppm         ASTM D5185m         >40         4         3         2           Tin         ppm         ASTM D5185m         >15         <1	WEAR METAL	.S	method	limit/base	current	history1	history2	
Nickel	Iron	ppm	ASTM D5185m	>100	10	6	7	
Titanium	Chromium	ppm	ASTM D5185m	>20	<1	0	<1	
Silver	Nickel	ppm	ASTM D5185m	>4	0	0	0	
Aluminum	Titanium	ppm	ASTM D5185m		9	8	8	
Lead         ppm         ASTM D5185m         >40         4         3         2           Copper         ppm         ASTM D5185m         >330         4         3         2           Tin         ppm         ASTM D5185m         >15         <1         0         <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         9         9         11           Barium         ppm         ASTM D5185m         0         9         9         11           Barium         ppm         ASTM D5185m         0         3         0         0           Manganese         ppm         ASTM D5185m         0         0         0         0         0           Magnesium         ppm         ASTM D5185m         0         0         0         0         0           Calcium         ppm         ASTM D5185m         1070         1171         1105         12	Silver	ppm	ASTM D5185m	>3	0	0	0	
Copper         ppm         ASTM D5185m         >330         4         3         2           Tin         ppm         ASTM D5185m         >15         <1	Aluminum	ppm	ASTM D5185m	>20	3	2	3	
Tin         ppm         ASTM D5185m         >15         <1         0         <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         9         9         11           Barium         ppm         ASTM D5185m         0         3         0         0           Molybdenum         ppm         ASTM D5185m         0         3         0         0           Manganese         ppm         ASTM D5185m         0         0         0         0           Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         31	Lead	ppm	ASTM D5185m	>40	4	3		
Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         9         9         11           Barium         ppm         ASTM D5185m         0         3         0         0           Molybdenum         ppm         ASTM D5185m         0         0         0         0           Manganese         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current	Copper	ppm	ASTM D5185m	>330	4	3	2	
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         9         9         11           Barium         ppm         ASTM D5185m         0         9         9         11           Barium         ppm         ASTM D5185m         0 <th cols<="" td=""><td>Tin</td><td>ppm</td><td>ASTM D5185m</td><td>&gt;15</td><th>&lt;1</th><td>0</td><td></td></th>	<td>Tin</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;15</td> <th>&lt;1</th> <td>0</td> <td></td>	Tin	ppm	ASTM D5185m	>15	<1	0	
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         9         9         11           Barium         ppm         ASTM D5185m         0         3         0         0           Molybdenum         ppm         ASTM D5185m         60         58         53         61           Manganese         ppm         ASTM D5185m         0         0         0         0           Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m	Vanadium	ppm	ASTM D5185m		<1	0	0	
Boron	Cadmium	ppm	ASTM D5185m		0	0	0	
Barium         ppm         ASTM D5185m         0         3         0         0           Molybdenum         ppm         ASTM D5185m         60         58         53         61           Manganese         ppm         ASTM D5185m         0         0         0         0           Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1           INFRA-RED         method         limit/base <th>ADDITIVES</th> <th></th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	ADDITIVES		method	limit/base	current	history1	history2	
Molybdenum         ppm         ASTM D5185m         60         58         53         61           Manganese         ppm         ASTM D5185m         0         0         0         0           Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7844         >3 <td>Boron</td> <td>ppm</td> <td></td> <td></td> <th></th> <td></td> <td></td>	Boron	ppm						
Manganese         ppm         ASTM D5185m         0         0         0         0           Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1		ppm	ASTM D5185m			-		
Magnesium         ppm         ASTM D5185m         1010         930         915         950           Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1	-							
Calcium         ppm         ASTM D5185m         1070         1171         1105         1212           Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1	-				-			
Phosphorus         ppm         ASTM D5185m         1150         1015         975         1053           Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1	-							
Zinc         ppm         ASTM D5185m         1270         1242         1282         1230           Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >25         4         4         2           Potassium         ppm         ASTM D5185m         >20         2         1         <1								
Sulfur         ppm         ASTM D5185m         2060         3443         2893         3112           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         >20         2         1         <1								
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         <1	-							
Silicon         ppm         ASTM D5185m         >25         4         6         7           Sodium         ppm         ASTM D5185m         <1         4         2           Potassium         ppm         ASTM D5185m         >20         2         1         <1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.4         0.3         0.3           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.2         7.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.3         19.9         19.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.9         15.3					3443			
Sodium         ppm         ASTM D5185m         <1         4         2           Potassium         ppm         ASTM D5185m         >20         2         1         <1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.4         0.3         0.3           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.2         7.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.3         19.9         19.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.9         15.3		ITS				•		
Potassium         ppm         ASTM D5185m         >20         2         1         <1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.4         0.3         0.3           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.2         7.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.3         19.9         19.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.9         15.3				>25				
INFRA-RED		ppm						
Soot %         %         *ASTM D7844 >3         0.4         0.3         0.3           Nitration         Abs/cm         *ASTM D7624 >20         8.5         8.2         7.6           Sulfation         Abs/.1mm         *ASTM D7415 >30         20.3         19.9         19.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         16.0         15.9         15.3	Potassium	ppm	ASTM D5185m	>20	2	1	<1	
Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.2         7.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.3         19.9         19.5           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         15.9         15.3	INFRA-RED		method	limit/base	current	history1	history2	
Sulfation         Abs/.1mm         *ASTM D7415 >30         20.3         19.9         19.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         16.0         15.9         15.3	Soot %							
FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2516.015.915.3	Nitration	Abs/cm	*ASTM D7624	>20	8.5	8.2	7.6	
Oxidation Abs/.1mm *ASTM D7414 >25 <b>16.0</b> 15.9 15.3	Sulfation	Abs/.1mm	*ASTM D7415	>30	20.3	19.9	19.5	
	FLUID DEGRAI	NOITAC	method	limit/base	current	history1	history2	
<b>Base Number (BN)</b> mg KOH/g ASTM D2896 9.8 <b>7.7</b> 7.9 8.1	Oxidation	Abs/.1mm	*ASTM D7414	>25	16.0	15.9	15.3	
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	7.7	7.9	8.1	



# **OIL ANALYSIS REPORT**

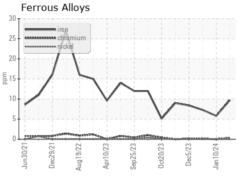


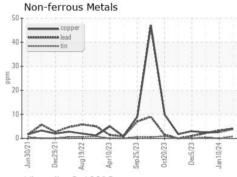


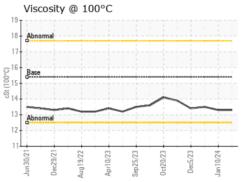
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

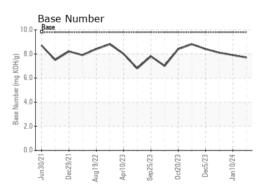
FLUID PROPE	RTIES	method				history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.3	13.3	13.5

## **GRAPHS**













Certificate L2367

Laboratory Sample No. Lab Number Test Package : FLEET

Unique Number : 10843171

: GFL0093537 : 06066494

To discuss this sample report, contact Customer Service at 1-800-237-1369.

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Recieved : 22 Jan 2024 : 22 Jan 2024 Diagnosed

Diagnostician : Wes Davis

GFL Environmental - 891 - Oklahoma City Hauling 1001 South Rockwell Oklahoma City, OK

US 73128 Contact: Andy Smith andrew.smith@gflenv.com T: (405)306-1651

\* - 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)