

OIL ANALYSIS REPORT

Sample Rating Trend





428010

Fluid

Component Diesel Engine

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

Sample Number Client Info GFL 0023443 GFL 0060413 GFL 0060413 GFL 0060413 GFL 0060413 GFL 0060413 GFL 0060433 I Mar 2022 Machine Age hrs Client Info 404407 12618 11479 Oil Age hrs Client Info 13495 0 0 Oil Changed Client Info 13495 0 0 0 Sample Status Imathematic Current NoRMAL NORMAL NORMAL CONTAMINATION method Imit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG WEAR METALS method Imit/base current history1 history2 Iron ppm ASTM 05185m >20 <1 <1 1 <1 <	N SHP 15W40 (-	- GAL)	Apr2021	May2022 Jun2022	Nov2022 Mar2023 Aug2023	Dec2023	
Sample Date Client Info 02 Dec 2023 21 Aug 2023 13 Mar 202 Machine Age hrs Client Info 404407 12618 11479 Oil Age hrs Client Info 13495 0 0 0 Oil Changed Client Info Changed NCR NC	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 404407 12618 11479 Oil Age hrs Client Info 13495 0 0 Oil Changed Client Info 13495 0 0 0 Sample Status Imit/base Current History1 NoRMAL CONTAMINATION method Imit/base current History1 History2 Water WC Method >0.2 NEG NEG NEG Water WC Method >0.2 NEG NEG NEG Water WC Method >0.2 NEG NEG NEG Iron ppm ASTM D5185m >20 <1	Sample Number		Client Info		GFL0023443	GFL0060413	GFL006039
Oil Age hrs Client Info 13495 0 0 Oil Changed Client Info ATTENTION NORMAL NORMAL Sample Status WC Method 0.2 NEG NEG NEG Qiyool WC Method 0.2 NEG NEG NEG Water WC Method 0.2 NEG NEG NEG Qiyool WC Method 0.2 NEG NEG NEG Water WC Method 0.2 NEG NEG NEG Water WC Method 0.2 15 17 Chromium ppm ASTM D5185m >20 <1	Sample Date		Client Info		02 Dec 2023	21 Aug 2023	13 Mar 2023
Oil Changed Sample Status Client Info Changed ATTENTION Changed NORMAL Changed NORMAL Changed NORMAL CONTAMINATION method Imit/base current history1 history1 Water WC Method >0.2 NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG WEAR METALS method Imit/base current history1 history2 Iron ppm ASTM D5185m >100 92 15 17 Chromium ppm ASTM D5185m >20 <1	Machine Age	hrs	Client Info		404407	12618	11479
Sample Status ATTENTION NORMAL NORMAL CONTAMINATION method limit/base current history1 history1 Water WC Method >0.2 NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG WEAR METALS method Imit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	Oil Age	hrs	Client Info		13495	0	0
CONTAMINATION method limit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG WEAR METALS method imit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	Oil Changed		Client Info		Changed	Changed	Changed
Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	Sample Status				ATTENTION	NORMAL	NORMAL
Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >20 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron ppm ASTM D5185m >100 92 15 17 Chromium ppm ASTM D5185m >20 <1	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1 <1 <1 Nickel ppm ASTM D5185m >2 <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel ppm ASTM D5185m >2 <1 <1 <1 Titanium ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >25 5 3 2 Lead ppm ASTM D5185m >25 5 3 2 Lead ppm ASTM D5185m >330 3 4 1 Tin ppm ASTM D5185m >330 3 4 1 Tin ppm ASTM D5185m >15 <1	Iron	ppm	ASTM D5185m	>100	92	15	17
Titanium ppm ASTM D5185m <1 <1 <1 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >25 5 3 2 Lead ppm ASTM D5185m >330 3 4 1 Copper ppm ASTM D5185m >15 <1	Chromium	ppm	ASTM D5185m	>20	<1	<1	<1
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >25 5 3 2 Lead ppm ASTM D5185m >330 3 4 1 Copper ppm ASTM D5185m >330 3 4 1 Tin ppm ASTM D5185m >15 <1	Nickel	ppm	ASTM D5185m	>2	<1	<1	<1
Aluminum ppm ASTM D5185m >25 5 3 2 Lead ppm ASTM D5185m >40 1 <1	Titanium	ppm	ASTM D5185m		<1	<1	<1
Lead ppm ASTM D5185m >40 1 <1 <1 <1 Copper ppm ASTM D5185m >330 3 4 1 Tin ppm ASTM D5185m >15 <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper ppm ASTM D5185m >330 3 4 1 Tin ppm ASTM D5185m >15 <1	Aluminum	ppm	ASTM D5185m	>25	5	3	2
Tin ppm ASTM D5185m >15 <1 0 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 8 2 4 Boron ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 0 44 58 51 Magnesium ppm ASTM D5185m 0 <1	Lead	ppm	ASTM D5185m	>40	1	<1	<1
Tin ppm ASTM D5185m >15 <1 0 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 0 44 58 51 Manganese ppm ASTM D5185m 0 <1	Copper	ppm	ASTM D5185m	>330	3	4	1
Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Boron ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 0 0 0 0 Maganese ppm ASTM D5185m 0 <1 <1 <1 <1 Magnesium ppm ASTM D5185m 0 <1 <1 <1 <1 Magnesium ppm ASTM D5185m 1010 627 904 768 Calcium ppm ASTM D5185m 1070 784 1037 1083 Phosphorus ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2660 2719 2930 2662 CONTAMINANTS method limit/	Tin	ppm	ASTM D5185m	>15	<1	0	<1
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 0 0 0 Malganese ppm ASTM D5185m 60 44 58 51 Manganese ppm ASTM D5185m 0 <1	Vanadium		ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 0 8 2 4 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 60 44 58 51 Manganese ppm ASTM D5185m 0 <1	Cadmium		ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 0 0 Molybdenum ppm ASTM D5185m 60 44 58 51 Manganese ppm ASTM D5185m 0 <1	ADDITIVES		method	limit/base	current	history1	history2
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Manganese ppm ASTM D5185m 0 <1 <1 <1 Magnesium ppm ASTM D5185m 1010 627 904 768 Calcium ppm ASTM D5185m 1070 784 1037 1083 Phosphorus ppm ASTM D5185m 1150 790 1024 930 Zinc ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D5185m >20 7 4 6 Sodium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D7844 >3	Barium	ppm	ASTM D5185m	0	0	0	0
Magnesium ppm ASTM D5185m 1010 627 904 768 Calcium ppm ASTM D5185m 1070 784 1037 1083 Phosphorus ppm ASTM D5185m 1150 790 1024 930 Zinc ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D585m >20 7 4 6 Fuel % ASTM D585m >20 7 4 6 Sodium ppm ASTM D585m >20 7 4 6 Fuel % ASTM D7844 >3 0.4 <td>Molybdenum</td> <td>ppm</td> <td>ASTM D5185m</td> <td>60</td> <th>44</th> <td>58</td> <td>51</td>	Molybdenum	ppm	ASTM D5185m	60	44	58	51
Calcium ppm ASTM D5185m 1070 784 1037 1083 Phosphorus ppm ASTM D5185m 1150 790 1024 930 Zinc ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D5185m >20 7 4 6 Fuel % ASTM D5185m >20 7 4 6 Sodium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/rm<*ASTM D7624	Manganese	ppm	ASTM D5185m	0	<1	<1	<1
Phosphorus ppm ASTM D5185m 1150 790 1024 930 Zinc ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >25 11 4 5 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0	Magnesium	ppm	ASTM D5185m	1010	627	904	768
Zinc ppm ASTM D5185m 1270 891 1222 1100 Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m 32 18 25 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0	Calcium	ppm	ASTM D5185m	1070	784	1037	1083
Sulfur ppm ASTM D5185m 2060 2719 2930 2662 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >25 11 4 5 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0	Phosphorus	ppm	ASTM D5185m	1150	790	1024	930
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m >25 11 4 5 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0	Zinc	ppm	ASTM D5185m	1270	891	1222	1100
Silicon ppm ASTM D5185m >25 11 4 5 Sodium ppm ASTM D5185m 32 18 25 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0	Sulfur	ppm	ASTM D5185m	2060	2719	2930	2662
Sodium ppm ASTM D5185m 32 18 25 Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.imm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.imm *ASTM D7414 >25 20.1 13.9 12.5	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 7 4 6 Fuel % ASTM D3524 >6.0 1.3 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.imm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.imm *ASTM D7414 >25 20.1 13.9 12.5	Silicon	ppm	ASTM D5185m	>25	11	4	5
Fuel % ASTM D3524 >6.0 1.3 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	Sodium	ppm	ASTM D5185m		32	18	25
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.imm *ASTM D7615 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.imm *ASTM D7414 >25 20.1 13.9 12.5	Potassium	ppm	ASTM D5185m	>20	7	4	6
Soot % % *ASTM D7844 >3 0.4 0.4 0.7 Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	Fuel	%	ASTM D3524	>6.0	1.3	<1.0	<1.0
Nitration Abs/cm *ASTM D7624 >20 8.5 6.4 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	Soot %	%	*ASTM D7844	>3	0.4	0.4	0.7
Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.2 18.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	Nitration	Abs/cm	*ASTM D7624	>20	8.5	6.4	6.9
Oxidation Abs/.1mm *ASTM D7414 >25 20.1 13.9 12.5	Sulfation	Abs/.1mm	*ASTM D7415	>30		18.2	
	FLUID DEGRAI		method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	20.1	13.9	12.5
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	4.4	8.9	9.3

DIAGNOSIS

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

Fuel content negligible. There is no indication of any contamination in the oil.

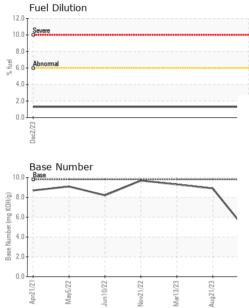
Fluid Condition

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



OIL ANALYSIS REPORT





				VISUA	L		method	d limit/ba	ase	current		history	1	histo	ory2
			v	Nhite Meta	al	scalar	*Visual	NONE	١	IONE		NONE		NONE	
			Y	Yellow Me	tal	scalar	*Visual	NONE	١	IONE		NONE		NONE	
			P	Precipitate	•	scalar	*Visual	NONE	١	IONE		NONE		NONE	
				Silt		scalar	*Visual	NONE		IONE		NONE		NONE	
				Debris		scalar	*Visual	NONE		IONE		NONE		NONE	
				Sand/Dirt		scalar	*Visual	NONE		IONE		NONE		NONE	
		Dec2/23	A	Appearanc	e	scalar	*Visual	NORML		IORML		NORML		NORN	
			C	Ddor		scalar	*Visual	NORML		IORML		NORML		NORN	/IL
				Emulsified		scalar	*Visual	>0.2		IEG		NEG		NEG	
				Free Wate	r	scalar	*Visual		r	IEG		NEG		NEG	
						ERTIES	methoo	d limit/ba	ase	current		history	1	histo	ory2
		-	V	/isc @ 10		cSt	ASTM D4	45 15.4	1	1.3		13.5		12.9	
				GRAPH											
			250-	Iron (pp	m)				Le	ad (ppm)				
			200-	Severe					80 - Se	vere					
			E 150						e 60-						
			^읍 100-	Abnormal				/	40 - Ab	normal					
			50-						20-						
			0.	21	- 22	22	23-1	33		22	22	22	23.	23.	5
				Apr21/21 May5/22	Jun10/22	Nov21/22	Mar13/23 Aug21/23	Dec2/23	Apr21/21	May5/22	Jun10/22	Nov21/22	Mar13/23	Aug21/23	Doc 2 12 2
				Aluminu			~ ~	C		- Iromium			2	A	
			50-	T:					⁵⁰ T 7		(ppm)				
			40-		1					vere			1		
	3		³⁰ 20	Abnormal					20 - Ab	normal					
Nov21/22	Mar13/23 Aug21/23			1						iterina					
2	A A		10· 0·	<u> </u>					10			1			
				Apr21/21	Jun10/22 -	Nov21/22 -	Mar13/23 -	Dec2/23	Apr21/21	May5/22 -	Jun10/22 -	Nov21/22 -	Mar13/23 -	Aug21/23 .	Dar2 172
					2	Novi	Mar	e			-	Novi	Mar	Aug	ć
			400-	Copper ((ppm)				80 T Se	icon (pp vere	m)				
			300-	Alinomal					60 -			1			
			튭 200 -						특 40 -						
									Ab	normal		1			
			100-						20						-
			0.	1/21	122	/22	1/23	1/23	1210	./22 -	1/22	/22	1/23 -	123-	661
				Apr21/21 May5/22	Jun10/22	Nov21/22	Mar13/23 Aug21/23	Dec2/23	Apr21/21	May5/22	Jun10/22	Nov21/22	Mar13/23	Aug21/23	C(1 Cool)
			20	Viscosity	@ 1009	C			Ba 10.0 - Ba	se Numl	ber				
			18-						Base Number (mg KOH(g))		~			-	
			00 16	Base					Ē 6.0-						
			(D-001) 14-	Abnormal					ag 4.0						
			12.	0											
			10-		22+	22	23		0.0	22+	22	22	23	23	50
					Jun10/22	Nov21/22	Mar13/23 Aug 21/23	Dec2/23	Apr21/21	May5/22	Jun10/22	Nov21/22	Mar13/23	Aug21/23	Der 7/73
				Apr21/21 May5/22	Jur	No	2 4					-	~	<	
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	Labor Samp				ck USA -		son Ave.,	Cary, NC 23 27 Dec 2023		GFL	-	onmenta	al - 660		
	Samp Lab N	le No. umber	: (: (WearCheo GFL00234 06045826	ck USA - 143	501 Madi Recieve Diagnos	son Ave., d : 2 ed : 2	Cary, NC 23 27 Dec 2023 28 Dec 2023	3 3	GFL	-		al - 660 204	IS - Roa 45 LEE overdal	HW` e, VA
	Samp Lab N Unique	le No. umber Number	: (: (: 1	WearCheo GFL00234 <mark>06045826</mark> 10806434	ck USA - 143	501 Madi Recieve Diagnos Diagnos	son Ave., d :2 aed :2 tician :[Cary, NC 23 27 Dec 2023 28 Dec 2023 Don Baldridg	3 3 ge	GFL	Enviro	onmenta	a l - 660 204 Cl	IS - Roa 45 LEE overdal US 2	HW` e, V/ 2407
Centificate L2367 to discuss th	Samp Lab N Unique Test F	le No. umber Number Package	: (: (: 1 : N	WearCheo GFL00234 06045826 10806434 MOB1+ (/	ck USA - 443 Addition	501 Madi Recieve Diagnos Diagnos al Tests: F	son Ave., d : 2 sed : 2 tician : [fuelDilution	Cary, NC 2 27 Dec 2023 28 Dec 2023 Don Baldridg n, PercentFu	3 3 ge	GFL	Enviro		a l - 660 204 Cl	IS - Roa 45 LEE overdal US 2	HW` e, V/ 2407

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Contact/Location: DELBERT BEASLEY - GFL660R