

### **OIL ANALYSIS REPORT**

Sample Rating Trend

NORMAL

# 429052-402457

Component Diesel Engine

Fluid PETRO CANADA DURON SHP 15W40 (--- LTR)

#### 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

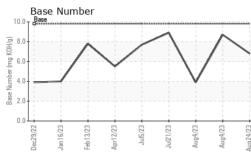
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

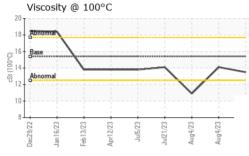
SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		GFL0078701	GFL0086362	GFL0086355
Sample Date		Client Info		24 Aug 2023	04 Aug 2023	04 Aug 2023
Machine Age	hrs	Client Info		10936	10776	10776
Oil Age	hrs	Client Info		304	0	144
Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Sample Status				NORMAL	NORMAL	ABNORMAL
CONTAMINAT	ION	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	1.9
Glycol		WC Method		NEG	NEG	NEG
WEAR METAL	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>110	14	5	17
Chromium	ppm	ASTM D5185m		<1	0	<1
Nickel	ppm	ASTM D5185m		0	0	<1
Titanium	ppm	ASTM D5185m		0	<1	0
Silver	ppm	ASTM D5185m	>2	<1	0	0
Aluminum	ppm	ASTM D5185m	>25	7	1	4
Lead	ppm	ASTM D5185m	>45	<1	0	2
Copper	ppm	ASTM D5185m		6	<1	4
Tin	ppm	ASTM D5185m	>4	<1	<1	<1
Vanadium	ppm	ASTM D5185m	~7	0	<1	0
Cadmium	ppm	ASTM D5185m		0	0	0
	ppin		11 11 11	-	-	-
ADDITIVES	0000		limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	0	62	7	4
Boron Barium	ppm	ASTM D5185m ASTM D5185m	0	62 0	7 0	4
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60	62 0 94	7 0 62	4 0 34
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0	62 0 94 1	7 0 62 <1	4 0 34 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010	62 0 94 1 858	7 0 62 <1 975	4 0 34 <1 ▲ 491
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070	62 0 94 1 858 1402	7 0 62 <1 975 1117	4 0 34 <1 ▲ 491 ▲ 602
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150	62 0 94 1 858 1402 868	7 0 62 <1 975 1117 1010	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270	62 0 94 1 858 1402 868 1117	7 0 62 <1 975 1117 1010 1243	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060	62 0 94 1 858 1402 868 1117 3408	7 0 62 <1 975 1117 1010 1243 3628	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 1010 1070 1150 1270 2060	62 0 94 1 858 1402 868 1117 3408 current	7 0 62 <1 975 1117 1010 1243 3628 history1	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b>	0 0 60 1010 1070 1150 1270 2060	62 0 94 1 858 1402 868 1117 3408	7 0 62 <1 975 1117 1010 1243 3628	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 1010 1070 1150 1270 2060	62 0 94 1 858 1402 868 1117 3408 current	7 0 62 <1 975 1117 1010 1243 3628 history1	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4 10
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b>	0 0 60 1010 1070 1150 1270 2060 limit/base >30	62 0 94 1 858 1402 868 1117 3408 current 4	7 0 62 <1 975 1117 1010 1243 3628 history1 3	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	0 0 60 1010 1070 1150 1270 2060 limit/base >30	62 0 94 1 858 1402 868 1117 3408 <u>current</u> 4 2	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4 10
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 <b>limit/base</b> >30 -20	62 0 94 1 858 1402 868 1117 3408 current 4 2 4	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 ► history2 4 10 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 <b>Imit/base</b> >30 \$20	62 0 94 1 858 1402 868 1117 3408 current 4 2 4 2 4	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2 2 history1	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 ► history2 4 10 2 %
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 <b>Imit/base</b> >30 >20 <b>Imit/base</b>	62 0 94 1 858 1402 868 1117 3408 <u>current</u> 4 2 4 2 4	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2 <u>history1</u> 0.5	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 ► history2 4 10 2 ↓ 10 2 ↓ 10 2 ↓ 10 2 ↓ 10 2 ↓ 10 ↓ 10 ↓ 10 ↓ 10 ↓ 10 ↓ 10 ↓ 10 ↓ 10
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 <i>limit/base</i> >30 <i>limit/base</i> >20	62 0 94 1 858 1402 868 1117 3408 <u>current</u> 4 2 4 2 4 <u>current</u> 0.4 9.1	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2 history1 0.5 6.6	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4 10 2 history2 0.5 5.9
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 <b>imit/base</b> >30 <b>imit/base</b> >3 20	62 0 94 1 858 1402 868 1117 3408 <u>current</u> 4 2 4 2 4 <u>current</u> 0.4 9.1 22.2	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2 <u>history1</u> 0.5 6.6 18.7	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 ► history2 ▲ 4 10 2 ↓ 10 2 ↓ 10 2 ↓ 10 5 5.9 16.6
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRAI	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844	0 0 0 1010 1070 1150 1270 2060 2060 2060 2060 2060 2060 2060 2	62 0 94 1 858 1402 868 1117 3408 <i>current</i> 4 2 4 <i>current</i> 0.4 9.1 22.2 <i>current</i>	7 0 62 <1 975 1117 1010 1243 3628 history1 3 4 2 history1 0.5 6.6 18.7 history1	4 0 34 <1 ▲ 491 ▲ 602 ▲ 709 ▲ 856 2257 history2 4 10 2 history2 0.5 5.9 16.6



## **OIL ANALYSIS REPORT**

VISUAL





	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE	
	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE	
$\langle \rangle \rangle$	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	
Jul5/23 Jul21/23 Aug4/23 Aug4/23	Appearance	scalar	*Visual	NORML	NORML	NORML	NORML	
Jul Aug Aug	Odor	scalar	*Visual	NORML	NORML	NORML	NORML	
	Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG	
	Free Water	scalar	*Visual		NEG	NEG	NEG	
	FLUID PROPE	RTIES	method	limit/base	current	history1	history2	
	Visc @ 100°C	cSt	ASTM D445	15.4	13.5	14.1	▲ 10.9	
	GRAPHS							
	Ferrous Alloys							
Jul5/23 + - Jul21/23 + - Aug4/23 + -	150 - iron nickel							
	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>							
		33	23	23				
	Dec29/22 Jan 16/23 Feb 13/23 Apr 12/23	Jul5/23	Jul21/23 Aug4/23 Aug4/23	Aug24/23				
	Non-ferrous Meta	ls						
	140 120 100 80 60							
				<u></u>				
	Dec29/22 Jan16/23 Feb13/23 Apr12/23	Jul5/23	Jul21/23 Aug4/23 Aug4/23	Aug24/23				
	Viscosity @ 100°C	3		-	Baco Number			
	20 T		1 1 1	10.	Base Number			
	18 - Abnorma 16 - Base 20 14 - Abnorma		<u> </u>	8se Number (mg KOH/g) 7.9		$\checkmark$	$\backslash \land$	
	- Abnormal 12 - 10		$\vee$	A N N N N N N N N N N N N N N N N N N N			V	
	on Dec29/22 Jan16/23 Feb13/23	Jul5/23	Jul21/23 + Aug4/23 + Aug4/23 +	Aug24/23 +	Dec29/22	Apr12/23 + Jul5/23 +	Aug4/23 - Aug4/23 -	
Laboratory Sample No. Lab Number Unique Number Test Packag	: <mark>05946893</mark> er : 10642852	501 Madia Received Diagnos Diagnosi	d :11 ed :12	ry, NC 2751 Sep 2023 Sep 2023 s Davis	2023 1130 County Line R 2023 Trafford, A			
discuss this sample report Denotes test methods that atements of conformity to spe	are outside of the ISO 1	-	jonathan.williams@gflenv.com T					