

## **OIL ANALYSIS REPORT**

## Area **Plymouth & Brockton 440** Component

#### Component Diesel Engine

Fluid PETRO CANADA DURON SHP 15W40 (36 QTS)

## DIAGNOSIS

### Recommendation

Resample at the next service interval to monitor.

#### Wear

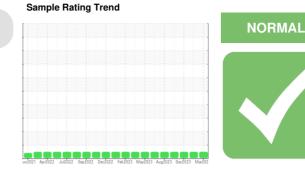
All component wear rates are normal.

#### 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.



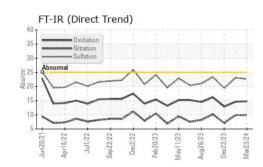
SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		PCA0104437	PCA0110053	PCA0104397
Sample Date		Client Info		23 Mar 2024	08 Feb 2024	22 Dec 2023
Machine Age	mls	Client Info		240157	227020	215629
Oil Age	mls	Client Info		24000	24000	12000
Oil Changed		Client Info		Changed	Changed	Not Changd
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINAT	ION	method	limit/base	current	history1	history2
Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
Water		WC Method	>0.2	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
WEAR METAL	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>165	21	19	9
Chromium	ppm	ASTM D5185m	>5	1	<1	<1
Nickel	ppm	ASTM D5185m	>4	<1	0	0
Titanium	ppm	ASTM D5185m	>2	<1	1	1
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>20	3	1	2
Lead	ppm	ASTM D5185m	>150	2	0	<1
Copper	ppm	ASTM D5185m	>90	<1	<1	1
Tin	ppm	ASTM D5185m	>5	1	0	<1
Vanadium	ppm	ASTM D5185m		<1	0	0
Cadmium	ppm	ASTM D5185m		<1	0	0
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	0	6	10	19
Boron Barium	ppm ppm		0	6 0	10 3	19 0
Barium	ppm	ASTM D5185m ASTM D5185m	0	0	3	0
Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m	0 60	0 60	3 63	0 60
Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0	0 60 <1	3 63 0	0 60 <1
Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010	0 60 <1 973	3 63 0 864	0 60 <1 928
Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070	0 60 <1 973 1277	3 63 0 864 1064	0 60 <1 928 1054
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 60 0 1010 1070 1150	0 60 <1 973 1277 1108	3 63 0 864 1064 940	0 60 <1 928 1054 1016
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270	0 60 <1 973 1277 1108 1344	3 63 0 864 1064 940 1148	0 60 <1 928 1054 1016 1246
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060	0 60 <1 973 1277 1108 1344 3701	3 63 0 864 1064 940 1148 3144	0 60 <1 928 1054 1016 1246 3172
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060	0 60 <1 973 1277 1108 1344 3701 current	3 63 0 864 1064 940 1148 3144 history1	0 60 <1 928 1054 1016 1246 3172 history2
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	0 60 0 1010 1070 1150 1270 2060 Limit/base >35	0 60 <1 973 1277 1108 1344 3701 current 4	3 63 0 864 1064 940 1148 3144 history1 3	0 60 <1 928 1054 1016 1246 3172 history2 3
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 Limit/base >35	0 60 <1 973 1277 1108 1344 3701 current 4 2	3 63 0 864 1064 940 1148 3144 history1 3 0	0 60 <1 928 1054 1016 1246 3172 history2 3 1
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 <b>limit/base</b> >35	0 60 <1 973 1277 1108 1344 3701 current 4 2 2	3 63 0 864 1064 940 1148 3144 history1 3 0 2	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 <i>limit/base</i> >20 <i>limit/base</i>	0 60 <1 973 1277 1108 1344 3701 current 4 2 2 2 current	3 63 0 864 1064 940 1148 3144 history1 3 0 2 history1	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1 1 history2 1.4
Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 <i>limit/base</i> >35 >20 <i>limit/base</i> >7.5	0 60 <1 973 1277 1108 1344 3701 current 4 2 2 current 2.5	3 63 0 864 1064 940 1148 3144 history1 3 0 2 history1 2.7	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1 1 history2
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 60 0 1010 1070 1150 1270 2060 <b>limit/base</b> >35 >20 <b>limit/base</b> >7.5 >20	0 60 <1 973 1277 1108 1344 3701 current 4 2 2 current 2.5 9.9	3 63 0 864 1064 940 1148 3144 history1 3 0 2 history1 2.7 9.9	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1 1 history2 1.4 7.1
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 TS ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D7415	0 60 1010 1070 1150 1270 2060 <b>limit/base</b> >35 20 <b>limit/base</b> >7.5 >20 >30	0 60 <1 973 1277 1108 1344 3701 current 4 2 2 current 2.5 9.9 22.6 current	3 63 0 864 1064 940 1148 3144 history1 3 0 2 2 history1 2.7 9.9 23.1 history1	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1 history2 1.4 7.1 19.4 history2
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 60 0 1010 1070 1150 1270 2060 <i>limit/base</i> >35 >20 <i>limit/base</i> >7.5 >20 >30	0 60 <1 973 1277 1108 1344 3701 Current 4 2 2 Current 2.5 9.9 22.6	3 63 0 864 1064 940 1148 3144 history1 3 0 2 <u>history1</u> 2.7 9.9 23.1	0 60 <1 928 1054 1016 1246 3172 history2 3 1 1 history2 1.4 7.1 19.4

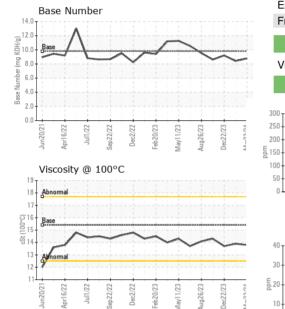


# **OIL ANALYSIS REPORT**

200-150 튭 100 · 50 0

: PCA0104437





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
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	13.8	13.9	13.7
GRAPHS				1. 17. 1		
Iron (ppm)			300	Lead (ppm)		
250 - Severe			250	-		
Abnormal			200 E 100	Abnormal		
150			톱 150 100			
50 -			50			
					3 2	+ 3 3 3
Jun20/21 Apr16/22 Jul1/22 Sep22/22	Dec2/22 Feb20/23	May11/23 - Aug26/23 - Dec22/23 -	Mar23/24	Jun20/21 Apr16/22 Jul1/22	Sep22/22 Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23 Mar23/24
¬ < ø	Fel D	Mar Aug	Ma	n a		Ma Aug De Ma
Aluminum (ppm)			12	Chromium (p	pm)	
30 -			10	Severe		
			8			
20 - Abnormal			4 G	Abnormal		
10			2	$\square$		
			0			
Jun20/21 Apr16/22 Jul1/22 Sep22/22	Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23	Mar23/24	Jun20/21 Apr16/22 Jul1/22	Sep22/22 Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23 Mar23/24
ਤੋਂ ਵੋ ੇ ਭੋ Copper (ppm)	Fet	Aug	Ma	r a		Mar Aug Der Ma
200			80	Silicon (ppm)		
Severe			60	Severe		
100 - Abnormal			톱 40	Abnormal		
50			20			
	3 2		- 0		3 1	
Jun20/21- Apr16/22 - Jul1/22 - Sep22/22 -	Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23	Mar23/24	Jun20/21 Apr16/22 Jul1/22	Sep 22/22 Dec2/22 Feb 20/23	May11/23 Aug26/23 Dec22/23 Mar23/24
Viscosity @ 100°C	<u>u</u>	M A D	2	Base Number		
20			15.0 P	E E LE		
18 Abnormal			0.0 100 Base Number (mg KOH/g)	Base	~~	$\sim$
14	$\sim$	~~~	mper co			
12 - Abnormal			N S.O			
10 12 21 21 21	3		0.0	21+	3 5 5	* 3 3 3
Jun20/21 Apr16/22 Jul1/22 Sep22/22	Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23	Mar23/24	Jun20/21 Apr16/22 Jul1/22	Sep22/22 Dec2/22 Feb20/23	May11/23 Aug26/23 Dec22/23 Mar23/24
Ju See	L B	Ma Au	ž	, Air	Se La Se	Ma Au De Ma

## **PLYMOUTH & BROCKTON**

8 INDUSTRIAL PARK RD PLYMOUTH, MA US 02360 Contact: Donald Pelpquin Dpeloquin@P-B.com T: (508)732-6039 F: (508)732-6091



Lab Number : 06147552 Tested : 15 Apr 2024 Unique Number : 10977630 Diagnosed : 15 Apr 2024 - Wes Davis Test Package : MOB 2 Certificate 12367 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)

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

Received

: 12 Apr 2024

Report Id: PLYPLYUS [WUSCAR] 06147552 (Generated: 04/15/2024 10:39:19) Rev: 1

Laboratory

Sample No.

Submitted By: Donald Pelpquin

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