

OIL ANALYSIS REPORT

Sample Rating Trend





Component Diesel Engine Fluid 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.

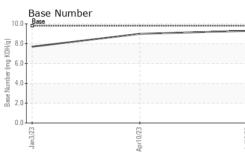
Fluid Condition

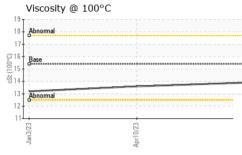
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

Sample Date Client Info 18 Jul 2023 10 Apr 2023 03 Jan 2023 Machine Age hrs Client Info 8617 8364 8025 Oil Age hrs Client Info 253 339 0 Oil Changed Client Info Changed	SAMPLE INFORM	1ATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 8617 8384 8025 Oil Age hrs Client Info 253 339 0 Oil Changed Client Info Changed	Sample Number		Client Info		SBP0003806	SBP0000856	SBP0000838
Oil Age hrs Client Info 253 339 0 Oil Changed Client Info Changed Changed </th <th>Sample Date</th> <th></th> <th>Client Info</th> <th></th> <th>18 Jul 2023</th> <th>10 Apr 2023</th> <th>03 Jan 2023</th>	Sample Date		Client Info		18 Jul 2023	10 Apr 2023	03 Jan 2023
Oil Changed Sample Status Client Info Changed NORMAL Changed ABNORMAL Changed ABNORMAL Changed ABNORMAL CONTAMINATION method limil/base current history1 history1 Fuel WC Method >6.0 <1.0	Machine Age	hrs	Client Info		8617	8364	8025
Sample Status method imit/base current history1 ABNORMAL ABNORMAL CONTAMINATION method imit/base current history1 history1 Fuel WC Method >6.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method NEG NEG NEG NEG WEAR METALS method imit/base current history1 history1 Iron ppm ASTM D5185m >200 0 0 <1 Nickel ppm ASTM D5185m >20 0 0 0 Silver ppm ASTM D5185m >20 0 0 0 Auminum ppm ASTM D5185m >20 0 <1 0 0 Copper ppm ASTM D5185m >20 0 <1 1 0 0 Cadmium ppm ASTM D5185m >20 0 <1 1 0 Strin D5185m	Oil Age	hrs	Client Info		253	339	0
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >6.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method >6.0 <1.0 <1.0 <1.0 <1.0 WEAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >200 0 <1 NEG Iron ppm ASTM D5185m >20 0 <1 Nickel ppm ASTM D5185m >20 0 <1 0 0 Silver ppm ASTM D5185m >20 0 <1 1 Lead ppm ASTM D5185m >20 6 51 316 316 Tin ppm ASTM D5185m >20 0 <1 1 0 Copper ppm ASTM D5185m >20 0 <1 0 0 0 0 0 0	Oil Changed		Client Info		Changed	Changed	Changed
Fuel WC Method >6.0 <1.0	Sample Status				NORMAL	ABNORMAL	ABNORMAL
Glycol WC Method NEG NEG NEG WeAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >200 1 2 6 Chromium ppm ASTM D5185m >20 0 0 <1 Nickel ppm ASTM D5185m >20 0 0 <1 Titanium ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >20 0 <1 <1 Lead ppm ASTM D5185m >20 6 ▲51 ▲316 Tin ppm ASTM D5185m >20 0 <1 <1 Vanadium ppm ASTM D5185m 20 0 <1 <1 Vanadium ppm ASTM D5185m 0 <1 0 0 Cademium ppm ASTM D5185m 0 <1 0 1	CONTAMINATION	١	method	limit/base	current	history1	history2
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Chromium ppm ASTM D5185m >20 0 0 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel ppm ASTM D5185m >55 0 0 <1	Iron	ppm	ASTM D5185m	>200	1	2	6
Titanium ppm ASTM D5185m <1	Chromium	ppm	ASTM D5185m	>20	0	0	<1
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >30 <1 2 1 Lead ppm ASTM D5185m >40 0 0 5 Copper ppm ASTM D5185m >20 6 ▲ 51 ▲ 316 Tin ppm ASTM D5185m >20 0 <1 <1 Vanadium ppm ASTM D5185m >20 0 <1 0 0 Cadmium ppm ASTM D5185m >20 0 <1 0 10 10	Nickel	ppm	ASTM D5185m	>5	0	0	<1
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Vanadium ppm ASTM D5185m <1			ASTM D5185m	>20		<1	
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Molybdenum ppm ASTM D5185m 60 60 60 59 Manganese ppm ASTM D5185m 0 <1 0 <1 Magnesium ppm ASTM D5185m 1010 1036 961 977 Calcium ppm ASTM D5185m 1010 1036 961 977 Calcium ppm ASTM D5185m 1070 1150 1126 1125 Phosphorus ppm ASTM D5185m 1150 1076 1014 1015 Zinc ppm ASTM D5185m 1270 1279 1233 1334 Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base	ADDITIVES		method				history2
Marganese ppm ASTM D5185m 0 <1		ppm					
Magnesium ppm ASTM D5185m 1010 1036 961 977 Calcium ppm ASTM D5185m 1070 1150 1126 1125 Phosphorus ppm ASTM D5185m 1070 1150 1014 1015 Zinc ppm ASTM D5185m 1270 1279 1233 1334 Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 0 0 <1 Potassium ppm ASTM D5185m >20 0 0.1 0.2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624	Boron		ASTM D5185m	0	<1	1	0
Calcium ppm ASTM D5185m 1070 1150 1126 1125 Phosphorus ppm ASTM D5185m 1150 1076 1014 1015 Zinc ppm ASTM D5185m 1270 1279 1233 1334 Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 1 0 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 <th>Boron Barium</th> <th>ppm</th> <th>ASTM D5185m ASTM D5185m</th> <th>0</th> <th><1 0</th> <th>1 0</th> <th>0</th>	Boron Barium	ppm	ASTM D5185m ASTM D5185m	0	<1 0	1 0	0
Phosphorus ppm ASTM D5185m 1150 1076 1014 1015 Zinc ppm ASTM D5185m 1270 1279 1233 1334 Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history1 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 0 0 <1 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415	Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60	<1 0 60	1 0 60	0 0 59
Zinc ppm ASTM D5185m 1270 1279 1233 1334 Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history1 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 0 0 <1 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0	<1 0 60 <1	1 0 60 0	0 0 59 <1
Sulfur ppm ASTM D5185m 2060 3822 3390 3369 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 2 4 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010	<1 0 60 <1 1036	1 0 60 0 961	0 0 59 <1 977
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m >20 2 2 4 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070	<1 0 60 <1 1036 1150	1 0 60 0 961 1126	0 0 59 <1 977 1125
Silicon ppm ASTM D5185m >20 2 2 4 Sodium ppm ASTM D5185m 3 2 1 Potassium ppm ASTM D5185m >20 0 0 <1	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	<1 0 60 <1 1036 1150 1076	1 0 60 0 961 1126 1014	0 59 <1 977 1125 1015
Sodium ppm ASTM D5185m 3 2 1 Potassium ppm ASTM D5185m >20 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	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	<1 0 60 <1 1036 1150 1076 1279	1 0 60 0 961 1126 1014 1233	0 0 59 <1 977 1125 1015 1334
Potassium ppm ASTM D5185m >20 0 0 <1	Boron 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 ASTM D5185m	0 0 60 1010 1070 1150 1270 2060	<1 0 60 <1 1036 1150 1076 1279 3822	1 0 60 0 961 1126 1014 1233 3390	0 0 59 <1 977 1125 1015 1334
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	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 limit/base	<1 0 60 <1 1036 1150 1076 1279 3822 current	1 0 60 961 1126 1014 1233 3390 history1	0 0 59 <1 977 1125 1015 1334 3369 history2
Soot % % *ASTM D7844 >3 0.1 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Maganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method	0 0 60 1010 1070 1150 1270 2060 limit/base	<1 0 60 <1 1036 1150 1076 1279 3822 current 2	1 0 60 0 961 1126 1014 1233 3390 history1 2	0 0 59 <1 977 1125 1015 1334 3369 history2 4
Nitration Abs/cm *ASTM D7624 >20 5.3 5.9 7.8 Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >20	<1 0 60 <1 1036 1150 1076 1279 3822 current 2 3	1 0 60 0 961 1126 1014 1233 3390 history1 2 2 2	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1
Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm	ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >20	<1 0 60 <1 1036 1150 1076 1279 3822 current 2 3 0	1 0 60 0 961 1126 1014 1233 3390 history1 2 2 2 0	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1
Sulfation Abs/.1mm *ASTM D7415 >30 17.5 18.6 18.3	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 imit/base >20 	<1 0 60 <1 1036 1150 1076 1279 3822 current 2 3 0 current	1 0 60 961 1126 1014 1233 3390 history1 2 2 0 0 history1	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1 <1 <1 history2
FLUID DEGRADATION method limit/base current history1 history2	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS 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 <i>limit/base</i> >20 <i>limit/base</i> >3	<1 0 60 <1 1036 1150 1076 1279 3822 <u>current</u> 2 3 3 0 <u>current</u> 0.1	1 0 60 961 1126 1014 1233 3390 history1 2 2 2 0 history1 0.1	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1 <1 <1 history2 0.2
	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS 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 imit/base >20 imit/base >3 >20	<1 0 60 <1 1036 1150 1076 1279 3822 current 2 3 0 current 0.1 5.3	1 0 60 0 961 1126 1014 1233 3390 history1 2 2 2 0 history1 0.1 5.9	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1 <1 <1 history2 0.2 7.8
Oxidation Abs/.1mm *ASTM D7414 >25 13.4 13.9 14.9	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS 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 imit/base >20 imit/base >3 >20 s3 >20	<1 0 60 <1 1036 1150 1076 1279 3822 <u>current</u> 2 3 3 0 <u>current</u> 0.1 5.3 17.5	1 0 60 0 961 1126 1014 1233 3390 history1 2 2 2 0 0 history1 0.1 5.9 18.6	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1 <1 <1 history2 0.2 7.8
Base Number (BN) mg KOH/g ASTM D2896 9.8 9.3 9.0 7.7	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D7415	0 0 0 1010 1070 1150 1270 2060 imit/base >20 imit/base >3 >20 >30 imit/base	<1 0 60 <1 1036 1150 1076 1279 3822 current 2 3 0 current 0.1 5.3 17.5 current	1 0 60 0 961 1126 1014 1233 3390 history1 2 2 2 2 0 history1 0.1 5.9 18.6 history1	0 0 59 <1 977 1125 1015 1334 3369 history2 4 1 <1 <1 history2 0.2 7.8 18.3 history2

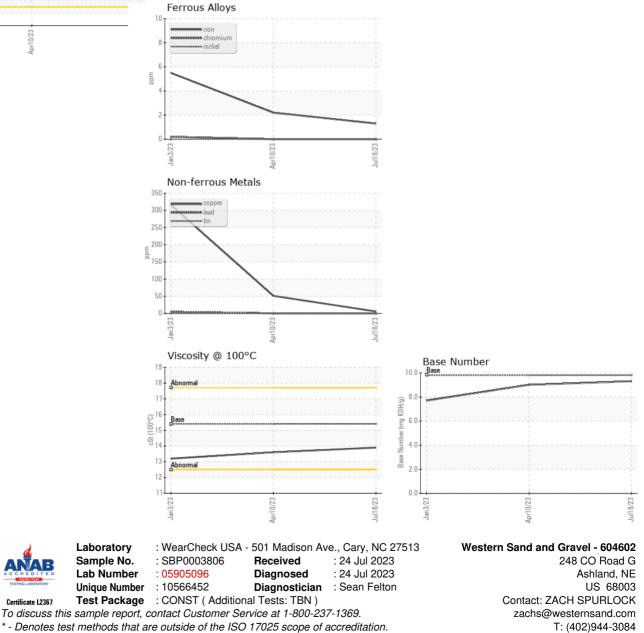


OIL ANALYSIS REPORT





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
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.9	13.6	13.2
GRAPHS						



Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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