

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL

CATERPILLAR 600-153

Component

Diesel Engine

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

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

All component wear rates are normal.

Contamination

There is no indication of any contamination in the

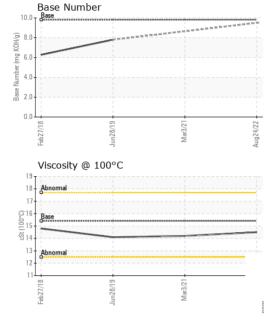
Fluid Condition

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	AL)		Feb 201	8 Jun2019	Mar2021 Au	ig2022	
Client Info	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs	Sample Number		Client Info		PCA0060071	PCA0035006	LWI-851062
Machine Age hrs	Sample Date		Client Info		24 Aug 2022	03 Mar 2021	28 Jun 2019
Contained Client Info Changed NORMAL NORMAL NORMAL	•	hrs	Client Info		10722	10135	9750
Contact Client Info Changed Changed Changed NORMAL NORMAL NORMAL NORMAL	Oil Age	hrs	Client Info		615	680	350
NORMAL NORMAL NORMAL CONTAMINATION method imilibase current history1 history2	-		Client Info		Changed	Changed	Changed
Fuel	Sample Status				_	NORMAL	
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 36 20 31 Chromium ppm ASTM D5185m >20 2 1 0 Nickel ppm ASTM D5185m >2 <1	Fuel		WC Method	>5	<1.0	<1.0	<1.0
Chromium	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 2 1 0 Nickel ppm ASTM D5185m >2 0 0 0 Titanium ppm ASTM D5185m >2 <1 0 0 Silver ppm ASTM D5185m >2 <1 <1 0 Aluminum ppm ASTM D5185m >2 <1 <1 0 Aluminum ppm ASTM D5185m >40 3 2 5 Lead ppm ASTM D5185m >40 3 2 5 Copper ppm ASTM D5185m >40 3 2 5 Copper ppm ASTM D5185m 0 0 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 3 4 2 Barium ppm ASTM D5185m 0 2 0 1	WEAR METAL	_S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	36	20	31
Titanium	Chromium	ppm	ASTM D5185m	>20	2	1	0
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	0
Aluminum	Titanium	ppm	ASTM D5185m	>2	<1	0	0
Lead	Silver	ppm	ASTM D5185m	>2	<1	<1	0
Copper ppm ASTM D5185m >330 11 15 48 Tin ppm ASTM D5185m >15 2 2 4 Antimony ppm ASTM D5185m 0 0 Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 1 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 3 4 2 Barium ppm ASTM D5185m 0 2 0 1 Molybdenum ppm ASTM D5185m 0 2 0 1 Magnesium ppm ASTM D5185m 100 913 972 955 Calcium ppm ASTM D5185m 100 1098 1090 1182 Phosphorus ppm ASTM D5185m 1270 1289 1218 1347	Aluminum	ppm	ASTM D5185m	>25	2	2	4
Tin	Lead	ppm	ASTM D5185m	>40	3	2	5
Antimony	Copper	ppm	ASTM D5185m	>330	11	15	48
Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m <1 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 3 4 2 Barium ppm ASTM D5185m 0 2 0 1 Molybdenum ppm ASTM D5185m 60 64 58 55 Manganese ppm ASTM D5185m 0 <1 <1 1 Magnesium ppm ASTM D5185m 1010 913 972 955 Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m >25 4 1	Tin	ppm	ASTM D5185m	>15	2	2	4
ADDITIVES	Antimony	ppm	ASTM D5185m			0	0
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 3 4 2 Barium ppm ASTM D5185m 0 2 0 1 Molybdenum ppm ASTM D5185m 0 -1 -1 1 Magnesium ppm ASTM D5185m 1010 913 972 955 Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1150 1076 1073 1135 Zinc ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 0 CONTAMINANTS method limit/base current history1 history2 Solicon ppm ASTM D5185m >20	Vanadium	ppm	ASTM D5185m		0	0	0
Boron	Cadmium		ASTM D5185m		<1	0	0
Barium ppm ASTM D5185m 0 2 0 1 Molybdenum ppm ASTM D5185m 60 64 58 55 Manganese ppm ASTM D5185m 0 <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 60 64 58 55 Manganese ppm ASTM D5185m 0 <1 <1 1 Magnesium ppm ASTM D5185m 1010 913 972 955 Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1270 1289 1218 1347 Zinc ppm ASTM D5185m 2060 3189 2858 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m -25 4 1 9 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/ba	Boron	ppm	ASTM D5185m	0	3	4	2
Manganese ppm ASTM D5185m 0 <1 <1 1 Magnesium ppm ASTM D5185m 1010 913 972 955 Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1150 1076 1073 1135 Zinc ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 0 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base	Barium	ppm	ASTM D5185m	0	2	0	1
Magnesium ppm ASTM D5185m 1010 913 972 955 Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1150 1076 1073 1135 Zinc ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 200 0 0 0 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *	Molybdenum	ppm	ASTM D5185m	60	64	58	55
Calcium ppm ASTM D5185m 1070 1098 1090 1182 Phosphorus ppm ASTM D5185m 1150 1076 1073 1135 Zinc ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 0 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7415	Manganese	ppm	ASTM D5185m	0	<1	<1	1
Phosphorus ppm ASTM D5185m 1150 1076 1073 1135 Zinc ppm ASTM D5185m 1270 1289 1218 1347 Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 0 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3<	Magnesium	ppm	ASTM D5185m	1010	913	972	955
Zinc	Calcium	ppm	ASTM D5185m	1070	1098	1090	1182
Sulfur ppm ASTM D5185m 2060 3189 2858 Lithium ppm ASTM D5185m 2060 3189 2858 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 <td>Phosphorus</td> <td>ppm</td> <td>ASTM D5185m</td> <td>1150</td> <th>1076</th> <td>1073</td> <td>1135</td>	Phosphorus	ppm	ASTM D5185m	1150	1076	1073	1135
Lithium ppm ASTM D5185m 0 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Zinc	ppm	ASTM D5185m	1270	1289	1218	1347
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Sulfur	ppm	ASTM D5185m	2060	3189	2858	
Silicon ppm ASTM D5185m >25 4 1 9 Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Lithium	ppm	ASTM D5185m				0
Sodium ppm ASTM D5185m 2 4 5 Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	CONTAMINAN	NTS	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 2 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Silicon	ppm	ASTM D5185m	>25	4	1	9
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Sodium	ppm	ASTM D5185m		2	4	5
Soot % % *ASTM D7844 >3 0.9 0.5 Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Potassium	ppm	ASTM D5185m	>20	2	0	1
Nitration Abs/cm *ASTM D7624 >20 9.1 7.6 7 Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 21.3 19.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Soot %	%	*ASTM D7844	>3	0.9	0.5	
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Nitration	Abs/cm	*ASTM D7624	>20	9.1	7.6	7
Oxidation Abs/.1mm *ASTM D7414 >25 16.2 15.1 11	Sulfation	Abs/.1mm	*ASTM D7415	>30	21.3	19.9	
	FLUID DEGRA	DATION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 9.8 9.5 7.8	Oxidation	Abs/.1mm	*ASTM D7414	>25	16.2	15.1	11
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	9.5		7.8



OIL ANALYSIS REPORT



VISUAL		method				history2
White Metal	scalar	*Visual	NONE	NONE	NONE	
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	
Precipitate	scalar	*Visual	NONE	NONE	NONE	
Silt	scalar	*Visual	NONE	NONE	NONE	
Debris	scalar	*Visual	NONE	NONE	NONE	
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	
Appearance	scalar	*Visual	NORML	NORML	NORML	
Odor	scalar	*Visual	NORML	NORML	NORML	
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	
Free Water	scalar	*Visual		NEG	NEG	
FLUID PROPERTIES		method	limit/base	current	history1	history2

Visc @ 100°C	cSt	ASTM D445	15.4		14.5	14.2	14.1	
GRAPHS								
Iron (ppm)				Le 100 _T	ad (ppm))		
200 Severe				1	vere			
150 Abnormal				E 60 - A				
1			-	40 - 0	onormal			
50		-		20				
Feb27/18 Jun28/19		Mar3/21	Aug24/22	Feb27/18		Jun28/19	Mar3/21	Aug24/22
-		2	Aug				2	Aug
Aluminum (ppm)				50 T	nromium	(ppm)		
Severe				40 + 0-	evere			
Abnormal				20 A	onormal			
10				10				
0		-	2	0				2
Feb27/18 Jun28/19		Mar3/21	Aug24/22 -	Feb27/18		Jun28/19	Mar3/21	Aug24/22
Copper (ppm)			d.		licon (ppr			A
Severe				80 T Se	evere	1	1	
00				60				
00				변 40 - Al	onormal			
00-				20 -				
138		12/	752	01=		61/	-12/	722
Feb27/18 Jun28/19		Mar3/21	Aug24/22	Feb27/18		Jun28/19	Mar3/21	Aug24/22
Viscosity @ 100°	С			Ba	ase Numb	er		

10.0 (mg KOH/g)

Base Number 4.0

0.0





Laboratory Sample No. Lab Number

Unique Number : 10117319

10

: PCA0060071 : 05632798

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

Diagnostician : Wes Davis

Mar3/21-

: 02 Sep 2022 : 03 Sep 2022

Aug24/22

Test Package : MOB 1 (Additional Tests: TBN) 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)

GE MARSHALL EXCAVATION

1351 JOLIET RD VALPARAISO, IN US 46385

Contact: MARK STEFFEL mark.steffel@gemarshall.com

> T: F: