

OIL ANALYSIS REPORT



Machine Id **4546** Component **Diesel Engine** Fluid **CITGO CITGUARD 600 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 INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0891560	WC0891585	
Sample Date		Client Info		03 Apr 2024	30 Jan 2024	
Machine Age	mls	Client Info		747407	730951	
Oil Age	mls	Client Info		15000	730951	
Oil Changed		Client Info		Changed	Changed	
Sample Status				NORMAL	NORMAL	
CONTAMINATION	١	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	
Water		WC Method	>0.2	NEG	NEG	
Glycol		WC Method		NEG	NEG	
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	10	7	
Chromium	ppm	ASTM D5185m	>20	2	1	
Nickel	ppm	ASTM D5185m	>4	1	<1	
Titanium	ppm	ASTM D5185m		<1	<1	
Silver	ppm	ASTM D5185m	>3	<1	0	
Aluminum	ppm	ASTM D5185m	>20	3	2	
Lead	ppm	ASTM D5185m	>40	2	2	
Copper	ppm	ASTM D5185m	>330	1	1	
Tin	ppm	ASTM D5185m	>15	2	1	
Vanadium	ppm	ASTM D5185m		<1	0	
Cadmium	ppm	ASTM D5185m		<1	0	
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 57	history1 64	history2
	ppm ppm					
Boron		ASTM D5185m	13	57	64	
Boron Barium	ppm	ASTM D5185m ASTM D5185m	13 0	57 0	64 0	
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	13 0	57 0 77	64 0 73	
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	13 0 57	57 0 77 1 408 1936	64 0 73 <1	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	13 0 57 825 1100 933	57 0 77 1 408 1936 1109	64 0 73 <1 372 1697 1032	
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	13 0 57 825 1100	57 0 77 1 408 1936 1109 1365	64 0 73 <1 372 1697	
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	13 0 57 825 1100 933	57 0 77 1 408 1936 1109	64 0 73 <1 372 1697 1032	
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	13 0 57 825 1100 933 1089	57 0 77 1 408 1936 1109 1365	64 0 73 <1 372 1697 1032 1206	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769	57 0 77 1 408 1936 1109 1365 3620	64 0 73 <1 372 1697 1032 1206 3074	
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	13 0 57 825 1100 933 1089 2769	57 0 77 1 408 1936 1109 1365 3620 current	64 0 73 <1 372 1697 1032 1206 3074 history1	 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769 limit/base >25	57 0 77 1 408 1936 1109 1365 3620 current 7	64 0 73 <1 372 1697 1032 1206 3074 history1 6	 history2
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 ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769 limit/base >25	57 0 77 1 408 1936 1109 1365 3620 current 7 2	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1	 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm	ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769 2769 2769 225	57 0 77 1 408 1936 1109 1365 3620 current 7 2 2 2	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1	 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769 2769 2769 2769 225 >20 imit/base >20	57 0 77 1 408 1936 1109 1365 3620 current 7 2 2 2	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1 <1 history1	 history2 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm	ASTM D5185m ASTM D5185m	13 0 57 825 1100 933 1089 2769 2769 2769 2769 225 >20 imit/base >20	57 0 77 1 408 1936 1109 1365 3620 current 7 2 2 2 2 current 0.2	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1 <1 0.2	 history2 history2 history2
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	13 0 57 825 1100 933 1089 2769 2769 2769 2769 225 20 imit/base >20	57 0 77 1 408 1936 1109 1365 3620 <i>current</i> 7 2 2 2 <i>current</i> 0.2 7.4	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1 <1 history1 0.2 7.4	 history2 history2
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	13 0 57 825 1100 933 1089 2769 2769 2769 225 20 220 320 320 33 20 33	57 0 77 1 408 1936 1109 1365 3620 <u>current</u> 7 2 2 2 2 <u>current</u> 0.2 7.4 20.4	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1 <1 kistory1 0.2 7.4 20.6	 history2 history2 history2
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 D7844 *ASTM D7844 *ASTM D7844	13 0 57 825 1100 933 1089 2769 2769 2769 225 20 220 220 20 33 20 20 30 20 30	57 0 77 1 408 1936 1109 1365 3620 current 7 2 2 2 current 0.2 7.4 20.4 current	64 0 73 <1 372 1697 1032 1206 3074 history1 6 1 <1 <1 history1 0.2 7.4 20.6 history1	 history2 history2 history2 history2



12.0 Base

2.0 0.0 Jan30/24

19-18. Abnor 17-() 10.00 15 14 Base

13. Abnor 12 11 Jan30/24

OIL ANALYSIS REPORT

FT-IR (Direct Trend)	VISUAL		method	limit/base	current	history1	history2
0 - Oxidation Nitration	White Metal	scalar '	*Visual	NONE	NONE	NONE	
Bonomar-Sulfation	Yellow Metal	scalar '	*Visual	NONE	NONE	NONE	
0+	Precipitate	scalar '	*Visual	NONE	NONE	NONE	
5-	Silt	scalar '	*Visual	NONE	NONE	NONE	
	Debris	scalar '	*Visual	NONE	NONE	NONE	
5	Sand/Dirt	scalar '	*Visual	NONE	NONE	NONE	
Jan 30/24 4	Appearance	scalar '	*Visual	NORML	NORML	NORML	
Janí	Odor	scalar '	*Visual	NORML	NORML	NORML	
Base Number	Emulsified Water	scalar '	*Visual	>0.2	NEG	NEG	
Base	Free Water	scalar '	*Visual		NEG	NEG	
0 +	FLUID PROPERT	IES	method	limit/base	current	history1	history2
	Visc @ 100°C	cSt /	ASTM D445	15.4	13.1	13.1	
0	GRAPHS						
0-	Ferrous Alloys						
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	10 iron chromium						
Jan 30/24	8- nickel						
	6 -						
Viscosity @ 100°C	u dd						
8 - Abnormal	4						
7	2 -						
5			Anne and Anne				
4	Jan 30/24			Apr3/24 -			
3 ⁴ <mark>Abnomal</mark> 2 4	Jan3			Apr			
1	Non-ferrous Metals	5					
л.20/24.	10 copper						
ب م	8 - second lead						
	6-						
	mqq						
	4						
	2						
	30/24 + 10			Apr3/24			
	Jan 30			Apr3			
				Base Number			
	Viscosity @ 100°C						
	18 - Abnormal			10.0	Base		
	17-			(B/H0) 8.0			
	Base 15 3 14			2 0.0 E			
	1) 13			0.8 KOH/g) 8ase Number (mg KOH/g)			
	13 - Abnormal			N 4.0	1		
	12			2.0			
	11			0.0	L		
	Jan 30/24			Apr3/24	Jan 30/24		Apr3/24
	а С			4	ل م		Ŕ
Sample No. Lab Number Unique Number Certificate 12367 To discuss this sample report, * - Denotes test methods that a	: 10968407 : FLEET contact Customer Servid are outside of the ISO 17	Receive Tested Diagno ce at 1-80 7025 scop	ed : 09 : 10 osed : 10 0-237-1369 e of accred	Apr 2024 Apr 2024 Apr 2024 - Wo Apr 2024 - Wo itation.	es Davis b	JOHNS Contact: BR/ randon.irish@on T: (0 RAVINE DR SON CITY, TN US 37601 ANDON IRISH
Statements of conformity to sp	ecifications are based of	n the simp	ole accepta	nce decision	rule (JCGM 106	<i>:2012)</i> F: (423)979-5922

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