

PROBLEM SUMMARY



Machine Id **9913** Component **Diesel Engine** Fluid **DIESEL ENGINE OIL SAE 15W40 (--- GAL)**

COMPONENT CONDITION SUMMARY



▲ Viscosity @ 100°C 18 17 Abnormal 16 (2000) 14 13 13 Base Abnormal 12 11 10 Apr7/23 0ct3/23 0ct12/22 /lar21/24 Mav20/22

RECOMMENDATION

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

PROBLEMATIC T	EST RE	SULTS				
Sample Status				SEVERE	SEVERE	SEVERE
Fuel	%	ASTM D3524	>5	12.0	▲ 10.2	▲ 8.7
Visc @ 100°C	cSt	ASTM D445	14.4	A 11.6	12.6	1 1.9

Customer Id: TOWCHANC Sample No.: HRE0000097 Lab Number: 06148473 Test Package: FLEET



To manage this report scan the QR code

To discuss the diagnosis or test data: Jonathan Hester +1 919-379-4092 x4092 <u>jhester@wearcheckusa.com</u>

To change component or sample information: Customer Service +1 1-800-237-1369 <u>customerservice@wearcheck.com</u>

RECOMMENDED ACTIONS							
Action Change Fluid	Status	Date	Done By ?	Description Oil and filter change at the time of sampling has been noted.			
Change Filter			?	Oil and filter change at the time of sampling has been noted.			
Resample			?	We recommend an early resample to monitor this condition.			
Check Fuel/injector System			?	We advise that you check the fuel injection system.			

HISTORICAL DIAGNOSIS

03 Oct 2023 Diag: Wes Davis

We advise that you check the fuel injection system. We recommend that you drain the oil from the component if this has not already been done. We recommend an early resample to monitor this condition. Please specify the component make and model with your next sample. Please specify the brand, type, and viscosity of the oil on your next sample. All component wear rates are normal. There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.





FUEL

FUEL

07 Apr 2023 Diag: Wes Davis

We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition. Please specify the component make and model with your next sample. Please specify the brand, type, and viscosity of the oil on your next sample. All component wear rates are normal. There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. Fuel is present in the oil and is lowering the viscosity. The oil is no longer serviceable due to the presence of contaminants.





12 Oct 2022 Diag: Wes Davis

Little or no information is provided as to the component and lubricant being tested. Recommendations are therefore generic in nature and may not apply to the current application. Please forward information as to equipment type, reservoir capacity, lubricant type and any pertinent information to allow for a more accurate assessment. Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. Please specify the component make and model with your next sample. Please specify the brand, type, and viscosity of the oil on your next sample. All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.





OIL ANALYSIS REPORT



Machine Id **9913** Component **Diesel Engine** Fluid **DIESEL ENGINE OIL SAE 15W40 (--- GAL)**

DIAGNOSIS

Recommendation

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

Contamination

There is a high amount of fuel present in the oil.

Fluid Condition

Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.

SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		HRE0000097	WC0860364	WC0790611
Sample Date		Client Info		21 Mar 2024	03 Oct 2023	07 Apr 2023
Machine Age	mls	Client Info		331444	325992	320514
Oil Age	mls	Client Info		6000	0	0
Oil Changed		Client Info		Changed	N/A	Changed
Sample Status				SEVERE	SEVERE	SEVERE
		mathad	limit/bass	ourroat	biotorut	biotory ()
CONTAMINATION	N	method	iimii/base	current	nistory i	nistoryz
Water		WC Method	>0.2	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	27	29	23
Chromium	ppm	ASTM D5185m	>20	2	<1	1
Nickel	ppm	ASTM D5185m	>4	<1	0	0
Titanium	ppm	ASTM D5185m		0	0	<1
Silver	ppm	ASTM D5185m	>3	0	0	0
Aluminum	ppm	ASTM D5185m	>20	2	1	<1
Lead	ppm	ASTM D5185m	>40	0	0	0
Copper	ppm	ASTM D5185m	>330	1	<1	<1
Tin	ppm	ASTM D5185m	>15	<1	0	0
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
			11 1.0			
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	limit/base	current 63	history1 8	history2 28
Boron Barium	ppm ppm	ASTM D5185m ASTM D5185m	limit/base 250 10	current 63 <1	history1 8 0	28 2
Boron Barium Molybdenum	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	current 63 <1 72	history1 8 0 64	28 2 71
Boron Barium Molybdenum Manganese	ppm ppm ppm ppm	Method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	current 63 <1 72 <1	history1 8 0 64 0	28 2 71 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base 250 10 100 450	current 63 <1 72 <1 168	history1 8 0 64 0 340	history2 28 2 71 <1 110
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base 250 10 100 450 3000	Current 63 <1 72 <1 168 1521	history1 8 0 64 0 340 1611	history2 28 2 71 <1 110 1700
ADDITIVES 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 ASTM D5185m	250 10 100 450 3000 1150	current 63 <1 72 <1 168 1521 815	history1 8 0 64 0 340 1611 844	history2 28 2 71 <1 110 1700 833
ADDITIVES Boron 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 ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350	current 63 <1 72 <1 168 1521 815 956	history1 8 0 64 0 340 1611 844 1084	Anistory2 28 2 71 <1 110 1700 833 1018
ADDITIVES 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	250 10 100 450 3000 1150 1350 4250	current 63 <1 72 <1 168 1521 815 956 2689	history1 8 0 64 0 340 1611 844 1084 2735	history2 28 2 71 <1 110 1700 833 1018 2902
ADDITIVES 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 ASTM D5185m	10010000000000000000000000000000000000	current 63 <1 72 <1 168 1521 815 956 2689 current	history1 8 0 64 0 340 1611 844 1084 2735 history1	history2 28 2 71 <1 110 1700 833 1018 2902 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	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 ASTM D5185m ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25	current 63 <1 72 <1 168 1521 815 956 2689 current 8	history1 8 0 64 0 340 1611 844 1084 2735 history1 4	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm 1 ppm 2 ppm 2 ppm 2 ppm 2 ppm 3 ppm 4 ppm 4 ppm 4 ppm 1 ppm 1 ppm 1	Method ASTM D5185m ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel	ppm ppm ppm ppm ppm ppm ppm ppm	Method ASTM D5185m ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 12.0	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1 10.2	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	Method ASTM D5185m ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5 Imit/base	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 1 1 1 1 12.0	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1 ↓10.2 history1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot %	ppm 1 ppm 2 ppm 2 ppm 2 ppm 2 ppm 3 ppm 4 ppm 4	method ASTM D5185m ASTM D3524 method *ASTM D7844	limit/base 250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >5 limit/base >3	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 ×1 1 ×1 1 ×12.0 current 1.7	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 4 1 1 4 1 1 2,3	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D51854	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5 Imit/base >3 >20	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 1 1.7 13.4	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1 <1 1 <1 10.2 history1 2.3 12.9	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9 12.0
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5 Imit/base >3 >20 >30 >30	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 × 1 1.7 13.4 27.2	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1 ▲1 <1 ▲10.2 history1 2.3 12.9 27.1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9 12.0 25.1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	Imit/base 250 10 100 450 3000 1150 350 4250 Imit/base >25 >158 >20 >3 >20 >30	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 ▲ 12.0 current 1.7 13.4 27.2	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 <1 ▲ 10.2 history1 2.3 12.9 27.1 biotory1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9 1.9 12.0 25.1 biotory2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D7624 *ASTM D7415 method	Imit/base 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5 5 Imit/base >3 >20 >30 >30 < Imit/base	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 1 1 1.7 13.4 27.2 current	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 < 1 1 < 1 1 2735 history1 2.3 12.9 27.1 history1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9 12.0 25.1 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA Oxidation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D7624 *ASTM D7414	Imit/base 250 10 450 3000 1150 1350 4250 Imit/base >25 >158 >20 >5 Imit/base >3 >20 >30 S30 S30 S30 S30 S20	current 63 <1 72 <1 168 1521 815 956 2689 current 8 <1 1 ×1 1 ×12.0 current 1.7 13.4 27.2 current 28.1	history1 8 0 64 0 340 1611 844 1084 2735 history1 4 1 3 4 1 1 3 4 1 1 3 4 1 3 1 2 3 1 2 3 1 2 3 1 2 9 2 7 1 4 1 2 3 1 2 3 1 2 3 1 2 4 1 2 3 1 2 4 1 2 3 1 2 4 1 2 3 1 2 4 1 2 4 1 2 4 1 1 2 4 1 1 2 4 1 1 2 4 1 1 2 4 1 1 1 1	history2 28 2 71 <1 110 1700 833 1018 2902 history2 6 0 1 ▲ 8.7 history2 1.9 12.0 25.1 history2 23.4



OIL ANALYSIS REPORT









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	NORN
Odor	scalar	*Visual	NORML	NORML	NORML	NORM
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPER	TIES	method	limit/base	e current	history1	histo
Visc @ 100°C	cSt	ASTM D445	14.4	11.6	12.6	▲ 11.9
GRAPHS						
Ferrous Alloys						
iron						
nickel						
0						
5-						
0						
5						
			and the second diversified of the second diversified of the second diversified of the second diversified of the			
20/22	sr1/23	t3/23	21/24			
0ct12/22	Apr7/23	0ct3/23	Mar21/24			
Octi 222 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Apr7/23	0ct3/23	Mar21/24			
Non-ferrous Meta	Apr7/23	0 ct3/23	Mar21/24			
Non-ferrous Metal	S	0ct3/23	Mar21/24			
Non-ferrous Meta	Apr7/23	0ct3/23	Mar21/24			
Non-ferrous Metal	5	0ct3/23	Mar21/24			
Non-ferrous Meta	5	0043/23	Mar21/24			
Non-ferrous Metal	5 Apri/23	0d3/23	Mar21/24			
Non-ferrous Metal	Apri/23	0d3/23	Ma21/24			
Non-ferrous Metal	April/23	043/23	Mar21/24			
Non-ferrous Metal	61/23	13/23 0 ct3/23	8124 6 Mar21/24 6			
0 Won-ferrous Metal Copper lead tin Copper lead tin Copper lead tin Copper Copper Lead Copper C	Apri/23	0et3/23	Mar21/24 6 Mar21/24 6			
Non-ferrous Metal	April/23	0ct3/23	Mar21/24 # Mar21/24 #	Base Number		
Non-ferrous Metal	Apri7/23	0ct3/23	Mar21/24	Base Number	-	
Non-ferrous Meta	Apri/23	0d3/23	Mar21/24	Base Number		
Non-ferrous Metal	April23	0ct3/23	Mar21/24 B	Base Number	-	
Non-ferrous Metal	Apri/23	0ct3/23	Mar21/24 Mar21	Base Number		
Non-ferrous Metal	Apr7/23	0ct3/23	Mar21/24 Mar21/24 Mar21/24	Base Number		
Non-ferrous Metal	Apri/23	0ct3/23	Mar21/24 Mar21	Base Number		
Non-ferrous Metal	April23	0ct3/23	Mar21/24 Mar	Base Number	-	
Non-ferrous Metal	April 723	0ct3/23	Mar21/24 Mar	Base Number		
Non-ferrous Metal	123 Salar	0d3/23	724 Mar21/24 Mar21/24 Mar21/24 Base Number (mg KOH(g)	Base Number	/23	



Contact/Location: Lisa DePasqua - TOWCHANC