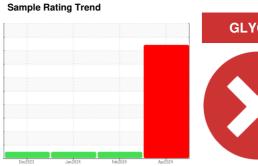


# **OIL ANALYSIS REPORT**



Machine Id 1012 Component

Diesel Engine

**DIESEL ENGINE OIL SAE 15W40 (--- GAL)** 

# DIAGNOSIS

## Recommendation

We advise that you check for the source of the coolant leak. We recommend that you drain the oil from the component if this has not already been done. We advise that you flush the component thoroughly before re-filling with oil. We recommend an early resample to monitor this condition.

#### Wear

All component wear rates are normal.

### Contamination

Test for glycol is positive. There is a high concentration of glycol present in the oil.

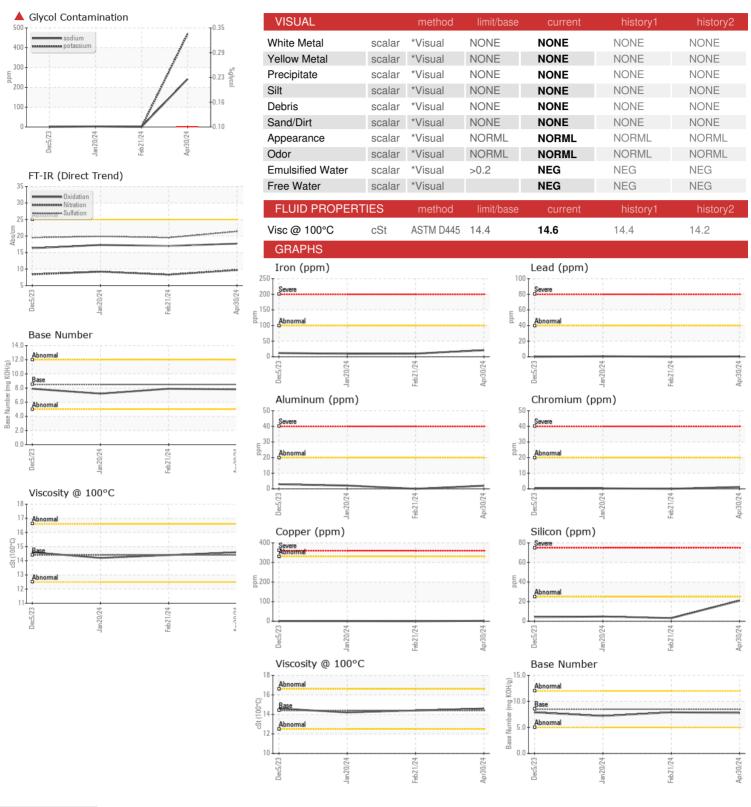
## Fluid Condition

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.

Client Info   WC0897848   WC0878772   WC0894044   Sample Date   Client Info   30 Apr 2024   21 Feb 2024   20 Jan			Dec202	3 Jan 2024	Feb 2024	pr2024	
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Client Info     30 Apr 2024   21 Feb 2024   20 Jan 2024	Sample Number		Client Info		WC0897848	WC0878772	WC0894044
Machine Age         mls         Client Info         0         0         0           Oil Age         mls         Client Info         0         0         0           Oil Changed         Client Info         N/A         N/A         N/A         N/A           Sample Status         SEVERE         NORMAL         NORMAL         NORMAL           CONTAMINATION         method         Imitibase         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0         <1.0           Water         WC Method         >5         <1.0         <1.0         <1.0         <1.0         <1.0           Wear METALS         method         Imitibase         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         10         10           Chromium         ppm         ASTM D5185m         >20         1         0         <1           Mickel         ppm         ASTM D5185m         >3         0         0         <1         1           Groman         ppm         ASTM D5185m         >20         2         0         2	Sample Date		Client Info		30 Apr 2024	21 Feb 2024	20 Jan 2024
Oil Age         mls         Client Info         N/A         N/A         N/A         N/A           Sample Status         Client Info         N/A         N/A         N/A         N/A         N/A           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0         <1.0           Water         WC Method         >5         <1.0         <1.0         <1.0         <1.0           Wear METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         10         10           Chromium         ppm         ASTM D5185m         >20         1         0         <1           Mickel         ppm         ASTM D5185m         >3         0         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         <1           Capper         ppm         ASTM D5185m         >30         2         1         <1         <1           Capper         ppm         ASTM D5185m	Machine Age	mls	Client Info		-		0
SEVERE   NORMAL   NORMAL	Oil Age	mls	Client Info		0	0	0
Sever   Normal   N	J .		Client Info		N/A	N/A	N/A
Fuel	Sample Status				SEVERE	NORMAL	NORMAL
Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         10         10           Chromium         ppm         ASTM D5185m         >20         1         0         <1	CONTAMINATION	V	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         10         10           Chromium         ppm         ASTM D5185m         >20         1         0         <1	Fuel		WC Method	>5	<1.0	<1.0	<1.0
Iron	Water		WC Method	>0.2	NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         1         0         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	21	10	10
Titanium	Chromium	ppm	ASTM D5185m	>20	1	0	<1
Silver	Nickel	ppm	ASTM D5185m	>4	<1	0	1
Aluminum	Titanium	ppm	ASTM D5185m		<1	0	0
Lead         ppm         ASTM D5185m         >40         <1         0         <1           Copper         ppm         ASTM D5185m         >330         2         <1         <1           Tin         ppm         ASTM D5185m         >15         <1         <1         <1           Vanadium         ppm         ASTM D5185m         >15         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         1         0         5           Barium         ppm         ASTM D5185m         10         2         0         0           Molybdenum         ppm         ASTM D5185m         10         2         0         0           Magnesium         ppm         ASTM D5185m         10         2         0         <1           Magnesium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1350         1243	Silver	ppm	ASTM D5185m	>3	0	0	<1
Copper         ppm         ASTM D5185m         >330         2         <1         <1           Tin         ppm         ASTM D5185m         >15         <1	Aluminum	ppm	ASTM D5185m	>20	2	0	2
Tin	Lead	ppm	ASTM D5185m	>40	<1	0	<1
Vanadium         ppm         ASTM D5185m         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         1         0         5           Barium         ppm         ASTM D5185m         10         2         0         0           Molybdenum         ppm         ASTM D5185m         100         88         61         60           Manganese         ppm         ASTM D5185m         100         88         1076         946           Calcium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1<	Copper	ppm	ASTM D5185m	>330	2	<1	<1
Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         1         0         5           Barium         ppm         ASTM D5185m         10         2         0         0           Molybdenum         ppm         ASTM D5185m         100         88         61         60           Manganese         ppm         ASTM D5185m         100         88         61         60           Magnesium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Solium         ppm         ASTM D5185m         >25 <t< td=""><td>Tin</td><td>ppm</td><td>ASTM D5185m</td><td>&gt;15</td><th>&lt;1</th><td>&lt;1</td><td>&lt;1</td></t<>	Tin	ppm	ASTM D5185m	>15	<1	<1	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         1         0         5           Barium         ppm         ASTM D5185m         10         2         0         0           Molybdenum         ppm         ASTM D5185m         100         88         61         60           Manganese         ppm         ASTM D5185m         100         88         61         60           Magnesium         ppm         ASTM D5185m         100         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >20 </td <td>Vanadium</td> <td>ppm</td> <td>ASTM D5185m</td> <td></td> <th>&lt;1</th> <td>0</td> <td>&lt;1</td>	Vanadium	ppm	ASTM D5185m		<1	0	<1
Boron	Cadmium	ppm	ASTM D5185m		<1	0	0
Barium         ppm         ASTM D5185m         10         2         0         0           Molybdenum         ppm         ASTM D5185m         100         88         61         60           Manganese         ppm         ASTM D5185m         100         <1         0         <1           Magnesium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         3000         1158         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >26         242         1         3           Potassium         ppm         ASTM D585m	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         100         88         61         60           Manganese         ppm         ASTM D5185m         <1         0         <1           Magnesium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1150         1089         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >20         470         0         3           Glycol         "ASTM D7844         >3         0.6	Boron	ppm	ASTM D5185m	250	1	0	5
Manganese         ppm         ASTM D5185m         <1         0         <1           Magnesium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1150         1089         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >20         470         0         3           Glycol         % ASTM D5185m         >20         470         NEG         NEG           INFRA-RED         method         limit/base         current         h	Barium	ppm	ASTM D5185m	10	2	0	0
Magnesium         ppm         ASTM D5185m         450         948         1076         946           Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1150         1089         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D5982         40.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624 <t< td=""><td>Molybdenum</td><td>ppm</td><td>ASTM D5185m</td><td>100</td><th>88</th><td>61</td><td>60</td></t<>	Molybdenum	ppm	ASTM D5185m	100	88	61	60
Calcium         ppm         ASTM D5185m         3000         1158         1169         1050           Phosphorus         ppm         ASTM D5185m         1150         1089         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         40.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415	Manganese	ppm	ASTM D5185m		<1	0	<1
Phosphorus         ppm         ASTM D5185m         1150         1089         1120         1063           Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         470         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base <td>Magnesium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>450</td> <th>948</th> <td>1076</td> <td>946</td>	Magnesium	ppm	ASTM D5185m	450	948	1076	946
Zinc         ppm         ASTM D5185m         1350         1243         1321         1286           Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         l	Calcium	ppm	ASTM D5185m	3000	1158	1169	1050
Sulfur         ppm         ASTM D5185m         4250         3232         3219         3002           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 <t< td=""><td>Phosphorus</td><td>ppm</td><td>ASTM D5185m</td><td>1150</td><th>1089</th><td>1120</td><td>1063</td></t<>	Phosphorus	ppm	ASTM D5185m	1150	1089	1120	1063
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Zinc	ppm	ASTM D5185m	1350	1243	1321	1286
Silicon         ppm         ASTM D5185m         >25         21         3         5           Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Sulfur	ppm	ASTM D5185m	4250	3232	3219	3002
Sodium         ppm         ASTM D5185m         >158         242         1         3           Potassium         ppm         ASTM D5185m         >20         470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	CONTAMINANTS	;	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         ▲ 470         0         3           Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Silicon	ppm	ASTM D5185m	>25	21	3	5
Glycol         %         *ASTM D2982         ▲ 0.10         NEG         NEG           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Sodium	ppm	ASTM D5185m	>158	<u>242</u>	1	3
INFRA-RED	Potassium	ppm	ASTM D5185m	>20	<b>470</b>	0	3
Soot %         *ASTM D7844         >3         0.6         0.4         0.4           Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Glycol	%	*ASTM D2982		<b>▲</b> 0.10	NEG	NEG
Nitration         Abs/cm         *ASTM D7624         >20         9.7         8.3         9.2           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         21.4         19.5         19.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.7         17.0         17.3	Soot %	%	*ASTM D7844	>3	0.6	0.4	0.4
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     17.7     17.0     17.3	Nitration	Abs/cm	*ASTM D7624	>20	9.7	8.3	9.2
Oxidation Abs/.1mm *ASTM D7414 >25 <b>17.7</b> 17.0 17.3	Sulfation	Abs/.1mm	*ASTM D7415	>30	21.4	19.5	19.9
		ATION	method	limit/base	current	history1	history2
							· ·



# **OIL ANALYSIS REPORT**







Certificate 12367

Sample No.

Lab Number : 06176796 Unique Number : 11022849

: WC0897848

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 13 May 2024 Tested

: 16 May 2024 Diagnosed : 16 May 2024 - Wes Davis Test Package : MOB 1 ( Additional Tests: Glycol, 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)

**GO DURHAM - RAPT** 

1903 FAYETTEVILLE ST DURHAM, NC US 27701

Contact: Robert Iosiniecki Robert.losiniecki@ratpdev.com

Contact/Location: Robert Iosiniecki - GODDUR

T:

F: