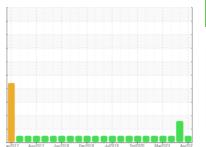


# **OIL ANALYSIS REPORT**

Sample Rating Trend



**NORMAL** 



Machine Id

# **FREIGHTLINER 2321**

Component

Diesel Engine

**DIESEL ENGINE OIL SAE 5W40 (19 QTS)** 

## 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

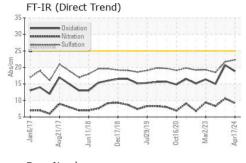
## **Fluid Condition**

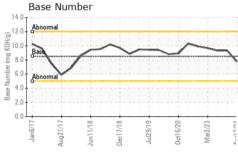
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

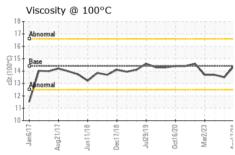
CONTAMINATION							
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         8368         4512         7334           Oil Age         hrs         Client Info         0         4512         316           Oil Changed         Client Info         Changed	Sample Number		Client Info		RW0004753	RW0004807	RW0004795
Oil Age         hrs         Client Info         Changed         4512         316           Oil Changed Sample Status         Client Info         Changed         Changed         Changed Changed         Changed Changed         Changed Changed         Changed Changed         Changed Changed         Changed Changed         NoRMAL         ABNORMAL         NORMAL         NORMAL         NORMAL         NORMAL         ABNORMAL         NORMAL	Sample Date		Client Info		17 Apr 2024	08 Feb 2024	05 Oct 2023
Oil Changed Sample Status         Client Info         Changed NORMAL         Changed ABNORMAL         Change ABNORMAL	Machine Age	hrs	Client Info		8368	4512	7334
CONTAMINATION	Oil Age	hrs	Client Info		0	4512	316
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >3.0         <1.0	Oil Changed		Client Info		Changed	Changed	Changed
Fuel	Sample Status				NORMAL	ABNORMAL	NORMAL
Water Glycol         WC Method WC Method         >0.2         NEG NEG         NEG NEG         NEG NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >90         43         66         35           Chromium         ppm         ASTM D5185m         >20         1         2         <1           Nickel         ppm         ASTM D5185m         >2         <1         1         <1           Silver         ppm         ASTM D5185m         >2         <1         1         0           Sliver         ppm         ASTM D5185m         >2         0         <1         0           Aluminum         ppm         ASTM D5185m         >20         7         6         4           Lead         ppm         ASTM D5185m         >40         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1 </th <th>CONTAMINATIO</th> <th>N</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	CONTAMINATIO	N	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
WEAR METALS	Water		WC Method	>0.2	NEG	NEG	NEG
Irron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         1         2         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>90	43	66	35
Titanium	Chromium	ppm	ASTM D5185m	>20	1	2	<1
Silver	Nickel	ppm	ASTM D5185m	>2	<1	1	<1
Aluminum         ppm         ASTM D5185m         >20         7         6         4           Lead         ppm         ASTM D5185m         >40         <1	Titanium	ppm	ASTM D5185m	>2	<1	<1	0
Lead         ppm         ASTM D5185m         >40         <1         <1         <1         <1         Clopper         ppm         ASTM D5185m         >330         130         167         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1	Silver	ppm	ASTM D5185m	>2	0	<1	0
Copper         ppm         ASTM D5185m         >330         130         167         <1           Tin         ppm         ASTM D5185m         >15         1         2         <1	Aluminum	ppm	ASTM D5185m	>20	7	6	4
Tin	Lead	ppm	ASTM D5185m	>40	<1	<1	<1
Vanadium         ppm         ASTM D5185m         <1         <1         0           Cadmium         ppm         ASTM D5185m         <1         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         124         44         6           Barium         ppm         ASTM D5185m         10         <1         7         0           Molybdenum         ppm         ASTM D5185m         100         9         53         61           Manganese         ppm         ASTM D5185m         100         9         53         61           Magnesium         ppm         ASTM D5185m         20         193         948         948           Calcium         ppm         ASTM D5185m         3000         1823         748         1057           Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         >25         13         49 <td>Copper</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;330</td> <th>130</th> <td>167</td> <td>&lt;1</td>	Copper	ppm	ASTM D5185m	>330	130	167	<1
Cadmium         ppm         ASTM D5185m         <1         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         124         44         6           Barium         ppm         ASTM D5185m         10         <1	Tin	ppm	ASTM D5185m	>15	1	2	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         124         44         6           Barium         ppm         ASTM D5185m         10         <1	Vanadium	ppm	ASTM D5185m		<1	<1	0
Boron         ppm         ASTM D5185m         250         124         44         6           Barium         ppm         ASTM D5185m         10         <1	Cadmium	ppm	ASTM D5185m		<1	<1	0
Barium         ppm         ASTM D5185m         10         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         100         9         53         61           Manganese         ppm         ASTM D5185m         2         5         <1           Magnesium         ppm         ASTM D5185m         450         193         948         948           Calcium         ppm         ASTM D5185m         3000         1823         748         1057           Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7844         >6         0.6	Boron	ppm	ASTM D5185m	250	124	44	6
Manganese         ppm         ASTM D5185m         2         5         <1           Magnesium         ppm         ASTM D5185m         450         193         948         948           Calcium         ppm         ASTM D5185m         3000         1823         748         1057           Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6	Barium	ppm	ASTM D5185m	10	<1	7	0
Magnesium         ppm         ASTM D5185m         450         193         948         948           Calcium         ppm         ASTM D5185m         3000         1823         748         1057           Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/.1mm         *ASTM D7415	Molybdenum	ppm	ASTM D5185m	100	9	53	61
Calcium         ppm         ASTM D5185m         3000         1823         748         1057           Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >20         3         3         3           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         metho	Manganese	ppm	ASTM D5185m		2	5	<1
Phosphorus         ppm         ASTM D5185m         1150         993         887         1055           Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         <	Magnesium	ppm	ASTM D5185m	450	193	948	948
Zinc         ppm         ASTM D5185m         1350         1119         1073         1277           Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm </td <td>Calcium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>3000</td> <th>1823</th> <td>748</td> <td>1057</td>	Calcium	ppm	ASTM D5185m	3000	1823	748	1057
Sulfur         ppm         ASTM D5185m         4250         3272         3230         3043           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Phosphorus	ppm	ASTM D5185m	1150	993	887	1055
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         13         ▲ 49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Zinc	ppm	ASTM D5185m	1350	1119	1073	1277
Silicon         ppm         ASTM D5185m         >25         13         ▲ 49         4           Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Sulfur	ppm	ASTM D5185m	4250	3272	3230	3043
Sodium         ppm         ASTM D5185m         >44         3         6         1           Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	CONTAMINANTS	6	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         3         3         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Silicon	ppm	ASTM D5185m	>25	13	<b>4</b> 9	4
INFRA-RED	Sodium	ppm	ASTM D5185m	>44	3	6	1
Soot %         %         *ASTM D7844 >6         0.6         0.6         0.5           Nitration         Abs/cm         *ASTM D7624 >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415 >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         18.8         20.7         15.0	Potassium	ppm	ASTM D5185m	>20	3	3	3
Nitration         Abs/cm         *ASTM D7624         >20         9.2         10.6         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Soot %	%	*ASTM D7844	>6	0.6	0.6	0.5
Sulfation         Abs/.1mm         *ASTM D7415         >30         22.3         21.7         18.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         18.8         20.7         15.0	Nitration	Abs/cm	*ASTM D7624	>20	9.2	10.6	8.3
Oxidation Abs/.1mm *ASTM D7414 >25 <b>18.8</b> 20.7 15.0				>30			
	FLUID DEGRADA	NOITA	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	18.8	20.7	15.0
	Base Number (BN)	mg KOH/g			7.76	9.32	9.31



## **OIL ANALYSIS REPORT**



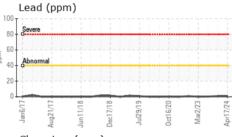


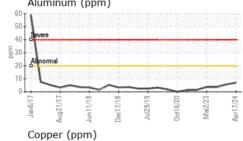


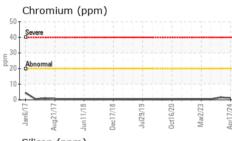
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	LIGHT	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

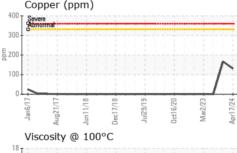
FLUID FROFER	TILO	memou			HISTOLAL	HISTOLA
Visc @ 100°C	cSt	ASTM D445	14.4	14.4	13.5	13.7

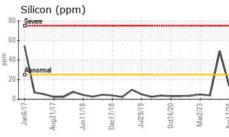
250 Seve	n (ppn	in:					
200 - 150 - 1			1.1.1				
100 - April	ormal	4	4-1-1				
50-						~	^
Jan6/17	1/17	1/18	- 81//	Jul29/19	02/9	2/23	Apr17/24
Jan	Aug21	Jun	Dec17/	Jul	Oct16/20	Mar2/2	Apr1
ΛΙ	minum	n (ppn	۵)				

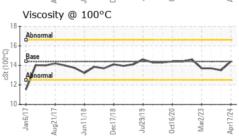


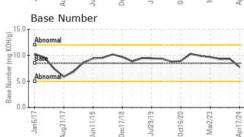
















Certificate 12367

Sample No.

Test Package : MOB 2

: RW0004753 Lab Number : 06158490 Unique Number : 10993913

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 23 Apr 2024 **Tested** : 24 Apr 2024

Diagnosed : 24 Apr 2024 - Wes Davis

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)

**CITY OF FARMINGTON HILLS** 

27245 HALSTED RD FARMINGTON HILLS, MI US 48331

Contact: JERRY BROCK jbrock@fhgov.com

T: (248)871-2850