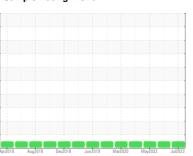


# **OIL ANALYSIS REPORT**

# **Sample Rating Trend**



NORMAL



# LIEBHERR 1400 CR4415 (S/N 074-414)

Component

**Diesel Engine** 

**DIESEL ENGINE OIL SAE 15W40 (9 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

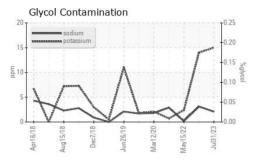
# **Fluid Condition**

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

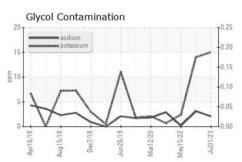
		Aprzulo	Aug2018 Dec2018	Jun2019 Mar2020 May202	0012020	
SAMPLE INFORM	//ATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0810428	WC0746611	WC0610336
Sample Date		Client Info		31 Jul 2023	05 Oct 2022	15 May 2022
Machine Age	hrs	Client Info		9667	8803	8776
Oil Age	hrs	Client Info		0	0	226
Oil Changed		Client Info		Changed	N/A	N/A
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATIO	V	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	<1.0
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	15	5	4
Chromium	ppm	ASTM D5185m	>5	<1	0	<1
Nickel	ppm	ASTM D5185m	>5	0	0	0
Titanium	ppm	ASTM D5185m		<1	<1	<1
Silver	ppm	ASTM D5185m	>3	0	<1	0
Aluminum	ppm	ASTM D5185m	>15	1	2	3
Lead	ppm	ASTM D5185m	>30	9	2	0
Copper	ppm	ASTM D5185m	>125	58	18	2
Tin	ppm	ASTM D5185m	>5	<1	<1	<1
Antimony	ppm	ASTM D5185m				
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
ADDITIVES		method				history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 257	history1 325	331
	ppm					
Boron		ASTM D5185m	250	257	325	331
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	257 50	325 2	331 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	257 50 44	325 2 44	331 0 109
Boron Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	257 50 44 <1	325 2 44 <1	331 0 109 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	257 50 44 <1 525	325 2 44 <1 420	331 0 109 <1 575
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	257 50 44 <1 525 1691	325 2 44 <1 420 1499	331 0 109 <1 575 1832
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	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	257 50 44 <1 525 1691 1068	325 2 44 <1 420 1499 959	331 0 109 <1 575 1832 856
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	257 50 44 <1 525 1691 1068 1391	325 2 44 <1 420 1499 959 1126	331 0 109 <1 575 1832 856 1063
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	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	250 10 100 450 3000 1150 1350 4250 limit/base	257 50 44 <1 525 1691 1068 1391 4749	325 2 44 <1 420 1499 959 1126 4203	331 0 109 <1 575 1832 856 1063 2600
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base	257 50 44 <1 525 1691 1068 1391 4749 current	325 2 44 <1 420 1499 959 1126 4203 history1	331 0 109 <1 575 1832 856 1063 2600 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >60	257 50 44 <1 525 1691 1068 1391 4749 current	325 2 44 <1 420 1499 959 1126 4203 history1	331 0 109 <1 575 1832 856 1063 2600 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158	257 50 44 <1 525 1691 1068 1391 4749  current 10 2	325 2 44 <1 420 1499 959 1126 4203 history1	331 0 109 <1 575 1832 856 1063 2600 history2 8
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158	257 50 44 <1 525 1691 1068 1391 4749  current 10 2 15	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158 >20	257 50 44 <1 525 1691 1068 1391 4749 current 10 2 15 NEG current	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m *ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158 >20 limit/base	257 50 44 <1 525 1691 1068 1391 4749  current 10 2 15 NEG  current 0.2	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG history1 0.1	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol INFRA-RED	ppm ppm ppm ppm 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 1350 4250 limit/base >60 >158 >20	257 50 44 <1 525 1691 1068 1391 4749 current 10 2 15 NEG current	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG history1	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m *ASTM D7844 *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158 >20 limit/base	257 50 44 <1 525 1691 1068 1391 4749  current 10 2 15 NEG  current 0.2 8.6	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG history1 0.1	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG history2 0.2 7.3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm	ASTM D5185m *ASTM D7844 *ASTM D7624 *ASTM D7415 method	250 10 100 450 3000 1150 1350 4250 limit/base >60 >158 >20 limit/base >3 >20 >30 limit/base	257 50 44 <1 525 1691 1068 1391 4749  current 10 2 15 NEG  current 0.2 8.6 21.3  current	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG history1 0.1 6 20.8 history1	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG history2 0.2 7.3 24.3 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m *ASTM D7844 *ASTM D7624 *ASTM D7624	250 10 100 100 450 3000 1150 1350 4250 limit/base >60 >158 >20 limit/base >3 >20 >30 limit/base >25	257 50 44 <1 525 1691 1068 1391 4749  current 10 2 15 NEG  current 0.2 8.6 21.3	325 2 44 <1 420 1499 959 1126 4203 history1 9 3 14 NEG history1 0.1 6 20.8	331 0 109 <1 575 1832 856 1063 2600 history2 8 <1 2 NEG history2 0.2 7.3 24.3



# **OIL ANALYSIS REPORT**



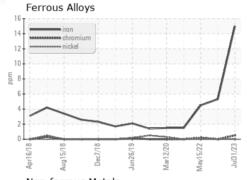
Visco	sity @	100°C				
17- Abnor	nal					
16 - 0 15 - Base						
(0,001) Base 13 Abnom	nal	<u> </u>		\ /		1
12				V		
Apr16/18	Aug15/18	Dec7/18	Jun26/19	Mar12/20	May15/22	

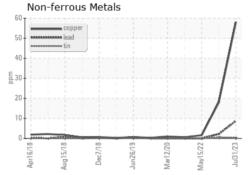


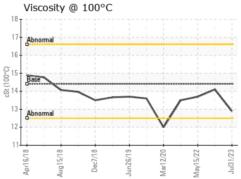
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	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

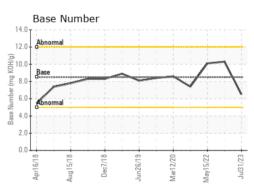
FLUID PROPER	TIES	method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	12.9	14.1	13.7

# **GRAPHS**













Certificate L2367

Laboratory Sample No. Lab Number

Unique Number : 10605185

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0810428 : 05925238

Received : 15 Aug 2023 Diagnosed

: 17 Aug 2023 Diagnostician : Jonathan Hester

Test Package : CONST ( 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)

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WILLIS, TX US 77378

Contact: JOHN HAWKINS johnh@bucknercompanies.com

T:

F: