

## **OIL ANALYSIS REPORT**

Sample Rating Trend

SAMPLE INFORMATION method limit/base

## NORMAL



## LIEBHERR LIEBHERR A934CHD 060316-1419 Diesel Engine

# n2013 Sm2014 Dec2015 Occ2016 Sm2017 Occ2019 Mac2021 May2022



VALVOLINE 15W40 (29 LTR)

## 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 Number		Client Info		DJJ0023812	DJJ0011084	DJJ0010945
Sample Date		Client Info		29 May 2024	04 Dec 2023	19 Dec 2022
Machine Age	hrs	Client Info		16306	16052	15577
Oil Age	hrs	Client Info		750	0	750
Oil Changed		Client Info		Changed	Changed	Changed
Sample Status				NORMAL	NORMAL	ABNORMAL
CONTAMINATIO	N	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	<1.0
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	>66	6	7	16
Chromium	ppm	ASTM D5185m	>4	0	<1	<1
Nickel	ppm	ASTM D5185m	>4	0	0	1
Titanium	ppm	ASTM D5185m		0	<1	0
Silver	ppm	ASTM D5185m	>3	0	0	0
Aluminum	ppm	ASTM D5185m	>8	4	2	3
Lead	ppm	ASTM D5185m	>10	0	0	<1
Copper	ppm	ASTM D5185m	>74	<1	<1	3
Tin	ppm	ASTM D5185m	>4	<1	0	0
Vanadium	ppm	ASTM D5185m		0	0	<1
Cadmium	ppm	ASTM D5185m		0	0	0
	1-1-			-		
ADDITVES		method	limit/base		historv1	history2
ADDITIVES	maa	method ASTM D5185m	limit/base	current	history1 50	history2 22
Boron	ppm	ASTM D5185m	39	64	50	22
Boron Barium	ppm	ASTM D5185m ASTM D5185m	39 1	64 0	50 3	22 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	39 1 49	64 0 83	50 3 89	22 0 101
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	39 1 49 1	64 0 83 <1	50 3 89 0	22 0 101 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	39 1 49 1 616	64 0 83 <1 52	50 3 89 0 37	22 0 101 <1 80
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	39 1 49 1 616 1554	64 0 83 <1 52 2140	50 3 89 0 37 2006	22 0 101 <1 80 2211
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	39 1 49 1 616 1554 899	64 0 83 <1 52 2140 1010	50 3 89 0 37 2006 943	22 0 101 <1 80 2211 963
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	39 1 49 1 616 1554 899 1069	64 0 83 <1 52 2140 1010 1161	50 3 89 0 37 2006 943 1101	22 0 101 <1 80 2211 963 1209
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	39 1 49 1 616 1554 899 1069 2624	64 0 83 <1 52 2140 1010 1161 4564	50 3 89 0 37 2006 943 1101 3914	22 0 101 <1 80 2211 963 1209 4409
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	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b>	64 0 83 <1 52 2140 1010 1161 4564 current	50 3 89 0 37 2006 943 1101 3914 history1	22 0 101 <1 80 2211 963 1209 4409 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	39 1 49 1 616 1554 899 1069 2624	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9	50 3 89 0 37 2006 943 1101 3914 history1 8	22 0 101 <1 80 2211 963 1209 4409 history2 11
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b> >15	64 0 83 <1 52 2140 1010 1161 4564 <u>current</u> 9 3	50 3 89 0 37 2006 943 1101 3914 history1 8 0	22 0 101 <1 80 2211 963 1209 4409 history2 11 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b>	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9	50 3 89 0 37 2006 943 1101 3914 history1 8	22 0 101 <1 80 2211 963 1209 4409 history2 11
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b> >15	64 0 83 <1 52 2140 1010 1161 4564 <u>current</u> 9 3	50 3 89 0 37 2006 943 1101 3914 <b>history1</b> 8 0	22 0 101 <1 80 2211 963 1209 4409 history2 11 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b> >15 >20	64 0 83 <1 52 2140 1010 1161 4564 current 9 3 2	50 3 89 0 37 2006 943 1101 3914 <b>history1</b> 8 0 2	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 2624 2624 20 2624 20 20 20 20 20	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9 3 2 <i>current</i>	50 3 89 0 37 2006 943 1101 3914 history1 8 0 2 2 history1	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	39 1 49 1 616 1554 899 1069 2624 2624 2624 215 >15 >20 20 20	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9 3 2 <i>current</i> 1	50 3 89 0 37 2006 943 1101 3914 history1 8 0 2 <u>history1</u> 1.4	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 1 3 1 history2 ▲ 3.2
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	39 1 49 1 616 1554 899 1069 2624 2624 2624 20 2624 20 20 20 20 20 20 20 20 20 20 20 20 20	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9 3 2 2 <i>current</i> 1 8.1	50 3 89 0 37 2006 943 1101 3914 history1 8 0 2 history1 1.4 8.8	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 history2 ∧ 3.2 12.0
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	39 1 49 1 616 1554 899 1069 2624 <b>limit/base</b> >20 <b>limit/base</b> >3 >20 >30	64 0 83 <1 52 2140 1010 1161 4564 <i>current</i> 9 3 2 2 <i>current</i> 1 8.1 21.1	50 3 89 0 37 2006 943 1101 3914 history1 8 0 2 2 history1 1.4 8.8 20.1	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 1 history2 ▲ 3.2 12.0 29.4
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	39 1 49 1 616 1554 899 1069 2624 <b>imit/base</b> >15 >20 <b>imit/base</b> >3 >20 >30	64 0 83 <1 52 2140 1010 1161 4564 0urrent 9 3 2 2 0urrent 1 8.1 21.1 0urrent	50 3 89 0 37 2006 943 1101 3914 <b>history1</b> 8 0 2 <b>history1</b> 1.4 8.8 20.1 <b>history1</b>	22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 1 history2 3.2 12.0 29.4 history2

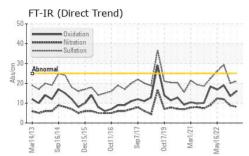


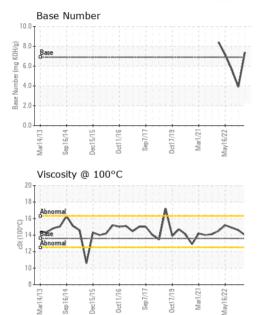
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Dec15/15

# **OIL ANALYSIS REPORT**





0ct17/19 Mar1/71

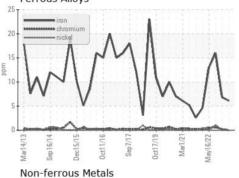
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	13.6	14.0	14.6	14.9
GRAPHS						

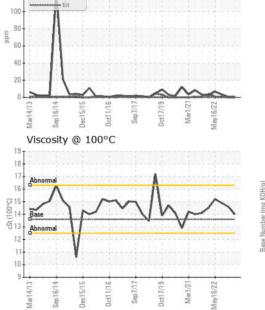
Ferrous Alloys

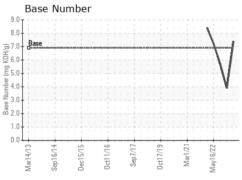
lead

140

120







METAL RECYCLING SERVICES - MONROE Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 Sample No. Received P.O. BOX 812 : DJJ0023812 : 04 Jun 2024 Lab Number : 06198677 Tested : 04 Jun 2024 MONROE, NC Unique Number : 11060800 Diagnosed : 04 Jun 2024 - Wes Davis US 28111 Test Package : CONST (Additional Tests: TBN) Contact: RYAN BOWDEN Certificate 12367 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. T: Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012) F: (704)238-0755

Report Id: METMONNC [WUSCAR] 06198677 (Generated: 06/06/2024 21:43:04) Rev: 1

Contact/Location: RYAN BOWDEN - METMONNC

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