

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 limit/base | 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 method 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 method ASTM D5185m ASTM D5185m | 39 1 49 1 616 1554 899 1069 2624 limit/base >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 method ASTM D5185m | 39 1 49 1 616 1554 899 1069 2624 limit/base | 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 method ASTM D5185m ASTM D5185m | 39 1 49 1 616 1554 899 1069 2624 limit/base >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 Sodium Potassium | ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 39 1 49 1 616 1554 899 1069 2624 limit/base >15 >20 | 64 0 83 <1 52 2140 1010 1161 4564 current 9 3 2 | 50 3 89 0 37 2006 943 1101 3914 history1 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 limit/base >20 limit/base >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 imit/base >15 >20 imit/base >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 history1 8 0 2 history1 1.4 8.8 20.1 history1 | 22 0 101 <1 80 2211 963 1209 4409 history2 11 3 1 1 history2 3.2 12.0 29.4 history2 |

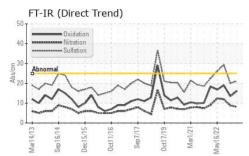


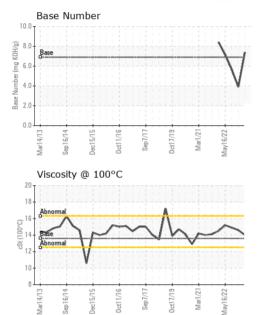
Mar14/13

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Dec15/15

OIL ANALYSIS REPORT





0ct17/19 Mar1/71

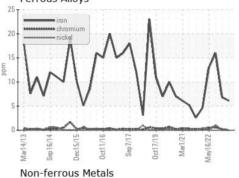
| VISUAL | | method | limit/base | current | history1 | history2 |
|------------------|--------|-----------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Precipitate | scalar | *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 | | | | | | |

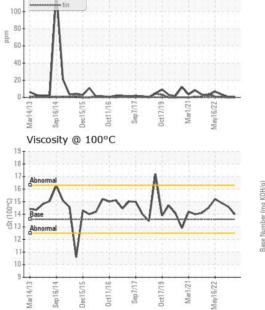
Ferrous Alloys

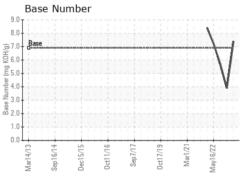
lead

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

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Contact/Location: RYAN BOWDEN - METMONNC

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