



LIEBHERR

OIL ANALYSIS REPORT

| | |
|-----------------|------------------|
| WEAR | NORMAL |
| CONTAMINATION | NORMAL |
| FLUID CONDITION | ATTENTION |



Machine Id
LIEBHERR LH110 155976-1227
Component
Diesel Engine
Fluid
DIESEL ENGINE OIL SAE 15W40 (--- GAL)

RECOMMENDATION

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

| Test | UOM | Method | Limit/Abn | Current | History1 | History2 |
|----------------|-----|-------------|-----------|--------------------|-------------|-------------|
| Sample Number | | Client Info | | LH0267259 | LH0267250 | LH0267555 |
| Sample Date | | Client Info | | 08 Jun 2024 | 29 May 2024 | 12 May 2024 |
| Machine Age | hrs | Client Info | | 2430 | 2217 | 1951 |
| Oil Age | hrs | Client Info | | 479 | 266 | 328 |
| Filter Age | hrs | Client Info | | 479 | 266 | 328 |
| Oil Changed | | Client Info | | Changed | Not Changd | Changed |
| Filter Changed | | Client Info | | Changed | Not Changed | Changed |
| Sample Status | | | | ATTENTION | ATTENTION | NORMAL |

WEAR

All component wear rates are normal.

| | | | | | | |
|--------------|--------|-------------|------|--------------|------|------|
| Iron | ppm | ASTM D5185m | >100 | 6 | 3 | 5 |
| Chromium | ppm | ASTM D5185m | >5 | <1 | <1 | <1 |
| Nickel | ppm | ASTM D5185m | >5 | <1 | <1 | <1 |
| Titanium | ppm | ASTM D5185m | | <1 | <1 | <1 |
| Silver | ppm | ASTM D5185m | >3 | 0 | 0 | 1 |
| Aluminum | ppm | ASTM D5185m | >15 | 3 | 3 | 3 |
| Lead | ppm | ASTM D5185m | >30 | 1 | <1 | <1 |
| Copper | ppm | ASTM D5185m | >125 | 2 | 2 | 12 |
| Tin | ppm | ASTM D5185m | >5 | <1 | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | | <1 | 0 | <1 |
| White Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |

CONTAMINATION

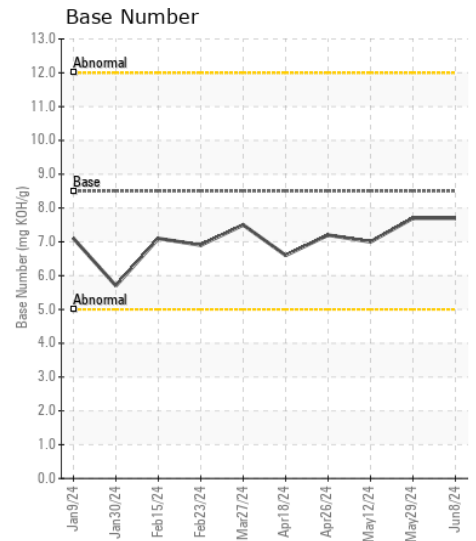
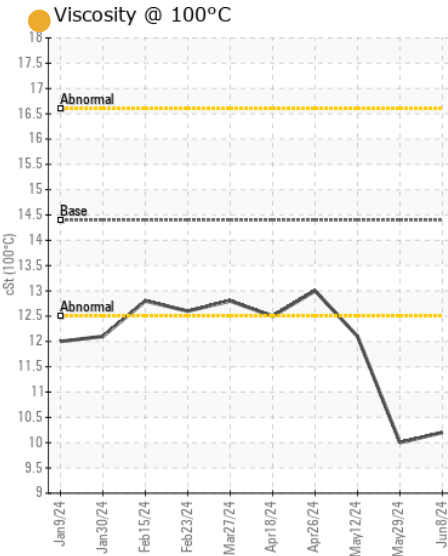
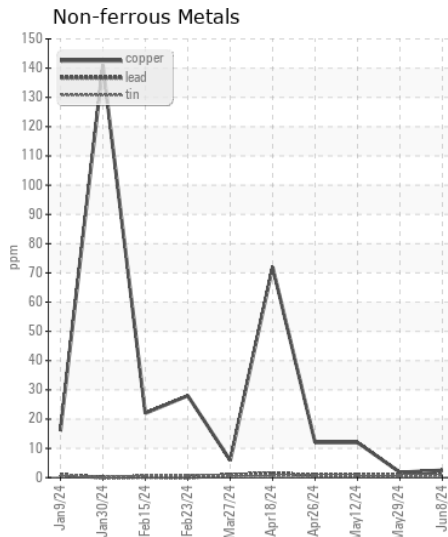
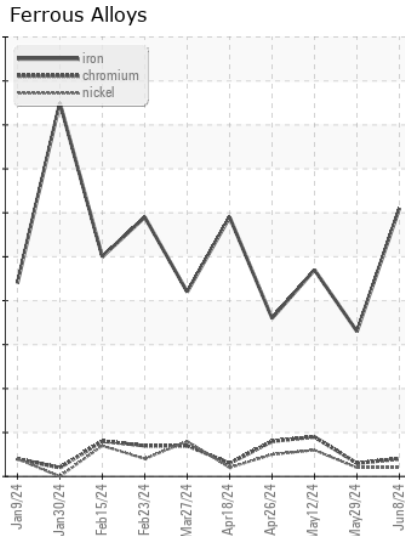
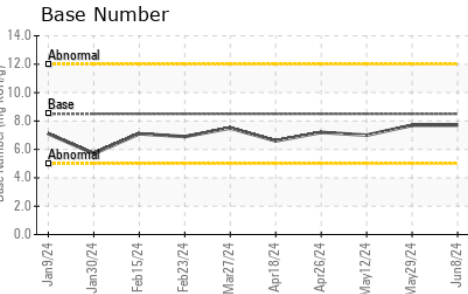
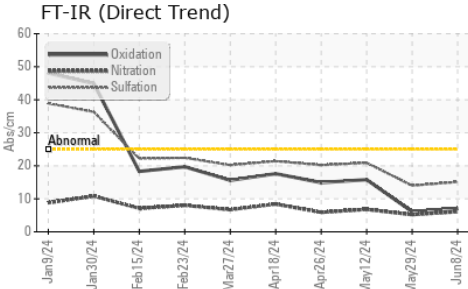
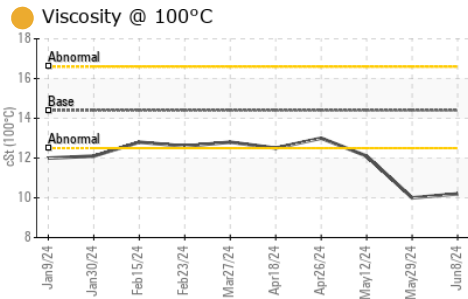
There is no indication of any contamination in the oil.

| | | | | | | |
|------------------|----------|-------------|-------|----------------|-------|-------|
| Silicon | ppm | ASTM D5185m | >60 | 10 | 10 | 10 |
| Potassium | ppm | ASTM D5185m | >20 | 2 | 2 | 3 |
| Fuel | | WC Method | >5 | <1.0 | <1.0 | 1.1 |
| Water | | WC Method | >0.2 | NEG | NEG | NEG |
| Glycol | | WC Method | | NEG | NEG | NEG |
| Soot % | % | *ASTM D7844 | >3 | 0.1 | 0 | 0.1 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | 6.1 | 5.2 | 6.8 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | 15.1 | 14.0 | 20.9 |
| 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 |

FLUID CONDITION

The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

| | | | | | | |
|------------------|----------|-------------|------|--------------|------|------|
| Sodium | ppm | ASTM D5185m | >158 | <1 | 0 | 3 |
| Boron | ppm | ASTM D5185m | 250 | 37 | 33 | 338 |
| Barium | ppm | ASTM D5185m | 10 | 0 | 0 | 1 |
| Molybdenum | ppm | ASTM D5185m | 100 | 16 | 12 | 76 |
| Manganese | ppm | ASTM D5185m | | <1 | <1 | <1 |
| Magnesium | ppm | ASTM D5185m | 450 | 81 | 74 | 379 |
| Calcium | ppm | ASTM D5185m | 3000 | 2743 | 2729 | 1343 |
| Phosphorus | ppm | ASTM D5185m | 1150 | 1015 | 1006 | 966 |
| Zinc | ppm | ASTM D5185m | 1350 | 1197 | 1168 | 1124 |
| Sulfur | ppm | ASTM D5185m | 4250 | 4053 | 4124 | 3414 |
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | 7.1 | 6.1 | 15.8 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | 8.5 | 7.7 | 7.7 | 7.0 |
| Visc @ 100°C | cSt | ASTM D445 | 14.4 | 10.2 | 10.0 | 12.1 |



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : LH0267259 **Received** : 20 Jun 2024
Lab Number : 06215454 **Tested** : 21 Jun 2024
Unique Number : 11088318 **Diagnosed** : 21 Jun 2024 - Don Baldrige
Test Package : CONST (Additional Tests: TBN)

KINDER MORGAN
 4301 IVERSON
 TRINITY, AL
 US 35601

Contact: RICKY JOHNSON
 ricky_johnson@kindermorgan.com

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)

T:
 F: (256)355-5250