



OIL ANALYSIS REPORT

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



Machine Id
CATERPILLAR GM01 - DA LUBRICANT BLUE FLAME HB-5 SAE 40 (S/N LGS00177)

Component
Biogas Engine

Fluid
D-A Lubricant Blue Flame HB-5 40W (140 GAL)

RECOMMENDATION

Resample at the next service interval to monitor.

| Test | UOM | Method | Limit/Abn | Current | History1 | History2 |
|----------------|-----|-------------|-----------|--------------------|-------------|-------------|
| Sample Number | | Client Info | | WC0880155 | WC0880154 | WC0880153 |
| Sample Date | | Client Info | | 18 Mar 2024 | 11 Mar 2024 | 04 Mar 2024 |
| Machine Age | hrs | Client Info | | 78738 | 78571 | 78405 |
| Oil Age | hrs | Client Info | | 514 | 347 | 181 |
| Filter Age | hrs | Client Info | | 514 | 347 | 181 |
| Oil Changed | | Client Info | | Not Changd | Not Changd | Not Changd |
| Filter Changed | | Client Info | | Not Changd | Not Changd | Not Changd |
| Sample Status | | | | NORMAL | NORMAL | NORMAL |

WEAR

All component wear rates are normal.

| | | | | | | |
|--------------|--------|-------------|------|--------------|------|------|
| Iron | ppm | ASTM D5185m | >45 | 15 | 7 | <1 |
| Chromium | ppm | ASTM D5185m | >2 | <1 | 0 | <1 |
| Nickel | ppm | ASTM D5185m | >2 | 0 | 0 | <1 |
| Titanium | ppm | ASTM D5185m | | 1 | <1 | 2 |
| Silver | ppm | ASTM D5185m | >5 | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >10 | 2 | 1 | 2 |
| Lead | ppm | ASTM D5185m | >5 | 0 | 0 | 0 |
| Copper | ppm | ASTM D5185m | >14 | 12 | 8 | 10 |
| Tin | ppm | ASTM D5185m | >13 | 2 | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | | 0 | <1 | 0 |
| White Metal | scalar | *Visual | NONE | LIGHT | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |

CONTAMINATION

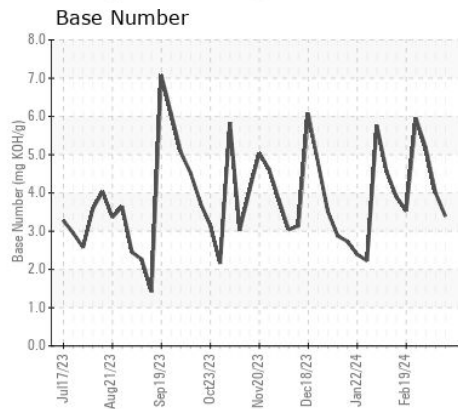
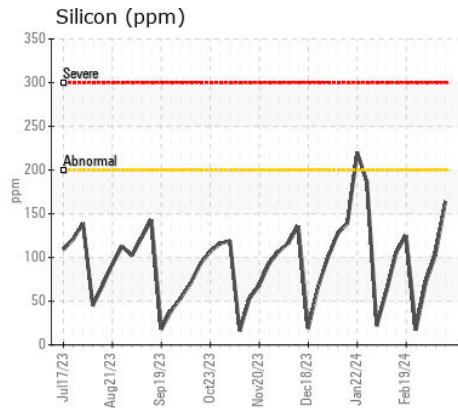
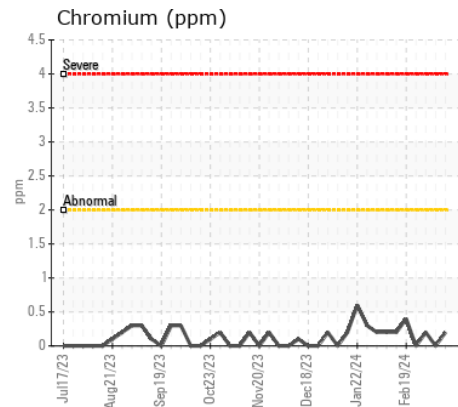
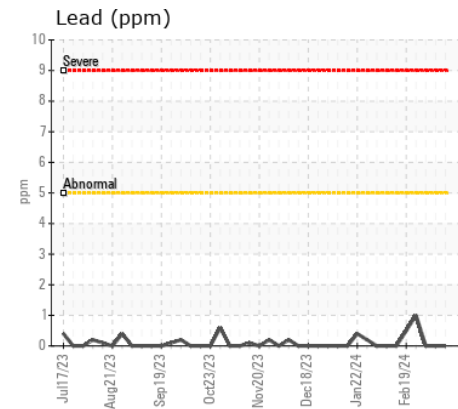
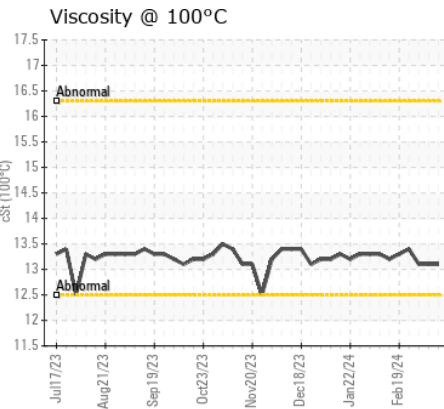
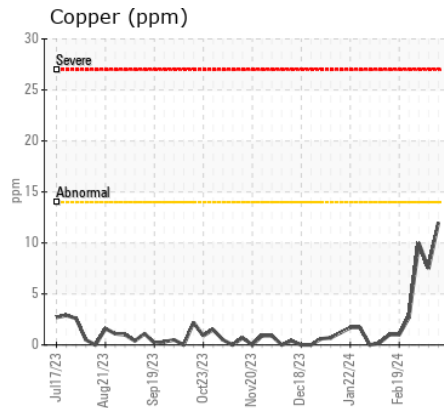
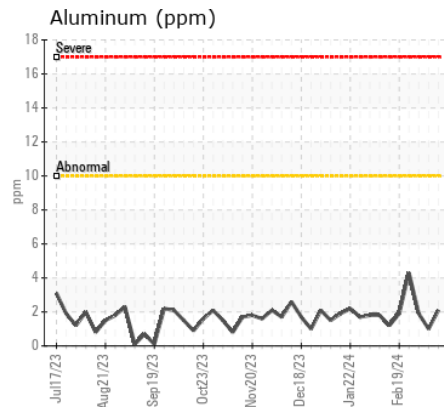
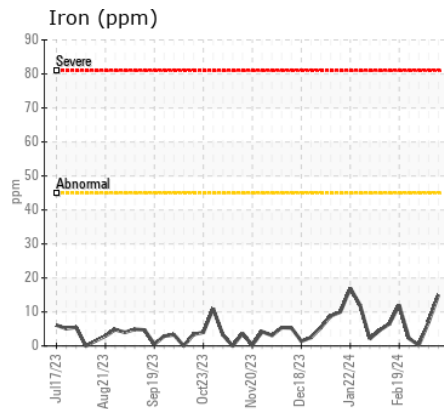
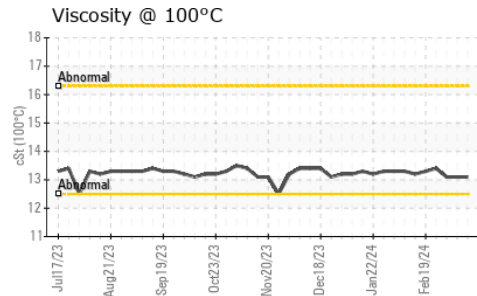
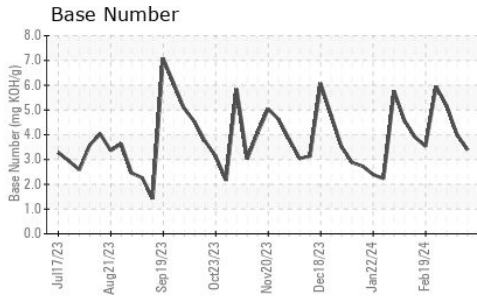
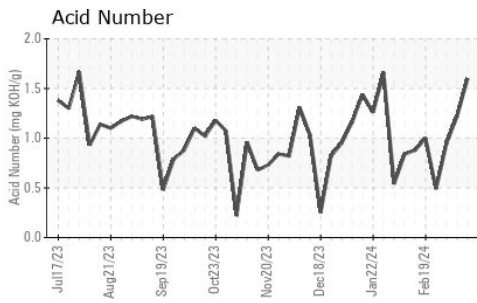
There is no indication of any contamination in the oil.

| | | | | | | |
|------------------|----------|-------------|-------|----------------|-------|-------|
| Silicon | ppm | ASTM D5185m | >200 | 164 | 103 | 71 |
| Potassium | ppm | ASTM D5185m | >20 | 0 | 0 | 1 |
| Fuel | | WC Method | >4.0 | <1.0 | <1.0 | <1.0 |
| Water | | WC Method | >0.1 | NEG | NEG | NEG |
| Glycol | | WC Method | | NEG | NEG | NEG |
| Soot % | % | *ASTM D7844 | | 0.1 | 0 | 0 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | 4.3 | 4.3 | 3.9 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | 19.8 | 18.8 | 16.8 |
| 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 | >0.1 | NEG | NEG | NEG |

FLUID CONDITION

The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

| | | | | | | |
|------------------|----------|-------------|-----|--------------|------|------|
| Sodium | ppm | ASTM D5185m | | 3 | 3 | 1 |
| Boron | ppm | ASTM D5185m | | 4 | 4 | 4 |
| Barium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m | | 6 | 3 | 2 |
| Manganese | ppm | ASTM D5185m | | <1 | 0 | 0 |
| Magnesium | ppm | ASTM D5185m | | 16 | 19 | 13 |
| Calcium | ppm | ASTM D5185m | | 1752 | 1649 | 1704 |
| Phosphorus | ppm | ASTM D5185m | | 324 | 282 | 288 |
| Zinc | ppm | ASTM D5185m | | 371 | 325 | 384 |
| Sulfur | ppm | ASTM D5185m | | 4818 | 3740 | 3388 |
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | 10.0 | 9.5 | 8.6 |
| Acid Number (AN) | mg KOH/g | ASTM D8045 | | 1.60 | 1.22 | 0.95 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | | 3.39 | 4.00 | 5.18 |
| Visc @ 100°C | cSt | ASTM D445 | | 13.1 | 13.1 | 13.1 |



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0880155
Lab Number : 06123239
Unique Number : 10937390
Test Package : MOB 2

Received : 19 Mar 2024
Tested : 20 Mar 2024
Diagnosed : 22 Mar 2024 - Sean Felton

ONSLow
 465 MEADOWVIEW RD
 JACKSONVILLE, NC
 US 28540

Contact: THOMAS BURTON
 thomas.burton@cubedistrictenergy.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: