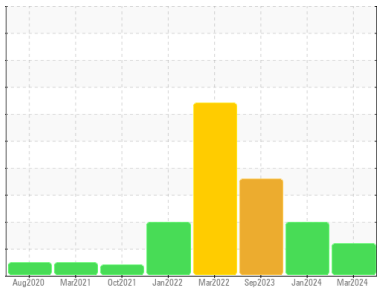
# OIL ANALYSIS REPORT

Area
## GUAY SON [CONHER]
Machine Id
## CATERPILLAR NAUTICO 5
Component
**Auxilary Power Unit Auxiliary Engine**
Fluid
**RALOY 15W40 (8 LTR)**

Sample Rating Trend




**FUEL**

## DIAGNOSIS

**Recommendation**
No corrective action is recommended at this time. Resample at the next service interval to monitor. ( Customer Sample Comment: Fluid: Raloy 15W40 )

**Wear**
All component wear rates are normal.

**Contamination**
Light fuel dilution occurring. The amount and size of particulates present in the system are acceptable.

**Fluid Condition**
The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **KL0014203** | KL0013489 | KL0012825 |
| Sample Date | | Client Info | | **20 Mar 2024** | 20 Jan 2024 | 15 Sep 2023 |
| Machine Age | hrs | Client Info | | **0** | 0 | 13005 |
| Oil Age | hrs | Client Info | | **12** | 72 | 60 |
| Oil Changed | | Client Info | | **Not Changd** | Not Changd | Not Changd |
| Sample Status | | | | **MARGINAL** | ATTENTION | ABNORMAL |

| CONTAMINATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Water | | WC Method | >0.1 | **NEG** | NEG | NEG |
| Glycol | | WC Method | | **NEG** | 0.0 | NEG |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Iron | ppm | ASTM D5185m | >100 | **19** | 63 | 60 |
| Chromium | ppm | ASTM D5185m | >20 | **<1** | 2 | <1 |
| Nickel | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Titanium | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Silver | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >20 | **2** | 2 | <1 |
| Lead | ppm | ASTM D5185m | >40 | **2** | 12 | 1 |
| Copper | ppm | ASTM D5185m | >330 | **3** | 28 | 3 |
| Tin | ppm | ASTM D5185m | >15 | **1** | 3 | <1 |
| Vanadium | ppm | ASTM D5185m | | **<1** | 0 | <1 |
| Cadmium | ppm | ASTM D5185m | | **0** | 0 | 0 |

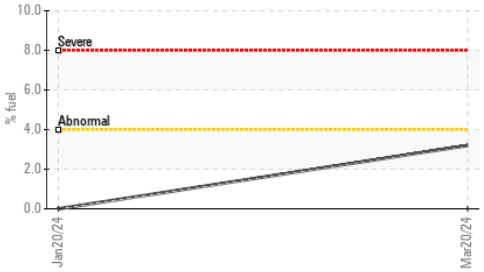
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | | **0** | 8 | 0 |
| Barium | ppm | ASTM D5185m | | **0** | <1 | 0 |
| Molybdenum | ppm | ASTM D5185m | | **<1** | 12 | 0 |
| Manganese | ppm | ASTM D5185m | | **<1** | 0 | <1 |
| Magnesium | ppm | ASTM D5185m | | **7** | 61 | 7 |
| Calcium | ppm | ASTM D5185m | | **2795** | 2490 | 2702 |
| Phosphorus | ppm | ASTM D5185m | | **1161** | 964 | 1072 |
| Zinc | ppm | ASTM D5185m | | **1366** | 1102 | 1319 |
| Sulfur | ppm | ASTM D5185m | | **3931** | 3789 | 4019 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >25 | **12** | 12 | ▲ 42 |
| Sodium | ppm | ASTM D5185m | | **6** | 47 | 1 |
| Potassium | ppm | ASTM D5185m | >20 | **4** | 48 | 3 |
| Fuel | % | ASTM D3524 | >4.0 | ▲ **3.2** | <1.0 | <1.0 |

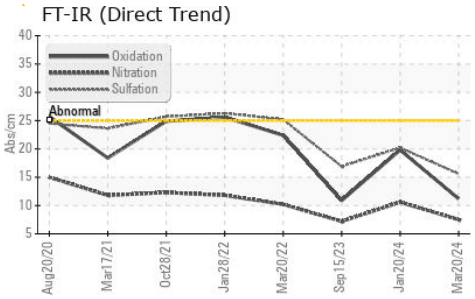
| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | *ASTM D7844 | | **0.1** | 0.2 | 0 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | **7.5** | 10.6 | 7.2 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | **15.6** | 20.2 | 16.9 |

# OIL ANALYSIS REPORT

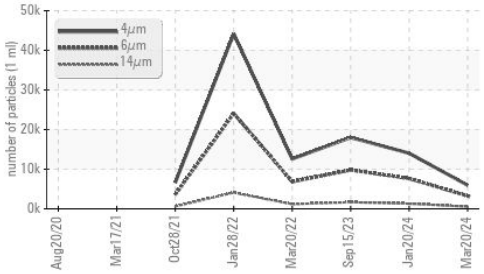
Fuel Dilution



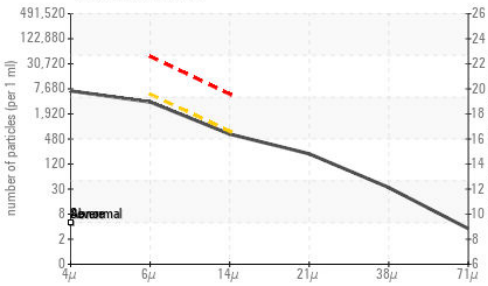

FT-IR (Direct Trend)



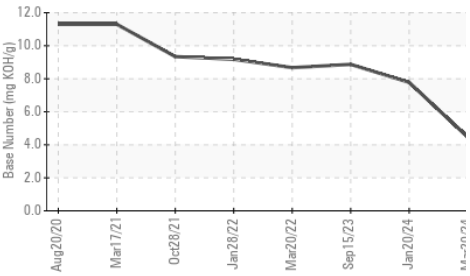

Particle Trend




Particle Count




Base Number




| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | | **5951** | 14024 | 18000 |
| Particles >6µm | | ASTM D7647 | >5000 | **3242** | 7640 | ▲ 9805 |
| Particles >14µm | | ASTM D7647 | >640 | **552** | 1300 | ▲ 1669 |
| Particles >21µm | | ASTM D7647 | >160 | **186** | 438 | ▲ 562 |
| Particles >38µm | | ASTM D7647 | >40 | **29** | 68 | ▲ 87 |
| Particles >71µm | | ASTM D7647 | >10 | **3** | 7 | 9 |
| Oil Cleanliness | | ISO 4406 (c) | >19/16 | **19/16** | 20/17 | ▲ 20/18 |

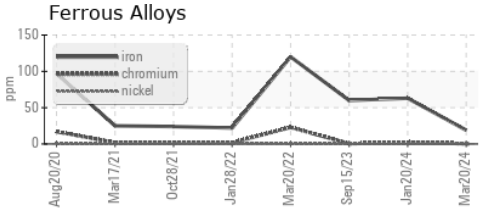
| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | **11.2** | 19.8 | 10.9 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | | **4.47** | 7.78 | 8.87 |

| 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 | >0.1 | **NEG** | NEG | NEG |
| Free Water | scalar | *Visual | | **NEG** | NEG | NEG |

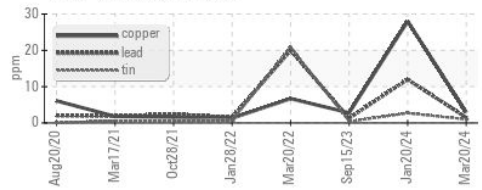
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 100°C | cSt | ASTM D445 | | ▲ **12.2** | 15.2 | 12.8 |

## GRAPHS

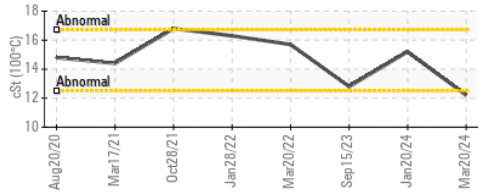
Ferrous Alloys



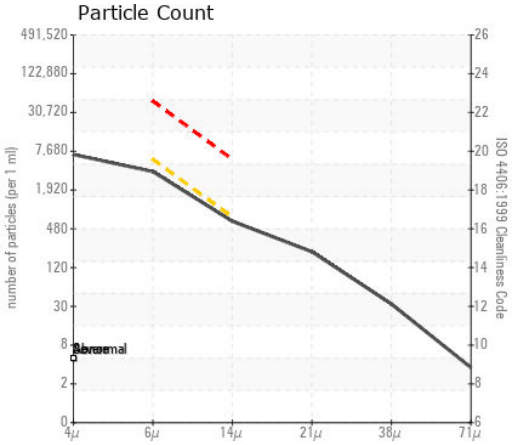

Non-ferrous Metals



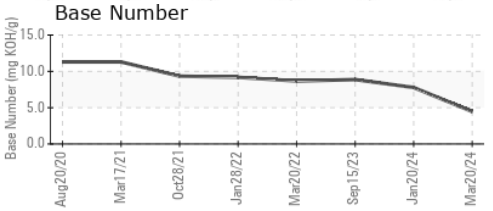

Viscosity @ 100°C




Particle Count




Base Number




**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : KL0014203 **Received** : 18 Apr 2024
**Lab Number** : 06153319 **Tested** : 23 Apr 2024
**Unique Number** : 10983397 **Diagnosed** : 23 Apr 2024 - Jonathan Hester
**Test Package** : MOB 2 ( Additional Tests: FuelDilution, PercentFuel, PrtCount )

Certificate L2367

*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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