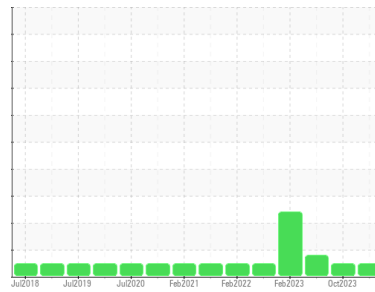




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Machine Id
WESTERN STAR 32
 Component
Diesel Engine
 Fluid
SHELL 15W40 (42 QTS)

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 INFORMATION

| | method | limit/base | current | history1 | history2 |
|---------------|-------------|-------------|--------------------|-------------|-------------|
| Sample Number | Client Info | | RW0004648 | RW0004640 | RW0002918 |
| Sample Date | Client Info | | 28 Mar 2024 | 17 Oct 2023 | 05 Jun 2023 |
| Machine Age | mls | Client Info | 730838 | 719439 | 709244 |
| Oil Age | mls | Client Info | 11399 | 10195 | 14864 |
| Oil Changed | Client Info | | Changed | Changed | Changed |
| Sample Status | | | NORMAL | NORMAL | ABNORMAL |

CONTAMINATION

| | 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 >100 | 56 | 62 | 57 |
| Chromium | ppm | ASTM D5185m >6 | 2 | 2 | 3 |
| Nickel | ppm | ASTM D5185m >4 | 1 | <1 | 1 |
| Titanium | ppm | ASTM D5185m >2 | 0 | 0 | <1 |
| Silver | ppm | ASTM D5185m >2 | <1 | 0 | 0 |
| Aluminum | ppm | ASTM D5185m >30 | 4 | 3 | 4 |
| Lead | ppm | ASTM D5185m >10 | 7 | 9 | 6 |
| Copper | ppm | ASTM D5185m >150 | 23 | 49 | ▲ 253 |
| Tin | ppm | ASTM D5185m >4 | 1 | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | <1 | 0 | 0 |
| Cadmium | ppm | ASTM D5185m | 0 | 0 | 0 |

ADDITIVES

| | method | limit/base | current | history1 | history2 |
|------------|--------|-------------|--------------|----------|----------|
| Boron | ppm | ASTM D5185m | 53 | 40 | 44 |
| Barium | ppm | ASTM D5185m | 0 | 0 | 2 |
| Molybdenum | ppm | ASTM D5185m | 88 | 94 | 92 |
| Manganese | ppm | ASTM D5185m | <1 | <1 | <1 |
| Magnesium | ppm | ASTM D5185m | 54 | 58 | 69 |
| Calcium | ppm | ASTM D5185m | 2249 | 2331 | 2266 |
| Phosphorus | ppm | ASTM D5185m | 1027 | 1143 | 1008 |
| Zinc | ppm | ASTM D5185m | 1245 | 1285 | 1227 |
| Sulfur | ppm | ASTM D5185m | 3886 | 3145 | 3234 |

CONTAMINANTS

| | method | limit/base | current | history1 | history2 |
|-----------|--------|------------------|----------|----------|----------|
| Silicon | ppm | ASTM D5185m >20 | 5 | 12 | 18 |
| Sodium | ppm | ASTM D5185m >150 | 3 | 5 | 2 |
| Potassium | ppm | ASTM D5185m >20 | 2 | 1 | 2 |

INFRA-RED

| | method | limit/base | current | history1 | history2 |
|-----------|----------|-----------------|-------------|----------|----------|
| Soot % | % | *ASTM D7844 >3 | 0.5 | 0.6 | 0.5 |
| Nitration | Abs/cm | *ASTM D7624 >20 | 13.4 | 13.3 | 13.2 |
| Sulfation | Abs/.1mm | *ASTM D7415 >30 | 24.6 | 24.8 | 24.5 |

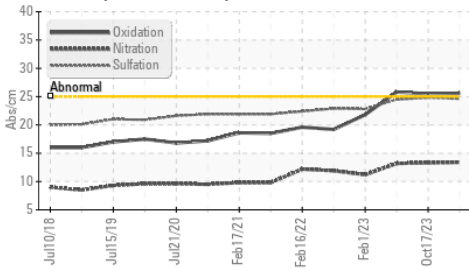
FLUID DEGRADATION

| | method | limit/base | current | history1 | history2 |
|------------------|----------|-----------------|-------------|----------|----------|
| Oxidation | Abs/.1mm | *ASTM D7414 >25 | 25.6 | 25.5 | 25.8 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | 7.14 | 7.87 | 7.57 |

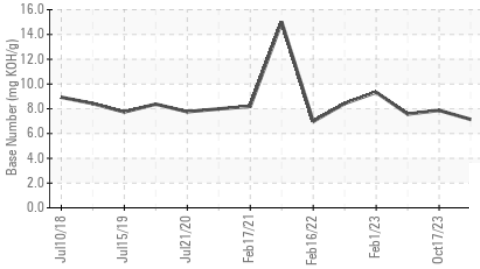


OIL ANALYSIS REPORT

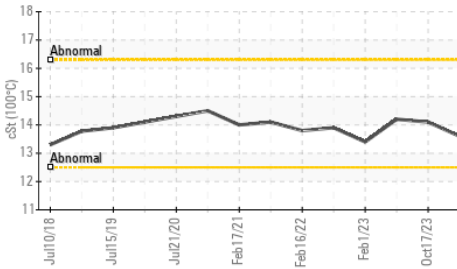
FT-IR (Direct Trend)



Base Number



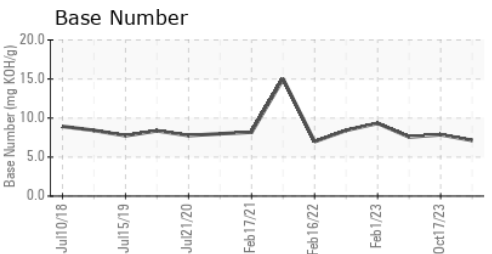
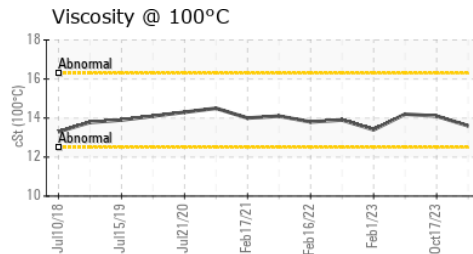
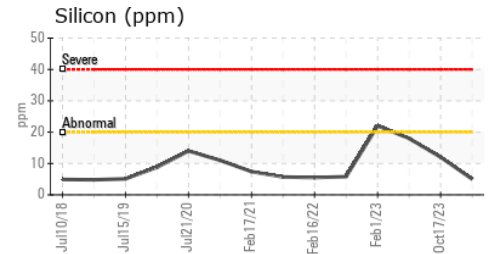
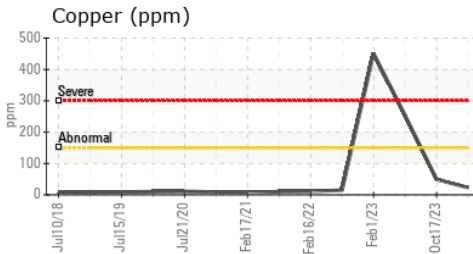
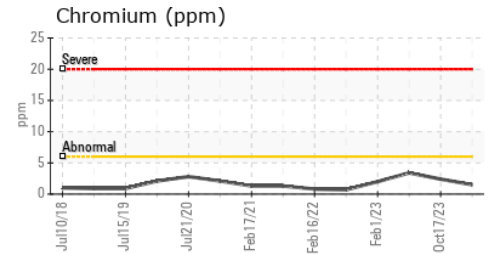
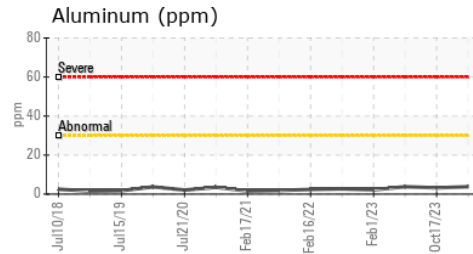
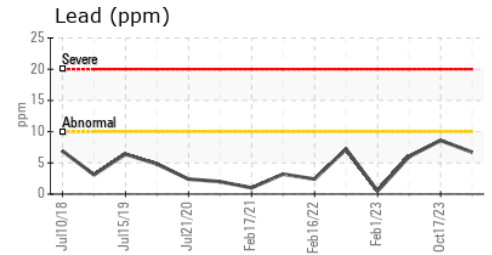
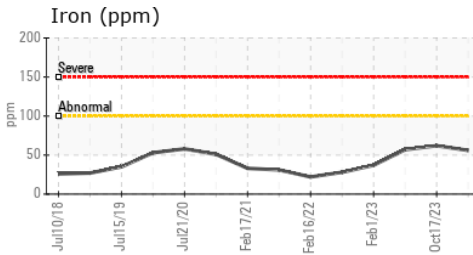
Viscosity @ 100°C



| VISUAL | method | limit/base | current | history1 | history2 |
|------------------|--------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE |
| Precipitate | scalar | *Visual | NONE | NONE | NONE |
| Silt | scalar | *Visual | NONE | NONE | NONE |
| Debris | scalar | *Visual | NONE | NONE | NONE |
| Sand/Dirt | scalar | *Visual | NONE | NONE | NONE |
| Appearance | scalar | *Visual | NORML | NORML | NORML |
| Odor | scalar | *Visual | NORML | NORML | NORML |
| Emulsified Water | scalar | *Visual | >0.2 | NEG | NEG |
| Free Water | scalar | *Visual | | NEG | NEG |

| FLUID PROPERTIES | method | limit/base | current | history1 | history2 |
|------------------|--------|------------|---------|----------|----------|
| Visc @ 100°C | cSt | ASTM D445 | 13.6 | 14.1 | 14.2 |

GRAPHS



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513

Sample No. : RW0004648

Lab Number : 06139357

Unique Number : 10964165

Test Package : MOB 2

Received : 04 Apr 2024

Tested : 05 Apr 2024

Diagnosed : 06 Apr 2024 - Don Baldrige

ROTHIG FOREST PRODUCTS, INC.

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LUTHER, MI

US 49656

Contact: DOUG NELSON

ROTHIGFORESTPRODUCTS@GMAIL.COM

T: (231)266-8292

F: (231)266-8578

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)