



OIL ANALYSIS REPORT

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

Area

Locomotives

Machine Id

2001

Component

Railway diesel

Fluid

RAILWAY ENGINE OIL SAE 40 (11 GAL)

RECOMMENDATION

Resample at the next service interval to monitor. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MOB 2 test kits, this testkit includes BN to determine the suitability of the oil for continued use.

| Test | UOM | Method | Limit/Abn | Current | History1 | History2 |
|----------------|-----|-------------|-----------|--------------------|-------------|-------------|
| Sample Number | | Client Info | | WC0891344 | WC0891349 | WC0891352 |
| Sample Date | | Client Info | | 19 Mar 2024 | 11 Mar 2024 | 05 Mar 2024 |
| Machine Age | hrs | Client Info | | 0 | 0 | 0 |
| Oil Age | hrs | Client Info | | 0 | 0 | 0 |
| Filter Age | hrs | Client Info | | 0 | 0 | 0 |
| Oil Changed | | Client Info | | Not Chngd | Not Chngd | Not Chngd |
| Filter Changed | | Client Info | | Not Chngd | Not Chngd | N/A |
| Sample Status | | | | NORMAL | NORMAL | NORMAL |

WEAR

All component wear rates are normal.

| | | | | | | |
|----------|-----|---------------|-----|--------------|----|----|
| Iron | ppm | ASTM D5185(m) | >42 | 16 | 15 | 16 |
| Chromium | ppm | ASTM D5185(m) | >6 | <1 | <1 | <1 |
| Nickel | ppm | ASTM D5185(m) | >2 | 0 | 0 | <1 |
| Titanium | ppm | ASTM D5185(m) | | 0 | 0 | 0 |
| Silver | ppm | ASTM D5185(m) | >5 | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185(m) | >4 | 3 | 3 | 3 |
| Lead | ppm | ASTM D5185(m) | >30 | <1 | <1 | 1 |
| Copper | ppm | ASTM D5185(m) | >95 | 7 | 6 | 7 |
| Tin | ppm | ASTM D5185(m) | >10 | <1 | <1 | <1 |
| Vanadium | ppm | ASTM D5185(m) | | 0 | 0 | 0 |

CONTAMINATION

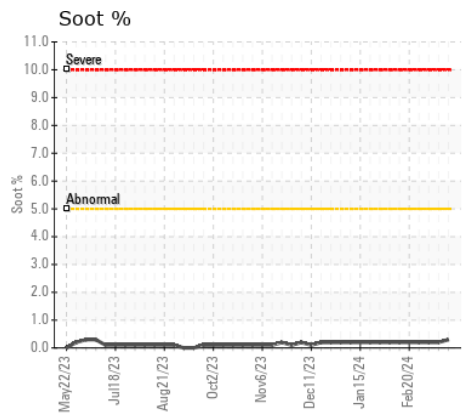
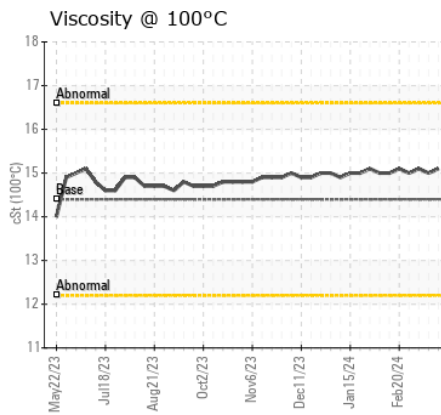
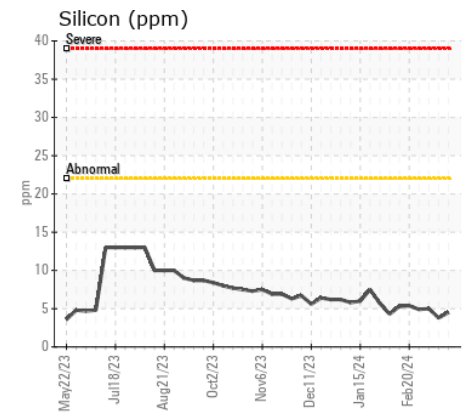
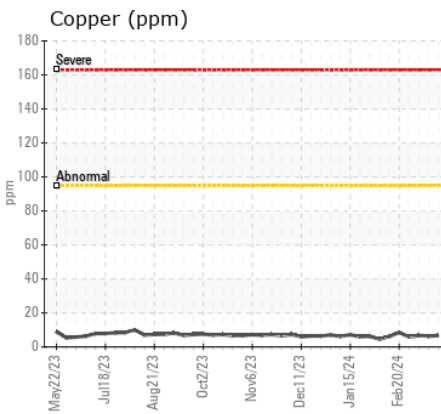
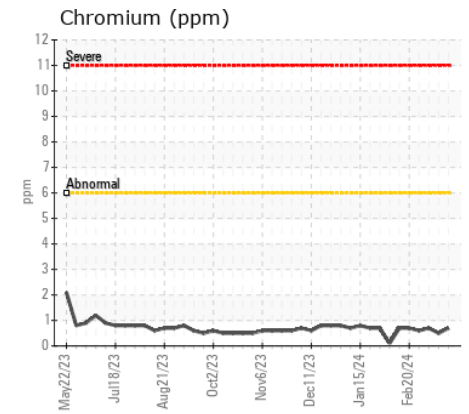
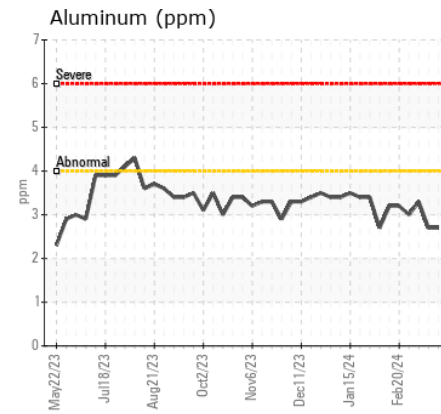
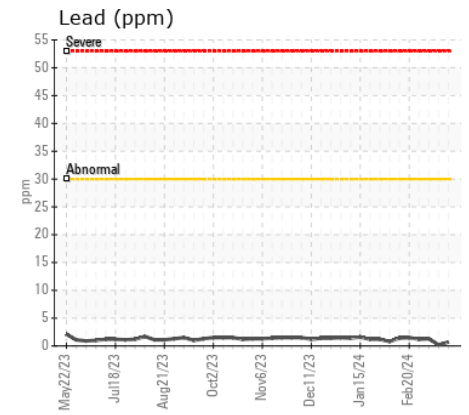
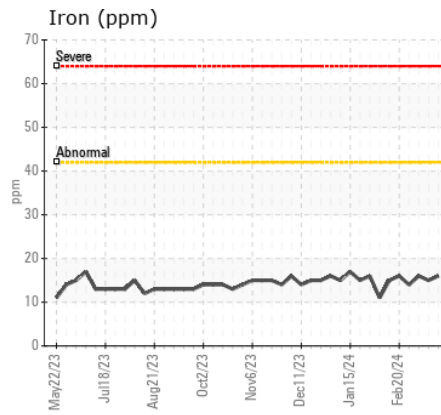
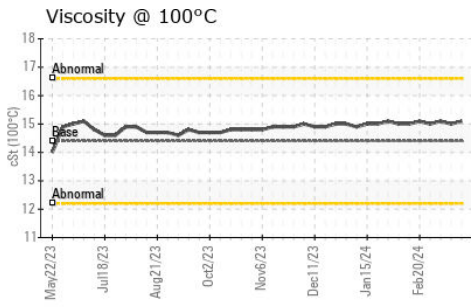
There is no indication of any contamination in the oil.

| | | | | | | |
|------------------|----------|---------------|------|----------------|------|------|
| Silicon | ppm | ASTM D5185(m) | >22 | 4 | 4 | 5 |
| Potassium | ppm | ASTM D5185(m) | >20 | 2 | 2 | 2 |
| 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* | | 0.3 | 0.2 | 0.2 |
| Nitration | Abs/cm | ASTM D7624* | >20 | 12.0 | 12.0 | 12.0 |
| Sulfation | Abs/.1mm | ASTM D7415* | >30 | 14.9 | 14.8 | 14.9 |
| Emulsified Water | scalar | Visual* | >0.1 | NEG | NEG | NEG |

FLUID CONDITION

The condition of the oil is acceptable for the time in service (unconfirmed).

| | | | | | | |
|--------------|----------|---------------|------|-------------|------|------|
| Sodium | ppm | ASTM D5185(m) | | 12 | 11 | 12 |
| Boron | ppm | ASTM D5185(m) | 10 | 2 | <1 | 2 |
| Barium | ppm | ASTM D5185(m) | 10 | 0 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | 25 | 0 | 0 | 0 |
| Manganese | ppm | ASTM D5185(m) | | 0 | 0 | 0 |
| Magnesium | ppm | ASTM D5185(m) | 20 | 19 | 17 | 17 |
| Calcium | ppm | ASTM D5185(m) | 4500 | 4755 | 4729 | 4679 |
| Phosphorus | ppm | ASTM D5185(m) | 10 | 4 | 2 | 2 |
| Zinc | ppm | ASTM D5185(m) | 10 | 5 | 3 | 3 |
| Sulfur | ppm | ASTM D5185(m) | 5000 | 2984 | 2954 | 3246 |
| Oxidation | Abs/.1mm | ASTM D7414* | >25 | 9.5 | 9.4 | 9.5 |
| Visc @ 100°C | cSt | ASTM D7279(m) | 14.4 | 15.1 | 15.0 | 15.1 |



ISO 17025:2017
Accredited
Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC0891344
Lab Number : 02625180
Unique Number : 5750299
Test Package : MOB 1

Received : 28 Mar 2024
Tested : 28 Mar 2024
Diagnosed : 28 Mar 2024 - Wes Davis

Vale - Transportation (Mobile Equipment)
 Transportation Department, (Services - Mobile Equipment)
 COPPER CLIFF, ON
 CA P0M 1N0
 Contact: Richard Rochon
 richard.rochon@vale.com
 T: (705)682-6014
 F:

To discuss this sample report, contact Customer Service at 1-800-268-2131.
 Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.
 Validity of results and interpretation are based on the sample and information as supplied.