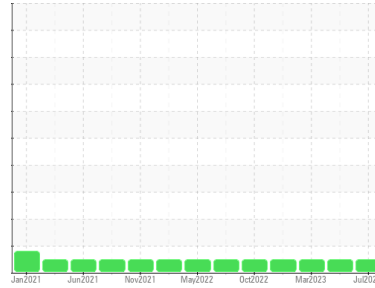


OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Area
KEMP QUARRIES / MUSKOGEE SAND
 Machine Id
ENG045
 Component
Diesel Engine
 Fluid
PETRO CANADA DURON SHP 15W40 (--- GAL)

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 | | PCA0087097 | PCA0087184 | PCA0087165 |
| Sample Date | Client Info | | 14 Jul 2023 | 01 May 2023 | 01 Mar 2023 |
| Machine Age | hrs | Client Info | 12635 | 12280 | 11955 |
| Oil Age | hrs | Client Info | 355 | 325 | 330 |
| Oil Changed | Client Info | | Changed | Changed | Changed |
| Sample Status | | | NORMAL | NORMAL | NORMAL |

CONTAMINATION

| | method | limit/base | current | history1 | history2 |
|--------|-----------|------------|----------------|----------|----------|
| Fuel | WC Method | >2.1 | <1.0 | <1.0 | <1.0 |
| Glycol | WC Method | | NEG | NEG | NEG |

WEAR METALS

| | method | limit/base | current | history1 | history2 |
|----------|--------|-----------------|--------------|----------|----------|
| Iron | ppm | ASTM D5185m >51 | 8 | 12 | 40 |
| Chromium | ppm | ASTM D5185m >11 | <1 | 0 | 1 |
| Nickel | ppm | ASTM D5185m >5 | <1 | <1 | <1 |
| Titanium | ppm | ASTM D5185m | 0 | 0 | 0 |
| Silver | ppm | ASTM D5185m >3 | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185m >31 | 2 | <1 | 2 |
| Lead | ppm | ASTM D5185m >26 | 13 | 4 | 4 |
| Copper | ppm | ASTM D5185m >26 | <1 | <1 | <1 |
| Tin | ppm | ASTM D5185m >4 | 1 | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | 0 | 0 | 0 |
| Cadmium | ppm | ASTM D5185m | 0 | 0 | 0 |

ADDITIVES

| | method | limit/base | current | history1 | history2 |
|------------|--------|------------------|-------------|----------|----------|
| Boron | ppm | ASTM D5185m 0 | 0 | <1 | 1 |
| Barium | ppm | ASTM D5185m 0 | 0 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m 60 | 63 | 59 | 63 |
| Manganese | ppm | ASTM D5185m 0 | 0 | <1 | 1 |
| Magnesium | ppm | ASTM D5185m 1010 | 956 | 876 | 962 |
| Calcium | ppm | ASTM D5185m 1070 | 1116 | 1023 | 1120 |
| Phosphorus | ppm | ASTM D5185m 1150 | 976 | 953 | 1000 |
| Zinc | ppm | ASTM D5185m 1270 | 1271 | 1140 | 1346 |
| Sulfur | ppm | ASTM D5185m 2060 | 2996 | 3241 | 3521 |

CONTAMINANTS

| | method | limit/base | current | history1 | history2 |
|-----------|--------|-----------------|--------------|----------|----------|
| Silicon | ppm | ASTM D5185m >22 | 2 | 1 | 4 |
| Sodium | ppm | ASTM D5185m >31 | 3 | 2 | 2 |
| Potassium | ppm | ASTM D5185m >20 | <1 | 0 | 2 |

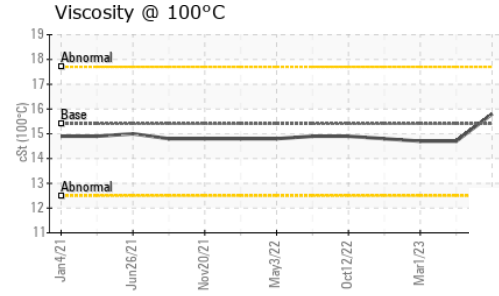
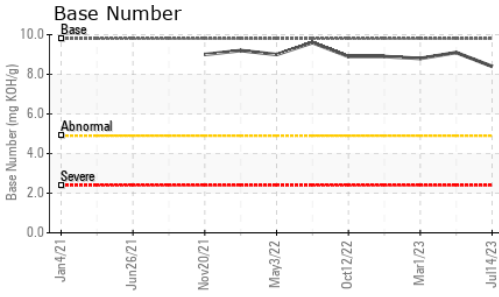
INFRA-RED

| | method | limit/base | current | history1 | history2 |
|-----------|----------|-----------------|-------------|----------|----------|
| Soot % | % | *ASTM D7844 >3 | 0.1 | 0.1 | 0.2 |
| Nitration | Abs/cm | *ASTM D7624 >20 | 11.7 | 9.0 | 7.3 |
| Sulfation | Abs/.1mm | *ASTM D7415 >30 | 21.3 | 19.4 | 18.4 |

FLUID DEGRADATION

| | method | limit/base | current | history1 | history2 |
|------------------|----------|-----------------|-------------|----------|----------|
| Oxidation | Abs/.1mm | *ASTM D7414 >25 | 23.1 | 17.6 | 14.7 |
| Base Number (BN) | mg KOH/g | ASTM D2896 9.8 | 8.4 | 9.1 | 8.8 |

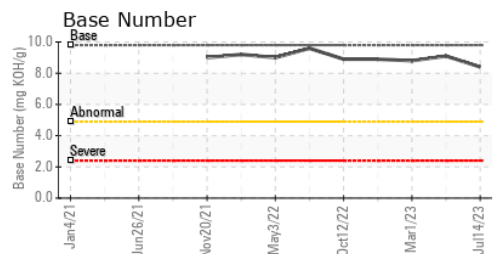
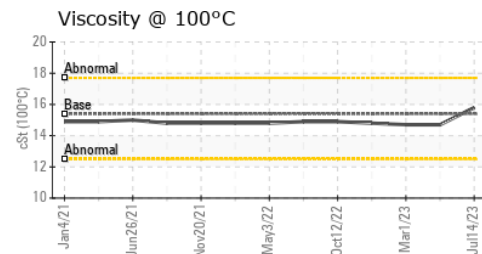
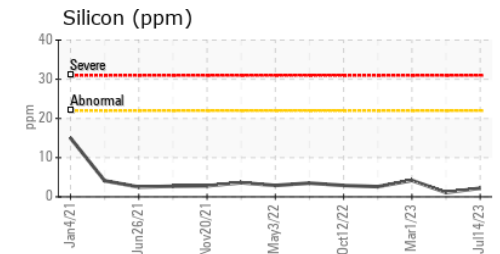
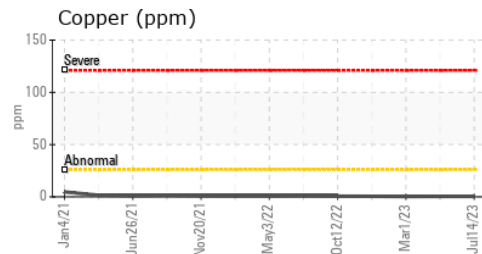
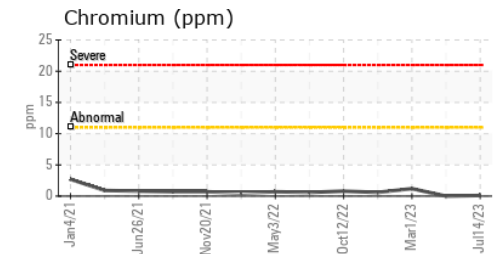
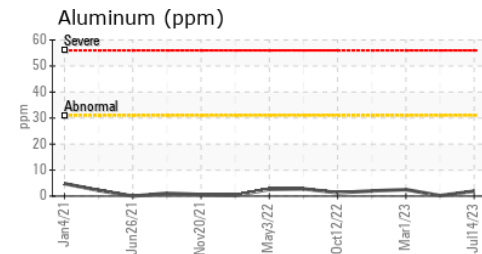
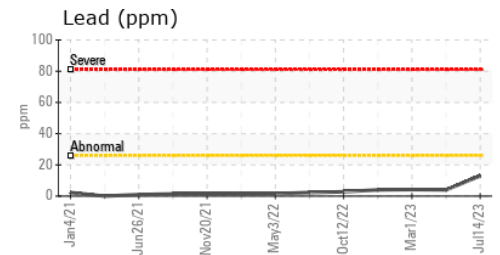
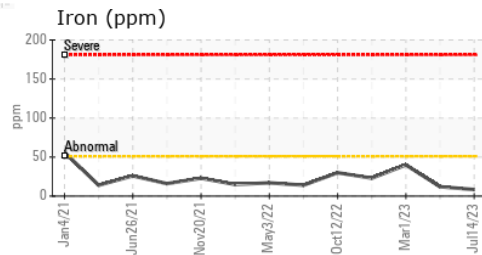
OIL ANALYSIS REPORT



| 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 | >0.21 | NEG | NEG |
| Free Water | scalar | *Visual | | NEG | NEG |

| FLUID PROPERTIES | method | limit/base | current | history1 | history2 | |
|------------------|--------|------------|---------|-------------|----------|------|
| Visc @ 100°C | cSt | ASTM D445 | 15.4 | 15.8 | 14.7 | 14.7 |

GRAPHS



Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : PCA0087097 **Received** : 04 Oct 2023
Lab Number : **05969523** **Diagnosed** : 05 Oct 2023
Unique Number : 10676074 **Diagnostician** : Wes Davis
Test Package : MOB 1 (Additional Tests: TBN)

Kemp Quarries - Muskogee Sand
 3395 W 50th St N
 Porter, OK
 US 74454
 Contact: MUSCOGEE NOTIFICATIONS
 muskogee@muskogeessand.com
 T:
 F:

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)