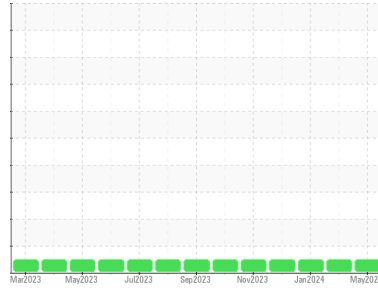




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Area

Huntington

Machine Id

[Huntington] Oil - Starboard Main Engine

Component

Starboard Main Engine

Fluid

DIESEL ENGINE OIL SAE 15W40 (165 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 | | WC0874559 | WC0874743 | WC0804930 |
| Sample Date | Client Info | | 08 May 2024 | 19 Mar 2024 | 21 Jan 2024 |
| Machine Age | hrs | Client Info | 22066 | 21029 | 19870 |
| Oil Age | hrs | Client Info | 0 | 0 | 0 |
| Oil Changed | Client Info | | Not Changed | Not Changed | Not Changed |
| Sample Status | | | NORMAL | NORMAL | NORMAL |

CONTAMINATION

| | method | limit/base | current | history1 | history2 |
|--------|-----------|------------|----------------|----------|----------|
| Fuel | WC Method | >4.0 | <1.0 | <1.0 | <1.0 |
| Glycol | WC Method | | NEG | NEG | NEG |

WEAR METALS

| | method | limit/base | current | history1 | history2 |
|----------|--------|-----------------|--------------|----------|----------|
| Iron | ppm | ASTM D5185m >75 | 19 | 20 | 15 |
| Chromium | ppm | ASTM D5185m >8 | <1 | 0 | <1 |
| Nickel | ppm | ASTM D5185m >2 | <1 | 0 | <1 |
| Titanium | ppm | ASTM D5185m >3 | <1 | 0 | <1 |
| Silver | ppm | ASTM D5185m >2 | <1 | 0 | <1 |
| Aluminum | ppm | ASTM D5185m >15 | 3 | 2 | 3 |
| Lead | ppm | ASTM D5185m >18 | 6 | 6 | 9 |
| Copper | ppm | ASTM D5185m >80 | 12 | 12 | 17 |
| Tin | ppm | ASTM D5185m >14 | <1 | <1 | 1 |
| Vanadium | ppm | ASTM D5185m | <1 | 0 | <1 |
| Cadmium | ppm | ASTM D5185m | <1 | 0 | <1 |

ADDITIVES

| | method | limit/base | current | history1 | history2 |
|------------|--------|------------------|--------------|----------|----------|
| Boron | ppm | ASTM D5185m 250 | 61 | 77 | 96 |
| Barium | ppm | ASTM D5185m 10 | <1 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m 100 | 80 | 80 | 87 |
| Manganese | ppm | ASTM D5185m | <1 | <1 | 2 |
| Magnesium | ppm | ASTM D5185m 450 | 962 | 833 | 823 |
| Calcium | ppm | ASTM D5185m 3000 | 1368 | 1364 | 1392 |
| Phosphorus | ppm | ASTM D5185m 1150 | 847 | 777 | 773 |
| Zinc | ppm | ASTM D5185m 1350 | 1059 | 967 | 974 |
| Sulfur | ppm | ASTM D5185m 4250 | 2938 | 3086 | 2690 |

CONTAMINANTS

| | method | limit/base | current | history1 | history2 |
|-----------|--------|------------------|------------|----------|----------|
| Silicon | ppm | ASTM D5185m >20 | 6 | 6 | 4 |
| Sodium | ppm | ASTM D5185m >158 | 4 | 4 | 7 |
| Potassium | ppm | ASTM D5185m >20 | 3 | <1 | 4 |
| Water | % | ASTM D6304 >0.1 | NEG | NEG | NEG |

INFRA-RED

| | method | limit/base | current | history1 | history2 |
|-----------|----------|-----------------|-------------|----------|----------|
| Soot % | % | *ASTM D7844 | 0.3 | 0.3 | 0.3 |
| Nitration | Abs/cm | *ASTM D7624 >20 | 10.5 | 11.2 | 10.2 |
| Sulfation | Abs/.1mm | *ASTM D7415 >30 | 23.2 | 24.7 | 23.6 |

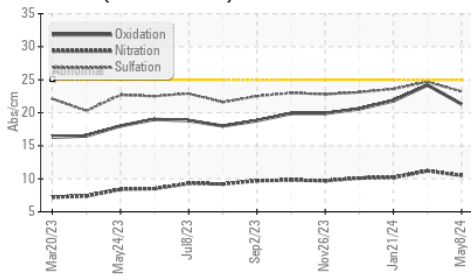
FLUID DEGRADATION

| | method | limit/base | current | history1 | history2 |
|------------------|----------|-----------------|-------------|----------|----------|
| Oxidation | Abs/.1mm | *ASTM D7414 >25 | 21.3 | 24.2 | 21.8 |
| Base Number (BN) | mg KOH/g | ASTM D2896 8.5 | 7.63 | 5.87 | 6.82 |

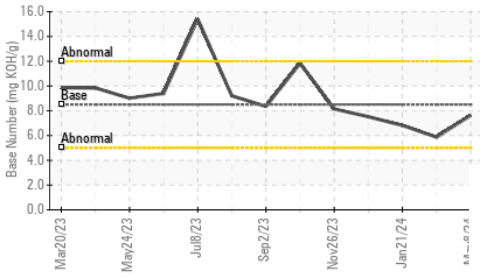


OIL ANALYSIS REPORT

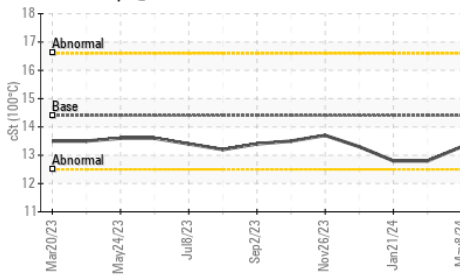
FT-IR (Direct Trend)



Base Number



Viscosity @ 100°C

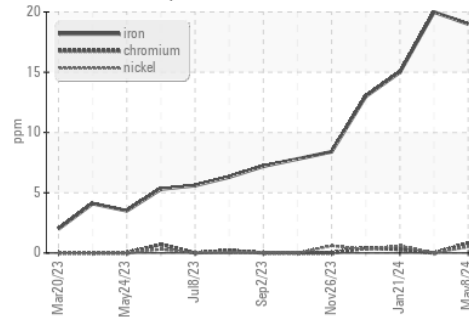


| VISUAL | method | limit/base | current | history1 | history2 |
|------------------|--------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | LIGHT | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE |
| Precipitate | scalar | *Visual | NONE | NONE | 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 | >0.1 | NEG | NEG |
| Free Water | scalar | *Visual | | NEG | NEG |

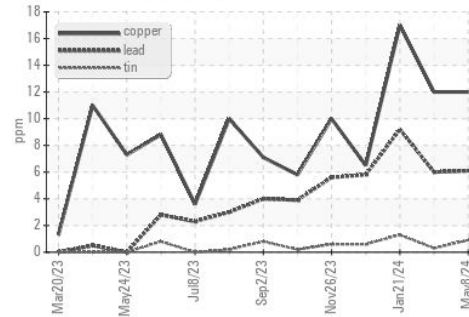
| FLUID PROPERTIES | method | limit/base | current | history1 | history2 |
|------------------|--------|------------|---------|----------|----------|
| Visc @ 100°C | cSt | ASTM D445 | 14.4 | 13.3 | 12.8 |

GRAPHS

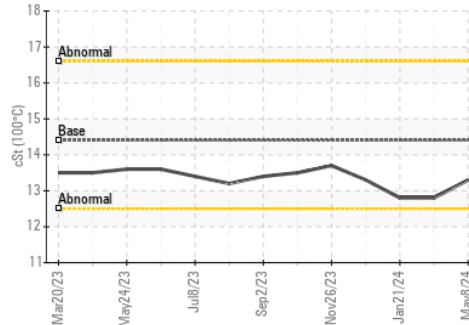
Ferrous Alloys



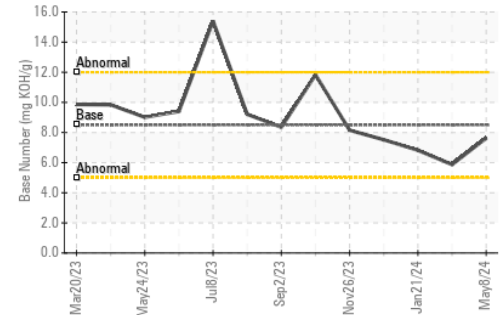
Non-ferrous Metals



Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
 Sample No. : WC0874559 Received : 16 May 2024
 Lab Number : 06181547 Tested : 20 May 2024
 Unique Number : 11032873 Diagnosed : 20 May 2024 - Sean Felton
 Test Package : IND 2 (Additional Tests: KF)

MARATHON PETROLEUM CO.
 101 12TH ST
 CATLETTSBURG, KY
 US 41169

To discuss this sample report, contact Customer Service at 1-800-237-1369.

Contact: CORY GUMBERT
 cagumbert@marathonpetroleum.com

* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

T: (606)585-3950

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

F: x: