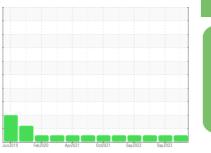


FSP137895

OIL ANALYSIS REPORT

Sample Rating Trend





NORMAL

Component Diesel Engine Fluid DIESEL ENGINE OIL SAE 15W40 (--- QTS)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. Please specify the component make and model with your next sample. Please specify the brand, type, and viscosity of the oil on your next sample.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

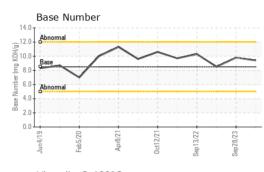
Fluid Condition

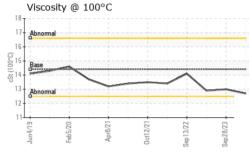
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

| SAMPLE INFORM | ATION | method | limit/base | current | history1 | history2 |
|---|--|--|--|--|---|---|
| Sample Number | | Client Info | | WC0875833 | WC0787679 | WC0787547 |
| Sample Date | | Client Info | | 15 Jan 2024 | 28 Sep 2023 | 28 Mar 2023 |
| Machine Age | mls | Client Info | | 0 | 182822 | 162730 |
| Oil Age | mls | Client Info | | 0 | 0 | 0 |
| Oil Changed | | Client Info | | Changed | N/A | Changed |
| Sample Status | | | | NORMAL | NORMAL | NORMAL |
| CONTAMINATION | N | 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 | 10 | 11 | 13 |
| Chromium | ppm | ASTM D5185m | >20 | <1 | <1 | <1 |
| Nickel | ppm | ASTM D5185m | >4 | <1 | 0 | <1 |
| Titanium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Silver | ppm | ASTM D5185m | >3 | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >20 | 2 | 3 | 2 |
| Lead | ppm | ASTM D5185m | >40 | 0 | 0 | <1 |
| Copper | ppm | ASTM D5185m | >330 | 6 | 4 | 2 |
| Tin | ppm | ASTM D5185m | >15 | <1 | 0 | <1 |
| Vanadium | ppm | ASTM D5185m | | <1 | 0 | 0 |
| Cadmium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| | | | | | | |
| ADDITIVES | | method | limit/base | current | history1 | history2 |
| ADDITIVES Boron | ppm | method ASTM D5185m | limit/base 250 | current 16 | history1 3 | history2 1 |
| | ppm ppm | ASTM D5185m | | | | |
| Boron | | ASTM D5185m | 250 | 16 | 3 | 1 |
| Boron Barium | ppm | ASTM D5185m ASTM D5185m | 250 10 | 16 0 | 3 5 | 1 0 |
| Boron Barium Molybdenum | ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 | 16 0 80 | 3 5 67 | 1 0 62 |
| Boron Barium Molybdenum Manganese | ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 | 16 0 80 <1 | 3 5 67 0 | 1 0 62 <1 |
| Boron Barium Molybdenum Manganese Magnesium | ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 | 16 0 80 <1 935 | 3 5 67 0 891 | 1 0 62 <1 938 |
| Boron Barium Molybdenum Manganese Magnesium Calcium | ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 3000 | 16 0 80 <1 935 1133 | 3 5 67 0 891 1027 | 1 0 62 <1 938 1074 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus | ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 | 16 0 80 <1 935 1133 1033 | 3 5 67 0 891 1027 995 | 1 0 62 <1 938 1074 1016 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc | ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 | 16 0 80 <1 935 1133 1033 1231 | 3 5 67 0 891 1027 995 1177 | 1 0 62 <1 938 1074 1016 1221 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur | ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 | 16 0 80 <1 935 1133 1033 1231 3234 | 3 5 67 0 891 1027 995 1177 3298 | 1 0 62 <1 938 1074 1016 1221 3195 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS | ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 | 16 0 80 <1 935 1133 1033 1231 3234 current | 3 5 67 0 891 1027 995 1177 3298 history1 | 1 0 62 <1 938 1074 1016 1221 3195 history2 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon | ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 limit/base >25 | 16 0 80 <1 935 1133 1033 1231 3234 current 5 | 3 5 67 0 891 1027 995 1177 3298 history1 5 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium | ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 | 16 0 80 <1 935 1133 1033 1231 3234 current 5 <<1 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium | ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 | 16 0 80 <1 935 1133 1033 1231 3234 current 5 < 1 2 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium | ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 Imit/base >3 | 16 0 80 <1 935 1133 1033 1231 3234 current 5 <1 2 current | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 * | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 4 history2 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % | ppm ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 Imit/base >3 | 16 0 80 <1 935 1133 1033 1231 3234 <u>current</u> 5 <1 2 <u>current</u> 0.7 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 <i>history1</i> 0.9 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 history2 1 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration | ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 Iimit/base >25 >158 >20 Iimit/base >3 >20 | 16 0 80 <1 935 1133 1033 1231 3234 <i>current</i> 5 <1 2 <i>current</i> 0.7 6.7 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 5 1 7 <i>history1</i> 0.9 7.8 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 history2 1 7.6 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation | ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D5185m | 250 10 100 450 3000 1150 1350 4250 imit/base >25 >158 >20 imit/base >3 >20 | 16 0 80 <1 935 1133 1033 1231 3234 <u>current</u> 5 <1 2 <u>current</u> 0.7 6.7 19.3 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 5 1 7 <i>history1</i> 0.9 7.8 20.1 | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 history2 1 7.6 18.8 |
| Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation | ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm | ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D7415 | 250 10 100 450 3000 1150 1350 4250 Iimit/base >25 >158 >20 Iimit/base >3 >20 >30 >30 | 16 0 80 <1 935 1133 1033 1231 3234 Current 5 <1 2 Current 0.7 6.7 19.3 | 3 5 67 0 891 1027 995 1177 3298 history1 5 1 7 5 1 7 <i>history1</i> 0.9 7.8 20.1 <i>history1</i> | 1 0 62 <1 938 1074 1016 1221 3195 history2 6 2 4 4 history2 1 7.6 18.8 history2 |



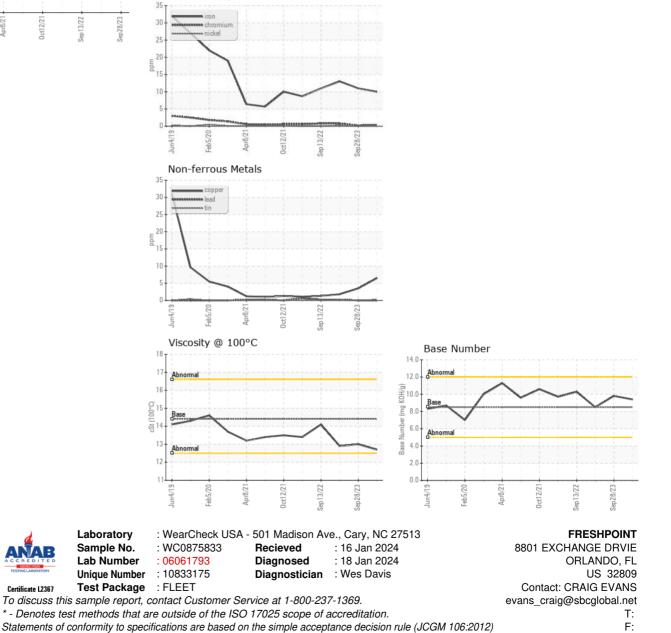
OIL ANALYSIS REPORT

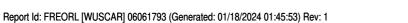




| VISUAL | | method | limit/base | current | history1 | history2 |
|------------------|--------|-----------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Precipitate | scalar | *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 | >0.2 | NEG | NEG | NEG |
| Free Water | scalar | *Visual | | NEG | NEG | NEG |
| FLUID PROPER | LIES | method | limit/base | current | history1 | history2 |
| Visc @ 100°C | cSt | ASTM D445 | 14.4 | 12.7 | 13.0 | 12.9 |
| GRAPHS | | | | | | |

Ferrous Alloys





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Contact/Location: CRAIG EVANS - FREORL