

OIL ANALYSIS REPORT

Area [21108] 80-227

Diesel Engine

CONOCO PHILLIPS GUARDOL ECT 15W40 (--- GAL)

Sample Rating Trend



DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

All component wear rates are normal.

Contamination

There is no indication of any contamination in the

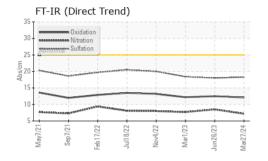
Fluid Condition

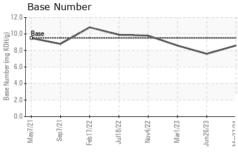
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

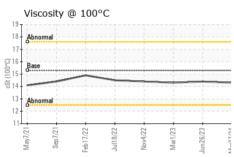
| SAMPLE INFORMATION method limit/base current history1 history2 |) (GAL) | | May2021 | Sep2021 Feb2022 Jul202 | 22 Nov2022 Mar2023 Jun202 | 3 Mar2024 | |
|---|------------------|----------|-------------|------------------------|---------------------------|-------------|-------------|
| Sample Date | SAMPLE INFORM | MATION | method | limit/base | current | history1 | history2 |
| Sample Date | Sample Number | | Client Info | | WC0836214 | WC0818596 | WC0793253 |
| Machine Age hrs Client Info 5222 4700 4352 Oil Age hrs Client Info 522 348 237 Oil Changed Client Info Changed Changed Changed Changed Changed Changed Changed Changed NORMAL NORMAL NORMAL 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 NEG WEAR METALS method imilibase current history2 1 Chromium ppm ASTM D5185m >20 3 3 1 | | | Client Info | | 27 Mar 2024 | 26 Jun 2023 | 01 Mar 2023 |
| Oil Age hrs Client Info 522 348 237 Oil Changed Changed | | hrs | Client Info | | 5222 | 4700 | 4352 |
| NORMAL NORMAL NORMAL CONTAMINATION method limit/base current history1 history2 | | hrs | Client Info | | 522 | 348 | 237 |
| NORMAL NORMAL NORMAL CONTAMINATION method limit/base current history1 history2 | • | | Client Info | | Changed | Changed | Changed |
| Fuel | | | | | NORMAL | NORMAL | NORMAL |
| Water Glycol WC Method >0.2 NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 18 15 12 Chromium ppm ASTM D5185m >20 3 3 1 Nickel ppm ASTM D5185m >4 0 <1 | CONTAMINATIO | N | method | limit/base | current | history1 | history2 |
| Select | Fuel | | WC Method | >5 | <1.0 | <1.0 | <1.0 |
| WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 18 15 12 Chromium ppm ASTM D5185m >20 3 3 1 Nickel ppm ASTM D5185m >20 6 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 | Water | | WC Method | >0.2 | NEG | NEG | NEG |
| Iron | Glycol | | WC Method | | NEG | NEG | NEG |
| Chromium ppm ASTM D5185m >20 3 3 1 Nickel ppm ASTM D5185m >4 0 <1 0 Titanium ppm ASTM D5185m >3 0 0 0 Silver ppm ASTM D5185m >20 6 5 5 Lead ppm ASTM D5185m >20 6 5 5 Lead ppm ASTM D5185m >40 0 0 0 Copper ppm ASTM D5185m >330 <1 <1 0 Tin ppm ASTM D5185m >15 0 <1 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 | WEAR METALS | | method | limit/base | current | history1 | history2 |
| Nickel | Iron | ppm | ASTM D5185m | >100 | 18 | 15 | 12 |
| Titanium | Chromium | ppm | ASTM D5185m | >20 | 3 | 3 | 1 |
| Silver | Nickel | ppm | ASTM D5185m | >4 | 0 | <1 | 0 |
| Aluminum ppm ASTM D5185m >20 6 5 5 Lead ppm ASTM D5185m >40 0 0 0 Copper ppm ASTM D5185m >330 <1 <1 0 Tin ppm ASTM D5185m 0 <1 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 85 98 79 78 Barium ppm ASTM D5185m 0 0 0 0 Magnesium ppm ASTM D5185m 350 730 322 | Titanium | ppm | ASTM D5185m | | <1 | <1 | <1 |
| Lead ppm ASTM D5185m >40 0 0 0 Copper ppm ASTM D5185m >330 <1 | Silver | ppm | ASTM D5185m | >3 | 0 | 0 | 0 |
| Copper ppm ASTM D5185m >330 <1 | Aluminum | ppm | ASTM D5185m | >20 | 6 | 5 | 5 |
| Tin ppm ASTM D5185m >15 0 <1 | Lead | ppm | ASTM D5185m | >40 | 0 | 0 | 0 |
| 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 85 98 79 78 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 0 0 0 0 Manganese ppm ASTM D5185m 350 730 322 524 Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1000 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 | Copper | ppm | ASTM D5185m | >330 | <1 | <1 | 0 |
| Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 85 98 79 78 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 6 55 17 Manganese ppm ASTM D5185m <-1 <1 <1 <1 Magnesium ppm ASTM D5185m 350 730 322 524 Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 </th <th>Tin</th> <th>ppm</th> <th>ASTM D5185m</th> <th>>15</th> <th>0</th> <th><1</th> <th>0</th> | Tin | ppm | ASTM D5185m | >15 | 0 | <1 | 0 |
| ADDITIVES | Vanadium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Boron ppm ASTM D5185m 85 98 79 78 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 6 55 17 Manganese ppm ASTM D5185m 350 730 322 524 Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1000 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 <th>Cadmium</th> <th>ppm</th> <th>ASTM D5185m</th> <th></th> <th>0</th> <th>0</th> <th>0</th> | Cadmium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 6 55 17 Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 350 730 322 524 Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1000 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 <th>ADDITIVES</th> <th></th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th> | ADDITIVES | | method | limit/base | current | history1 | history2 |
| Molybdenum ppm ASTM D5185m 6 55 17 Manganese ppm ASTM D5185m <1 | Boron | ppm | ASTM D5185m | 85 | | 79 | |
| Manganese ppm ASTM D5185m <1 | Barium | ppm | | | | | |
| Magnesium ppm ASTM D5185m 350 730 322 524 Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1100 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM | | ppm | ASTM D5185m | | | | |
| Calcium ppm ASTM D5185m 1800 1350 1967 1471 Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1100 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION meth | - | ppm | ASTM D5185m | | | | |
| Phosphorus ppm ASTM D5185m 1000 1116 1102 962 Zinc ppm ASTM D5185m 1100 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >25 13 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm< | _ | ppm | | | | | |
| Zinc ppm ASTM D5185m 1100 1258 1293 1141 Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >25 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | ppm | | | | | |
| Sulfur ppm ASTM D5185m 3500 4511 4859 3785 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >25 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/.1mm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | | | | | |
| CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m >20 2 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | | | | | |
| Silicon ppm ASTM D5185m >25 13 10 7 Sodium ppm ASTM D5185m 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | ASTM D5185m | 3500 | 4511 | 4859 | 3785 |
| Sodium ppm ASTM D5185m 3 5 4 Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | 5 | method | limit/base | current | • | history2 |
| Potassium ppm ASTM D5185m >20 2 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | | >25 | | | |
| INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | ppm | | | | | |
| Soot % % *ASTM D7844 >3 0.2 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | Potassium | ppm | ASTM D5185m | >20 | 2 | | 2 |
| Nitration Abs/cm *ASTM D7624 >20 7.2 8.5 7.7 Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | | limit/base | | | |
| Sulfation Abs/.1mm *ASTM D7415 >30 18.3 18.0 18.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | | | | | | | |
| FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2512.112.512.2 | | | | | | | |
| Oxidation Abs/.1mm *ASTM D7414 >25 12.1 12.5 12.2 | Sulfation | Abs/.1mm | *ASTM D7415 | >30 | 18.3 | 18.0 | 18.4 |
| | FLUID DEGRAD | ATION | method | limit/base | current | history1 | history2 |
| Base Number (BN) mg KOH/g ASTM D2896 9.5 8.6 7.6 8.6 | Oxidation | Abs/.1mm | *ASTM D7414 | >25 | 12.1 | 12.5 | 12.2 |
| | Base Number (BN) | mg KOH/g | ASTM D2896 | 9.5 | 8.6 | 7.6 | 8.6 |



OIL ANALYSIS REPORT



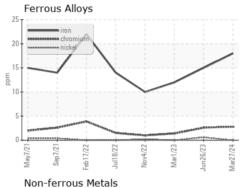


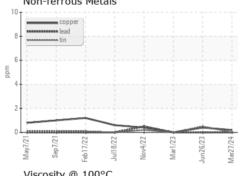


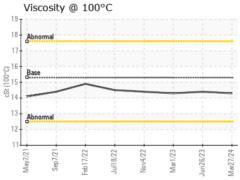
| VISUAL | | method | limit/base | current | history1 | history2 |
|-------------------------|--------|---------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Precipitate | 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 |

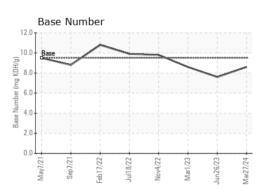
| FLUID PHOPENTIES | | method | | | riistory i | HISTORYZ |
|------------------|-----|-----------|------|------|------------|----------|
| Visc @ 100°C | cSt | ASTM D445 | 15.3 | 14.3 | 14.4 | 14.3 |

GRAPHS













Certificate 12367

Laboratory Sample No.

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0836214 Lab Number : 06149314 Unique Number : 10979392

Received : 15 Apr 2024 **Tested** Diagnosed

: 16 Apr 2024 : 16 Apr 2024 - Wes Davis

TULSA, OK US 74146 Contact: BEN CALDWELL kevin.marson@wearcheck.com T: (918)728-5749

MANHATTAN ROAD AND BRIDGE

5601 S 122ND E AVE

Test Package : CONST (Additional Tests: TBN) 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)