

## **OIL ANALYSIS REPORT**

### Area Robinson [Robinson] Oil- Port Genset

Port Diesel Engine

Fluid DIESEL ENGINE OIL SAE 15W40 (--- GAL)

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

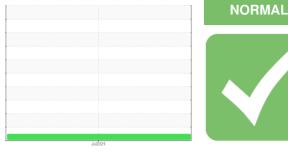
All component wear rates are normal.

#### 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 Rating Trend



| SAMPLE INFORM   | ΛΑΤΙΟΝ   | method   | limit/base   | current   | history1  | history2   |
|---|--|--|--|---|---|--|
| Sample Number   |  | Client Info  |  | WC0859941   |   |  |
| Sample Date   |  | Client Info  |  | 01 Jul 2024   |   |  |
| Machine Age   | hrs  | Client Info  |  | 2013  |   |  |
| Oil Age   | hrs  | Client Info  |  | 300   |   |  |
| Oil Changed   |  | Client Info  |  | N/A   |   |  |
| Sample Status   |  |  |  | NORMAL  |   |  |
| CONTAMINATIO  | N  | method   | limit/base   | current   | history1  | history2   |
| Fuel  |  | WC Method  | >2.1   | <1.0  |   |  |
| Glycol  |  | WC Method  | 26.1   | NEG   |   |  |
| ,   |  |  |  | MEG   |   |  |
| WEAR METALS   |  | method   | limit/base   | current   | history1  | history2   |
| Iron  | ppm  | ASTM D5185m  | >51  | 14  |   |  |
| Chromium  | ppm  | ASTM D5185m  | >11  | <1  |   |  |
| Nickel  | ppm  | ASTM D5185m  | >5   | 0   |   |  |
| Titanium  | ppm  | ASTM D5185m  |  | 5   |   |  |
| Silver  | ppm  | ASTM D5185m  | >3   | 0   |   |  |
| Aluminum  | ppm  | ASTM D5185m  | >31  | 1   |   |  |
| Lead  | ppm  | ASTM D5185m  | >26  | 7   |   |  |
| Copper  | ppm  | ASTM D5185m  | >26  | 9   |   |  |
| Tin   | ppm  | ASTM D5185m  | >4   | 0   |   |  |
| Vanadium  | ppm  | ASTM D5185m  |  | 0   |   |  |
| Cadmium   | ppm  | ASTM D5185m  |  | 0   |   |  |
|   |  |  |  |   |   |  |
| ADDITIVES   |  | method   | limit/base   | current   | history1  | history2   |
| ADDITIVES<br>Boron  | ppm  | Method<br>ASTM D5185m  | limit/base   | current<br>29   | history1  | history2   |
|   | ppm<br>ppm   |  |  |   | , in the second s |  |
| Boron   |  | ASTM D5185m  | 250  | 29  |   |  |
| Boron<br>Barium   | ppm  | ASTM D5185m<br>ASTM D5185m   | 250<br>10  | 29<br>0   |   |  |
| Boron<br>Barium<br>Molybdenum   | ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 250<br>10  | 29<br>0<br>46   |   |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese  | ppm<br>ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100   | 29<br>0<br>46<br><1   |   | <br>   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium   | ppm<br>ppm<br>ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450  | 29<br>0<br>46<br><1<br>1018   |   |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium  | ppm<br>ppm<br>ppm<br>ppm<br>ppm                                    | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000  | 29<br>0<br>46<br><1<br>1018<br>1436   | <br><br>  |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                             | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000<br>1150  | 29<br>0<br>46<br><1<br>1018<br>1436<br>855  | <br><br><br>  |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                      | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350  | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041  | <br><br><br><br>  |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                      | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br>limit/base  | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724  |   |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                      | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br>limit/base<br>>22   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>current   |   |  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br>limit/base<br>>22   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>current<br>4  | <br><br><br><br><br>history1  | <br><br><br><br><br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>current<br>4<br>10  | <br><br><br><br><br>history1  | <br><br><br><br><br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>current<br>4<br>10<br>2   | <br><br><br><br><br>history1  | <br><br><br><br><br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Water   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20<br>>0.21  | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>current<br>4<br>10<br>2<br>NEG  | <br><br><br><br><br>history1<br><br>  | <br><br><br><br><br>history2<br><br>                                 |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Water<br>INFRA-RED  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm        | ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20<br>>0.21<br><b>limit/base</b><br>>3                                   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br><i>current</i><br>4<br>10<br>2<br>NEG<br><i>current</i><br>0.2                        | <br><br><br><br><br>history1<br><br><br><br>history1  | <br><br><br><br><br>history2<br><br><br><br>history2                 |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Vater<br>INFRA-RED  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m  | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20<br>>0.21<br><b>limit/base</b><br>>3                                   | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br><i>current</i><br>4<br>10<br>2<br>NEG   | <br><br><br><br><br>history1<br><br><br><br>history1<br><br>  | <br><br><br><br><br>history2<br><br><br><br>history2                 |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Water<br>INFRA-RED<br>Soot %<br>Nitration                               | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D6304<br><b>method</b><br>*ASTM D7844   | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>iimit/base</b><br>>22<br>>158<br>>20<br>>0.21<br><b>iimit/base</b><br>>3<br>>20                            | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br><i>current</i><br>4<br>10<br>2<br>NEG<br><i>urrent</i><br>0.2<br>12.3                 | <br><br><br><br><br>history1<br><br><br><br>history1<br><br>history1  | history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Water<br>INFRA-RED<br>Soot %<br>Nitration<br>Sulfation<br>FLUID DEGRADA | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>imit/base</b><br>>22<br>>158<br>>20<br>>0.21<br><b>imit/base</b><br>>3<br>>20<br>>30<br>30                 | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br>Current<br>4<br>10<br>2<br>NEG<br>0.2<br>12.3<br>21.0                                 |   | <br><br><br><br><br><br>history2<br><br><br>history2<br><br>history2 |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>Vater<br>INFRA-RED<br>Soot %<br>Nitration<br>Sulfation                  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m   | 250<br>10<br>100<br>450<br>3000<br>1150<br>1350<br>4250<br><b>limit/base</b><br>>22<br>>158<br>>20<br>>0.21<br><b>limit/base</b><br>>3<br>>20<br>30<br><b>limit/base</b> | 29<br>0<br>46<br><1<br>1018<br>1436<br>855<br>1041<br>3724<br><b>current</b><br>4<br>10<br>2<br><b>NEG</b><br><b>current</b><br>0.2<br>12.3<br>21.0 |   | history2 history2 history2   |



35

30

u<sup>25</sup> 4ps/cm 20

15 10 Jul1/24 -

10.0

0.8 Base Number (mg KOH/g) 4.0 2.0

0.0 Jul1/24 -

18 <del>т</del> 17-Abnormal

16 (100-01) 15 14 Base

13 Abnormal 12 11 Jul1/24

# **OIL ANALYSIS REPORT**

| FT-IR (Direct Trend)             | VISUAL                      |                        | method                 | limit/base   | current                               | history1        | history2            |
|----------------------------------|-----------------------------|------------------------|------------------------|--|---------------------------------------|-----------------|---------------------|
| Oxidation                        | White Metal                 | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
| 0 - Suffation Sulfation          | Yellow Metal                | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
| 5 - Abnormal                     | Precipitate                 | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
| 0                                | Silt                        | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
| 5-                               | Debris                      | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
|                                  | Sand/Dirt                   | scalar                 | *Visual                | NONE   | NONE                                  |                 |                     |
| Jul1/24 +                        | Appearance                  | scalar                 | *Visual                | NORML  | NORML                                 |                 |                     |
| lu c                             | Odor                        | scalar                 | *Visual                | NORML  | NORML                                 |                 |                     |
| Page Number                      | Emulsified Water            | scalar                 | *Visual                | >0.21  | NEG                                   |                 |                     |
| Base Number                      | Free Water                  | scalar                 | *Visual                |  | NEG                                   |                 |                     |
| 0                                | FLUID PROPER                | TIES                   | method                 | limit/base   | current                               | history1        | history2            |
| 0- Abnormal                      | Visc @ 100°C                | cSt                    | ASTM D445              | 14.4   | 13.4                                  |                 |                     |
|                                  | GRAPHS                      |                        |                        |  |                                       |                 |                     |
| 0 - Severe                       | Ferrous Alloys              |                        |                        |  |                                       |                 |                     |
| 0                                | 14<br>12 iron               |                        |                        |  |                                       |                 |                     |
| Jul1/24<br>10.11.04              | 12 - chromium<br>10 -       |                        |                        |  |                                       |                 |                     |
| Viscosity @ 100°C                | 8                           |                        |                        |  |                                       |                 |                     |
| Viscosity @ 100°C                | E 6                         |                        |                        |  |                                       |                 |                     |
| 7 Abnormal                       | 4                           |                        |                        |  |                                       |                 |                     |
| 5                                | 2                           |                        |                        |  |                                       |                 |                     |
| 4                                | 0                           |                        |                        | 4  |                                       |                 |                     |
| 3- Abnormal                      | Jul1/24                     |                        |                        | Jul1/24  |                                       |                 |                     |
| 2                                | Non-ferrous Meta            | als                    |                        |  |                                       |                 |                     |
| - +2/11/24                       | <sup>10</sup> T             |                        |                        |  |                                       |                 |                     |
| л <b>Г</b>                       | 8 - copper                  |                        |                        |  |                                       |                 |                     |
|                                  |                             |                        |                        | ****   |                                       |                 |                     |
|                                  | 6 +                         |                        |                        |  |                                       |                 |                     |
|                                  | 4                           |                        |                        |  |                                       |                 |                     |
|                                  | 2-                          |                        |                        |  |                                       |                 |                     |
|                                  | 0                           |                        |                        |  |                                       |                 |                     |
|                                  | 11/24                       |                        | ********************** | 11/24  |                                       |                 |                     |
|                                  | Jul<br>L                    |                        |                        | μĻ   |                                       |                 |                     |
|                                  | Viscosity @ 100°            | С                      |                        |  |                                       | ber             |                     |
|                                  | 17                          |                        |                        | 9.   |                                       |                 |                     |
|                                  | 17 Abnormal                 |                        |                        | 8.<br>57.  | 1                                     |                 |                     |
|                                  | 16                          |                        |                        | HOX 6.   | 0                                     |                 |                     |
|                                  | (3) 15<br>00<br>73 14       |                        |                        | <u>ل</u> ا ع   | D Abnormal                            |                 |                     |
|                                  |                             |                        |                        | (6)1.1<br>6)6<br>5.1<br>9<br>9<br>8<br>9<br>8<br>9<br>8<br>9<br>2.1<br>8<br>9<br>2.1 |                                       |                 |                     |
|                                  | 13 - Abnormal               |                        |                        |  | Severe                                |                 |                     |
|                                  | 12                          |                        |                        | 1.   |                                       |                 |                     |
|                                  | 1145                        |                        |                        | .0   |                                       |                 | 24                  |
|                                  | Jul1/24                     |                        |                        | Jul1/24  | Jul1/24                               |                 | Jul1/24             |
|                                  |                             |                        |                        |  |                                       |                 |                     |
|                                  |                             | n Ave., Cary, NC 27513 |                        |  | MARATHON PETROLEUM CO.<br>101 12TH ST |                 |                     |
| Sample No.                       | : WC0859941<br>: : 06236264 | Recei<br>Teste         |                        |  |                                       | CATI F          | TTSBURG, KY         |
| TESTING LABORATORY Unique Number | · : 11125098                | Diagn                  | -                      | 5 Jul 2024 - Se  | an Felton                             | 0,1122          | US 41169            |
| Certificate L2367 Test Package   | : IND 2 ( Additional Te     | ests: KF)              |                        |  |                                       |                 | EY GUMBERT          |
| To discuss this sample repor     |                             |                        |                        |  | cag                                   | umbert@marathor | petroleum.com<br>T: |
| Statements of conformity to s    |                             |                        |                        |  | rule (JCGM                            | 106:2012)       | F:                  |
|                                  |                             |                        | •                      |  |                                       |                 |                     |

Submitted By: M/V ROBINSON

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