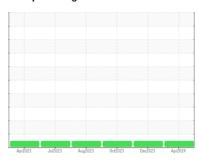


# **OIL ANALYSIS REPORT**

Sample Rating Trend





Machine Id
2343
Component
Diesel Engine

**ROYAL PURPLE MOTOR OIL 15W40 (48 QTS)** 

#### DIAGNOSIS

### Recommendation

Resample at the next service interval to monitor. Please specify the component make and model with your next sample.

#### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil.

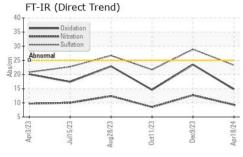
#### **Fluid Condition**

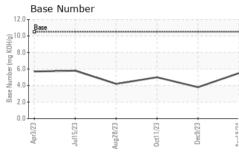
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

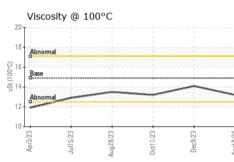
| Sample Date   Client Info   18 Apr 2024   09 Dec 2023   11 Oct 2023   Machine Age   mls   Client Info   368372   323502   264210   001 Age   mls   Client Info   50000   1000000   5000000   500000   5000000   5000000   5000000   5000000   50000000   500000000  | TS)             |            | Apr2023     | Jul2023 Aug2023 | 0 oct2023 Dec2023 | Apr2024     |             |
|--|-----------------|------------|-------------|-----------------|-------------------|-------------|-------------|
| Client Info   18 Apr 2024   09 Dec 2023   11 Oct 2023   Machine Age   mls   Client Info   368372   323502   264210   Oil Age   mls   Client Info   50000   100000   50000   50000   Oil Changed   Client Info   Not Changed   NORMAL   NORM | SAMPLE INFOR    | RMATION    | method      | limit/base      | current           | history1    | history2    |
| Machine Age   mis   Client Info   368372   323502   264210   | Sample Number   |            | Client Info |                 | WC0720072         | WC0720155   | WC0720163   |
| Oil Age         mls         Client Info         50000         100000         50000           Oil Changed         Client Info         Not Changd         Not Changed         Not  | Sample Date     |            | Client Info |                 | 18 Apr 2024       | 09 Dec 2023 | 11 Oct 2023 |
| Contamped   Client Info   Not Changed   NoRMAL   NORMAL   NORMAL   | Machine Age     | mls        | Client Info |                 | 368372            | 323502      | 264210      |
| NORMAL   NORMAL   NORMAL   CONTAMINATION   method   limit/base   current   history1   history2   | Oil Age         | mls        | Client Info |                 | 50000             | 100000      | 50000       |
| Fuel   | Oil Changed     |            | Client Info |                 | Not Changd        | Changed     | Not Changd  |
| Fuel   | Sample Status   |            |             |                 | NORMAL            | NORMAL      | NORMAL      |
| Water Glycol         WC Method WC Method         >0.2         NEG NEG         NEG NEG         NEG NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         39         45         17           Chromium         ppm         ASTM D5185m         >20         2         2         <1         <1         0           Nickel         ppm         ASTM D5185m         >4         <1         <1         0         0           Silver         ppm         ASTM D5185m         >4         <1         <1         0         0           Silver         ppm         ASTM D5185m         >40         0         <1         0         0           Aluminum         ppm         ASTM D5185m         >20         11         12         6           Lead         ppm         ASTM D5185m         >40         0         <1         0         0           Copper         ppm         ASTM D5185m         >15         <1         <1         0         0           Vanadium         ppm         ASTM D5185m         >15         <1         <1         0   | CONTAMINATI     | ON         | method      | limit/base      | current           | history1    | history2    |
| WEAR METALS  | Fuel            |            | WC Method   | >5              | <1.0              | <1.0        | <1.0        |
| WEAR METALS  | Water           |            | WC Method   | >0.2            | NEG               | NEG         | NEG         |
| Iron   | Glycol          |            | WC Method   |                 | NEG               | NEG         | NEG         |
| Chromium         ppm         ASTM D5185m         >20         2         2         -1           Nickel         ppm         ASTM D5185m         >4         <1   | WEAR METALS     | 3          | method      | limit/base      | current           | history1    | history2    |
| Nickel   |                 | ppm        |             |                 |                   |             |             |
| Titanium   |                 | ppm        |             |                 | _                 |             |             |
| Silver   |                 |            |             | >4              |                   |             |             |
| Aluminum         ppm         ASTM D5185m         >20         11         12         6           Lead         ppm         ASTM D5185m         >40         0         <1   |                 |            |             |                 |                   |             |             |
| Lead         ppm         ASTM D5185m         >40         0         <1         0           Copper         ppm         ASTM D5185m         >330         35         26         25           Tin         ppm         ASTM D5185m         >15         <1         <1         0           Vanadium         ppm         ASTM D5185m         <1         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           Boron         ppm         ASTM D5185m         0         0         0         0           Boron         ppm         ASTM D5185m         0         0         0         0           Boron         ppm         ASTM D5185m         100         2         2         3           Boron         ppm         ASTM D5185m         100         2         2         3           Mangaesium         ppm         ASTM D5185m         1050         1006         1023         820   |                 |            |             |                 |                   |             |             |
| Copper         ppm         ASTM D5185m         >330         35         26         25           Tin         ppm         ASTM D5185m         >15         <1  |                 |            |             |                 |                   |             |             |
| Tin  |                 |            |             |                 |                   |             |             |
| Vanadium         ppm         ASTM D5185m         <1         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           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         100         2         2         3           Manganese         ppm         ASTM D5185m         100         2         2         3           Magnesium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8 <t< td=""><td></td><td></td><td></td><td></td><th></th><td></td><td></td></t<>  |                 |            |             |                 |                   |             |             |
| Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         0           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         100         2         2         3           Manganese         ppm         ASTM D5185m         100         2         2         3           Magnesium         ppm         ASTM D5185m         60         38         62         51           Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         250         3556         3404         2938           CONTAMINANTS         method         limit/base         current         his  |                 |            |             | >15             |                   |             |             |
| ADDITIVES  |                 |            |             |                 |                   |             |             |
| Boron  |                 | ррпі       |             | 12              |                   |             |             |
| Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         100         2         2         3           Manganese         ppm         ASTM D5185m         100         2         2         3           Magnesium         ppm         ASTM D5185m         60         38         62         51           Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >225         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base <td></td> <td></td> <td></td> <td></td> <th></th> <td></td> <td></td>  |                 |            |             |                 |                   |             |             |
| Molybdenum         ppm         ASTM D5185m         100         2         2         3           Manganese         ppm         ASTM D5185m         < 1         <1         0           Magnesium         ppm         ASTM D5185m         60         38         62         51           Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7624         >20         9.3  |                 |            |             |                 |                   |             |             |
| Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         60         38         62         51           Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7845 <td< td=""><td></td><td></td><td></td><td></td><th></th><td></td><td></td></td<>   |                 |            |             |                 |                   |             |             |
| Magnesium         ppm         ASTM D5185m         60         38         62         51           Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/.1mm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D  | -               |            |             | 100             |                   |             |             |
| Calcium         ppm         ASTM D5185m         3050         2523         2656         2307           Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/.1mm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method  | •               |            |             | 60              |                   |             | -           |
| Phosphorus         ppm         ASTM D5185m         1050         1006         1023         820           Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm </td <td>-</td> <td></td> <td></td> <td></td> <th></th> <td></td> <td></td>  | -               |            |             |                 |                   |             |             |
| Zinc         ppm         ASTM D5185m         1200         1151         1301         1070           Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6   |                 |            |             |                 |                   |             |             |
| Sulfur         ppm         ASTM D5185m         12500         3556         3404         2938           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6  |                 |            |             |                 |                   |             |             |
| Silicon         ppm         ASTM D5185m         >25         8         12         5           Sodium         ppm         ASTM D5185m         1         3         3           Potassium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6   | -               |            |             |                 |                   |             |             |
| Sodium         ppm         ASTM D5185m         1         3         3           Potassium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6  | CONTAMINAN      | TS         | method      | limit/base      | current           | history1    | history2    |
| Potassium         ppm         ASTM D5185m         >20         21         19         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6   | Silicon         | ppm        | ASTM D5185m | >25             | 8                 | 12          | 5           |
| INFRA-RED  | Sodium          | ppm        | ASTM D5185m |                 | 1                 | 3           | 3           |
| Soot %         %         *ASTM D7844 >3         1.2         1.5         0.7           Nitration         Abs/cm         *ASTM D7624 >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415 >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         14.8         23.5         14.6  | Potassium       | ppm        | ASTM D5185m | >20             | 21                | 19          | 14          |
| Nitration         Abs/cm         *ASTM D7624         >20         9.3         12.7         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6  | INFRA-RED       |            | method      | limit/base      | current           | history1    | history2    |
| Sulfation         Abs/.1mm         *ASTM D7415         >30         23.3         28.9         21.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.8         23.5         14.6  | Soot %          | %          | *ASTM D7844 | >3              | 1.2               | 1.5         | 0.7         |
| FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     14.8     23.5     14.6  | Nitration       | Abs/cm     | *ASTM D7624 | >20             | 9.3               | 12.7        | 8.5         |
| Oxidation   Abs/.1mm *ASTM D7414 >25   14.8   23.5   14.6  | Sulfation       | Abs/.1mm   | *ASTM D7415 | >30             |                   | 28.9        | 21.7        |
|  | FLUID DEGRAI    | DATION     | method      | limit/base      | current           | history1    | history2    |
| Base Number (BN) mg KOH/g ASTM D2896 10.5 5.5 3.8 5.0  | Oxidation       | Abs/.1mm   | *ASTM D7414 | >25             | 14.8              | 23.5        | 14.6        |
|  | Base Number (BN | ) mg KOH/g | ASTM D2896  | 10.5            | 5.5               | 3.8         | 5.0         |



## **OIL ANALYSIS REPORT**



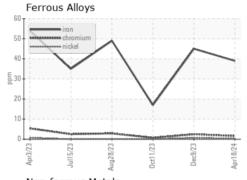


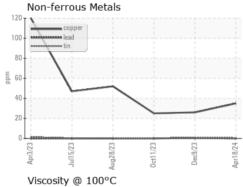


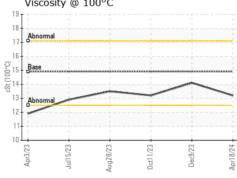
| VISUAL                  |        | method  | limit/base | current | history1 | history2 |
|-------------------------|--------|---------|------------|---------|----------|----------|
| White Metal             | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Yellow Metal            | 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    |
| <b>Emulsified Water</b> | scalar | *Visual | >0.2       | NEG     | NEG      | NEG      |
| Free Water              | scalar | *Visual |            | NEG     | NEG      | NEG      |

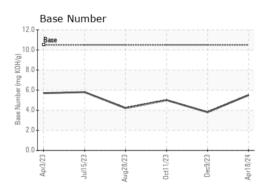
| FLUID PROPER | TIES | method    |      |      |      | history2 |
|--------------|------|-----------|------|------|------|----------|
| Visc @ 100°C | cSt  | ASTM D445 | 14.9 | 13.2 | 14.1 | 13.2     |

### **GRAPHS**













Certificate 12367

Laboratory Sample No.

: WC0720072 Lab Number : 06174818 Unique Number : 11020871

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received **Tested** 

: 09 May 2024 : 10 May 2024 Diagnosed : 10 May 2024 - Wes Davis

974 TN WALTZ PARKWAY ASHLAND CITY, TN US 37015

Contact: MASON NICHOLSON

M.NICHOLSON@DILLONTRANSPORTATION.COM

T: (615)792-5099

**DILLON TRANSPORTATION** 

Test Package : FLEET 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)

F: (615)469-4200