

## **OIL ANALYSIS REPORT**

Sample Rating Trend



#### Area FUEL Machine Id 461 Component Diesel Engine Fluid PETRO CANADA DURON SHP 10W30 (42 QTS)

### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

Elevated aluminum (AI) and/or lead (Pb) and potassium (K) levels in your metals analysis are likely a result of solder flux release into the lubricant and is common on new equipment/components. 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 Number     Client Info     PCA0109981     PCA0098670        Sample Date     Client Info     22 Jan 2024     29 Sep 2023        Machine Age     mils     Client Info     78557     63000        Oil Age     mils     Client Info     16000     16000        Sample Status     Image     Client Info     Changed     Changed        Sample Status     Image     Client Info     Changed     Changed        Sample Status     Image     Client Info     Changed     Changed        Valer     WC Method     >3.0     <1.0     <1.0        Water     WC Method     >200     23     16        Nickel     ppm     ASTM D5165m     >20     <1.0        Nickel     ppm     ASTM D5165m     >20     <1.0        Silver     ppm     ASTM D5165m     >20     <1.0        Gopper     ppm     ASTM D5165m     >10   | 215)             |          |             | Sep2023    | Jan2024    |            |          |
|--|------------------|----------|-------------|------------|------------|------------|----------|
| Sample Date     Client Info     22 Jan 2024     29 Sep 2023        Machine Age     mls     Client Info     78557     63000        Oil Age     mls     Client Info     16000     16000        Sample Status     Imit/base     Current     NoRMAL        Fuel     WC Method     >3.0     <1.0         Ware     WC Method     >0.2     NEG     NEG        Were     WC Method     >0.2     NEG     NEG        Were     WC Method     NEG     NEG         Otionamp     pm     ASTM D5185m     >200     23     16        Chromium     ppm     ASTM D5185m     >20     0         Nickel     ppm     ASTM D5185m     >20     0         Auminum     ppm     ASTM D5185m     >20     0         Auminum     ppm     ASTM D5185m<  | SAMPLE INFOR     | MATION   | method      | limit/base | current    | history1   | history2 |
| Sample Date     Client Info     22 Jan 2024     29 Sep 2023        Machine Age     mls     Client Info     78557     63000        Oil Age     mls     Client Info     16000     16000        Oil Changed     Client Info     Changed     NORMAL        Sample Status     Client Info     Changed     NORMAL        CONTAMINATION     method     imit/base     current     history1     history1       Fuel     WC Method     >0.2     NEG     NEG        WEAR METALS     method     imit/base     current     history1     history1       Iron     ppm     ASTM 05185m     >200     23     16        Chromium     ppm     ASTM 05185m     >20     0         Silver     ppm     ASTM 05185m     >20     0         Auminum     ppm     ASTM 05185m     >20     0         Auminum     ppm   | Sample Number    |          | Client Info |            | PCA0109981 | PCA0098670 |          |
| Machine Age     mis     Client Info     78557     63000        Oil Age     mis     Client Info     16000     16000        Oil Changed     Client Info     Changed     Changed         Sample Status     Imit/base     current     NORMAL     NORMAL        CONTAMINATION     method     Imit/base     current     History1        Water     WC Method     >0.2     NEG     NEG        WeAR METALS     method     Imit/base     current     History1     History1       Iron     ppm     ASTM D5185m     >0     23     16        Nickel     ppm     ASTM D5185m     >2     0      10       Irianium     ppm     ASTM D5185m     >2     0      11        Aluminum     ppm     ASTM D5185m     >10     0     0        Vanadium     ppm     ASTM D5185m     0     3     0 </td <td></td> <td></td> <td></td> <td></td> <th></th> <td></td> <td></td>   |                  |          |             |            |            |            |          |
| Oil Age     mis     Client Info     16000     16000        Sample Status     Client Info     Changed     Changed         CONTAMINATION     method     limil/base     current     history1        Water     WC Method     >3.0     <1.0   | -                | mls      |             |            |            |            |          |
| Oil Changed<br>Sample Status     Client Info     Changed<br>NORMAL     Changed<br>NORMAL        CONTAMINATION     method     Imit/base     current     history1     history1       Fuel     WC Method     >3.0     <1.0  | •                |          |             |            |            |            |          |
| Sample Status     NORMAL     NORMAL     NORMAL        CONTAMINATION     method     limit/base     current     history1     history1       Fuel     WC Method     >3.0     <1.0   | -                |          |             |            |            |            |          |
| Fuel     WC Method     >3.0     <1.0     <1.0        Water     WC Method     >0.2     NEG     NEG        Glycol     WC Method     NEG     NEG         WEAR METALS     method     limit/base     current     history1     history1       Iron     ppm     ASTM D5185m     >200     23     16        Nickel     ppm     ASTM D5185m     >2     0         Aluminum     ppm     ASTM D5185m     >2     0     <1  | -                |          |             |            | •          | U          |          |
| Fuel     WC Method     >3.0     <1.0     <1.0        Water     WC Method     >0.2     NEG     NEG        Glycol     WC Method     NEG     NEG         WEAR METALS     method     limit/base     current     history1     history1       Iron     ppm     ASTM D5185m     >200     23     16        Nickel     ppm     ASTM D5185m     >2     0         Aluminum     ppm     ASTM D5185m     >2     0     <1  | CONTAMINAT       | ION      | method      | limit/base | current    | history1   | history2 |
| Glycol     WC Method     NEG     NEG        WEAR METALS     method     limit/base     current     history1     history1       Iron     ppm     ASTM D5185m     >200     23     16        Chromium     ppm     ASTM D5185m     >6     4     6        Nickel     ppm     ASTM D5185m     >2     0         Silver     ppm     ASTM D5185m     >2     0         Aluminum     ppm     ASTM D5185m     >2     0         Copper     ppm     ASTM D5185m     >10     0     0        Cadmium     ppm     ASTM D5185m     >6     0         ADDITIVES     method     limit/base     current     history1     history1       Barium     ppm     ASTM D5185m     0     0     0        Molybdenum     ppm     ASTM D5185m     0     63     57  | Fuel             |          | WC Method   | >3.0       | <1.0       | <1.0       |          |
| WEAR METALS     method     limit/base     current     history1     history1       Iron     ppm     ASTM D5185m     >200     23     16        Chromium     ppm     ASTM D5185m     >20     23     16        Nickel     ppm     ASTM D5185m     >2     2     0        Silver     ppm     ASTM D5185m     >2     0        Aluminum     ppm     ASTM D5185m     >2     0        Aluminum     ppm     ASTM D5185m     >10     0     0        Copper     ppm     ASTM D5185m     >50     8     2.7        Cadmium     ppm     ASTM D5185m     >6     0         ADDITIVES     method     limit/base     current     history1     history1     history2       Barium     ppm     ASTM D5185m     0     0     0         Maganese     ppm     ASTM D5185m  | Water            |          | WC Method   | >0.2       | NEG        | NEG        |          |
| Iron     ppm     ASTM D5185m     >200     23     16  | Glycol           |          | WC Method   |            | NEG        | NEG        |          |
| Chromium     ppm     ASTM D5185m     >6     4     6        Nickel     ppm     ASTM D5185m     >3     0     0        Silver     ppm     ASTM D5185m     >2     2     0        Aluminum     ppm     ASTM D5185m     >2     0         Aluminum     ppm     ASTM D5185m     >50     31     37        Lead     ppm     ASTM D5185m     >50     8     27        Copper     ppm     ASTM D5185m     >6     0     <1   | WEAR METAL       | .S       | method      | limit/base | current    | history1   | history2 |
| Chromium     ppm     ASTM D5185m     >6     4     6  | Iron             | ppm      | ASTM D5185m | >200       | 23         | 16         |          |
| Nickel     ppm     ASTM D5185m     >3     0     0        Titanium     ppm     ASTM D5185m     >2     2     0        Silver     ppm     ASTM D5185m     >2     0         Aluminum     ppm     ASTM D5185m     >50     31     37        Copper     ppm     ASTM D5185m     >50     8     27        Copper     ppm     ASTM D5185m     >6     0         Vanadium     ppm     ASTM D5185m     >6     0     0        Cadmium     ppm     ASTM D5185m     >6     0     0        ADDITIVES     method     limit/base     current     history1     history       Barium     ppm     ASTM D5185m     0     0     0        Maganese     ppm     ASTM D5185m     90     976     932        Maganesium     ppm     ASTM D5185m     950     <   | Chromium         |          | ASTM D5185m | >6         | 4          | 6          |          |
| Titanium     ppm     ASTM D5185m     >2     2     0        Silver     ppm     ASTM D5185m     >2     0     <1  | Nickel           |          | ASTM D5185m | >3         | 0          | 0          |          |
| Silver     ppm     ASTM D5185m     >2     0     <1        Aluminum     ppm     ASTM D5185m     >50     31     37        Lead     ppm     ASTM D5185m     >50     8     27        Copper     ppm     ASTM D5185m     >6     0     <1        Vanadium     ppm     ASTM D5185m     >6     0     <1        Vanadium     ppm     ASTM D5185m     >6     0     <1        Vanadium     ppm     ASTM D5185m     0     0     0     0        ADDITIVES     method     limit/base     current     history1     history1       Boron     ppm     ASTM D5185m     0     63     57        Marganese     ppm     ASTM D5185m     0     <1     <1        Marganese     ppm     ASTM D5185m     950     976     932        Calcium     ppm     ASTM D5185m     <  | Titanium         |          | ASTM D5185m | >2         | 2          | 0          |          |
| Aluminum     ppm     ASTM D5185m     >50     31     37        Lead     ppm     ASTM D5185m     >10     0     0        Copper     ppm     ASTM D5185m     >50     8     27        Tin     ppm     ASTM D5185m     >6     0     <1   | Silver           |          | ASTM D5185m | >2         | 0          | <1         |          |
| Lead     ppm     ASTM D5185m     >10     0     0        Copper     ppm     ASTM D5185m     >50     8     27        Tin     ppm     ASTM D5185m     >6     0     <1   | Aluminum         |          | ASTM D5185m | >50        | 31         | 37         |          |
| Copper     ppm     ASTM D5185m     >50     8     27        Tin     ppm     ASTM D5185m     >6     0     <1   | Lead             |          |             | >10        | 0          | 0          |          |
| Tin     ppm     ASTM D5185m     >6     0     <1        Vanadium     ppm     ASTM D5185m     0     0     0        Cadmium     ppm     ASTM D5185m     0     0     0        ADDITIVES     method     limit/base     current     history1     history       Boron     ppm     ASTM D5185m     2     11     5        Barium     ppm     ASTM D5185m     0     0     0     0        Molydenum     ppm     ASTM D5185m     50     63     57        Magnesium     ppm     ASTM D5185m     0     <1  |                  |          |             | >50        | 8          | 27         |          |
| Vanadium     ppm     ASTM D5185m     0     0        ADDITIVES     method     limit/base     current     history1     history       Boron     ppm     ASTM D5185m     2     11     5        Barium     ppm     ASTM D5185m     2     11     5        Barium     ppm     ASTM D5185m     0     0     0     0        Maganese     ppm     ASTM D5185m     0     c1     <1        Magnesium     ppm     ASTM D5185m     0     <11     <1        Calcium     ppm     ASTM D5185m     950     976     932        Magnesium     ppm     ASTM D5185m     950     1041     985        Calcium     ppm     ASTM D5185m     995     1041     985        Sulfur     ppm     ASTM D5185m     200     3472     2691        Sulfur     ppm     ASTM D5185m     >0   |                  |          |             |            | 0          | <1         |          |
| Cadmium     ppm     ASTM D5185m     0     0        ADDITIVES     method     limit/base     current     history1     history1       Boron     ppm     ASTM D5185m     2     11     5        Barium     ppm     ASTM D5185m     0     0     0     0        Manganese     ppm     ASTM D5185m     50     63     57        Magnesium     ppm     ASTM D5185m     0     <1  | Vanadium         |          | ASTM D5185m |            | 0          | 0          |          |
| Boron     ppm     ASTM D5185m     2     11     5        Barium     ppm     ASTM D5185m     0     0     0     0        Molybdenum     ppm     ASTM D5185m     50     63     57        Manganese     ppm     ASTM D5185m     0     <1  |                  |          |             |            | 0          |            |          |
| Barium     ppm     ASTM D5185m     0     0     0        Molybdenum     ppm     ASTM D5185m     50     63     57        Manganese     ppm     ASTM D5185m     0     <1  | ADDITIVES        |          | method      | limit/base | current    | history1   | history2 |
| Molybdenum     ppm     ASTM D5185m     50     63     57        Manganese     ppm     ASTM D5185m     0     <1  | Boron            | ppm      | ASTM D5185m | 2          | 11         | 5          |          |
| Manganese     ppm     ASTM D5185m     0     <1     <1        Magnesium     ppm     ASTM D5185m     950     976     932        Calcium     ppm     ASTM D5185m     1050     1219     1191        Phosphorus     ppm     ASTM D5185m     1050     1245     1252        Zinc     ppm     ASTM D5185m     1180     1245     1252        Sulfur     ppm     ASTM D5185m     2600     3472     2691        CONTAMINANTS     method     limit/base     current     history1     history1       Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history1       Soot %     %     *ASTM D7844     >3     0.6     0.4        Sulfation     Abs/.1mm     *ASTM D7414 <td>Barium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>0</td> <th>0</th> <td>0</td> <td></td>                      | Barium           | ppm      | ASTM D5185m | 0          | 0          | 0          |          |
| Magnesium     ppm     ASTM D5185m     950     976     932        Calcium     ppm     ASTM D5185m     1050     1219     1191        Phosphorus     ppm     ASTM D5185m     1050     1219     1191        Phosphorus     ppm     ASTM D5185m     995     1041     985        Zinc     ppm     ASTM D5185m     1180     1245     1252        Sulfur     ppm     ASTM D5185m     2600     3472     2691        CONTAMINANTS     method     limit/base     current     history1     history       Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history       Soot %     %     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/cm     *AS  | Molybdenum       | ppm      | ASTM D5185m | 50         | 63         | 57         |          |
| Calcium     ppm     ASTM D5185m     1050     1219     1191        Phosphorus     ppm     ASTM D5185m     995     1041     985        Zinc     ppm     ASTM D5185m     1180     1245     1252        Sulfur     ppm     ASTM D5185m     2600     3472     2691        CONTAMINANTS     method     limit/base     current     history1     history       Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history1       Soot %     %     *ASTM D7844     >3     0.6     0.4        Sulfation     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        FLUID DEGRADATION     method <t< td=""><td>Manganese</td><td>ppm</td><td>ASTM D5185m</td><td>0</td><th>&lt;1</th><td>&lt;1</td><td></td></t<> | Manganese        | ppm      | ASTM D5185m | 0          | <1         | <1         |          |
| Phosphorus     ppm     ASTM D5185m     995     1041     985        Zinc     ppm     ASTM D5185m     1180     1245     1252        Sulfur     ppm     ASTM D5185m     2600     3472     2691        CONTAMINANTS     method     limit/base     current     history1     history       Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history       Soot %     %     *ASTM D7844     >3     0.6     0.4        Sulfation     Abs/cm     *ASTM D7624     >20     8.4     8.0        FLUID DEGRADATION     method     limit/base </td <td>Magnesium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>950</td> <th>976</th> <td>932</td> <td></td>               | Magnesium        | ppm      | ASTM D5185m | 950        | 976        | 932        |          |
| Zinc     ppm     ASTM D5185m     1180     1245     1252        Sulfur     ppm     ASTM D5185m     2600     3472     2691        CONTAMINANTS     method     limit/base     current     history1     history       Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history       Soot %     %     *ASTM D7844     >3     0.6     0.4        Sulfation     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        Cxidation     Abs/.1mm     *ASTM D7414 </td <td>Calcium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>1050</td> <th>1219</th> <td>1191</td> <td></td>              | Calcium          | ppm      | ASTM D5185m | 1050       | 1219       | 1191       |          |
| SulfurppmASTM D5185m260034722691CONTAMINANTSmethodlimit/basecurrenthistory1historySiliconppmASTM D5185m>5095SodiumppmASTM D5185m21PotassiumppmASTM D5185m>206069INFRA-REDmethodlimit/basecurrenthistory1historySoot %%*ASTM D7844>30.60.4NitrationAbs/cm*ASTM D7624>208.48.0SulfationAbs/Inm*ASTM D7415>3019.420.3FLUID DEGRADATIONmethodlimit/basecurrenthistory1historyOxidationAbs/Inm*ASTM D7414>2515.616.6  | Phosphorus       | ppm      | ASTM D5185m | 995        | 1041       | 985        |          |
| CONTAMINANTSmethodlimit/basecurrenthistory1historySiliconppmASTM D5185m>5095SodiumppmASTM D5185m21PotassiumppmASTM D5185m>206069INFRA-REDmethodlimit/basecurrenthistory1historySoot %%*ASTM D7844>30.60.4NitrationAbs/cm*ASTM D7624>208.48.0SulfationAbs/fm*ASTM D7624>3019.420.3FLUID DEGRADATIONmethodlimit/basecurrenthistory1historyOxidationAbs/Inm*ASTM D7414>2515.616.6   | Zinc             | ppm      | ASTM D5185m | 1180       | 1245       | 1252       |          |
| Silicon     ppm     ASTM D5185m     >50     9     5        Sodium     ppm     ASTM D5185m     2     1      1      1      1      1      1      1      1      1      1     1      1     1      1     1      1     1      1     1      1     1     1      1 <td< td=""><td>Sulfur</td><td>ppm</td><td>ASTM D5185m</td><td>2600</td><th>3472</th><td>2691</td><td></td></td<>  | Sulfur           | ppm      | ASTM D5185m | 2600       | 3472       | 2691       |          |
| Sodium     ppm     ASTM D5185m     2     1        Potassium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history       Soot %     %     *ASTM D7844     >3     0.6     0.4        Nitration     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        FLUID DEGRADATION     method     limit/base     current     history1     history1       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.6     16.6  | CONTAMINAN       | ITS      | method      | limit/base | current    | history1   | history2 |
| Potassium     ppm     ASTM D5185m     >20     60     69        INFRA-RED     method     limit/base     current     history1     history       Soot %     %     *ASTM D7844     >3     0.6     0.4        Nitration     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        FLUID DEGRADATION     method     limit/base     current     history1     history1       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.6     16.6  | Silicon          | ppm      | ASTM D5185m | >50        | 9          | 5          |          |
| INFRA-RED   method   limit/base   current   history1   history     Soot %   %   *ASTM D7844   >3   0.6   0.4      Nitration   Abs/cm   *ASTM D7624   >20   8.4   8.0      Sulfation   Abs/.1mm   *ASTM D7615   >30   19.4   20.3      FLUID DEGRADATION   method   limit/base   current   history1   history     Oxidation   Abs/.1mm   *ASTM D7414   >25   15.6   16.6  |                  | ppm      | ASTM D5185m |            | 2          | 1          |          |
| Soot %     %     *ASTM D7844     >3     0.6     0.4        Nitration     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        FLUID DEGRADATION     method     limit/base     current     history1     history       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.6     16.6   | Potassium        | ppm      | ASTM D5185m | >20        | 60         | 69         |          |
| Nitration     Abs/cm     *ASTM D7624     >20     8.4     8.0        Sulfation     Abs/.1mm     *ASTM D7415     >30     19.4     20.3        FLUID DEGRADATION     method     limit/base     current     history1     history       Oxidation     Abs/.1mm     *ASTM D7414     >25     15.6     16.6  | INFRA-RED        |          | method      | limit/base | current    | history1   | history2 |
| Sulfation   Abs/.1mm   *ASTM D7415   >30   19.4   20.3      FLUID DEGRADATION   method   limit/base   current   history1   history1     Oxidation   Abs/.1mm   *ASTM D7414   >25   15.6   16.6   | Soot %           | %        | *ASTM D7844 | >3         | 0.6        | 0.4        |          |
| FLUID DEGRADATION   method   limit/base   current   history1   history1     Oxidation   Abs/.1mm   *ASTM D7414   >25   15.6   16.6   | Nitration        | Abs/cm   | *ASTM D7624 | >20        | 8.4        | 8.0        |          |
| Oxidation Abs/.1mm *ASTM D7414 >25 15.6 16.6   | Sulfation        | Abs/.1mm | *ASTM D7415 | >30        | 19.4       | 20.3       |          |
|  | FLUID DEGRAI     | DATION   | method      | limit/base | current    | history1   | history2 |
| Base Number (BN) mg KOH/g ASTM D2896 9.15 10.13  | Oxidation        | Abs/.1mm | *ASTM D7414 | >25        | 15.6       | 16.6       |          |
|  | Base Number (BN) | mg KOH/g | ASTM D2896  |            | 9.15       | 10.13      |          |



Base

Pn 79

15 14

cSt (100°C)

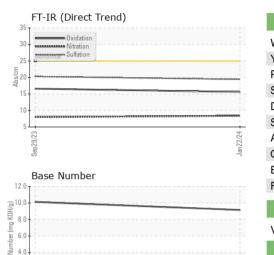
Abnorma

Sep29/23

Viscosity @ 100°C

# **OIL ANALYSIS REPORT**

VISUAL





Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012) F: (617)889-6422

Certificate L2367

Submitted By: JOHN MEDEIROS Page 2 of 2