

## **OIL ANALYSIS REPORT**

Sample Rating Trend





**588M** Component **Diesel Engine** Fluid **PETRO CANADA DURON SHP 15W40 (--- GAL)** 

### Recommendation

Resample at the next service interval to monitor.

Machine Id

#### 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.

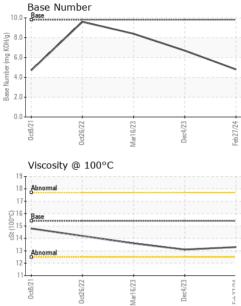
|   |   |   | 12  |   | 1.                                      | hint of  |
|---|---|---|---|---|---|--|
| SAMPLE INFOR  | VIATION   | method  | limit/base  | current   | history1  | history2   |
| Sample Number   |   | Client Info   |   | GFL0108918  | GFL0101482  | GFL0073927   |
| Sample Date   |   | Client Info   |   | 27 Feb 2024   | 04 Dec 2023   | 16 Mar 2023  |
| Machine Age   | hrs   | Client Info   |   | 9176  | 8844  | 8084   |
| Oil Age   | hrs   | Client Info   |   | 600   | 8084  | 7689   |
| Oil Changed   |   | Client Info   |   | Changed   | Not Changd  | Changed  |
| Sample Status   |   |   |   | NORMAL  | NORMAL  | NORMAL   |
| CONTAMINAT  | ION   | method  | limit/base  | current   | history1  | history2   |
| Fuel  |   | WC Method   | >3.0  | <1.0  | <1.0  | <1.0   |
| Water   |   | WC Method   | >0.2  | NEG   | NEG   | NEG  |
| Glycol  |   | WC Method   |   | NEG   | NEG   | NEG  |
| WEAR METAL  | S   | method  | limit/base  | current   | history1  | history2   |
| Iron  | ppm   | ASTM D5185m   | >90   | 61  | 32  | 17   |
| Chromium  |   | ASTM D5185m   |   | 2   | <1  | <1   |
| Nickel  | ppm<br>ppm  | ASTM D5185m   | >20   | 1   | 0   | 0  |
| Titanium  |   | ASTM D5185m   |   | ،<br><1   | 0   | 0  |
| Silver  | ppm   | ASTM D5185m   | >2  | <1<br>0   | 0   | 0  |
| Aluminum  | ppm<br>ppm  | ASTM D5185m   |   | 10  | 5   | 4  |
| Lead  |   | ASTM D5185m   | >20   | 0   | 0   | 0  |
|   | ppm   |   |   | 4   | 2   | 1  |
| Copper<br>Tin   | ppm   | ASTM D5185m<br>ASTM D5185m  | >330  | 4<br><1   | 0   | 0  |
| Vanadium  | ppm   | ASTM D5185m   | >10   | <1  | 0   | 0  |
| Cadmium   | ppm   | ASTM D5185m   |   | <1  | 0   | 0  |
| Gaumum  | ppm   | ASTIVI DUTOJITI   |   | 51  | 0   | 0  |
|   |   |   |   |   |   |  |
| ADDITIVES   |   | method  | limit/base  | current   | history1  | history2   |
| ADDITIVES<br>Boron  | ppm   | ASTM D5185m   | limit/base  | current<br>2  | history1<br><1  | history2<br>4  |
|   | ppm<br>ppm  | ASTM D5185m   |   |   |   |  |
| Boron   |   | ASTM D5185m   | 0   | 2   | <1  | 4  |
| Boron<br>Barium   | ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 0   | 2<br>0  | <1<br>2   | 4  |
| Boron<br>Barium<br>Molybdenum   | ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>60  | 2<br>0<br>64  | <1<br>2<br>56   | 4<br>0<br>57   |
| Boron<br>Barium<br>Molybdenum<br>Manganese  | ppm<br>ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60<br>0   | 2<br>0<br>64<br>1   | <1<br>2<br>56<br>0  | 4<br>0<br>57<br><1   |
| 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   | 0<br>0<br>60<br>0<br>1010   | 2<br>0<br>64<br>1<br>905  | <1<br>2<br>56<br>0<br>839   | 4<br>0<br>57<br><1<br>861  |
| 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  | 0<br>0<br>60<br>0<br>1010<br>1070   | 2<br>0<br>64<br>1<br>905<br>991   | <1<br>2<br>56<br>0<br>839<br>995  | 4<br>0<br>57<br><1<br>861<br>1031  |
| 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  | 0<br>0<br>60<br>0<br>1010<br>1070<br>1150   | 2<br>0<br>64<br>1<br>905<br>991<br>941  | <1<br>2<br>56<br>0<br>839<br>995<br>872                                       | 4<br>0<br>57<br><1<br>861<br>1031<br>924   |
| 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   | 0<br>0<br>60<br>0<br>1010<br>1070<br>1150<br>1270   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212  | <1<br>2<br>56<br>0<br>839<br>995<br>872<br>1122                               | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106   |
| 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  | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060  | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564  | <1<br>2<br>56<br>0<br>839<br>995<br>872<br>1122<br>2766                       | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN  | 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  | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060  | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br>current   | <1<br>2<br>56<br>0<br>839<br>995<br>872<br>1122<br>2766<br>history1           | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>TS                      | 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   | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b>   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br>current<br>8  | <1 2 56 0 839 995 872 1122 2766 history1 5                                    | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>TS                      | 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<br>ASTM D5185m  | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b>   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><u>current</u><br>8<br>12   | <1 2 56 0 839 995 872 1122 2766 history1 5 4                                  | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>TS                      | ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b><br>>25<br>>20  | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br>current<br>8<br>12<br>12  | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7                                | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED                                     | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>TS                      | ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b><br>>25   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><i>current</i><br>8<br>12<br>12<br>12<br>12   | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7 history1                       | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3<br>3<br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %                           | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>TS<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br>2060<br>225<br>>25<br>>20<br>Limit/base<br>>20   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><u>current</u><br>8<br>12<br>12<br>12<br>12<br>12   | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7 history1 0.6                   | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3<br>6<br>3<br><i>history2</i><br>0.2                          |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium<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 D5185m   | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br>2060<br>225<br>225<br>220<br>1imit/base<br>>20   | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><i>current</i><br>8<br>12<br>12<br>12<br>12<br><i>current</i><br>1.1                        | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7 history1 0.6 9.0               | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3<br>6<br>3<br><i>history2</i><br>0.2<br>7.5                   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium<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 D7844<br>*ASTM D7844<br>*ASTM D7844 | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br>2060<br>225<br>220<br>220<br>220<br>20<br>20<br>20<br>20<br>20<br>20<br>20<br>20<br>20 | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><i>current</i><br>8<br>12<br>12<br>12<br><i>current</i><br>1.1<br>1.1<br>1.1<br>1.4<br>24.8 | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7 history1 0.6 9.0 21.3 history1 | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3<br>6<br>3<br>8<br>history2<br>0.2<br>7.5<br>19.3<br>history2 |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium<br>Potassium<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                              | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>imit/base</b><br>>25<br><b>imit/base</b><br>>6<br>>20                               | 2<br>0<br>64<br>1<br>905<br>991<br>941<br>1212<br>2564<br><u>current</u><br>8<br>12<br>12<br>12<br>12<br><u>current</u><br>1.1                        | <1 2 56 0 839 995 872 1122 2766 history1 5 4 7 history1 0.6 9.0 21.3          | 4<br>0<br>57<br><1<br>861<br>1031<br>924<br>1106<br>3217<br>history2<br>3<br>6<br>3<br>6<br>3<br><b>history2</b><br>0.2<br>7.5<br>19.3           |



# **OIL ANALYSIS REPORT**

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

VISUAL



|            | Laboratory<br>Sample No.<br>Lab Number | : GFL0108918  | Receiv<br>Tested | Madison Ave., Cary, NC 27513<br><b>Received</b> : 01 Mar 2024<br><b>Tested</b> : 01 Mar 2024<br><b>Diagnosed</b> : 04 Mar 2024 - Sean F<br>ce at 1-800-237-1369. |  |            | GFL Environmental - 415 - Michigan Eas<br>6200 Elmridg<br>Sterling Heights, N<br>Iton US 4831<br>Contact: Frank Wola<br>fwolak@gflenv.cor |              |  |  |
|------------|--|---|------------------|--|--|------------|---|--------------|--|--|
|            |  | 0ct8/21   | Mar16/23 +       | Dec4/23 +  | Feb27/24   | 0ct26/22 + | Mar16/23  | Dec4/23 +    |  |  |
|            |  | 13 - Abnormal<br>12 -   |                  |  | 2.0  |            |   |              |  |  |
|            |  | <del></del> |                  |  | 0.8<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 |            |   |              |  |  |
|            |  | (2,001)<br>15<br>trong 14   |                  |  | HOX Bu 6.0   | /          |   |              |  |  |
|            |  | 18 - Abnormal   |                  |  | (B) 8.0  |            |   |              |  |  |
|            |  | <sup>19</sup>   |                  |  | Ba<br>10.0 Bas                                       | se Number  |   |              |  |  |
|            |  | ة<br>Viscosity @ 10   |                  | De   |  |            |   |              |  |  |
|            |  | 0ct8/21   | Mar16/23         | Dec4/23  | Feb27/24   |            |   |              |  |  |
|            |  | 2   |                  |  |  |            |   |              |  |  |
|            |  | 4   |                  |  | -  |            |   |              |  |  |
|            |  |   |                  |  |  |            |   |              |  |  |
|            |  | 8 - exercise lead   |                  |  |  |            |   |              |  |  |
|            |  | 10 copper   |                  |  |  |            |   |              |  |  |
|            |  | Non-ferrous M   | Mar16/23         | Dec  | Feb 2  |            |   |              |  |  |
|            |  | 0ct8/21   | 6/23             | Dec4/23  | Feb27/24 📕 -   |            |   |              |  |  |
|            |  | 20  |                  |  |  |            |   |              |  |  |
|            |  | E <sup>50</sup><br>40<br>30   |                  |  |  |            |   |              |  |  |
| Mar        | DE                                     | 60-   |                  | /  |  |            |   |              |  |  |
| Mar16/23 - | Dec4/23                                | 80 - iron<br>chromium   |                  |  |  |            |   |              |  |  |
|            |  | Ferrous Alloys  |                  |  |  |            |   |              |  |  |
|            |  | Visc @ 100°C<br>GRAPHS  | cSt              | ASTM D445 15   | 5.4 <b>1</b>   | 3.3        | 13.1  | 13.6         |  |  |
|            |  | FLUID PRO   |                  |  | imit/base  | current    | history1  | history2     |  |  |
|            |  | Free Water  |                  | *Visual  |  | IEG        | NEG   | NEG          |  |  |
| M          | Te Fe                                  | Odor<br>Emulsified Water  |                  |  |  | IORML      | NORML<br>NEG  | NORML<br>NEG |  |  |
| Mar16/23   | Dec4/23<br>Feb27/24                    | Appearance  |                  |  |  | ORML       | NORML   | NORML        |  |  |
|            | Sand/Dirt                              |   |                  |  | ONE  | NONE       | NONE  |              |  |  |
|            | Silt<br>Debris                         |   |                  |  | IONE   | NONE       | NONE<br>NONE  |              |  |  |
|            | Precipitate                            |   |                  |  | ONE  | NONE       | NONE  |              |  |  |
|            | Yellow Metal                           |   |                  |  | IONE   | NONE       | NONE  |              |  |  |

Submitted By: Frank Wolak

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