

## **OIL ANALYSIS REPORT**

#### Sample Rating Trend



### <sup>Machine Id</sup> 425138 - SW4515

#### Component Diesel Engine

Fluid

PETRO CANADA DURON SHP 15W40 (--- GAL)

#### DIAGNOSIS

#### 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 INFOR  | MATION   | method  | limit/base   | current  | history1  | history2   |
|---|--|---|--|--|---|--|
| Sample Number   |  | Client Info   |  | GFL0085501   | GFL0085417  | GFL0065800   |
| Sample Date   |  | Client Info   |  | 03 Aug 2023  | 31 May 2023   | 17 Feb 2023  |
| Machine Age   | mls  | Client Info   |  | 329182   | 325338  | 315859   |
| Oil Age   | mls  | Client Info   |  | 325338   | 315859  | 0  |
| Oil Changed   |  | Client Info   |  | Changed  | Changed   | N/A  |
| Sample Status   |  |   |  | NORMAL   | NORMAL  | NORMAL   |
| CONTAMINAT  | ION  | method  | limit/base   | current  | history1  | history2   |
| Fuel  |  | WC Method   | >5   | <1.0   | <1.0  | <1.0   |
| Glycol  |  | WC Method   | 20   | NEG  | NEG   | NEG  |
| -   | 0  |   | limit/booo   | ourroat  | biotory (1  | bistory  |
| WEAR METAL  |  | method  | limit/base   | current  | history1  | history2   |
| Iron  | ppm  | ASTM D5185m   | >100   | 10   | 25  | 17   |
| Chromium  | ppm  |   | >20  | <1   | 2   | 0  |
| Nickel  | ppm  | ASTM D5185m   | >4   | 0  | 0   | 0  |
| Titanium  | ppm  | ASTM D5185m   |  | <1   | 0   | 0  |
| Silver  | ppm  | ASTM D5185m   | >3   | <1   | 0   | 0  |
| Aluminum  | ppm  | ASTM D5185m   | >20  | <1   | <1  | 1  |
| Lead  | ppm  | ASTM D5185m   | >40  | <1   | <1  | <1   |
| Copper  | ppm  | ASTM D5185m   | >330   | 1  | <1  | 0  |
| Tin   | ppm  | ASTM D5185m   | >15  | 0  | <1  | 0  |
| Vanadium  | ppm  | ASTM D5185m   |  | <1   | 0   | 0  |
| Cadmium   | ppm  | ASTM D5185m   |  | 0  | 0   | 0  |
|   |  |   |  |  |   |  |
| ADDITIVES   |  | method  | limit/base   | current  | history1  | history2   |
| ADDITIVES<br>Boron  | ppm  | method<br>ASTM D5185m   | limit/base<br>0  | current<br>1   | history1<br>27  | history2<br>0  |
|   | ppm<br>ppm   |   |  |  |   |  |
| Boron   |  | ASTM D5185m   | 0  | 1  | 27  | 0  |
| Boron<br>Barium   | ppm  | ASTM D5185m<br>ASTM D5185m  | 0  | 1<br>0   | 27<br>0   | 0  |
| Boron<br>Barium<br>Molybdenum   | ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>60   | 1<br>0<br>41   | 27<br>0<br>34   | 0<br>0<br>63   |
| 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  | 1<br>0<br>41<br><1   | 27<br>0<br>34<br><1   | 0<br>0<br>63<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  | 1<br>0<br>41<br><1<br>24   | 27<br>0<br>34<br><1<br>92   | 0<br>0<br>63<br><1<br>994  |
| 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  | 1<br>0<br>41<br><1<br>24<br>2298   | 27<br>0<br>34<br><1<br>92<br>2328   | 0<br>0<br>63<br><1<br>994<br>1198  |
| 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  | 1<br>0<br>41<br><1<br>24<br>2298<br>1038   | 27<br>0<br>34<br><1<br>92<br>2328<br>1013   | 0<br>0<br>63<br><1<br>994<br>1198<br>1038  |
| 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  | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231   | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218   | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361  |
| 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   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640   | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573   | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706  |
| 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   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br>current  | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1   | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<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>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   | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br>imit/base<br>>25   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br>current<br>6   | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8  | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<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>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>imit/base<br>>25   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br>current<br>6<br><  | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1   | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0  |
| 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>ppm<br>TS  | ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>60<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b><br>>25<br>>20   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br>current<br>6<br><1<br>2  | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2  | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1  |
| 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>imit/base</b><br>>25   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br>current<br>6<br><1<br>2<br>2<br>current                                | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2<br>history1<br>0.9                             | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1<br>history2<br>0.6                             |
| 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<br>INFRA-RED<br>Soot %                           | 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>limit/base<br>>25<br>>20<br>limit/base<br>>3<br>>20   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br><i>current</i><br>6<br><1<br>2<br><i>current</i><br>0.5                | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2<br>2<br>history1                               | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1<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              | 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>limit/base<br>>25<br>>20<br>limit/base<br>>3<br>>20   | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br><i>current</i><br>6<br><1<br>2<br><i>current</i><br>0.5<br>9.5         | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2<br>history1<br>0.9<br>13.9                     | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1<br>history2<br>0.6<br>10.8                     |
| 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 | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br>2060<br>225<br>20<br>220<br>220<br>20<br>1imit/base<br>>3<br>220<br>330                     | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br><i>current</i><br>6<br><1<br>2<br><i>current</i><br>0.5<br>9.5<br>19.6 | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2<br>history1<br>0.9<br>13.9<br>25.1<br>history1 | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1<br>history2<br>0.6<br>10.8<br>22.1<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><i>limit/base</i><br>>25<br><i>limit/base</i><br>>3<br>>20<br><i>limit/base</i><br>>3<br>20 | 1<br>0<br>41<br><1<br>24<br>2298<br>1038<br>1231<br>3640<br><u>current</u><br>6<br><1<br>2<br><u>current</u><br>0.5<br>9.5<br>19.6 | 27<br>0<br>34<br><1<br>92<br>2328<br>1013<br>1218<br>3573<br>history1<br>8<br>1<br>2<br><u>history1</u><br>0.9<br>13.9<br>25.1      | 0<br>0<br>63<br><1<br>994<br>1198<br>1038<br>1361<br>3706<br>history2<br>3<br>0<br><1<br>history2<br>0.6<br>10.8<br>22.1             |

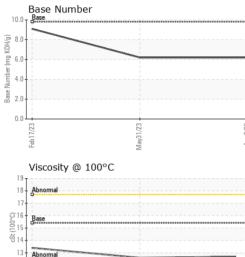


Abnormal 12 11

Feb17/23

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# **OIL ANALYSIS REPORT**



|                   |   | VISUAL<br>White Metal                         | scalar                         | method<br>*Visual                     | limit/base                        | current<br>NONE | history1<br>NONE       | history2<br>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                                |  |
| 1/23              | Aug3/23 -   | Appearance                                    | scalar                         | *Visual                               | NORML                             | NORML           | NORML                  | NORML                               |  |
| May31/23          | Aug   | Odor  | scalar                         | *Visual                               | NORML                             | NORML           | NORML                  | NORML                               |  |
| С                 |   | Emulsified Water                              | scalar                         | *Visual                               | >0.2                              | NEG             | NEG                    | NEG                                 |  |
| C                 |   | Free Water                                    | scalar                         | *Visual                               |                                   | NEG             | NEG                    | NEG                                 |  |
|                   |   | FLUID PROP                                    | ERTIES                         | method                                | limit/base                        | current         | history1               | history2                            |  |
|                   |   | Visc @ 100°C                                  | cSt                            | ASTM D445                             |                                   | 12.7            | 12.6                   | 13.4                                |  |
|                   |   | GRAPHS  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | Ferrous Alloys                                | _                              |                                       |                                   |                 |                        |                                     |  |
| 23                |   | 25 iron                                       | $\frown$                       |                                       |                                   |                 |                        |                                     |  |
| May31/23          |   | 20 - nickel                                   |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | _ 15  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | Ē. 10-  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 10  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 5-  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   |   | Interstanting and the second   |                                       |                                   |                 |                        |                                     |  |
|                   |   | -<br>Feb17/23                                 | 1/23 -                         |                                       | Aug3/23 -                         |                 |                        |                                     |  |
|                   |   | Feb1  | May31/23                       |                                       | Aug                               |                 |                        |                                     |  |
|                   |   | Non-ferrous Met                               | als                            |                                       |                                   |                 |                        |                                     |  |
|                   |   | 10 copper                                     |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 8 -   |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | un  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 6   |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 4 4   |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   |   |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 2 -   | 1                              |                                       |                                   |                 |                        |                                     |  |
|                   |   |   |                                |                                       | C.O.                              |                 |                        |                                     |  |
|                   |   | eb 17/23                                      | lay31/23                       |                                       | Aug3/23                           |                 |                        |                                     |  |
|                   |   |   | 2                              |                                       | Aı                                |                 |                        |                                     |  |
|                   |   | Viscosity @ 100                               | °C                             |                                       |                                   | Base Number     |                        |                                     |  |
|                   |   | 18 - Abnormal                                 |                                |                                       | 10.0                              | Base            |                        |                                     |  |
|                   |   | 17-   |                                |                                       | ( <sup>₿</sup> / <sup>8.0</sup>   |                 |                        |                                     |  |
|                   |   | C <sup>16</sup> Base                          |                                |                                       | ġ<br>ġ 6.0                        |                 |                        |                                     |  |
|                   |   | Double 16 Base Base 11 S 14                   |                                |                                       | 0.6 Base Number (mg KOH/g)        |                 |                        |                                     |  |
|                   |   | <sup>63</sup> 14                              |                                |                                       | 4.0                               |                 |                        |                                     |  |
|                   |   | 13 Abnormal                                   |                                |                                       | 2.0                               | -               |                        |                                     |  |
|                   |   | 12 -  |                                |                                       |                                   |                 |                        |                                     |  |
|                   |   | 114   | 23                             |                                       | 0.0                               | 53              | 23                     | 23                                  |  |
|                   |   | Feb 17/23                                     | May31/23                       |                                       | Aug3/23                           | Feb 17/23       | May31/23               | Aug3/23                             |  |
|                   |   | LL.   | N                              |                                       | -                                 |                 |                        | 4                                   |  |
|                   |   | ····  |                                |                                       |                                   |                 |                        |                                     |  |
| 4                 | Laboratory  |   |                                |                                       |                                   | GFL Envir       |                        | ugar Land Hauling                   |  |
|                   | Sample No.  | : WearCheck USA<br>: GFL0085501<br>: 05918319 | Received                       | d : 08 /                              | Aug 2023                          | GFL Envir       | 16011 We               | st Belfort Street                   |  |
|                   | Sample No.<br>Lab Number<br>Unique Number                 | : GFL0085501<br>: 05918319<br>r : 10590233    |                                | d : 08 /<br>ed : 09 /                 |                                   | GFL Envir       | 16011 We               |                                     |  |
| Certificate L2367 | Sample No.<br>Lab Number<br>Unique Number<br>Test Package | : GFL0085501<br>: 05918319<br>r : 10590233    | Received<br>Diagnos<br>Diagnos | d : 08 /<br>ed : 09 /<br>tician : Sea | Aug 2023<br>Aug 2023<br>In Felton | GFL Envir       | 16011 We<br>t<br>Conta | st Belfort Street<br>Sugar Land, TX |  |

Submitted By: TECHNICIAN ACCOUNT