

# **OIL ANALYSIS REPORT**

#### Sample Rating Trend





#### SIZUO/ Component

Diesel Engine

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.

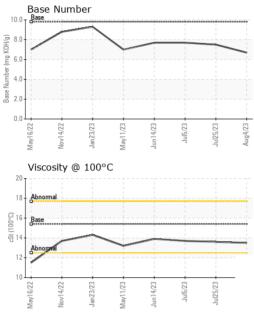
## Fluid Condition

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

| SAMPLE INFORI   | MATION  | method  | limit/base  | current   | history1   | history2   |
|---|---|---|---|---|--|--|
| Sample Number   |   | Client Info   |   | GFL0074744  | GFL0082658   | GFL0082650   |
| Sample Date   |   | Client Info   |   | 04 Aug 2023   | 25 Jul 2023  | 05 Jul 2023  |
| Machine Age   | hrs   | Client Info   |   | 2184  | 2083   | 1913   |
| Oil Age   | hrs   | Client Info   |   | 0   | 0  | 0  |
| Oil Changed   |   | Client Info   |   | Changed   | Changed  | Changed  |
| 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   |   | NEG   | NEG  | NEG  |
| WEAR METAL  | S   | method  | limit/base  | current   | history1   | history2   |
| Iron  | ppm   | ASTM D5185m   | >110  | 30  | 27   | 22   |
| Chromium  | ppm   | ASTM D5185m   | >4  | <1  | 0  | <1   |
| Nickel  | ppm   | ASTM D5185m   | >2  | <1  | 0  | 0  |
| Titanium  | ppm   | ASTM D5185m   |   | 0   | 0  | 0  |
| Silver  | ppm   | ASTM D5185m   | >2  | 0   | <1   | <1   |
| Aluminum  | ppm   | ASTM D5185m   | >25   | 12  | 10   | 9  |
| Lead  | ppm   | ASTM D5185m   | >45   | 0   | 0  | 0  |
| Copper  | ppm   | ASTM D5185m   | >85   | 3   | 3  | 2  |
| Tin   | ppm   | ASTM D5185m   | >4  | <1  | <1   | <1   |
| Vanadium  | ppm   | ASTM D5185m   |   | <1  | 0  | 0  |
| Cadmium   | ppm   | ASTM D5185m   |   | 0   | 0  | 0  |
|   |   |   |   |   |  |  |
| ADDITIVES   |   | method  |   |   |  | history2   |
| ADDITIVES<br>Boron  | ppm   | method<br>ASTM D5185m   | limit/base  | current<br>0  | history1<br><1   | history2<br>1  |
|   | ppm<br>ppm  | ASTM D5185m   |   |   |  |  |
| Boron<br>Barium   | ppm   | ASTM D5185m   | 0   | 0   | <1   | 1  |
| Boron<br>Barium<br>Molybdenum   |   | ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60  | 0<br>1  | <1<br>0  | 1<br>0   |
| Boron<br>Barium<br>Molybdenum<br>Manganese  | ppm<br>ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>60  | 0<br>1<br>62  | <1<br>0<br>64  | 1<br>0<br>59   |
| Boron<br>Barium<br>Molybdenum   | ppm<br>ppm<br>ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60<br>0   | 0<br>1<br>62<br><1  | <1<br>0<br>64<br><1  | 1<br>0<br>59<br><1   |
| 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   | 0<br>0<br>60<br>0<br>1010   | 0<br>1<br>62<br><1<br>956   | <1<br>0<br>64<br><1<br>913   | 1<br>0<br>59<br><1<br>965  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium   | 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   | 0<br>1<br>62<br><1<br>956<br>1067   | <1<br>0<br>64<br><1<br>913<br>1116   | 1<br>0<br>59<br><1<br>965<br>1067  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus  | 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   | 0<br>1<br>62<br><1<br>956<br>1067<br>1002   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065  |
| 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   | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321  |
| 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<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  | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772  |
| 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   | 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  | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br>current  | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<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  | 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><br>>30  | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br>current<br>5   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4  | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4   |
| 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><b>method</b><br>ASTM D5185m   | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b><br>>30  | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br><u>current</u><br>5<br>3   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<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  | 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>>20<br><b>imit/base</b>                          | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br><u>current</u><br>5<br>3<br>15   | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9   |
| 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>Imit/base</b><br>>30<br>>20<br><b>Imit/base</b>                   | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br><u>current</u><br>5<br>3<br>15<br><u>current</u><br>0.4                | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16<br>history1<br>0.4                            | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9<br>9  |
| 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                                    | 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>>30<br>>20<br><b>Imit/base</b>                   | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br>current<br>5<br>3<br>15<br>current                                     | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16<br>history1                                   | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9<br><u>history2</u><br>0.3                     |
| 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<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><i>limit/base</i><br>>30<br>200<br><i>limit/base</i><br>>3<br>>20    | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br>current<br>5<br>3<br>15<br>current<br>0.4<br>8.6                       | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16<br>history1<br>0.4<br>8.6                     | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9<br><u>history2</u><br>0.3<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 D5185m               | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>imit/base</b><br>>30<br><b>imit/base</b><br>>3<br>20              | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br><u>current</u><br>5<br>3<br>15<br><u>current</u><br>0.4<br>8.6<br>20.7 | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16<br>history1<br>0.4<br>8.6<br>21.0             | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9<br><u>history2</u><br>0.3<br>7.5<br>21.0      |
| 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<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>TS<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>imit/base<br>>30<br>imit/base<br>>3<br>>20<br>imit/base<br>>3<br>>20 | 0<br>1<br>62<br><1<br>956<br>1067<br>1002<br>1243<br>3003<br>Current<br>5<br>3<br>15<br>Current<br>0.4<br>8.6<br>20.7<br>Current    | <1<br>0<br>64<br><1<br>913<br>1116<br>1009<br>1237<br>3220<br>history1<br>4<br>0<br>16<br>history1<br>0.4<br>8.6<br>21.0<br>history1 | 1<br>0<br>59<br><1<br>965<br>1067<br>1065<br>1321<br>3772<br>history2<br>4<br>1<br>9<br>history2<br>0.3<br>7.5<br>21.0<br>history2 |



# **OIL ANALYSIS REPORT**



| d                         | Laboratory<br>Sample No.       | ZZJ91/MeW<br>: WearCheck USA - 5   | 501 Madia                  |                               | ezybing<br>ry, NC 27513<br>Aug 2023   | May16/22<br>Nov14/22<br>Jan23/23 |                       | EZ/SZINF<br>EZ/SZINF<br>Little Rock Hauling<br>2005 Hwy 161 N. |
|---------------------------|--------------------------------|--|----------------------------|-------------------------------|---|----------------------------------|-----------------------|--|
|                           |                                | Abnormal<br>Base<br>Abnormal<br>Abnormal<br>Abnormal<br>Abnormal<br>Abnormal |                            |                               | 10.0<br>(B)HOX<br>Bul Jag<br>Winny See<br>8.0<br>(B)HOX<br>Bul Jag<br>Winny See<br>8.0<br>(B)HOX<br>Bul Jag<br>Bul Jag | Base                             | \                     |  |
|                           |                                | Viscosity @ 100°C  | May11/23 +                 | Julis 23<br>Julis 23          | Aug4/23   | Base Number                      |                       |  |
| May11/23 + Jun14/23 +     | Jul5/23 + -                    |  | May11/23                   | Jul5/23                       | Aug4/23   |                                  |                       |  |
|                           |                                | Visc @ 100°C<br>GRAPHS<br>Ferrous Alloys                                     | cSt                        | ASTM D445                     |   | 13.5                             | 13.6                  | 13.7   |
|                           |                                | Free Water<br>FLUID PROPE  | scalar                     | *Visual method                | limit/base  | NEG<br>current                   | NEG<br>history1       | NEG<br>history2  |
| О<br>Мау11/23<br>Jun14/23 | Jul5/23<br>Jul25/23<br>Aug4/23 | Odor<br>Emulsified Water   | scalar                     | *Visual<br>*Visual            | NORML<br>>0.2   | NORML                            | NORML                 | NORML  |
| 23 -                      | 23                             | Debris<br>Sand/Dirt<br>Appearance  | scalar<br>scalar<br>scalar | *Visual<br>*Visual<br>*Visual | NONE<br>NORML   | NONE<br>NONE<br>NORML            | NONE<br>NONE<br>NORML | NONE<br>NONE<br>NORML  |
|                           |                                | Precipitate<br>Silt  | scalar<br>scalar           | *Visual<br>*Visual            | NONE<br>NONE  | NONE<br>NONE                     | NONE<br>NONE          | NONE<br>NONE   |
| -                         |                                | White Metal<br>Yellow Metal  | scalar<br>scalar           | *Visual<br>*Visual            | NONE<br>NONE  | NONE<br>NONE                     | NONE<br>NONE          | NONE   |

Submitted By: Nicole Walls Page 2 of 2