

# **OIL ANALYSIS REPORT**

#### Sample Rating Trend





# 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.

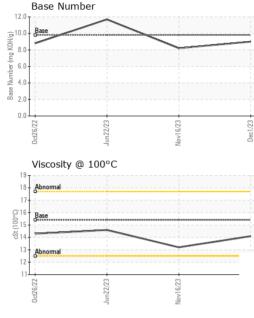
### Fluid Condition

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

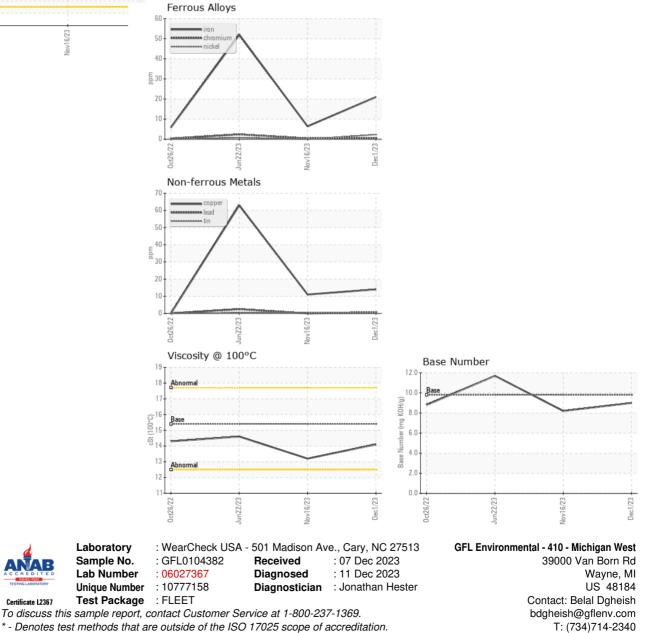
| Sample Number         Client Info         OFL0104382         GFL0104382         GFL0059230         GFL0084892           Sample Date         Client Info         01 Dec 2023         16 Nov 2022         22 Jun 2023           Machine Age         hrs         Client Info         21350         21245         63           Oil Anged         Client Info         21350         21245         63           Oil Anged         Client Info         21350         21245         63           Oil Age         NorMAL         NORMAL         ABNORMAL           Sample Status         Interview         Client Info         Changed         Changed         Changed           GONTAMINATION         method         >5         <1.0         <1.0         <1.0           Water         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >50         <1         <1.0         <1.0           Kiter         ppm         ASTM05155         >40         <1         0         <1           Kiter         ppm         ASTM05155         >40         <1         <1  | SAMPLE INFORI   | MATION  | method   | limit/base   | current  | history1   | history2   |
|--|---|---|--|--|--|--|--|
| Machine Age         hrs         Client Info         21350         21245         22866           Oil Ghanged         Client Info         21350         21245         63           Oil Ghanged         Client Info         21350         21245         63           Sample Status         Imit/base         Current         NoRMAL         ABNORMAL           CONTAMINATION         method         Imit/base         current         History1         History2           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG         NEG           Chromium         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >20         2         4         6           Auminum         ppm         ASTM D5185m         >30         0         0         0           Auminum         ppm         ASTM D5185m         >30   | Sample Number   |   | Client Info  |  | GFL0104382   | GFL0059230   | GFL0084892   |
| Oil Age         Ins         Client Info         21350         21245         63           Oil Changed         Client Info         Changed         Changed         Changed           Sample Status         Imit/base         current         NoRMAL         ABNORMAL           CONTAMINATION         method         Imit/base         current         Nistory1         history1           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         REG         NEG         NEG           Water         WC Method         >0.2         1         6         52           Chromium         ppm         ASTM D5185m         >40         0         <1           Nickel         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >3         0         0         <1         0         2           Copper         ppm         ASTM D5185m         >30         14         11         63         3         14         11         63         3           Cadmium         ppm         ASTM D5185m         0         0         0<  | Sample Date   |   | Client Info  |  | 01 Dec 2023  | 16 Nov 2023  | 22 Jun 2023  |
| Oil Changed<br>Sample Status         Client Info         Changed<br>NORMAL         Changed<br>NORMAL         Changed<br>ABNORMAL         Changed<br>ABNORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5.         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         imit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >20         <1         <1         0         <1           Silver         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >30         0         0         2           Copper         ppm         ASTM D5185m         >30         11   | Machine Age   | hrs   | Client Info  |  | 21350  | 21245  | 22866  |
| Sample Status         NORMAL         NORMAL         NORMAL         ABNORMAL           CONTAMINATION         method         imit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         imit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >3         0         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >10         0         0         1           Vanadium <th>Oil Age</th> <th>hrs</th> <th>Client Info</th> <th></th> <th>21350</th> <th>21245</th> <th>63</th>  | Oil Age   | hrs   | Client Info  |  | 21350  | 21245  | 63   |
| CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >4         2         0         <1           Titanium         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >30         <1         11         63           Tin         ppm         ASTM D5185m         0         <0         <1         <1           Cadmium         ppm         ASTM D5185m         0         <0         <0         <1           B   | Oil Changed   |   | Client Info  |  | Changed  | Changed  | Changed  |
| Fuel         WC Method         >5         <1.0   | Sample Status   |   |  |  | NORMAL   | NORMAL   | ABNORMAL   |
| Water         WC Method         >0.2         NEG         NEG         NEG         NEG           Glycol         WC Method         Imit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >4         2         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >10         0         0         2           Copper         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         211         2         65           Barium         ppm         ASTM D5185m         0         <1         1  | CONTAMINAT  | ION   | method   | limit/base   | current  | history1   | history2   |
| Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >4         2         0         <1           Titanium         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >30         14         11         63           Tin         ppm         ASTM D5185m         0         0         <1         1           Vanadium         ppm         ASTM D5185m         0         0         <1         1           Vanadium         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         21         1         1          Magne   | Fuel  |   | WC Method  | >5   | <1.0   | <1.0   | <1.0   |
| WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >20         <1         <1         2           Nickel         ppm         ASTM D5185m         >20         <1         <1         0         <1           Titanium         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >3         0         0         2           Lead         ppm         ASTM D5185m         >20         2         4         6           Copper         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >20         2         4         6           Copper         ppm         ASTM D5185m         0         21         2         6           Cadmium         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         21         <  | Water   |   | WC Method  | >0.2   | NEG  | NEG  | NEG  |
| Iron         ppm         ASTM D5185m         >100         21         6         52           Chromium         ppm         ASTM D5185m         >20         <1  | Glycol  |   | WC Method  |  | NEG  | NEG  | NEG  |
| Chromium         ppm         ASTM D5185m         >20         <1  | WEAR METAL  | S   | method   | limit/base   | current  | history1   | history2   |
| Nickel         ppm         ASTM D5185m         >4         2         0         <1   | Iron  | ppm   | ASTM D5185m  | >100   | 21   | 6  | 52   |
| Titanium         ppm         ASTM D5185m         <1  | Chromium  | ppm   | ASTM D5185m  | >20  | <1   | <1   | 2  |
| Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >40         <1   | Nickel  | ppm   | ASTM D5185m  | >4   | 2  | 0  | <1   |
| Aluminum         ppm         ASTM D5185m         >20         2         4         6           Lead         ppm         ASTM D5185m         >40         <1         0         2           Copper         ppm         ASTM D5185m         >330         14         11         63           Tin         ppm         ASTM D5185m         >15         <1         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0         <1   | Titanium  | ppm   | ASTM D5185m  |  | <1   | 0  | <1   |
| Lead         ppm         ASTM D5185m         >40         <1  | Silver  | ppm   | ASTM D5185m  | >3   | 0  | 0  | 0  |
| Copper         ppm         ASTM D5185m         >330         14         11         63           Tin         ppm         ASTM D5185m         >15         <1         <1         <1           Vanadium         ppm         ASTM D5185m         >15         <1         <1         <1           Cadmium         ppm         ASTM D5185m         0         0         0         <1           Cadmium         ppm         ASTM D5185m         0         21         2         65           Boron         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         0         0         0           Manganese         ppm         ASTM D5185m         0         <11         <11         1           Magnesium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         >206         <   | Aluminum  | ppm   | ASTM D5185m  | >20  | 2  | 4  | 6  |
| Tin         ppm         ASTM D5185m         >15         <1   | Lead  | ppm   | ASTM D5185m  | >40  | <1   | 0  | 2  |
| Vanadium         ppm         ASTM D5185m         0         0         <1  | Copper  | ppm   | ASTM D5185m  | >330   | 14   | 11   | 63   |
| Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         0         0         0         0           Molybdenum         ppm         ASTM D5185m         0         current         history1         history2           Manganese         ppm         ASTM D5185m         0         c1         c1         1           Magnesium         ppm         ASTM D5185m         0         c1         c1         1           Magnesium         ppm         ASTM D5185m         1010         4322         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1070         1873         944         1020           Sulfur         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m   | Tin   | ppm   | ASTM D5185m  | >15  | <1   | <1   | <1   |
| ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         56         52         131           Manganese         ppm         ASTM D5185m         0         <1         <1         1           Magnesium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1270         1209         11117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Sodium         ppm         ASTM D5185m         <   | Vanadium  | ppm   | ASTM D5185m  |  | 0  | 0  | <1   |
| Boron         ppm         ASTM D5185m         0         21         2         65           Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         56         52         131           Manganese         ppm         ASTM D5185m         0         <1         <1         1           Magnesium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base  | Cadmium   | ppm   | ASTM D5185m  |  | 0  | 0  | 0  |
| Barium         ppm         ASTM D5185m         0         0         0         0           Molybdenum         ppm         ASTM D5185m         60         56         52         131           Manganese         ppm         ASTM D5185m         0         <1         <1         1           Magnesium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1070         1873         944         1020           Sulfur         ppm         ASTM D5185m         1150         1045         923         840           Zinc         ppm         ASTM D5185m         1270         1209         11117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>  |   |   |  |  |  |  |  |
| Molybdenum         ppm         ASTM D5185m         60         56         52         131           Manganese         ppm         ASTM D5185m         0         <1   | ADDITIVES   |   | method   | limit/base   | current  | history1   | history2   |
| Manganese         ppm         ASTM D5185m         0         <1   |   | ppm   |  |  |  |  |  |
| Magnesium         ppm         ASTM D5185m         1010         432         830         849           Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1150         1045         923         840           Zinc         ppm         ASTM D5185m         1150         1045         923         840           Zinc         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5         ▲ 49           Sodium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/.1mm         *ASTM D7414 </th <th>Boron</th> <th></th> <th>ASTM D5185m</th> <th>0</th> <th>21</th> <th>2</th> <th>65</th>  | Boron   |   | ASTM D5185m  | 0  | 21   | 2  | 65   |
| Calcium         ppm         ASTM D5185m         1070         1873         944         1020           Phosphorus         ppm         ASTM D5185m         1150         1045         923         840           Zinc         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.tmm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method   | Boron<br>Barium   | ppm   | ASTM D5185m<br>ASTM D5185m   | 0  | 21<br>0  | 2<br>0   | 65<br>0  |
| Phosphorus         ppm         ASTM D5185m         1150         1045         923         840           Zinc         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm<*ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm<*ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current <th>Boron<br/>Barium<br/>Molybdenum</th> <th>ppm<br/>ppm</th> <th>ASTM D5185m<br/>ASTM D5185m<br/>ASTM D5185m</th> <th>0<br/>0<br/>60</th> <th>21<br/>0<br/>56</th> <th>2<br/>0<br/>52</th> <th>65<br/>0<br/>131</th> | Boron<br>Barium<br>Molybdenum   | ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60   | 21<br>0<br>56  | 2<br>0<br>52   | 65<br>0<br>131   |
| Zinc         ppm         ASTM D5185m         1270         1209         1117         1192           Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/tmm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.tmm         *ASTM D7414         >25         13.7         14.1         19.2   | 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  | 21<br>0<br>56<br><1  | 2<br>0<br>52<br><1   | 65<br>0<br>131<br>1  |
| Sulfur         ppm         ASTM D5185m         2060         3940         2839         3369           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2   | 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  | 21<br>0<br>56<br><1<br>432   | 2<br>0<br>52<br><1<br>830  | 65<br>0<br>131<br>1<br>849   |
| CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>256549SodiumppmASTM D5185m031888PotassiumppmASTM D5185m>201614INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>30.10.20.7NitrationAbs/cm*ASTM D7624>205.95.315.0SulfationAbs/.tmm*ASTM D7415>3017.918.724.6FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.tmm*ASTM D7414>2513.714.119.2  | 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  | 21<br>0<br>56<br><1<br>432<br>1873   | 2<br>0<br>52<br><1<br>830<br>944   | 65<br>0<br>131<br>1<br>849<br>1020   |
| Silicon         ppm         ASTM D5185m         >25         6         5         49           Sodium         ppm         ASTM D5185m         0         3         1888           Potassium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.tmm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.tmm         *ASTM D7414         >25         13.7         14.1         19.2  | 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  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045   | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192  |
| Sodium         ppm         ASTM D5185m         0         3         ▲ 1888           Potassium         ppm         ASTM D5185m<>20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844<>3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624<>20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415<>30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414<>25         13.7         14.1         19.2   | 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  | 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  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209   | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192  |
| Potassium         ppm         ASTM D5185m         >20         1         6         14           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2   | 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   | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940   | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369  |
| INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2  | 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<br><b>method</b><br>ASTM D5185m   | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060   | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current  | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49  |
| Soot %         %         *ASTM D7844         >3         0.1         0.2         0.7           Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2  | 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><b>method</b><br>ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br>limit/base<br>>25  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6   | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49<br>▲ 1888  |
| Nitration         Abs/cm         *ASTM D7624         >20         5.9         5.3         15.0           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2  | 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><b>method</b><br>ASTM D5185m<br>ASTM D5185m  | 0<br>0<br>60<br>1010<br>1070<br>1150<br>1270<br>2060<br>limit/base<br>>25  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6<br>0  | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3  | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49<br>▲ 1888  |
| Sulfation         Abs/.1mm         *ASTM D7415         >30         17.9         18.7         24.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2  | 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  | 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                                  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6<br>0<br>1<br>1  | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br>kistory1                                   | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49<br>▲ 1888<br>14<br>history2  |
| FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     13.7     14.1     19.2  | 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 %                           | 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  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6<br>0<br>1<br>current<br>0.1                                   | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br>history1<br>0.2                            | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49<br>▲ 1888<br>14<br>14<br>bistory2  |
| Oxidation         Abs/.1mm         *ASTM D7414         >25         13.7         14.1         19.2  | 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 %                           | 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                    | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6<br>0<br>1<br>1<br>current<br>0.1                              | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br>history1<br>0.2                            | 65<br>0<br>131<br>1<br>849<br>1020<br>840<br>1192<br>3369<br>history2<br>▲ 49<br>▲ 1888<br>14<br>14<br>bistory2  |
|  | 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>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>limit/base<br>>25<br>>20<br>limit/base<br>>3<br>>20       | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>current<br>6<br>0<br>1<br>current<br>0.1<br>5.9                            | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br>history1<br>0.2<br>5.3                     | <ul> <li>65</li> <li>0</li> <li>131</li> <li>1</li> <li>849</li> <li>1020</li> <li>840</li> <li>1192</li> <li>3369</li> <li>history2</li> <li>▲ 49</li> <li>▲ 1888</li> <li>14</li> <li>history2</li> <li>0.7</li> <li>15.0</li> </ul>                                 |
|  | 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>>3<br>>20  | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br><u>current</u><br>6<br>0<br>1<br>1<br><u>current</u><br>0.1<br>5.9<br>17.9 | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br><u>history1</u><br>0.2<br>5.3<br>18.7      | <ul> <li>65</li> <li>0</li> <li>131</li> <li>1</li> <li>849</li> <li>1020</li> <li>840</li> <li>1192</li> <li>3369</li> <li>history2</li> <li>▲ 49</li> <li>▲ 1888</li> <li>14</li> <li>history2</li> <li>0.7</li> <li>15.0</li> <li>24.6</li> </ul>                   |
|  | 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 | ASTM D5185m<br>ASTM D7844<br>*ASTM D7624<br>*ASTM D7415 | 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>33<br>220<br>330 | 21<br>0<br>56<br><1<br>432<br>1873<br>1045<br>1209<br>3940<br>Current<br>6<br>0<br>1<br>Current<br>0.1<br>5.9<br>17.9<br>Current         | 2<br>0<br>52<br><1<br>830<br>944<br>923<br>1117<br>2839<br>history1<br>5<br>3<br>6<br>history1<br>0.2<br>5.3<br>18.7<br>history1 | <ul> <li>65</li> <li>0</li> <li>131</li> <li>1</li> <li>849</li> <li>1020</li> <li>840</li> <li>1192</li> <li>3369</li> <li>history2</li> <li>▲ 49</li> <li>▲ 1888</li> <li>14</li> <li>history2</li> <li>0.7</li> <li>15.0</li> <li>24.6</li> <li>history2</li> </ul> |



# **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    |
| Emulsified Water | scalar | *Visual   | >0.2       | NEG     | NEG      | NEG      |
| Free Water       | scalar | *Visual   |            | NEG     | NEG      | NEG      |
| FLUID PROPE      | RTIES  | method    | limit/base | current | history1 | history2 |
| Visc @ 100°C     | cSt    | ASTM D445 | 15.4       | 14.1    | 13.2     | 14.6     |
| GRAPHS           |        |           |            |         |          |          |
|                  |        |           |            |         |          |          |



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

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