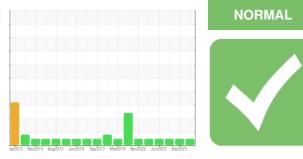


# **OIL ANALYSIS REPORT**

Sample Rating Trend



Component Diesel Engine PETRO CANADA DURON SHP 15W40 (20 LTR)

SAMPLE INFORMATION method

### DIAGNOSIS Recommendation

Resample at the next service interval to monitor.

Machine Id 7939

#### 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     GFL012376     GFL0038428     GFL0038451       Sample Date     Client Info     105485     16462     94460       Oil Age     mis     Client Info     105485     16462     94460       Oil Changed     Client Info     105485     16462     94460       Sample Status     Client Info     NORMAL     NORMAL     NORMAL       CONTAMILATI-ON     method     Sample Status     NORMA     NORMAL     NORMAL       CONTAMILATI-ON     method     Sample Status     VC Method     >5     <1.0     <1.0     <1.0       Water     WC Method     >5     <1.0     <1.0     <1.0     <1.0       Water     WC Method     >5     <1.0     <1.0     <1.0     <1.0       Water     WC Method     >5     <1.0     <1.0     <1.0     <1.0       Water     MC Method     >5     <1.0     <1.0     <1.0     <1.0       Water     PDM     ASTM05165     >30     0     <1     <1     <  |  |  | method  | IIIIII/Dase   | current   | TIIStOLA   | TIIStory2  |
|--|--|--|---|---|---|--|--|
| Machine Age     mis     Client Info     105485     16462     94460       Oil Age     mis     Client Info     105485     16462     0       Oil Changed     Client Info     NORMAL     NORMAL     NORMAL     NORMAL       Sample Status     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       VEAR METALS     method     Imit/base     current     History1     History2       Iron     ppm     ASTM D5185m     >80     46     67     61       Chromium     ppm     ASTM D5185m     >2     0     1     1       Itatianiam     ppm     ASTM D5185m     >3     0     0     <1     2       Itotad     ppm     ASTM D5185m     >30     2     1     2     3   | Sample Number  |  | Client Info   |   | GFL0123786  | GFL0098428   | GFL0084561   |
| Oil Age     mis     Client Info     105485     16462     0       Oil Changed     Client Info     Changed     Changed     Changed       Sample Status     Imit/base     current     history1     history2       Fuel     WC Method     >5     <1.0     <1.0     <1.0       Water     WC Method     >0.2     NEG     NEG     NEG       Water     WC Method     >0.2     NEG     NEG     NEG       Water     WC Method     >0.2     NEG     NEG     NEG       WeAR METALS     method     imit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >5     2     4     3       Nickel     ppm     ASTM D5185m     >2     0     1     1       Atuminum     ppm     ASTM D5185m     30     0     0     <1     2       Atuminum     ppm     ASTM D5185m     >10     16     2     3     1       Lead     ppm <td< th=""><th>Sample Date</th><th></th><th>Client Info</th><th></th><th>24 May 2024</th><th>06 Dec 2023</th><th>15 Jun 2023</th></td<>  | Sample Date  |  | Client Info   |   | 24 May 2024   | 06 Dec 2023  | 15 Jun 2023  |
| Oil Changed<br>Sample Status     Client Info     Changed<br>NORMAL     Changed<br>NORMAL     Changed<br>NORMAL     Changed<br>NORMAL       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     >5.     <1.0     <1.0     <1.0       WC Method     >0.     NEG     NEG     NEG     NEG       Iron     ppm     ASTM D5185m     >2.0     1     1     1       Chromium     ppm     ASTM D5185m     >3.0     0     <1     1       Silver     ppm     ASTM D5185m     >3.0     2     <1     4       Copper     ppm     ASTM D5185m     >3.0     2     <1     2       Copper     ppm     ASTM D5185m     >3.0     2     <1     2       Copper     ppm     ASTM D5185m     >5     0     <1     2  | Machine Age  | mls  | Client Info   |   | 105485  | 16462  | 94460  |
| Oil Changed<br>Sample Status     Client Info     Changed<br>NORMAL     Changed<br>NORMAL     Changed<br>NORMAL     Changed<br>NORMAL       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     >5.     <1.0     <1.0     <1.0       WC Method     >0.     NEG     NEG     NEG     NEG       Iron     ppm     ASTM D5185m     >2.0     1     1     1       Chromium     ppm     ASTM D5185m     >3.0     0     <1     1       Silver     ppm     ASTM D5185m     >3.0     2     <1     4       Copper     ppm     ASTM D5185m     >3.0     2     <1     2       Copper     ppm     ASTM D5185m     >3.0     2     <1     2       Copper     ppm     ASTM D5185m     >5     0     <1     2  | Oil Age  | mls  | Client Info   |   | 105485  | 16462  | 0  |
| Sample Status     NORMAL     NORMAL     NORMAL     NORMAL     NORMAL       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       VEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >80     46     67     61       Chromium     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >3     0     0     <1       Aluminum     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >30     2     <1     2       Vanadium     ppm     ASTM D5185m     0     0     <1     2   | 0  |  |   |   |   | Changed  | Changed  |
| CONTAMINATION     method     limit/base     current     history1     history2       Fuel     WC Method     >0.2     NEG     NEG     NEG       Glycol     WC Method     >0.2     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM 05186m     >5     2     4     3       Nickel     ppm     ASTM 05186m     >5     2     4     3       Nickel     ppm     ASTM 05186m     30     5     10     16       Lead     ppm     ASTM 05186m     >30     2     <1     4       Copper     ppm     ASTM 05186m     >30     2     <1     4       Copper     ppm     ASTM 05186m     >30     2     <1     4       Copper     ppm     ASTM 05186m     0     0     <1     2       Cadmium     ppm     ASTM 05186m     0     0     1     2  | -  |  |   |   | •   | Ũ  | 0  |
| Fuel     WC Method     >5     <1.0   |  |  |   |   |   |  |  |
| Water     WC Method     >0.2     NEG     NEG     NEG     NEG       Glycol     WC Method     NEG     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5165m     >5     2     4     3       Nickel     ppm     ASTM D5165m     >2     0     1     1       Silver     ppm     ASTM D5165m     >3     0     <1     <1       Silver     ppm     ASTM D5165m     >30     5     10     16       Lead     ppm     ASTM D5165m     >30     5     0     <1     2       Copper     ppm     ASTM D5165m     >50     0     <1     2       Vanadium     ppm     ASTM D5165m     0     0     0     12       Copper     ppm     ASTM D5165m     0     0     12     0       Madium     ppm     ASTM D5165m     0     0     122 <t< th=""><th>CONTAMINAT</th><th>ION</th><th>method</th><th>limit/base</th><th>current</th><th>history1</th><th>history2</th></t<>   | CONTAMINAT   | ION  | method  | limit/base  | current   | history1   | history2   |
| Glycol     WC Method     NEG     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >80     46     67     61       Chromium     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >3     0     0     <1       Aluminum     ppm     ASTM D5185m     >30     5     10     16       Lead     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >5     0     <1     2       Vanadium     ppm     ASTM D5185m     0     <1     <1     2       Vanadium     ppm     ASTM D5185m     0     0     0     <1     <1       Vanadium     ppm     ASTM D5185m     0     0     2     0     10       Vanadium     ppm     ASTM D5185m     0     0   | Fuel   |  | WC Method   | >5  | <1.0  | <1.0   | <1.0   |
| WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >80     46     67     61       Chromium     ppm     ASTM D5185m     >5     2     4     3       Nickel     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >3     0     0     <1     41       Silver     ppm     ASTM D5185m     >3     0     0     <1     4       Copper     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >10     0     <1     2       Vanadium     ppm     ASTM D5185m     0     0     <1     <1     2       Vanadium     ppm     ASTM D5185m     0     0     11     2     0       Cadmium     ppm     ASTM   | Water  |  | WC Method   | >0.2  | NEG   | NEG  | NEG  |
| Iron     ppm     ASTM D5185m     >800     46     677     611       Chromium     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >2     0     1     1       Silver     ppm     ASTM D5185m     >30     0     <1     41       Aluminum     ppm     ASTM D5185m     >30     5     10     16       Lead     ppm     ASTM D5185m     >30     5     0     <1     2       Vanadium     ppm     ASTM D5185m     >5     0     <1     2     3       Tin     ppm     ASTM D5185m     >5     0     <1     <1     2       Cadmium     ppm     ASTM D5185m     0     0     <1     <1     2       Boron     ppm     ASTM D5185m     0     0     0     2     2       Magnesium     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm  | Glycol   |  | WC Method   |   | NEG   | NEG  | NEG  |
| Iron     ppm     ASTM D5185m     >800     46     677     611       Chromium     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >2     0     1     1       Silver     ppm     ASTM D5185m     >30     0     <1     41       Aluminum     ppm     ASTM D5185m     >30     5     10     16       Lead     ppm     ASTM D5185m     >30     5     0     <1     2       Vanadium     ppm     ASTM D5185m     >5     0     <1     2     3       Tin     ppm     ASTM D5185m     >5     0     <1     <1     2       Cadmium     ppm     ASTM D5185m     0     0     <1     <1     2       Boron     ppm     ASTM D5185m     0     0     0     2     2       Magnesium     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm  |  | 0  | mathad  | limit/bass  | ourropt   | biotorut   | biotory ()   |
| Chromium     ppm     ASTM D5185m     >5     2     4     3       Nickel     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     >2     0     <1     <1       Silver     ppm     ASTM D5185m     >3     0     0     <1       Aluminum     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >5     0     <1     2     3       Tin     ppm     ASTM D5185m     >5     0     <1     2     3       Cadmium     ppm     ASTM D5185m     0     0     0     <1     1       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     12     0       Magnagese     ppm     ASTM D5185m<   |  | 5  | methoa  | limit/base  |   |  |  |
| Nickel     ppm     ASTM D5185m     >2     0     1     1       Titanium     ppm     ASTM D5185m     0     <1     <1       Silver     ppm     ASTM D5185m     >3     0     0     <1       Aluminum     ppm     ASTM D5185m     >30     5     10     16       Lead     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >5     0     <1     2       Vanadium     ppm     ASTM D5185m     >5     0     <1     1       Cadmium     ppm     ASTM D5185m     0     0     0     <1     1       ADDTTVES     method     imit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     2     0       Molydenum     ppm     ASTM D5185m     0     <1     1     2     2       Magnesium     ppm     ASTM D5185m     100 <td< th=""><th>Iron</th><th>ppm</th><th>ASTM D5185m</th><th>&gt;80</th><th>46</th><th>67</th><th></th></td<>  | Iron   | ppm  | ASTM D5185m   | >80   | 46  | 67   |  |
| Titanium     ppm     ASTM D5185m     0     <1  | Chromium   | ppm  | ASTM D5185m   | >5  | 2   | 4  | 3  |
| Silver     ppm     ASTM D5185m     >30     0     0     <1  | Nickel   | ppm  | ASTM D5185m   | >2  | 0   | 1  | 1  |
| Aluminum     ppm     ASTM D5185m     >30     5     10     16       Lead     ppm     ASTM D5185m     >30     2     <1     4       Copper     ppm     ASTM D5185m     >150     1     2     3       Tin     ppm     ASTM D5185m     >5     0     <1     2       Vanadium     ppm     ASTM D5185m     0     0     <1     2       Vanadium     ppm     ASTM D5185m     0     0     <1     <1       Cadmium     ppm     ASTM D5185m     0     0     0     2        Boron     ppm     ASTM D5185m     0     0     0     2        Magnaese     ppm     ASTM D5185m     0     0     112     0       Magnesium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Sulfur     ppm     ASTM D5185m     2060<   |  | ppm  | ASTM D5185m   |   | 0   | <1   | <1   |
| Lead     ppm     ASTM D5185m     >30     2     <1  | Silver   | ppm  | ASTM D5185m   | >3  | 0   | 0  | <1   |
| Copper     ppm     ASTM D5185m     >150     1     2     3       Tin     ppm     ASTM D5185m     >5     0     <1     2       Vanadium     ppm     ASTM D5185m     >5     0     <1     2       Vanadium     ppm     ASTM D5185m     0     0     <1     <1       Cadmium     ppm     ASTM D5185m     0     0     <1     <1       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     2       Barium     ppm     ASTM D5185m     0     0     12     0       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     120     3254   | Aluminum   | ppm  | ASTM D5185m   | >30   | 5   | 10   | 16   |
| Tin     ppm     ASTM D5185m     >55     0     <1   | Lead   | ppm  | ASTM D5185m   | >30   | 2   | <1   | 4  |
| Vanadium     ppm     ASTM D5185m     0     0     <1  | Copper   | ppm  | ASTM D5185m   | >150  | 1   | 2  | 3  |
| Cadmium     ppm     ASTM D5185m     0     <1   | Tin  | ppm  | ASTM D5185m   | >5  | 0   | <1   | 2  |
| ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     2       Barium     ppm     ASTM D5185m     0     0     12     0       Molybdenum     ppm     ASTM D5185m     60     62     58     70       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m   | Vanadium   | ppm  | ASTM D5185m   |   | 0   | 0  | <1   |
| Boron     ppm     ASTM D5185m     0     0     0     12     0       Molybdenum     ppm     ASTM D5185m     60     62     58     70       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D  | Cadmium  | ppm  | ASTM D5185m   |   | 0   | <1   | <1   |
| Boron     ppm     ASTM D5185m     0     0     0     12     0       Molybdenum     ppm     ASTM D5185m     60     62     58     70       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     010     1035     890     1110       Calcium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     170     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9  Sodium     ppm     ASTM D5185m  |  |  |   |   |   |  |  |
| Barium     ppm     ASTM D5185m     0     0     12     0       Molybdenum     ppm     ASTM D5185m     60     62     58     70       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20   | ADDITIVES  |  | method  |   |   |  | history2   |
| Molybdenum     ppm     ASTM D5185m     60     62     58     70       Manganese     ppm     ASTM D5185m     0     <1     1     2       Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANT     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     li   |  | maa  |   |   |   |  |  |
| Marganese     ppm     ASTM D5185m     0     <1   | Boron  |  | ASTM D5185m   | 0   | 0   | 0  | 2  |
| Magnesium     ppm     ASTM D5185m     1010     1035     890     1110       Calcium     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1150     1090     911     1148       Zinc     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/mm     *ASTM D7624  | Boron<br>Barium  | ppm  | ASTM D5185m<br>ASTM D5185m  | 0   | 0<br>0  | 0<br>12  | 2  |
| Calcum     ppm     ASTM D5185m     1070     1171     962     1222       Phosphorus     ppm     ASTM D5185m     1150     1090     911     1148       Zinc     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/.m     *ASTM D7624     >20 <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>0<br/>0<br/>62</th> <th>0<br/>12<br/>58</th> <th>2<br/>0<br/>70</th> | Boron<br>Barium<br>Molybdenum  | ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 0<br>0<br>60  | 0<br>0<br>62  | 0<br>12<br>58  | 2<br>0<br>70   |
| Phosphorus     ppm     ASTM D5185m     1150     1090     911     1148       Zinc     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2     15.6       Sulfation     Abs/.im     *ASTM D7415<   | 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   | 0<br>0<br>62<br><1  | 0<br>12<br>58<br>1   | 2<br>0<br>70<br>2  |
| Zinc     ppm     ASTM D5185m     1270     1309     1143     1420       Sulfur     ppm     ASTM D5185m     2060     3254     2695     3482       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.tmm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.tmm     *ASTM D7414<   | 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   | 0<br>0<br>62<br><1<br>1035  | 0<br>12<br>58<br>1<br>890  | 2<br>0<br>70<br>2<br>1110  |
| SulfurppmASTM D5185m2060325426953482CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>20099SodiumppmASTM D5185m>200810PotassiumppmASTM D5185m>2082523INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>31.62.32NitrationAbs/cm*ASTM D7624>2014.318.915.6SulfationAbs/lim*ASTM D7415>3026.833.530.0FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.im*ASTM D7414>2526.338.729.4   | 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   | 0<br>0<br>62<br><1<br>1035<br>1171  | 0<br>12<br>58<br>1<br>890<br>962   | 2<br>0<br>70<br>2<br>1110<br>1222  |
| CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>20099SodiumppmASTM D5185m>20810PotassiumppmASTM D5185m>2082523INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>31.62.32NitrationAbs/cm*ASTM D7624>2014.318.915.6SulfationAbs/lmm*ASTM D7415>3026.833.530.0FLUID DEGRADATION methodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2526.338.729.4  | 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   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090  | 0<br>12<br>58<br>1<br>890<br>962<br>911  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148  |
| Silicon     ppm     ASTM D5185m     >20     0     9     9       Sodium     ppm     ASTM D5185m     10     8     10       Potassium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.tmm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.tmm     *ASTM D7414     >25     26.3     38.7     29.4   | 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   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420  |
| Sodium     ppm     ASTM D5185m     10     8     10       Potassium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4   | 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>0<br>1010<br>1070<br>1150<br>1270<br>2060   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482  |
| Sodium     ppm     ASTM D5185m     10     8     10       Potassium     ppm     ASTM D5185m     >20     8     25     23       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4   | 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>0<br>1010<br>1070<br>1150<br>1270<br>2060   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482  |
| INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | 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  | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br>current   | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2  |
| Soot %     %     *ASTM D7844     >3     1.6     2.3     2       Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | 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  | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br>current<br>0  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9   | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2<br>9   |
| Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINAN<br>Silicon<br>Sodium  | ppm  | 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>0<br>1010<br>1070<br>1150<br>1270<br>2060<br><b>limit/base</b>  | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br>current<br>0<br>10  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2<br>9<br>10   |
| Nitration     Abs/cm     *ASTM D7624     >20     14.3     18.9     15.6       Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | 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  | 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>>20   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br>current<br>0<br>10<br>8   | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25  | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2<br>9<br>10<br>23   |
| Sulfation     Abs/.1mm     *ASTM D7415     >30     26.8     33.5     30.0       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | 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>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>220<br>220   | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br>current<br>0<br>10<br>8   | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>8<br>25<br>history1                                 | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br><b>history2</b><br>9<br>10<br>23<br><b>history2</b>   |
| FLUID DEGRADATION method limit/base current history1 history2   Oxidation Abs/.1mm *ASTM D7414 >25 26.3 38.7 29.4  | 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>>20<br>20<br>20  | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br><i>current</i><br>0<br>10<br>8<br><i>current</i>  | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>history1<br>2.3                                     | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2<br>9<br>10<br>23<br>history2<br>2  |
| Oxidation     Abs/.1mm     *ASTM D7414     >25     26.3     38.7     29.4  | 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><b>TS</b><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>2060<br>200<br>200<br>200<br>200<br>200<br>200                             | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br><i>current</i><br>0<br>10<br>8<br><i>current</i><br>1.6<br>14.3                           | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>history1<br>2.3<br>18.9                             | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br>history2<br>9<br>10<br>23<br>history2<br>2<br>15.6  |
|  | 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 %<br>Nitration<br>Sulfation                              | 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 D5185m                              | 0<br>0<br>0<br>1010<br>1070<br>1150<br>1270<br>2060<br>2060<br>220<br>20<br>20<br>320<br>320<br>33<br>220<br>330                          | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br><i>current</i><br>0<br>10<br>8<br><i>current</i><br>1.6<br>14.3<br>26.8                   | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>history1<br>2.3<br>18.9<br>33.5                     | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br><b>history2</b><br>9<br>10<br>23<br><b>history2</b><br>2<br>15.6<br>30.0                                |
| Base Number (BN) mg KUHig ASIM D2896 9.8 6.9 4.7 6.2   | 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<br>Sulfation                              | 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<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>2060<br>200<br>200<br>200<br>200<br>200<br>200                             | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br><i>current</i><br>0<br>10<br>8<br><i>current</i><br>1.6<br>14.3<br>26.8<br><i>current</i> | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>history1<br>2.3<br>18.9<br>33.5<br>history1         | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br><b>history2</b><br>9<br>10<br>23<br><b>history2</b><br>2<br>15.6<br>30.0<br><b>history2</b>             |
|  | 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<br>FLUID DEGRAE<br>Oxidation | 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<br>ppm<br>ppm<br>pp | 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><b>imit/base</b><br>>20<br><b>imit/base</b><br>>3<br>>20<br>30<br><b>imit/base</b> | 0<br>0<br>62<br><1<br>1035<br>1171<br>1090<br>1309<br>3254<br><u>current</u><br>0<br>10<br>8<br><u>current</u><br>1.6<br>14.3<br>26.8<br><u>current</u> | 0<br>12<br>58<br>1<br>890<br>962<br>911<br>1143<br>2695<br>history1<br>9<br>8<br>25<br>history1<br>2.3<br>18.9<br>33.5<br>history1<br>38.7 | 2<br>0<br>70<br>2<br>1110<br>1222<br>1148<br>1420<br>3482<br><b>history2</b><br>9<br>10<br>23<br><b>history2</b><br>2<br>15.6<br>30.0<br><b>history2</b><br>2<br>2.4 |

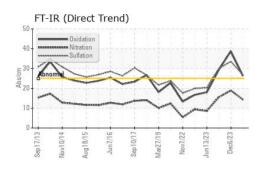


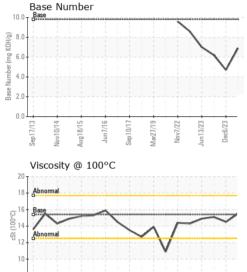
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# **OIL ANALYSIS REPORT**





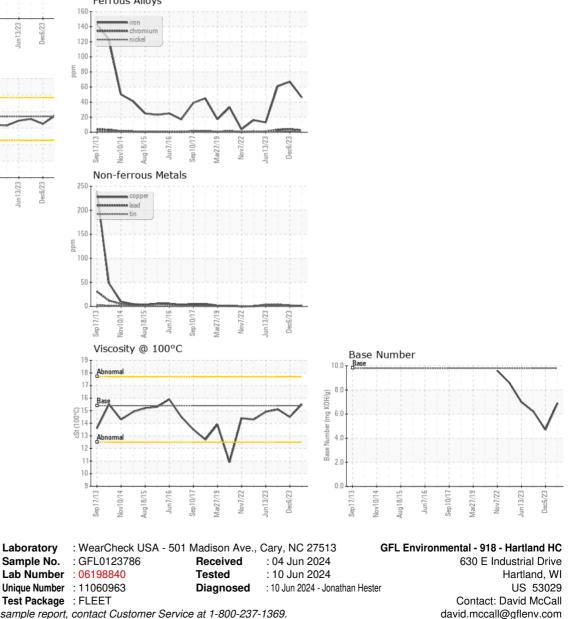
Sep 10/17

Aar77/19 Vov7/22 un13/23

| VISUAL           |        | method    |            |         |          | 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       | 15.5    | 14.5     | 15.1     |
| GRAPHS           |        |           |            |         |          |          |

Ferrous Alloys

Dec6/23 -



To discuss this sample report, contact Customer Service at 1-800-237-1369.

\* - Denotes test methods that are outside of the ISO 17025 scope of accreditation. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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Certificate 12367

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Page 2 of 2

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