

OIL ANALYSIS REPORT

Sample Rating Trend

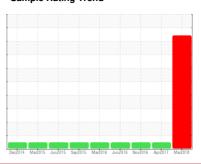
GLYCOL



2013 FREIGHTLINER 7902

Component Front Natural Gas Engine

PETRO CANADA DURON GEO LD 15W40 (24 LTF





DIAGNOSIS

Recommendation

We advise that you check for the source of the coolant leak. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

Contamination

Test for glycol is positive. There is a high concentration of glycol present in the oil.

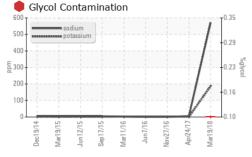
Fluid Condition

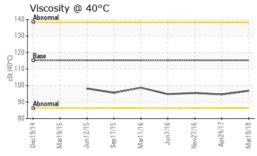
The oil is no longer serviceable due to the presence of contaminants.

| Sample Number PC403040 Sample Date 19 Mar 2018 24 Apr 2017 27 Nov 2016 Machine Age hrs 12153 9949 8912 Oil Age hrs 900 1200 0 Oil Changed N/A NA NA Sample Status method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 Chromium ppm ASTM D5185 >4 2 <1 <1 Nickel ppm ASTM D5185 >4 2 <1 <1 Nickel ppm ASTM D5185 >3 0 0 0 Aluminum ppm ASTM D5185 >3 0 0 0 Aluminum ppm ASTM D5185 >3 0 0 0 Aluminum ppm ASTM D5185 >35 50 45 13 Tin ppm ASTM D5185 | GEO LD 15W40 (24 LTR) De2014 Me2015 Jun2015 Sep2015 Me2016 Nev2016 Rev2016 Rev2017 Me2018 | | | | | | | | |
|---|--|----------|------------|------------|-------------|-------------|-------------|--|--|
| Sample Date 19 Mar 2018 24 Apr 2017 27 Nov 2016 Machine Age hrs 12153 9949 8912 Oil Age hrs 900 1200 Changed Changed Changed N/A NORMAL NORMAL WEAR METALS method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 9 Ohromium ppm ASTM D5185 >4 2 <1 <1 <1 <1 <1 <1 <1 | SAMPLE INFO | NOITAME | method | limit/base | current | history 1 | history 2 | | |
| Machine Age Oil Age hrs 12153 9949 8912 Oil Age hrs 900 1200 0 Oil Changed Status SEVERE NORMAL NORMAL WEAR METALS method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 Chromium ppm ASTM D5185 >4 2 <1 | Sample Number | | | | PC417029 | PC405514 | PC403040 | | |
| Oil Age hrs 900 1200 0 Oil Changed Sample Status method limit/base current history 1 N/A WEAR METALS method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 Chromium ppm ASTM D5185 >50 35 9 9 Nickel ppm ASTM D5185 >4 2 -1 -1 -1 Nickel ppm ASTM D5185 >2 1 -1 </td <td>Sample Date</td> <td></td> <td></td> <td></td> <td>19 Mar 2018</td> <td>24 Apr 2017</td> <td>27 Nov 2016</td> | Sample Date | | | | 19 Mar 2018 | 24 Apr 2017 | 27 Nov 2016 | | |
| Changed Sample Status | Machine Age | hrs | | | 12153 | 9949 | 8912 | | |
| WEAR METALS method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 Chromium ppm ASTM D5185 >4 2 <1 | Oil Age | hrs | | | 900 | 1200 | 0 | | |
| WEAR METALS method limit/base current history 1 history 2 Iron ppm ASTM D5185 >50 35 9 9 Chromium ppm ASTM D5185 >4 2 <1 | Oil Changed | | | | Changed | Changed | N/A | | |
| Chromium | Sample Status | | | | SEVERE | NORMAL | NORMAL | | |
| Chromium ppm ASTM D5185 >4 2 <1 <1 Nickel ppm ASTM D5185 >2 1 <1 | WEAR META | LS | method | limit/base | current | history 1 | history 2 | | |
| Nickel | Iron | ppm | ASTM D5185 | >50 | 35 | 9 | 9 | | |
| Titanium ppm ASTM D5185 <1 0 0 Silver ppm ASTM D5185 >3 0 0 0 Aluminum ppm ASTM D5185 >3 0 0 0 ALEad ppm ASTM D5185 >9 5 2 2 Copper ppm ASTM D5185 >30 19 14 2 Copper ppm ASTM D5185 >30 19 14 2 Copper ppm ASTM D5185 >35 50 45 13 Tin ppm ASTM D5185 2 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 < | Chromium | ppm | ASTM D5185 | >4 | 2 | <1 | <1 | | |
| Silver | Nickel | ppm | ASTM D5185 | >2 | 1 | <1 | <1 | | |
| ASTM D5185 Part Part Part Part Part Part Part Part | Titanium | ppm | ASTM D5185 | | <1 | 0 | 0 | | |
| Aluminum | Silver | | ASTM D5185 | >3 | 0 | 0 | 0 | | |
| Lead ppm ASTM D5185 >30 19 14 2 Copper ppm ASTM D5185 >35 50 45 13 Tin ppm ASTM D5185 >4 <1 | Aluminum | | | | | 2 | 2 | | |
| Copper ppm ASTM D5185 >35 50 45 13 Tin ppm ASTM D5185 >4 <1 | | | | | | | | | |
| Tin | | | | | 50 | 45 | 13 | | |
| Antimony ppm ASTM D5185 2 2 2 2 2 2 2 2 2 | | | | | | | | | |
| Vanadium ppm ASTM D5185 <1 0 0 Beryllium ppm ASTM D5185 0 0 0 Cadmium ppm ASTM D5185 0 0 0 ADDITIVES method limit/base current history 1 history 2 Boron ppm ASTM D5185 120 11 10 8 Barium ppm ASTM D5185 120 11 10 8 Barium ppm ASTM D5185 125 143 127 115 Manganese ppm ASTM D5185 1 <1 <1 <1 Magnesium ppm ASTM D5185 100 2164 2155 2111 Phosphorus ppm ASTM D5185 2100 2164 2155 2111 Phosphorus ppm ASTM D5185 800 773 694 695 Sulfur ppm ASTM D5185 2860 3027 2271 2233 | | | | | | | | | |
| Decyllium | • | | | | - -1 | | | | |
| Cadmium ppm ASTM D5185 0 0 0 ADDITIVES method limit/base current history 1 history 2 Boron ppm ASTM D5185 120 11 10 8 Barium ppm ASTM D5185 1 <1 | | | | | | | | | |
| Boron ppm ASTM D5185 120 11 10 8 | - | | | | | | | | |
| Barium ppm ASTM D5185 < 1 <1 <1 <1 | ADDITIVES | | method | limit/base | current | history 1 | history 2 | | |
| Molybdenum ppm ASTM D5185 125 143 127 115 Manganese ppm ASTM D5185 1 <1 <1 <1 Magnesium ppm ASTM D5185 17 8 7 Calcium ppm ASTM D5185 2100 2164 2155 2111 Phosphorus ppm ASTM D5185 800 773 694 695 Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 <1 <1 <1 CONTAMINANTS method limit/base current history 1 history 2 Silicon ppm ASTM D5185 >+100 10 5 15 Sodium ppm ASTM D5185 >20 187 1 <1 Glycol % ASTM D585 20 < | Boron | ppm | ASTM D5185 | 120 | 11 | 10 | 8 | | |
| Manganese ppm ASTM D5185 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 | Barium | ppm | ASTM D5185 | | <1 | <1 | <1 | | |
| Magnesium ppm ASTM D5185 17 8 7 Calcium ppm ASTM D5185 2100 2164 2155 2111 Phosphorus ppm ASTM D5185 800 773 694 695 Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 | Molybdenum | ppm | ASTM D5185 | 125 | 143 | 127 | 115 | | |
| Calcium ppm ASTM D5185 2100 2164 2155 2111 Phosphorus ppm ASTM D5185 800 773 694 695 Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 | Manganese | ppm | ASTM D5185 | | 1 | <1 | <1 | | |
| Calcium ppm ASTM D5185 2100 2164 2155 2111 Phosphorus ppm ASTM D5185 800 773 694 695 Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 | Magnesium | ppm | ASTM D5185 | | 17 | 8 | 7 | | |
| Phosphorus ppm ASTM D5185 800 773 694 695 Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 | _ | | ASTM D5185 | 2100 | 2164 | 2155 | 2111 | | |
| Zinc ppm ASTM D5185 880 891 890 869 Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 <1 <1 <1 CONTAMINANTS method limit/base current history 1 history 2 Silicon ppm ASTM D5185 >+100 10 5 15 Godium ppm ASTM D5185 >+100 10 5 15 Potassium ppm ASTM D5185 >20 187 1 <1 Glycol % ASTM D2982 0.10 INFRA-RED method limit/base current history 1 history 2 Soot % % ASTM D7686 0 0 0 0 Soot % % ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/cm ASTM D7415 >35 33.3 | Phosphorus | ppm | ASTM D5185 | 800 | 773 | 694 | 695 | | |
| Sulfur ppm ASTM D5185 2860 3027 2271 2233 Lithium ppm ASTM D5185 <1 | | | ASTM D5185 | 880 | 891 | 890 | 869 | | |
| Lithium ppm ASTM D5185 <1 <1 <1 CONTAMINANTS method limit/base current history 1 history 2 Silicon ppm ASTM D5185 >+100 10 5 15 Sodium ppm ASTM D5185 >+100 10 5 1 Potassium ppm ASTM D5185 >20 187 1 <1 | Sulfur | | ASTM D5185 | 2860 | 3027 | 2271 | 2233 | | |
| Silicon ppm ASTM D5185 >+100 10 5 15 Sodium ppm ASTM D5185 △ 571 6 1 Potassium ppm ASTM D5185 >20 △ 187 1 <1 Glycol % ASTM D2982 ● 0.10 INFRA-RED method limit/base current history 1 history 2 Soot % % ASTM D7686 0 0 0 Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Lithium | | ASTM D5185 | | <1 | <1 | <1 | | |
| Sodium ppm ASTM D5185 ▲ 571 6 1 Potassium ppm ASTM D5185 >20 ▲ 187 1 <1 | CONTAMINA | NTS | method | limit/base | current | history 1 | history 2 | | |
| Potassium ppm ASTM D5185 >20 ▲ 187 1 <1 Glycol % ASTM D2982 ● 0.10 INFRA-RED method limit/base current history 1 history 2 Soot % % ASTM D7686 0 0 0 Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Silicon | ppm | ASTM D5185 | >+100 | 10 | 5 | 15 | | |
| Glycol % ASTM D2982 ● 0.10 INFRA-RED method limit/base current history 1 history 2 Soot % % ASTM D7686 0 0 0 Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Sodium | ppm | ASTM D5185 | | <u></u> 571 | 6 | 1 | | |
| INFRA-RED method limit/base current history 1 history 2 Soot % % ASTM D7686 0 0 0 Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Potassium | ppm | ASTM D5185 | >20 | 187 | 1 | <1 | | |
| Soot % % ASTM D7686 0 0 0 Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Glycol | % | ASTM D2982 | | • 0.10 | | | | |
| Nitration Abs/cm ASTM D7624 >25 11.8 10.3 8.7 Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | INFRA-RED | | method | limit/base | current | history 1 | history 2 | | |
| Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Soot % | % | ASTM D7686 | | 0 | 0 | 0 | | |
| Sulfation Abs/.1mm ASTM D7415 >35 33.3 26.1 23.8 FLUID DEGRADATION method limit/base current history 1 history 2 | Vitration | Abs/cm | ASTM D7624 | >25 | 11.8 | 10.3 | 8.7 | | |
| | Sulfation | | ASTM D7415 | >35 | | 26.1 | 23.8 | | |
| Oxidation Abs/.1mm ASTM D7414 >25 24.6 13.5 11.6 | FLUID DEGRA | ADATION | method | limit/base | current | history 1 | history 2 | | |
| | Oxidation | Abs/.1mm | ASTM D7414 | >25 | 24.6 | 13.5 | 11.6 | | |



OIL ANALYSIS REPORT



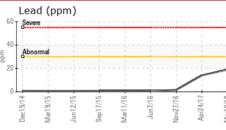


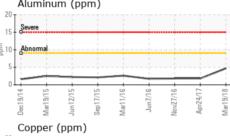
| Visual | NONE | | | |
|--------|---|---|---|--|
| | NONE | VLITE | | |
| Visual | NONE | NONE | | |
| Visual | NONE | NONE | | |
| Visual | NONE | NONE | | |
| Visual | NONE | VLITE | | |
| Visual | NONE | NONE | | |
| Visual | NORML | NORML | | |
| Visual | NORML | NORML | | |
| Visual | >0.1 | NEG | NEG | NEG |
| Visual | | NEG | NEG | NEG |
| | Visual Visual Visual Visual Visual Visual Visual Visual | Visual NONE Visual NONE Visual NONE Visual NONE Visual NORML Visual NORML Visual >0.1 | Visual NONE NONE Visual NONE NONE Visual NONE VLITE Visual NONE NONE Visual NORML NORML Visual NORML NORML Visual NORML NORML Visual >0.1 NEG | Visual NONE NONE Visual NONE NONE Visual NONE VLITE Visual NONE NONE Visual NORML NORML Visual NORML NORML Visual >0.1 NEG NEG |

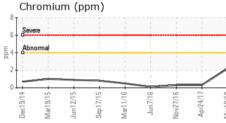
| FLUID PROPE | RTIES | method | limit/base | current | history 1 | history 2 |
|----------------------|-------|------------|------------|---------|-----------|-----------|
| Visc @ 40°C | cSt | ASTM D7279 | 115.2 | 96.8 | 94.6 | 95.5 |
| Visc @ 100°C | cSt | ASTM D7279 | 15.4 | 12.9 | 13.4 | 13.7 |
| Viscosity Index (VI) | Scale | ASTM D2270 | 140 | 130 | 141 | 145 |

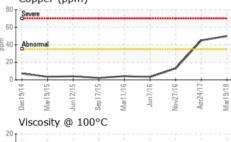
| Iro | n (pp | m) | | | | | | |
|------------|----------|-------|------|------|------|--------|---------|----------|
| Seve | re | | | | | | | |
| - 60 - Abo | | | | | | | | |
| Abno | ormal | | | | | | | |
| 20 | | | | | | | | / |
| | _ | | - | - | - | _ | - | |
| 9/14 | 9/15 | 2/15 | 7/15 | 1/16 | 91// | 91// | 4/17. | 9/18 |
| Dec19/1 | Mar19/19 | Jun | Sep1 | Marl | Jun | Nov27/ | Apr24/1 | Mar19/18 |
| ۸lıı | | m (nr | m) | | | | | |

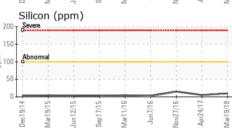
GRAPHS

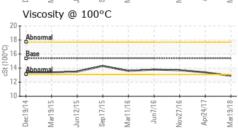


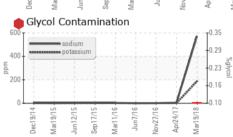














Laboratory: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 **Sample No.**: WC1234567 **Received**: 25 Apr 2018

Lab Number : 01234567 Diagnosed : 26 Apr 2018
Unique Number : 12345678 Diagnostician : Kevin Marson
Test Package : MOB 1 (Additional Tests: Glycol, KV40, VI, Visual)

To discuss diagnosis or test data, contact Technical Support at 1-800-268-2131. To change component or sample information, contact Customer Service at 1-800-268-2131. **Cusany Logistics Inc.**

1212 Industrial Place Centerville, OH USA 75900

Contact: Jim Leduc jim.leduc@cusanylogisticsinc.com

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