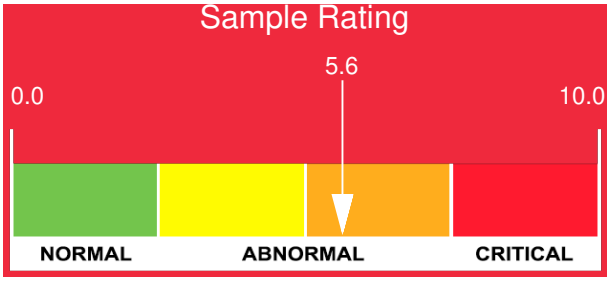
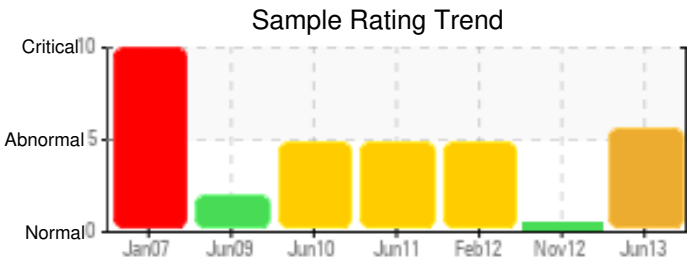


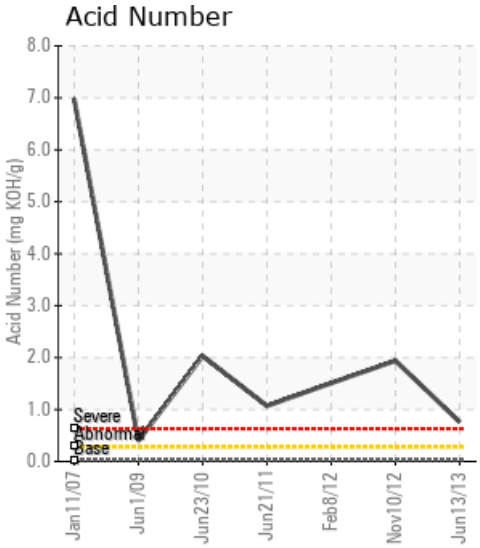

# HEAT TRANSFER SYSTEM

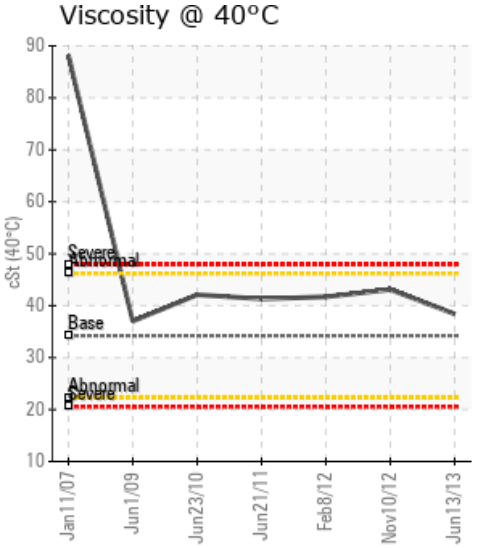
| Customer: PTRHTF10025 | System Information | Sample Information |
|---|---|---|
| LAKESIDE INDUSTRIES<br>8705 N.E. 117TH AVENUE<br>VANCOUVER, WA 98662 US<br>Attn: Chris Merringer<br>Tel: (360)903-3695<br>E-Mail:<br>chris.merringer@lakesideindustries.com | System Volume: 600 gal<br>Bulk Operating Temp: 325F / 163C<br>Heating Source:<br>Blanket:<br>Fluid: PETRO CANADA PETRO-THERM<br>Make: HEATEC | Lab No: 01849092<br>Analyst: Michael Kaufman<br>Sample Date: 06/13/13<br>Received Date: 07/08/13<br>Completed: 07/12/13<br>Michael Kaufman<br>mkaufman@suncor.com |

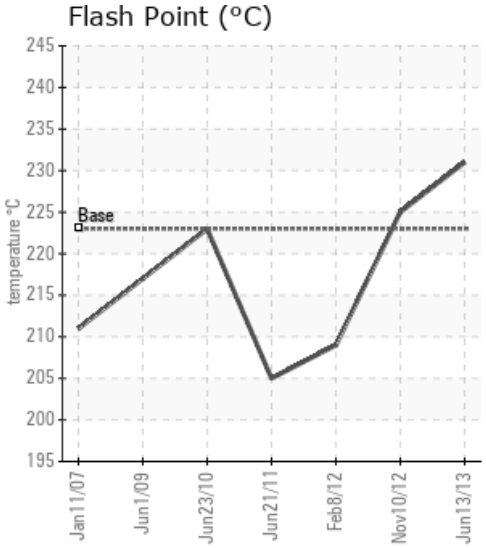
Recommendation: The oil is showing signs of improvement, probably due to a fluid top-up. The Acid number has decreased from 1.94 in Nov 2012 to 0.76, but we would still consider it high. High acid problems appear to date back to 2007. Acids form as a result of oxidation and their presence can be corrosive to the system over time. If this sample is representative of what is in the system, we recommend a partial fluid change-out help bring that acid number down.

Comments: Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high.

| Sample Date | Received Date | Fluid Age | Sample Location | Flash Point (COC) | Water (KF) | Viscosity (40°C) | Acid Number | Solids | GCD 10% | GCD 50% | GCD 90% | GCD % < 335°C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm/dd/yy | | | °F/°C | ppm | cSt | mg/KOH/g | %wt | °F/°C | °F/°C | °F/°C | % |
| 06/13/13 | 07/08/13 | 6.0y | RETURN LINE B4 FLTR | 448 / 231 | 47.4 | 38.4 | 0.760 | 1.60 | 715 / 380 | 810 / 432 | 911 / 489 | 0.94 |
| 11/10/12 | 11/13/12 | | | 437 / 225 | 93 | 43.1 | 1.94 | 1.833 | 705 / 374 | 804 / 429 | 903 / 484 | 2.852 |
| 02/08/12 | 02/16/12 | 4.0y | NA | 408 / 209 | 106 | 41.7 | 1.51 | 1.015 | 705 / 374 | 803 / 429 | 898 / 481 | 3.002 |
| 06/21/11 | 06/30/11 | | BEFORE FILTER | 401 / 205 | 64 | 41.3 | 1.07 | 0.889 | 710 / 376 | 807 / 430 | 901 / 483 | 2.54 |
| 06/23/10 | 07/06/10 | 3.0y | HEATECK | 433 / 223 | 87 | 42.1 | 2.03 | 1.240 | 700 / 371 | 799 / 426 | 890 / 477 | 3.451 |
| | | | | | | | | | | | | |
| Baseline Data | | | | 433 / 223 | | 34.2 | 0.03 | | 707 / 375 | 799 / 426 | 887 / 475 | 2.6 |

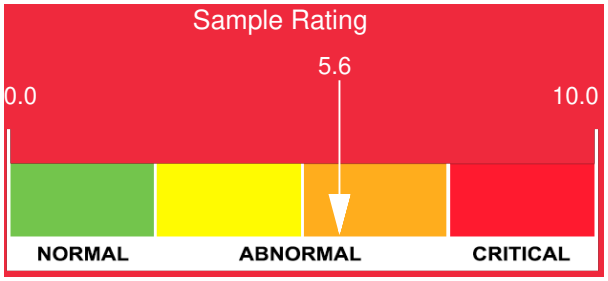


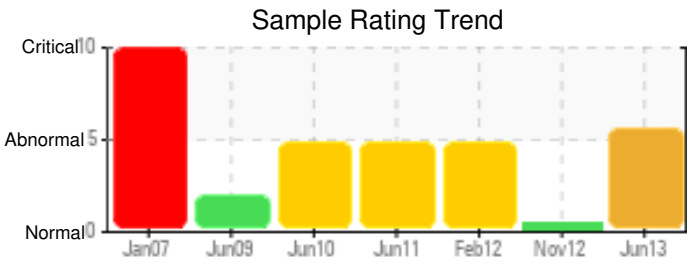



PETRO-CANADA LUBRICANTS

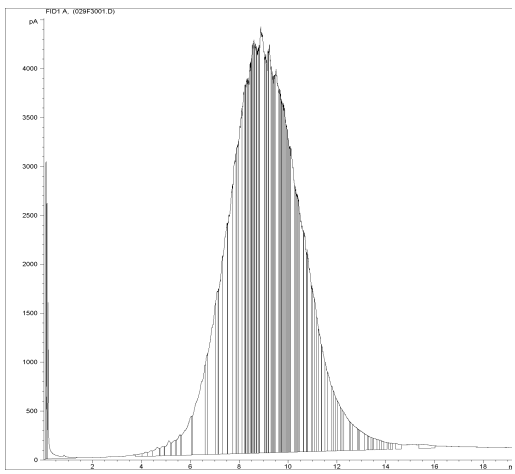


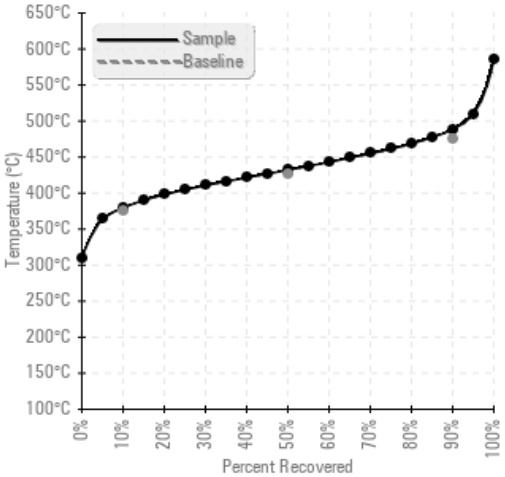

| Sample Date | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/13/13 | 41 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11/10/12 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 02/08/12 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06/21/11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 | 0 |
| 06/23/10 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| Baseline Data | | | 0 | 0 | | | | | | 0 | | | 0 | 0 | | | | | 0 | | | | 0 | |

Elemental anaysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]

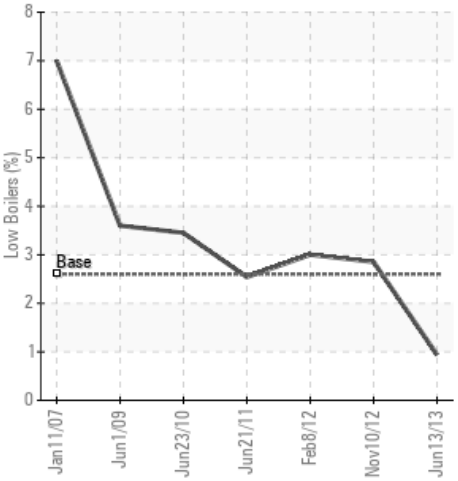
GCD Spectrum



Gas Chromatography Distillation




% Boiling < 335°C




## Historical Comments

| | |
|---|---|
| 11/10/12 | The rating system is inadequate and therefore falsely ranked this sample as "normal" when in fact this oil is in the "severe" category. The oxidation level, measured via the TAN analyis, shows the oil is oxidized way beyond what is tolerable. Oxidation |
| 02/08/12 | The overall oil condition worsened since the last sample from 7 months ago as the Total Acid Number increased from the already high 1.0 to 1.5 today. High TAN is normally associated with oxidation, a form of oil degradation. The high TAN problem dates back as far back as 2007. if this sample is truly representative of what is circulating in the system an oil replacement should be considered at some point. High TAN oil is more corrosive and will attack the piping and over time. We would rate the sample condition as more critical than the "green" rating it has now. |
| 06/21/11 | |
| 06/23/10 | |
| | |