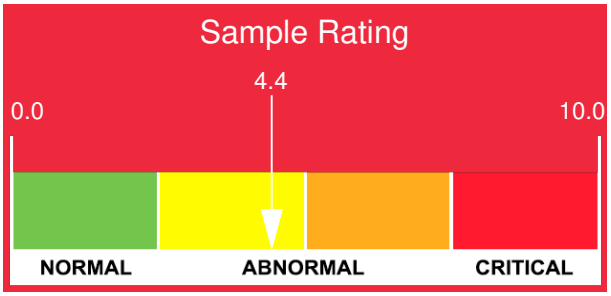
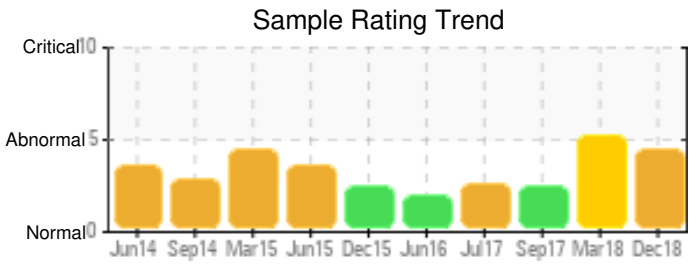
PETRO-CANADA LUBRICANTS



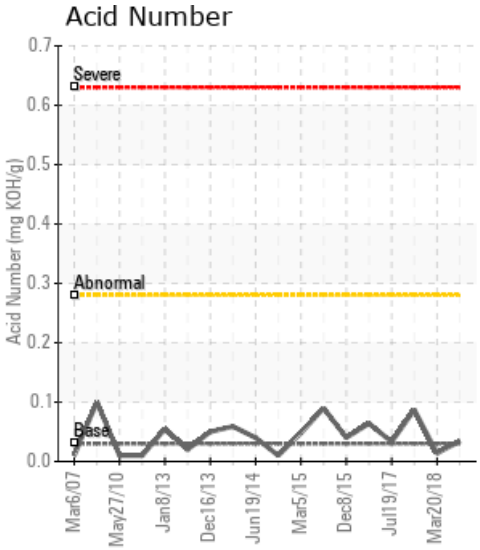

# MAIN HOT OIL SYSTEM

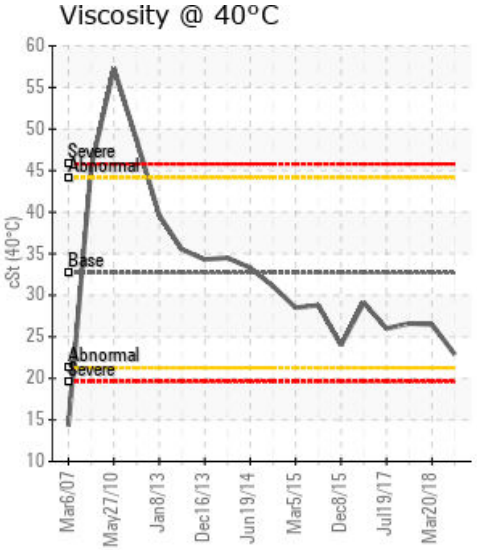
| Customer: PTRHTF10068 | System Information | Sample Information |
|---|---|---|
| Certainteed - Saint Gobain<br>1077 PLEASANT ST<br>NORWOOD, MA 02062 USA<br>Attn: David Fletcher<br>Tel: (781)551-0656<br>E-Mail: david.r.fletcher@saint-gobain.com | System Volume: 5000 gal<br>Bulk Operating Temp: 560F / 293C<br>Heating Source:<br>Blanket:<br>Fluid: PETRO CANADA CALFLO AF<br>Make: A.M.KINNEY | Lab No: 02261307<br>Analyst: Gaston Arseneault<br>Sample Date: 12/14/18<br>Received Date: 01/10/19<br>Completed: 01/18/19 |

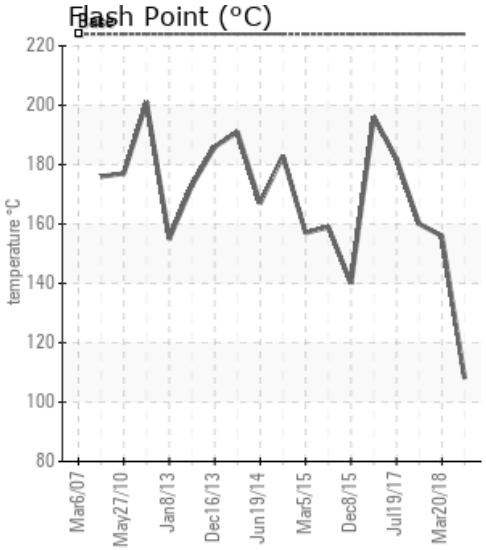
Recommendation: The viscosity of the oil decreased further. The low boilers increased and the flash point is down considerably from the last sample. This system definitely requires action to reverse this trend and bring back the properties of the oil. We wonder if vented material has been added back into the system by error ? We could do a retest to confirm the results.

Comments: COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C 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 | % |
| 12/14/18 | 01/10/19 | 5y | | 226 / 108 | 6.7 | 22.9 | 0.034 | 0.044 | 608 / 320 | 765 / 407 | 890 / 477 | 11.99 |
| 03/20/18 | 04/04/18 | 6y | | 313 / 156 | 4.0 | 26.5 | 0.014 | 0.027 | 622 / 328 | 781 / 416 | 914 / 490 | 10.45 |
| 09/08/17 | 09/22/17 | 4y | | 320 / 160 | 9.5 | 26.6 | 0.087 | 0.081 | 667 / 353 | 797 / 425 | 918 / 492 | 6.49 |
| 07/19/17 | 08/08/17 | 3y | FB-69 WINDSEAL SYSTM | 360 / 182 | 10.6 | 26.0 | 0.033 | 0.057 | 716 / 380 | 821 / 438 | 940 / 504 | 3.80 |
| 06/10/16 | 08/25/16 | 1y | | 385 / 196 | 16.9 | 29.1 | 0.064 | 0.051 | 683 / 362 | 803 / 428 | 930 / 499 | 4.61 |
| 12/08/15 | 12/17/15 | 2y | FB-69 WINDSEAL SYS | 284 / 140 | 5.0 | 24.0 | 0.04 | 0.066 | 691 / 366 | 800 / 427 | 913 / 489 | 2.71 |
| Baseline Data | | | | 435 / 224 | | 32.7 | 0.03 | | 693 / 367 | 790 / 421 | 887 / 475 | 2.5 |



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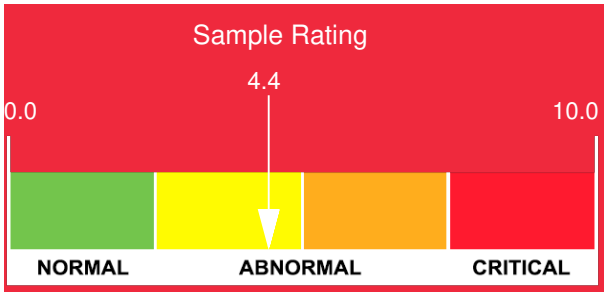
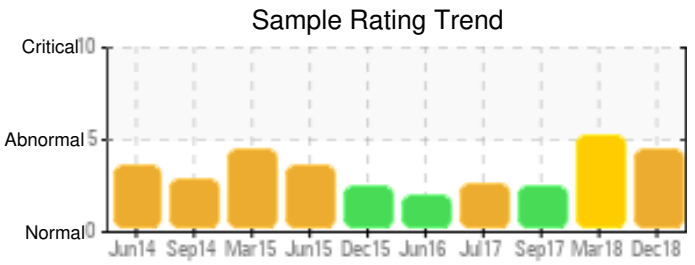
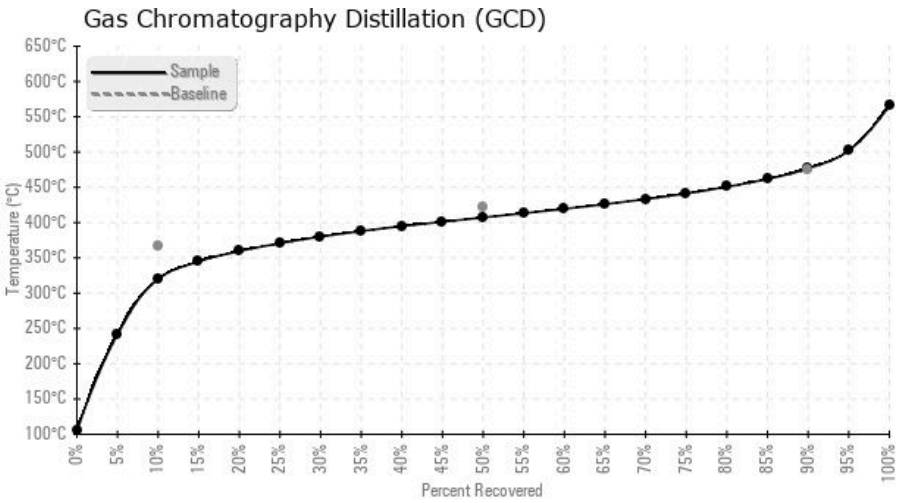
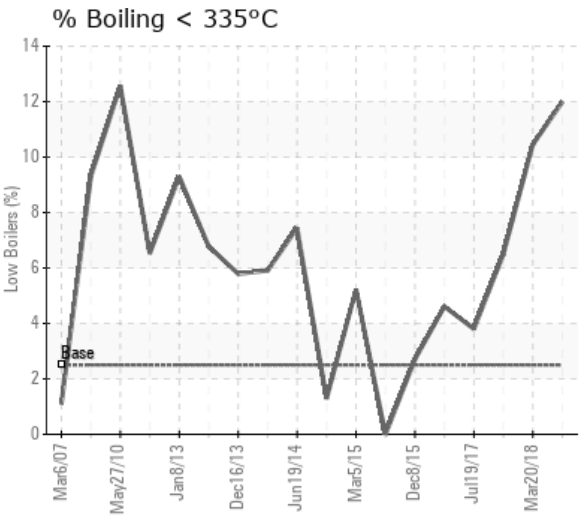



| Sample Date | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/14/18 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| 03/20/18 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| 09/08/17 | 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| 07/19/17 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 |
| 06/10/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| 12/08/15 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 |
| Baseline Data | | | 0 | 0 | | | | | | 0 | | | 0 | 0 | | | | | 0 | | | | 270 | |

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




## Historical Comments

| | |
|---|---|
| 03/20/18 | The viscosity of the oil remains low. Along the lines of what was suggested at the last sampling, we suggest to do more aggressive venting to get the low boilers out and restore the physical properties of the fluid, like the flash point. (GCD) 10% Distillation Point is severely high. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. COC Flash Point is severely low. |
| 09/08/17 | The GC results vary widely but the lab committed to using a dedicated GC for this program to increase the predictability and accuracy of GC results. Minus the lower flash point, the properties are consistent with the previous sample where low viscosity is confirmed. We suggest to perform venting of the light ends and replace the fluid lost by adding fresh oil until the expansion tank is 75% full when in operation. No vanadium present so no suspected presence of an asphalt leak. COC Flash Point is severely low. COC Flash Point tested twice (156°C and 160°C). (GCD) 90% Distillation Point is abnormally high. |
| 07/19/17 | We brought up some questions for the lab based on questionable GCD results lately. The flash point remains strong but it has decreased since the last sample. Considering the fluid starts at 32 cSt and it is now 26 cSt (19% lower), we suggest to vent the light ends out of the system and the expansion tank and top-up the losses with fresh Calflo to bring back the properties closer to fresh oil. (GCD) 90% Distillation Point is severely high. |
| 06/10/16 | There is a noticeable bump in viscosity getting closer to fresh oil and flash point improved significantly. Solids are very low and other elements are not even detected at the parts per million level. No action needed at this time besides re-sampling at the next scheduled interval. If for any reason the system performance does not reflect those good results pls contact us immediately. (GCD) 90% Distillation Point is severely high. |
| 12/08/15 | The drop in flash point, viscosity and increase in low boilers all match. However, the drop in flash point is a bit much compared to the very slight increase in low boilers. Nothing to worry about but that's the importance of monitoring the fluid every quarter or semi-annually to look past one questionable lab result and really see what's going on. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally high. |

