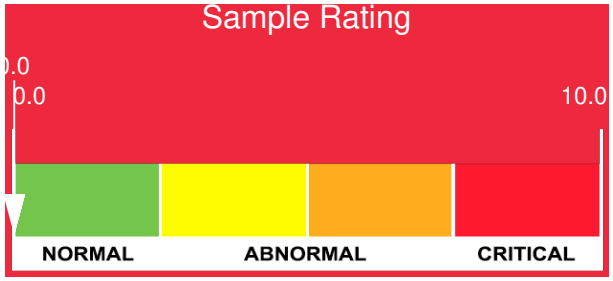
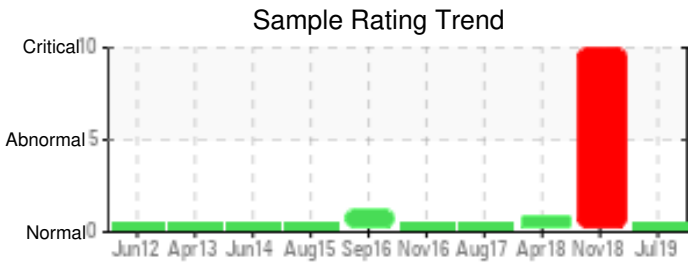


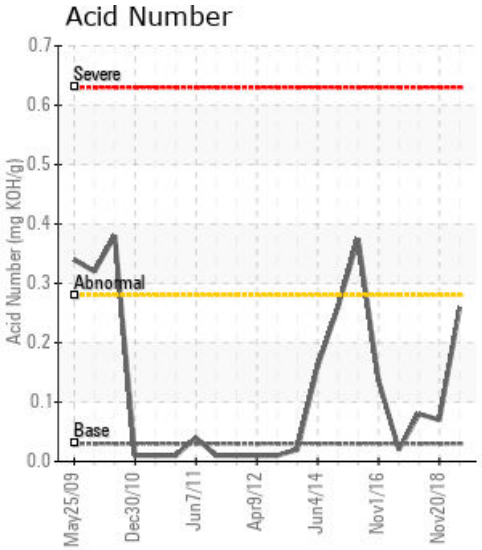

# [TIDEWATER MIDSTREAM LSD / 11-33-45-8W5M] TRAIN A

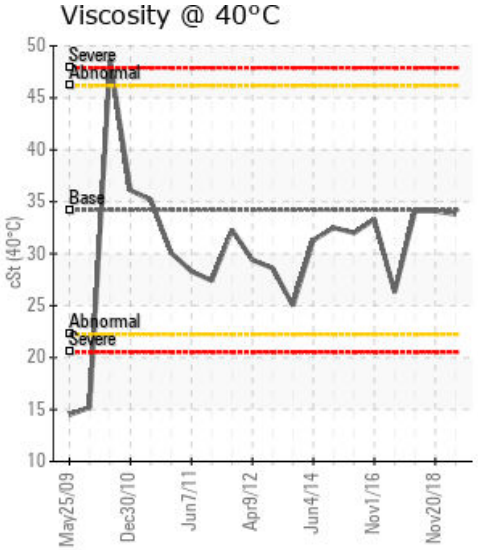
| Customer: PTRHTF20006 | System Information | Sample Information |
|---|---|---|
| Tidewater<br>21 Oxford Pl.<br>Alder Flats, AB T0C 0A0 Canada<br>Attn: Darren Muth<br>Tel: (780)679-2462<br>E-Mail: dmuth@tidewatermidstream.com | System Volume: 6000 ltr<br>Bulk Operating Temp: 284F / 140C<br>Heating Source:<br>Blanket:<br>Fluid: PETRO CANADA PETRO-THERM<br>Make: | Lab No: 02298377<br>Analyst: Terry Veenstra<br>Sample Date: 07/15/19<br>Received Date: 07/22/19<br>Completed: 07/25/19 |

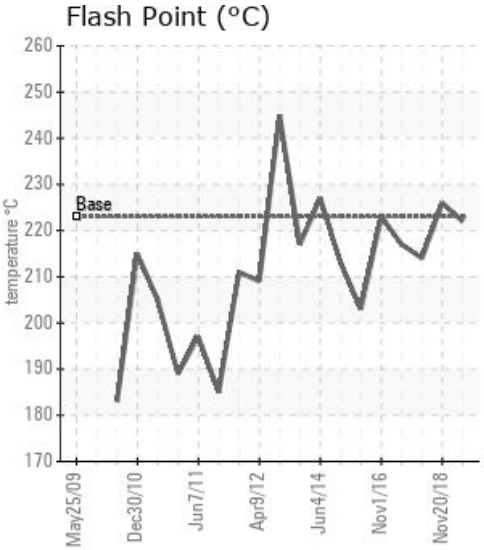
Recommendation: This sample indicates that the fluid in this system is in good condition. As part of good system maintenance, vent system occasionally to eliminate low boilers from the fluid. Resample in 6 months.

Comments:

| 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 | % |
| 07/15/19 | 07/22/19 | 9y | HEATER BATH | 432 / 222 | 114.9 | 33.8 | 0.259 | 0.266 | 710 / 376 | 810 / 432 | 913 / 490 | 1.39 |
| 11/20/18 | 11/27/18 | 8y | | 439 / 226 | 6172.4 | 34.1 | 0.07 | 0.064 | 636 / 335 | 733 / 389 | 834 / 445 | 9.40 |
| 04/10/18 | 04/18/18 | 7y | | 417 / 214 | 8.1 | 34.1 | 0.08 | 0.251 | 705 / 374 | 813 / 434 | 928 / 498 | 2.34 |
| 08/22/17 | 08/28/17 | 7y | HEATER BATH | 423 / 217 | 16.7 | 26.3 | 0.02 | 0.250 | 707 / 375 | 809 / 432 | 904 / 485 | 1.88 |
| 11/01/16 | 11/08/16 | 6y | | 433 / 223 | 184.4 | 33.3 | 0.137 | 0.107 | 708 / 376 | 811 / 433 | 909 / 487 | 1.71 |
| 09/09/16 | 09/14/16 | 6y | HEATER BATH | 397 / 203 | 34.2 | 32.0 | 0.375 | 0.217 | 697 / 370 | 803 / 428 | 894 / 479 | 2.97 |
| Baseline Data | | | | 433 / 223 | | 34.2 | 0.03 | | 720 / 382 | 817 / 436 | 900 / 482 | 1.00 |

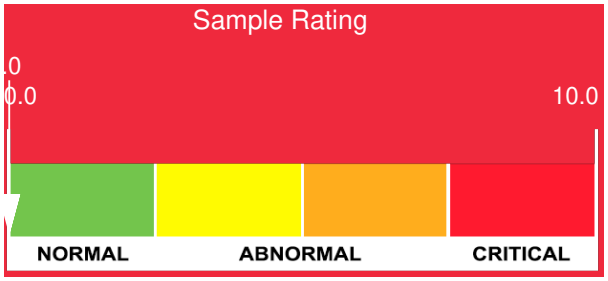


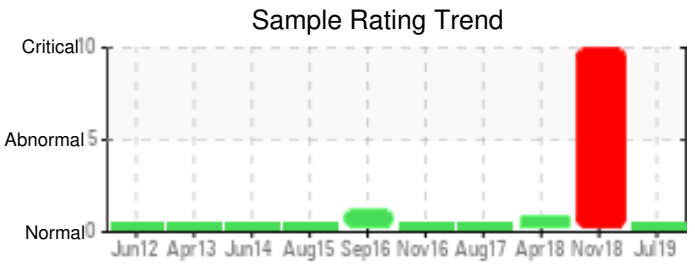



PETRO-CANADA LUBRICANTS

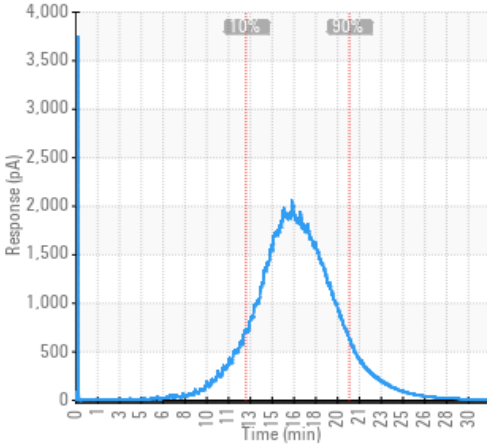


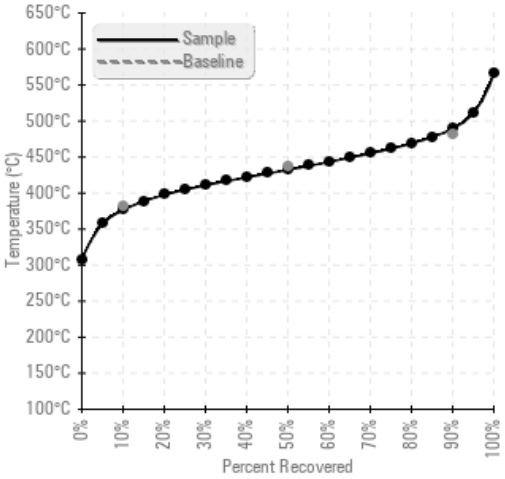

| Sample Date | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07/15/19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 11/20/18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04/10/18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08/22/17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11/01/16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09/09/16 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Baseline Data | | | 0 | 0 | | | | | | 0 | | | 0 | 0 | | | | | 0 | | | | 0 | |

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

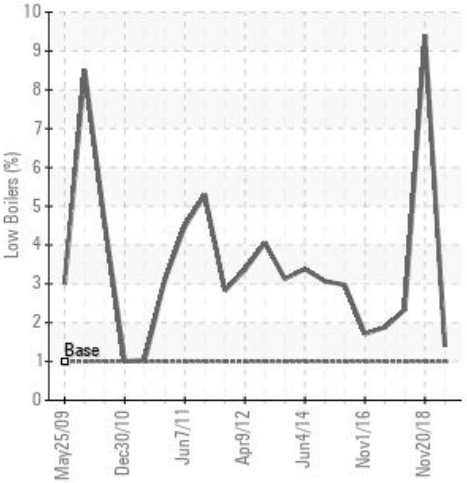
GCD Spectrum




Gas Chromatography Distillation




% Boiling < 335°C




## Historical Comments

| | |
|---|---|
| 11/20/18 | This sample shows severe water contamination. GCD @ 10%, 50% and 90% are also severely low indicating possible contamination with process fluids. Vent off moisture in high point vent or in expansion tank. Water contamination levels are severely high. Water contamination levels are severely high.. ppm Water contamination levels are severely high. (GCD) 90% Distillation Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) 50% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high. |
| 04/10/18 | GCD @ 90% is high indicating some heavier ends in sample likely caused by overheating of fluid. Otherwise oil is still in good shape. Continue to operate and resample in 6 - 8 months. (GCD) 90% Distillation Point is abnormally high. |
| 08/22/17 | Fluid condition continues to be very good. Very little change from the last sample Nov 2016. Continue to sample annually to proactively monitor fluid condition. |
| 11/01/16 | This oil sample look good. The oil is suitable for further use. |
| 09/09/16 | Acid number is higher than it should be however oil is good for continued use. Resample in 3 months. Acid Number (AN) is abnormally high. |

