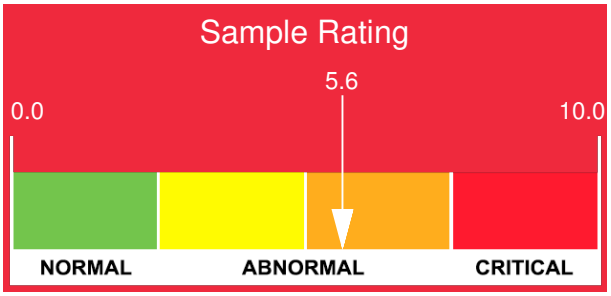
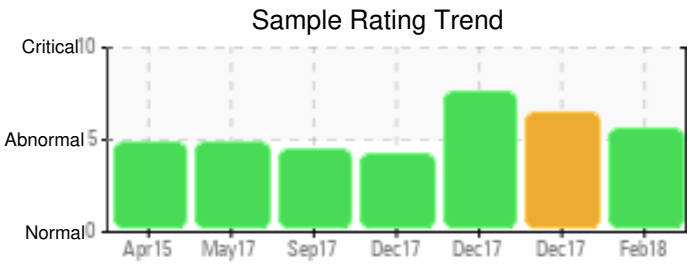




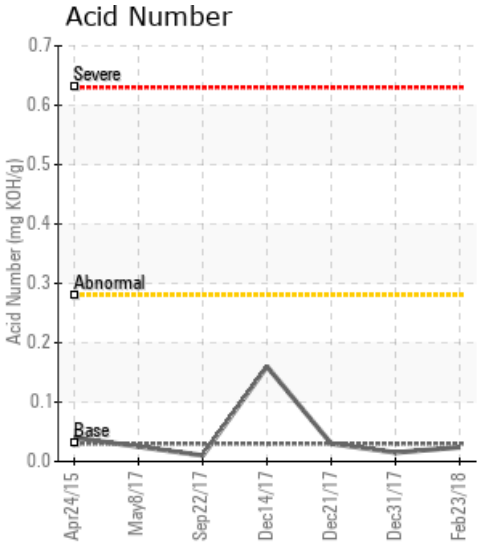
BONAVISTA 16-11-54-15W5

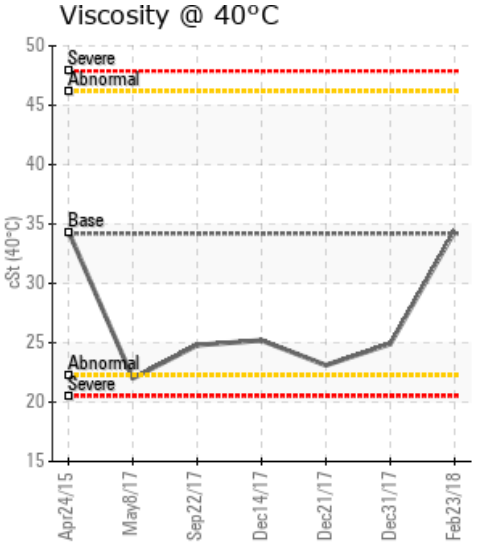
Customer:	System Information	Sample Information
BONAVISTA ENERGY 15111 TWP RD 542 YELLOWHEAD COUNTY, AB T7E 3J5 Canada Attn: Dan Duriez Tel: (780)728-3552 E-Mail:	System Volume: 14000 ltr Bulk Operating Temp: 435F / 224C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02200897 Analyst: Peter Harteveld Sample Date: 02/23/18 Received Date: 02/27/18 Completed: 03/01/18 To discuss this report contact Peter Harteveld at (780)967-4234

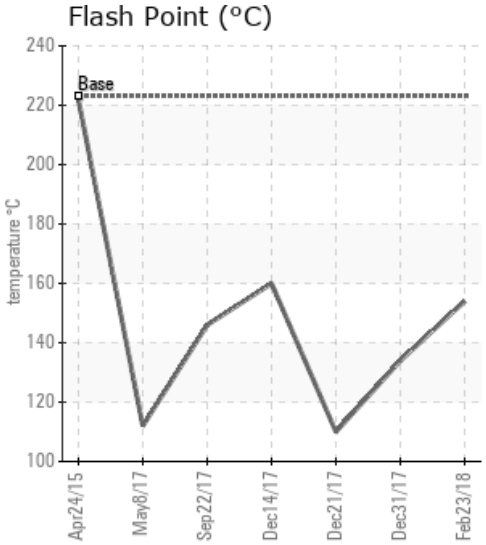
Recommendation: The fluid is in a reasonable condition and suitable for further use. There is a small improvement in Flash Point, viscosity and top-end of the distillation curve. The low boiler vapor content is still too high. Please keep venting on a regular basis and re-sample in 3 months time. (May/June) Please list the fluid age on the next analysis request form.

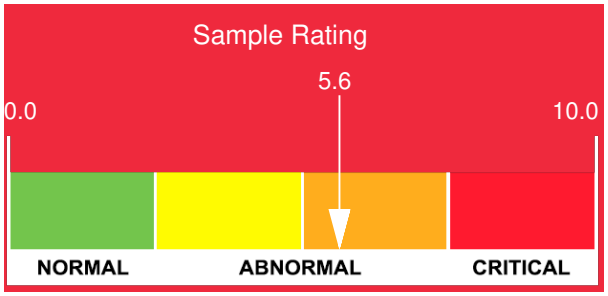
Comments: (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high.

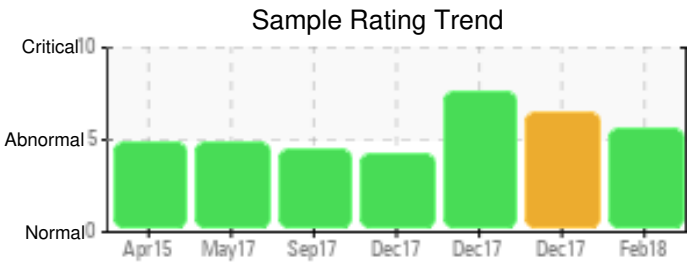
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
02/23/18	02/27/18	0y		309 / 154	2.3	34.4	0.024	0.039	564 / 296	795 / 424	910 / 488	12.41
12/31/17	01/05/18	0y		273 / 134	9.9	24.9	0.015	0.006	610 / 321	764 / 407	875 / 469	11.53
12/21/17	01/16/18	0y		230 / 110	54.3	23.1	0.030	0.021	600 / 316	765 / 407	862 / 461	11.99
12/14/17	12/18/17	0y		320 / 160	14.4	25.2	0.16	0.085	655 / 346	787 / 420	896 / 480	7.71
09/22/17	09/27/17	0y	Top Filter Housing	295 / 146	5.1	24.8	0.01	0.033	649 / 343	795 / 424	910 / 488	8.44
05/08/17	06/14/17	3y		234 / 112	21.0	22.0	0.025	0.039	637 / 336	797 / 425	909 / 487	9.40
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00





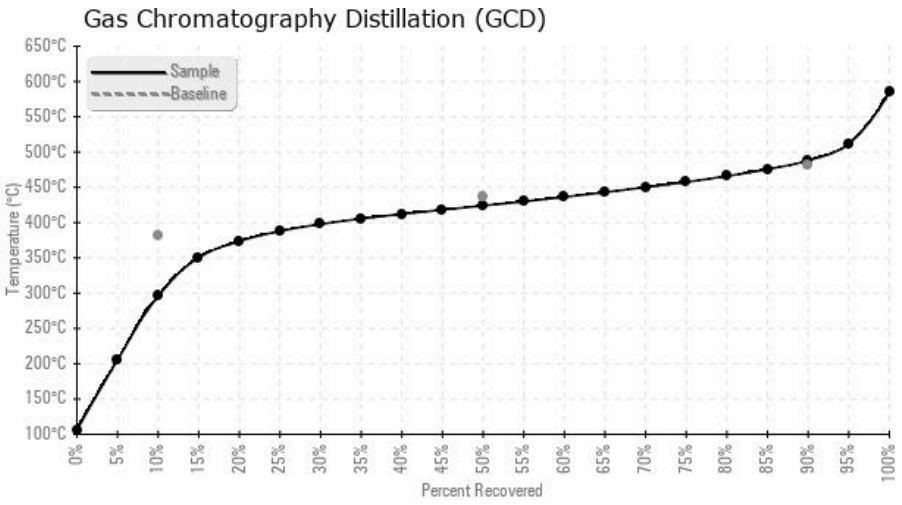


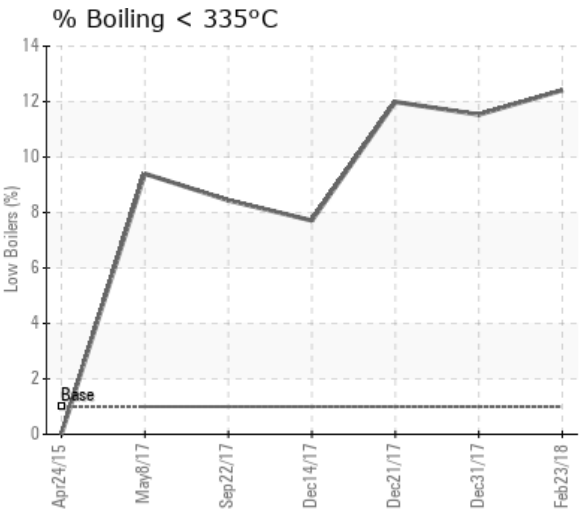




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
02/23/18	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/31/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/21/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/14/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/22/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/08/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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%]





Historical Comments

12/31/17	This sample was taken two weeks after the previous one. The fluid shows an increase in thermal degradation. If the sample was taken from a different sample point or there is an internal leak of process fluid into the Petro-Therm it would explain the ongoing degradation.The combination of low viscosity, low Flash Point, high % boil-off below 335C and low 10% GCD temperature indicate thermal degradation but the same symptoms will show when there is an internal leak. Venting of low boiler vapors to atmosphere is still recommended to restore fluid condition. Currently the fluid is suitable for further use. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high. (GCD) 90% Distillation Point is marginally low.
12/21/17	This sample taken on Dec 21, 2017 came after the sample taken on Dec 31, 2017 (lab nr. 02191318) Comments were already made on the last sample and customer was contacted by phone. Since there is no value in taking weekly heat transfer fluid samples it was agreed with the customer to take the next sample one month after the last system modification which took place recently. Next sample has to be taken mid February. (GCD) 10% Distillation Point is severely low. (GCD) 90% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high.
12/14/17	The fluid condition shows a small improvement compared to that of the previous sample. The combination of low viscosity, low Flash Point, high % boil-off below 335C and low 10% GCD temperature indicates thermal degradation.Venting of low boiler vapors to atmosphere is still recommended to restore fluid condition. Currently the fluid is suitable for further use. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
09/22/17	The fluid condition is similar to that of the previous sample. The combination of low viscosity, low Flash Point, high % boil-off below 335C and low 10% GCD temperature indicates either thermal degradation of the fluid or contamination with process fluid like Condensate. The latter seems unlikely as the fluid does not contain elements that can coincide with such contamination. Petro-Canada R&D has been contacted for their opinion of the carbon distribution analysis which may shed light into contamination.Venting of low boiler vapors to atmosphere is still recommended to restore fluid condition. Currently the fluid is suitable for further use. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
05/08/17	Reduced flash point can be a safety concern.Reduced viscosity, 10% Distillation point and flash point as well as increased % <335C GCD (9.40) can indicate a contaminated fluid, a thermally degraded fluid or a combination of the two. Investigate possible contamination/ mixing with another product or for leaking process fluid.Once cross contamination has been resolved or ruled out, proceed to perform thorough venting of the low boiling vapors from the expansion tank. At this time, turn off nitrogen blanket to allow low boiling vapors to vent out of system. Perform thorough venting regime and ensure nitrogen blanket is re-activated in between and after venting. Re-sample fluid in 2-3 months