

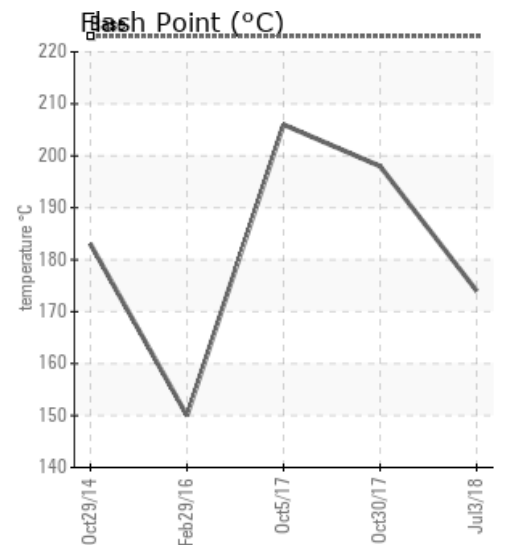
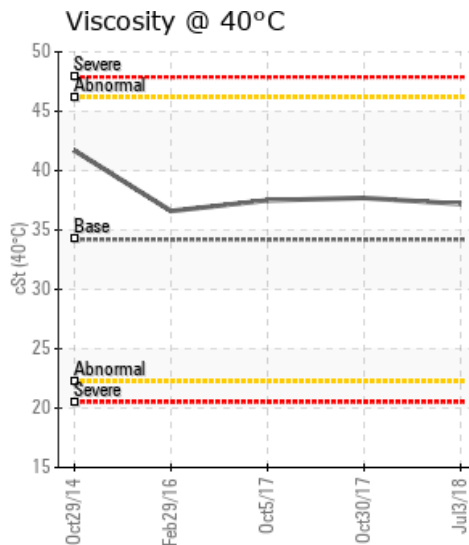
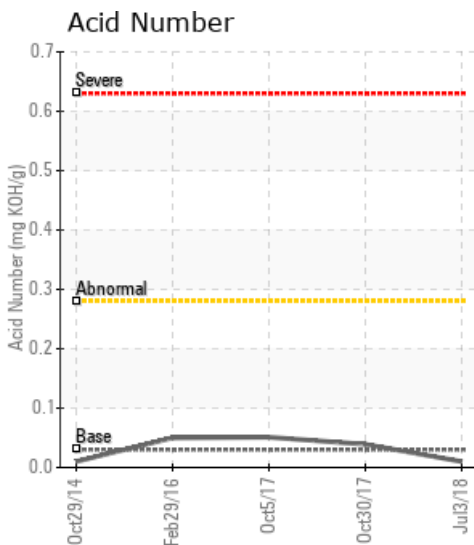
CONOCO SAND CREEK 6-25-45-10W5

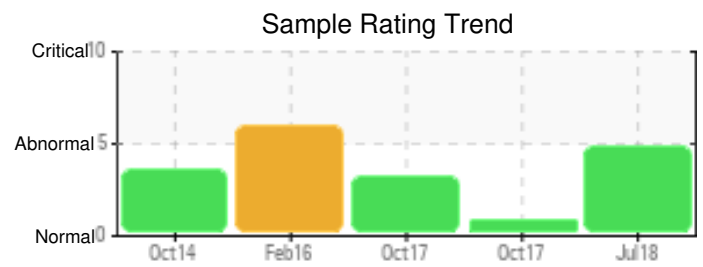
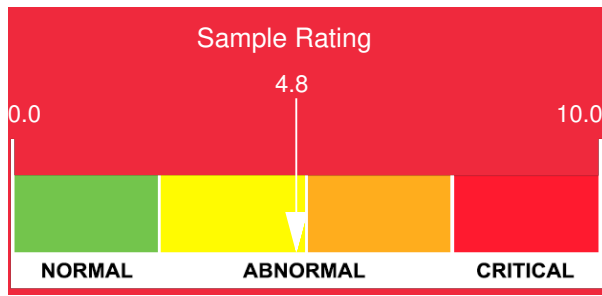
Customer: PTRHTF20190	System Information	Sample Information
Cenovus Sand Creek 5023 54A Ave Eckville, AB T0M 0X0 Canada Attn: Brendon Emmett Tel: (780)898-7136 E-Mail: brendon.emmett@cenovus.com	System Volume: 25000 ltr Bulk Operating Temp: 455F / 235C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: BOURE CANADA	Lab No: 02227703 Analyst: Terry Veenstra Sample Date: 07/03/18 Received Date: 07/12/18 Completed: 07/17/18 To discuss this report contact Terry Veenstra at (780)591-5339

Recommendation: GCD @ 10% is abnormally low indicating some and COC Flash Point is abnormally low indicating thermal degradation of fluid. If a Natural Blanket instead of a Nitrogen Blanket is on place, this could be contributing to the Low boilers in the sample. GCD % <335°C is very high at 10.99%. Normally for Petrotherm, this should be ~1%. This could cause problems in low pressures areas such as the suction of the pumps. Recommendation: Vent off low boilers to atmosphere in safe manner and resample afterwards.

Comments: (GCD) 10% Distillation Point is severely low. COC Flash 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	%
07/03/18	07/12/18	10y	RETURN LINE	345 / 174	0.00	37.2	0.01	0.213	426 / 219	801 / 427	893 / 478	10.99
10/30/17	11/06/17	0y		388 / 198	165.6	37.7	0.039	0.023	745 / 396	844 / 451	919 / 493	1.47
10/05/17	10/12/17	10y		403 / 206	428.0	37.5	0.051	0.025	744 / 396	849 / 454	918 / 492	2.74
02/29/16	03/04/16	0y	SUNHEAT TRANSFER OIL	302 / 150	506.7	36.6	0.05	0.085	752 / 400	853 / 456	920 / 494	1.64
10/29/14	11/10/14	10y	BOILER	361 / 183	3.8	41.7	0.01	0.059	747 / 397	847 / 453	914 / 490	2.15
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

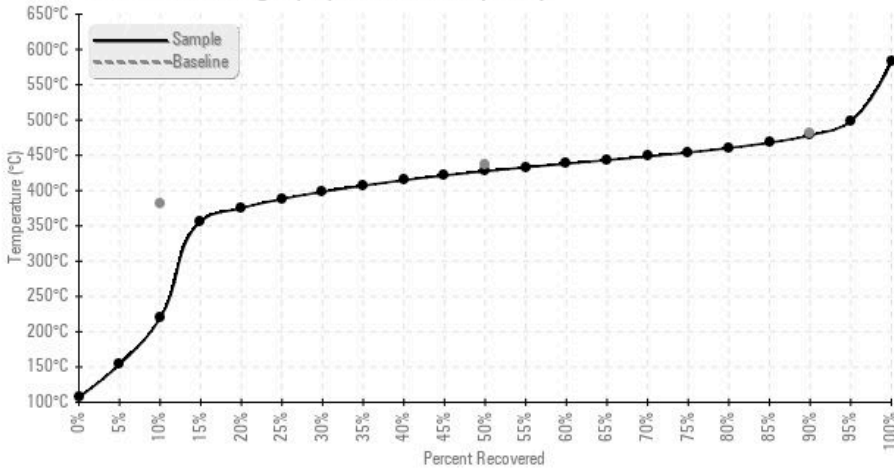




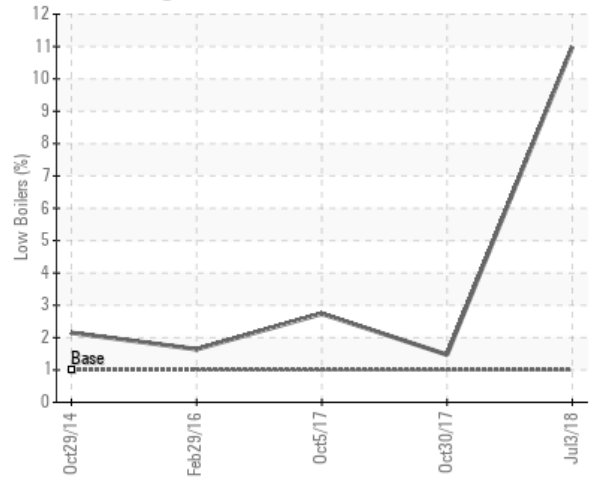
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
07/03/18	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
10/30/17	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/05/17	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
02/29/16	10	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
10/29/14	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1
Baseline Data			0	0						0			0	0					0				0	

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

Gas Chromatography Distillation (GCD)



% Boiling < 335°C



Historical Comments

10/30/17	This fluid is in good condition and suitable for continued use. Resample in 12 months. (GCD) 90% Distillation Point is marginally high.
10/05/17	Water contamination is high. GCD Initial boiling oil is abnormally low likely due to light ends from thermal cracking of fluid. Flash point is lower than normal also due to light ends in the sample. Consideration should be given to sweetening or changing fluid. Water contamination levels are marginally high. Water contamination levels are marginally high.. ppm Water contamination levels are marginally high. COC Flash Point is marginally low.
02/29/16	Low flash point and reduced fluid viscosity indicate thermal cracking has taken place. A partial fluid replacement would help bring this back up. Suspect a build-up of deposits on the heat source or reduced circulation flow is likely the cause. ppm Water contamination levels are marginally high. COC Flash Point is severely low. (GCD) 10% Distillation Point is marginally high. (GCD) 50% Distillation Point is marginally high. (GCD) 90% Distillation Point is marginally high.
10/29/14	Flash point has been reduced somewhat due to thermal degradation (cracking). This is also the likely cause for the higher viscosity number. Recommend to vent off the low boiler vapors via the thief hatch by temporarily stopping the N2 blanket and opening the thief hatch (2 hour intervals). Fluid is otherwise in good condition and suitable for continued use. Please re-sample in 6 months. Visc @ 40°C is abnormally high. (GCD) 50% Distillation Point is marginally high. COC Flash Point is marginally low.