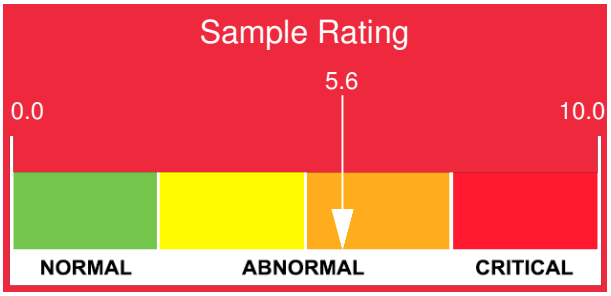
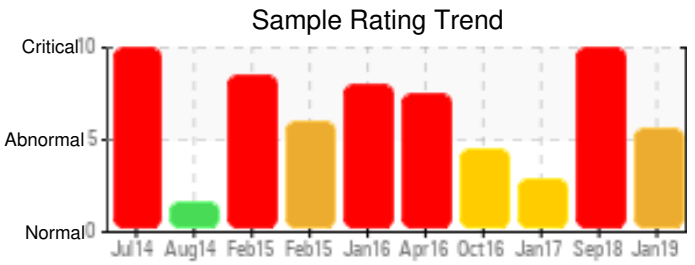




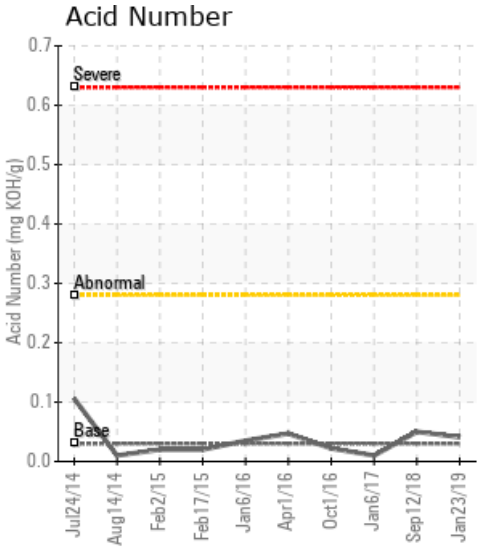
[CENOVUS WOLF LAKE LSD / 5-1-51-15W5] CENOVUS HOT OIL SYSTEM

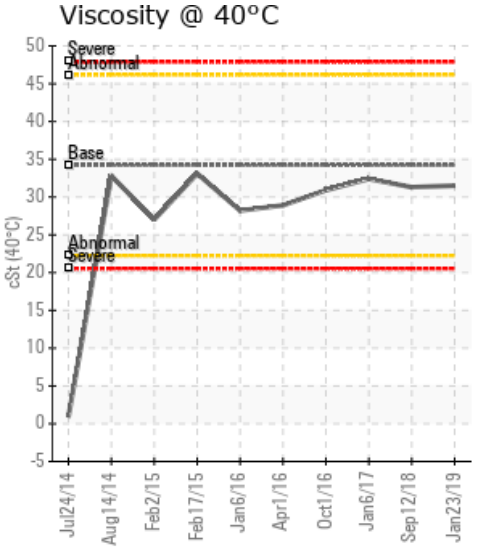
Customer: PTRHTF20039	System Information	Sample Information
BRENNTAG CANADA INC 3124-54TH AVENUE SE CALGARY, AB T2A 0A8 CANADA Attn: Toader Georgiana Tel: E-Mail: gtoader@brenntag.ca	System Volume: 30000 ltr Bulk Operating Temp: 500F / 260C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02269457 Analyst: Terry Veenstra Sample Date: 01/23/19 Received Date: 02/22/19 Completed: 02/28/19

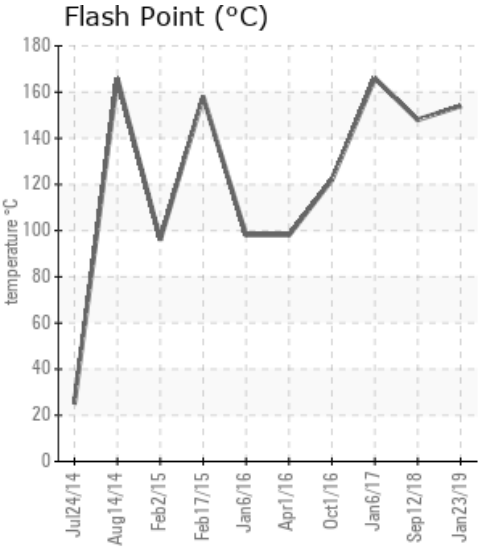
Recommendation: GDC 10% Distillation as well has the Flash Point are low indicating some lighter ends. Venting of the system is required. Vent lighter ends off system and resample in 6 months.

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

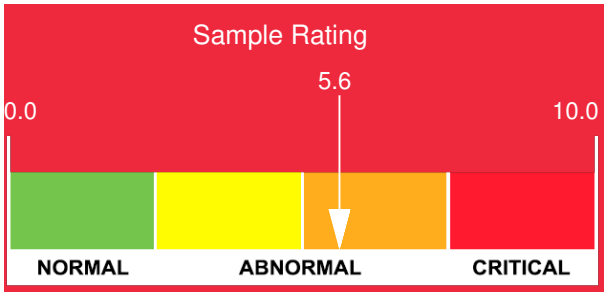
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/23/19	02/22/19	28y	NEW PROCESS REBOILER	309 / 154	7.8	31.5	0.041	0.248	601 / 316	817 / 436	905 / 485	10.64
09/12/18	09/24/18	16y		298 / 148	122.3	31.3	0.05	0.688	736 / 391	823 / 439	898 / 481	1.41
01/06/17	01/16/17	14y	DISCHARGE LINE	331 / 166	5.7	32.4	0.01	0.022	734 / 390	847 / 453	929 / 499	2.41
10/01/16	10/31/16	14y	DISCHARGE LINE	252 / 122	5.9	30.9	0.022	0.095	721 / 383	842 / 450	927 / 497	4.26
04/01/16	04/11/16	12y	DISCHARGE LINE	208 / 98	28.9	28.9	0.047	0.123	707 / 375	840 / 449	919 / 493	6.12
01/06/16	01/28/16	12y	DISCHARGE LINE	208 / 98	27.2	28.2	0.035	0.085	693 / 367	836 / 447	915 / 490	6.68
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

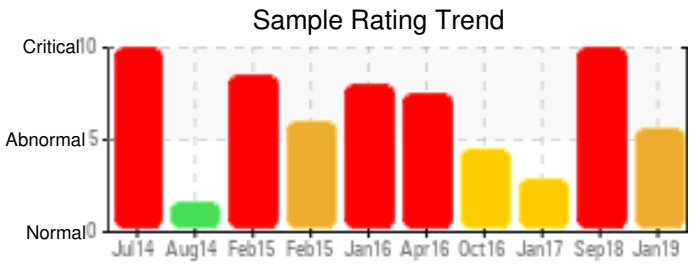






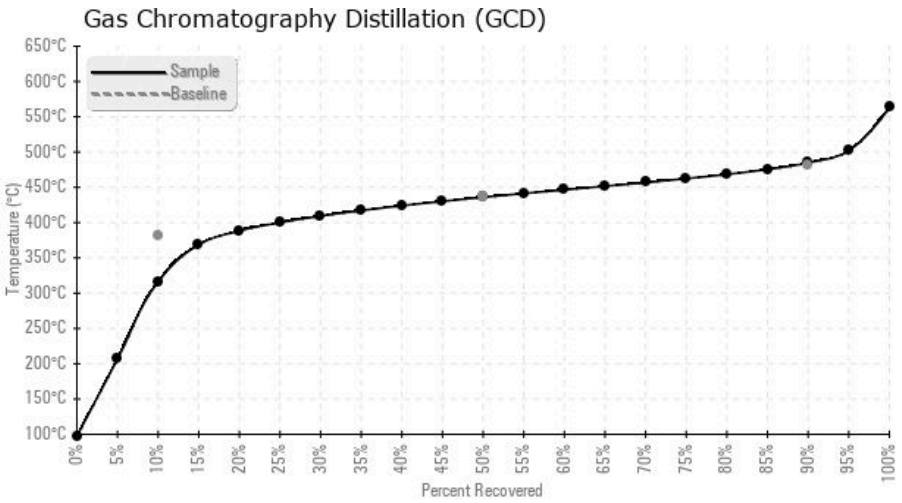
PETRO-CANADA LUBRICANTS

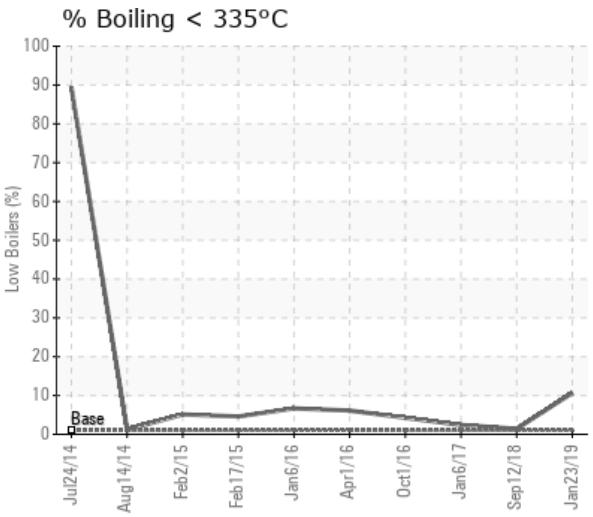




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
01/23/19	22	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	4	0	3	1
09/12/18	182	0	0	0	0	0	0	0	0	0	2	76	1	0	0	0	2	0	1	3	22	5	8	6
01/06/17	19	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	5	0	1	1
10/01/16	3	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0
04/01/16	8	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0	0
01/06/16	7	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	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

09/12/18	Fluid is showing low flash point and high Pentane Insolubles which indicates signs of Thermal Cracking. Consider venting off low boilers. Presence of sodium and water indicates contamination of fluid or contaminated sample. Venting of system should be done as regular system maintenance. Resample in 3 months after venting system.PQ levels are abnormal. Iron ppm levels are abnormal. Pentane Insolubles levels are severely high. Sodium ppm levels are severely high. COC Flash Point is severely low.
01/06/17	The fluid is in good condition and suitable for further use. A significant decrease in viscosity in combination with low Flash Point and low 10% GCD temperature indicates thermal degradation of the fluid. Venting of low boiler vapors to atmosphere on a regular basis is recommended to restore fluid properties. COC Flash Point is severely low. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally low.
10/01/16	The fluid shows signs of thermal degradation. These are: Low viscosity, very low Flash Point, low 10% GCD temperature and the presence of low boiler vapor as indicated by high boil-off below 335 degrees C. It is recommended to remove the low boiler vapors by venting to atmosphere. This to restore the Flash Point to a more acceptable level. Operating the system at 260 degrees C with a fluid Flash Point of 122 degrees C is potentially unsafe. COC Flash Point is severely low. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally low. (GCD) 10% Distillation Point is marginally low.
04/01/16	Flash Point is low and the fluid contains 6% low boiler vapors. These are indications of thermal degradation. Please continue to vent off low boiler vapors at a regular interval. When done efficiently, this should increase the Flash Point to a more acceptable level. The Flash Point is too low to ensure safe operation of the system at 190 degrees C. Please re-sample in 6 months. Make sure the sample date is filled in correctly. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally high.
01/06/16	The Flash Point is very low at 98 degrees C. Operating the system at a bulk fluid temperature of 190 degrees C with this low Flash Point is an unsafe situation that needs to be corrected. The viscosity is slightly low. This in combination with elevated low boiler vapor content of 6.7% indicates thermal degradation however the low Flash Point can also be the result of contamination.The following is recommended:1. Inspect process heat exchanger bundles for leaks and repair as necessary.2. Vent off the low boiler vapors. This will bring the Flash Point up to a more acceptable level.3. Re-sample after venting. For recommended venting procedure please contact your Petro-Canada Technical Service Advisor. COC Flash Point is severely low.