

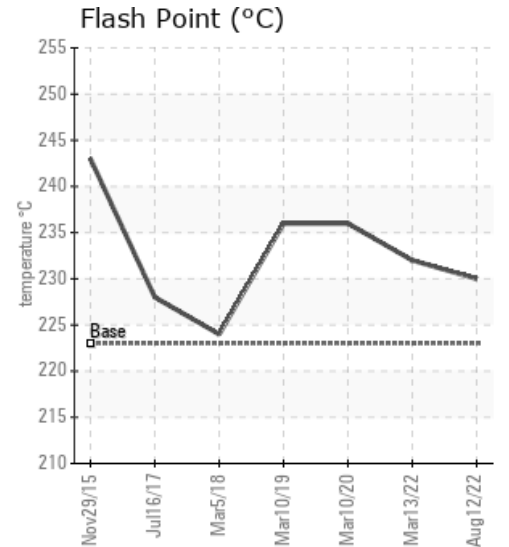
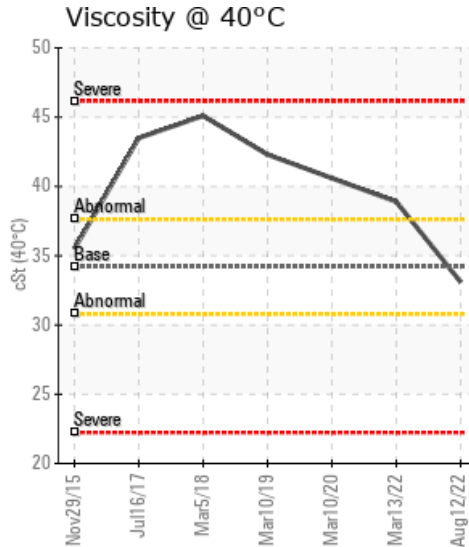
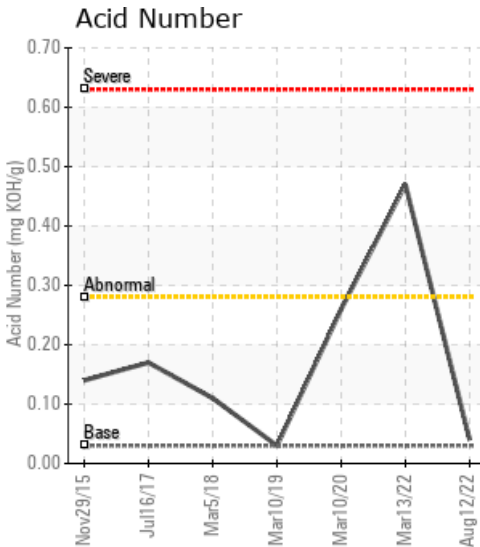
[TOURMALINE / 1-34-51-18W5] H900

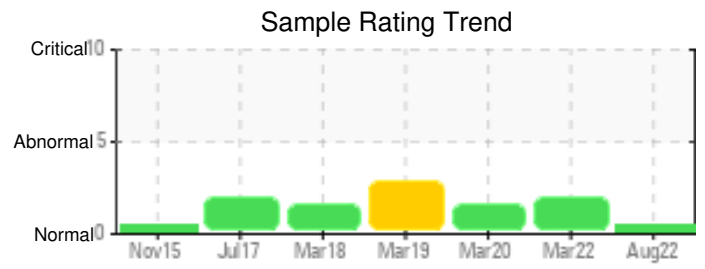
Customer: PTRHTF20039	System Information	Sample Information
BRENNTAG CANADA INC 3124-54TH AVENUE SE CALGARY, AB T2C 0A8 Canada Attn: Matthew Kryska Tel: E-Mail: mkryska@brenntag.ca	System Volume: 10000 ltr Bulk Operating Temp: 175F / 79C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02507969 Analyst: Clinton Buhler Sample Date: 08/12/22 Received Date: 08/30/22 Completed: 09/07/22 Clinton Buhler Clinton.Buhler@hollyfrontier.com

Recommendation: This is the first sample taken since the fluid was replaced in early June 2022. Sample results indicate the fluid is in suitable condition for continued service. Please ensure blanket gas is operational in the expansion tank to prevent future oxidation of the fluid. Re-sample in 6 months.

Comments:

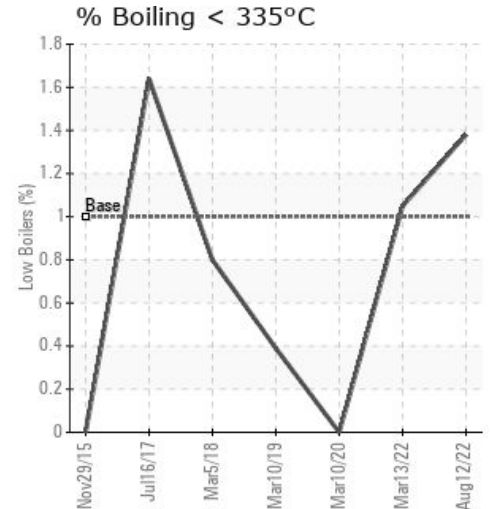
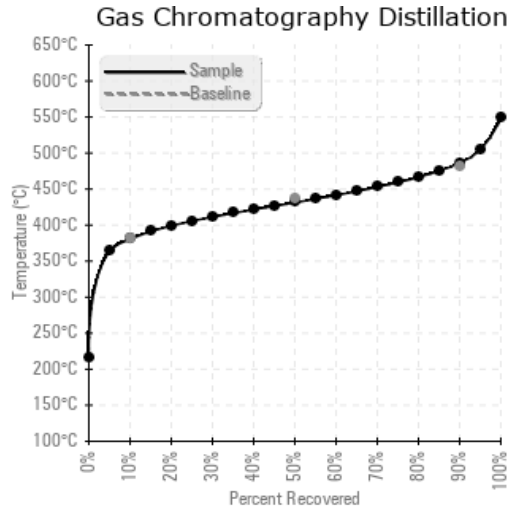
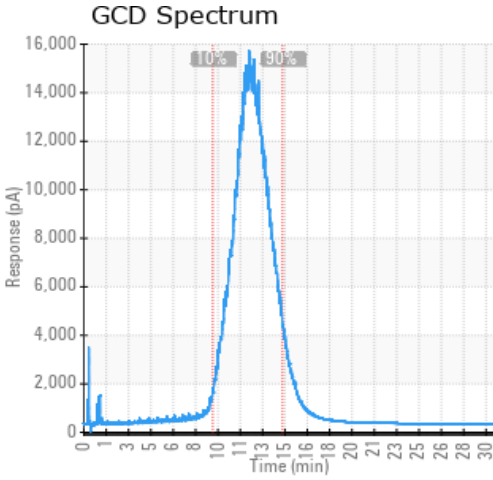
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
08/12/22	08/30/22	0.2y	pump bleed	446 / 230	9.1	33.1	0.04	0.091	717 / 380	808 / 431	907 / 486	1.38
03/13/22	04/11/22	5.0y	pump discharge	450 / 232	6.4	38.9	0.47	0.509	730 / 388	818 / 437	917 / 492	1.05
03/10/20	04/14/20	4.0y	PUMP	457 / 236	12.2	40.6	0.26	0.755	738 / 392	820 / 438	916 / 491	0.00
03/10/19	03/20/19	0.0y		457 / 236	4.3	42.3	0.03	1.08	726 / 386	815 / 435	910 / 488	0.39
03/05/18	03/06/18	3.0y		435 / 224	48.3	45.1	0.11	1.15	724 / 385	808 / 431	912 / 489	0.80
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
08/12/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/13/22	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/10/20	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/10/19	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/05/18	16	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseline Data			0	0						0			0	0					0				0	

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



Historical Comments	
03/13/22	Sample results indicate that fluid degradation continues as evidenced by increased Acid Number and elevated solids content. These along with elevated fluid viscosity and flash point suggest fluid oxidation is ongoing. Please ensure blanket gas is operational. Fluid is not yet at condemnable levels but the increased Acid Number is going that direction (limit is 1). Solids content can be associated to oxidation and thermal degradation and indicates fouling of the system. Filtration is optimal. Please re-sample in 6 months
03/10/20	Pentane insolubles are higher than normal is Acid number indicating some oxidation of fluid. Ensure gas blanket is in place and functioning. Resample in 6 months. Pentane Insolubles levels are severely high.
03/10/19	The fluid is in a good condition and suitable for further use but the solids content is high. Please consider filtration of the fluid. Re-sample after filtration has taken place. Pentane Insolubles levels are severely high.
03/05/18	The fluid is in good condition and suitable for further use. Pentane Insoluble (solids) content is high. Filtration of the fluid is required. Please re-sample in 6 months. Pentane Insolubles levels are severely high.

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