

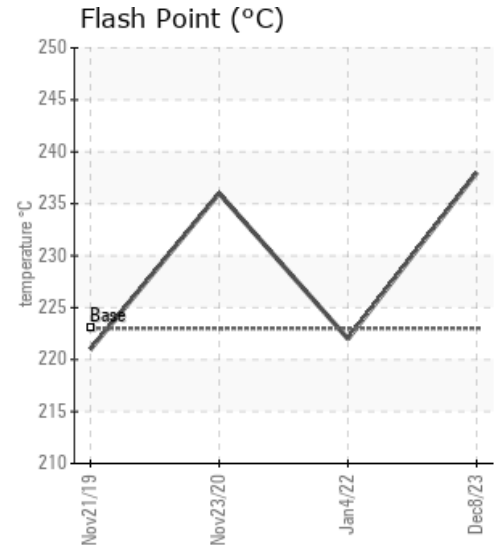
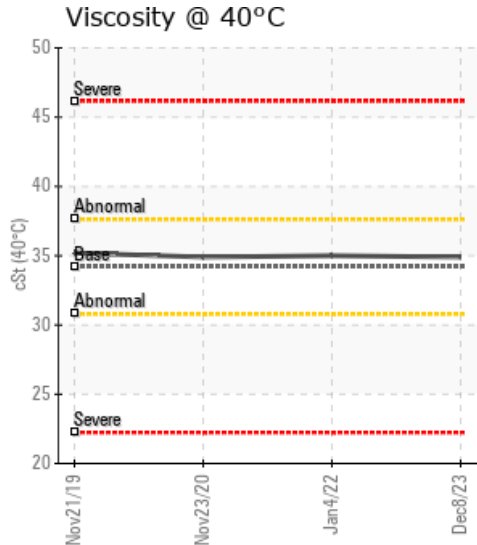
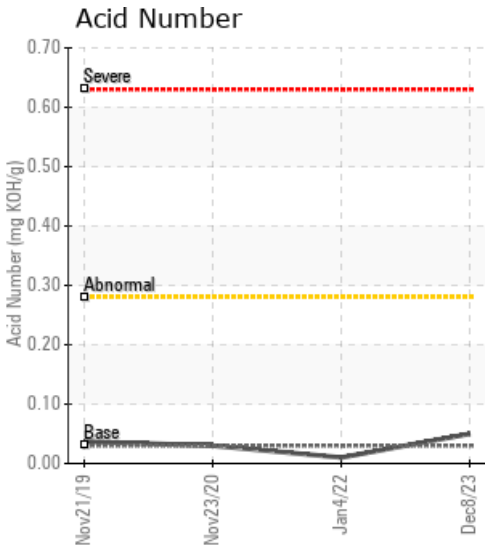
## [LSD 11-21-66-3W6] PHASE #3 HEAT MEDIUM

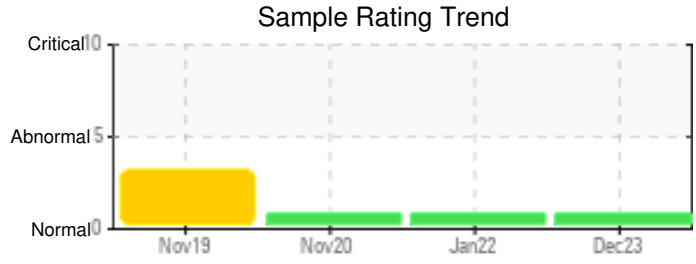
Customer: PTRHTF20236	System Information	Sample Information
Pembina - Petterson Creek	System Volume: 55000 ltr	Lab No: 02605135
Grande Prairie, AB CA	Bulk Operating Temp: 392F / 200C	Analyst: Clinton Buhler
Attn: Ryan Solheim	Heating Source:	Sample Date: 12/08/23
Tel:	Blanket:	Received Date: 12/22/23
E-Mail: rsolheim@pembina.com	Fluid: PETRO CANADA PETRO-THERM	Completed: 01/05/24
	Make: HEATEC	Clinton Buhler
		Clinton.Buhler@HFSinclair.com

Recommendation: Sample results indicate the fluid is in suitable condition for continued service. Please re-sample in 12 months.

Comments: (GCD) 90% Distillation Point is marginally high.

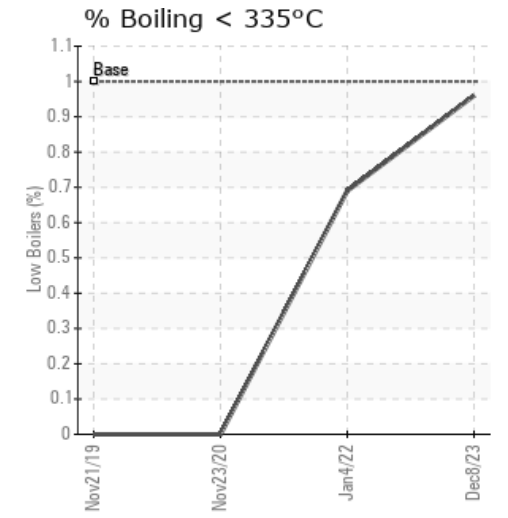
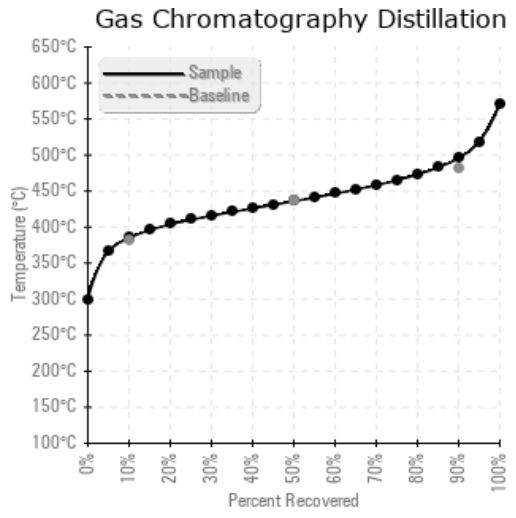
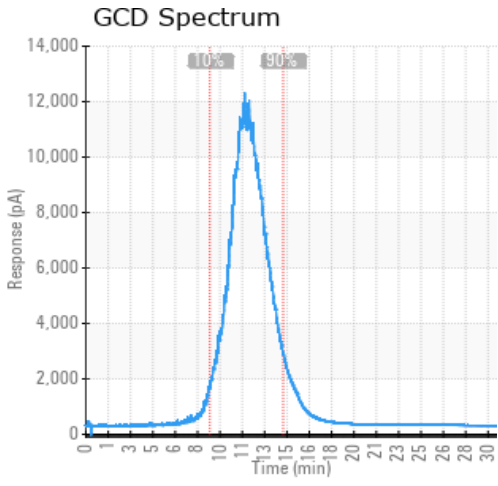
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/08/23	12/22/23	0.0m		460 / 238	33	34.9	0.05	0.026	725 / 385	817 / 436	924 / 496	0.96
01/04/22	01/24/22	24.0m	Pump suction	432 / 222	4.5	35.0	0.01	0.058	729 / 387	818 / 437	923 / 495	0.69
11/23/20	12/14/20	12.0m	Pump suction	457 / 236	9.1	34.9	0.03	0.088	732 / 389	819 / 437	927 / 497	0.00
11/21/19	02/03/20	1.0m	PUMP SUCTION	430 / 221	814.9	35.2	0.037	0.050	736 / 391	814 / 435	916 / 491	0.00
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
12/08/23	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/04/22	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/23/20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/21/19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
<b>Baseline Data</b>			0	0						0			0	0					0				0	

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



Historical Comments	
01/04/22	Sample results indicate the fluid is in suitable condition for continued service. Please re-sample in 12 months (GCD) 90% Distillation Point is marginally high.
11/23/20	Sample results indicate that the thermal fluid is suitable for continued service. Slightly elevated 90% GCD temperature and slightly increased viscosity may be an initial indication of oxidation. Please ensure that blanket gas is operational and applied to the expansion tank headspace. Please re-sample in 12 months (GCD) 90% Distillation Point is marginally high.
11/21/19	Sample results indicate that there is excess water in the system. This may be related to initial construction and commissioning or may also be related to where the sample could have been drawn from (stagnant low lying area where water can collect) and/or perhaps the sample valve and piping was not purged out thoroughly before taking the sample. Water vapor should be safely and thoroughly vented from the system expansion tank. Check for water at low spots in the system. Once this is completed, please re-sample in ~3-6 months, being cognizant to thoroughly purge the sample valve and piping before obtaining the sample. Water contamination levels are abnormally high

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