

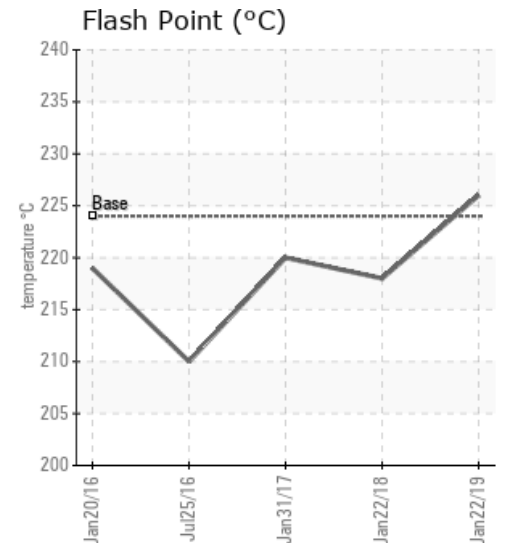
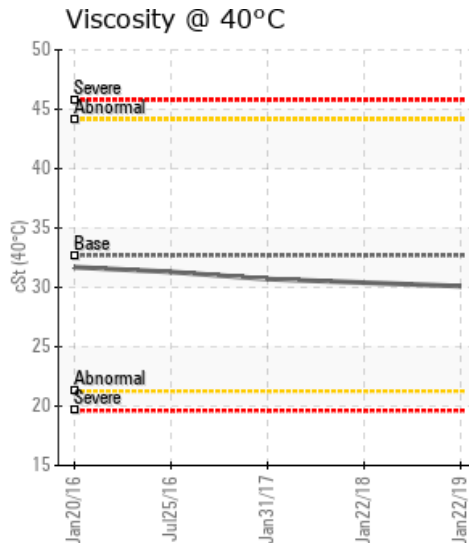
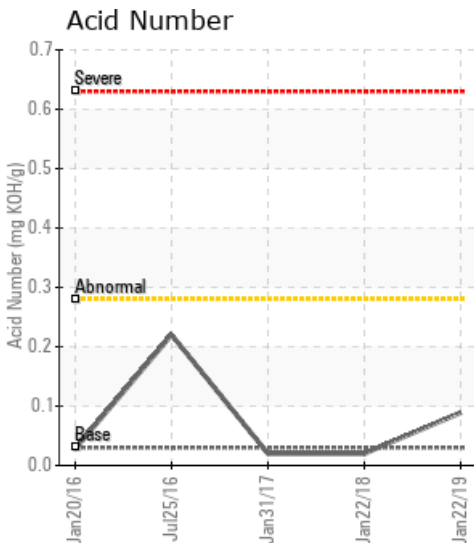
## [PEMBINA / LSD 8-13-63-5W6] PHASE #4 HEAT MEDIUM

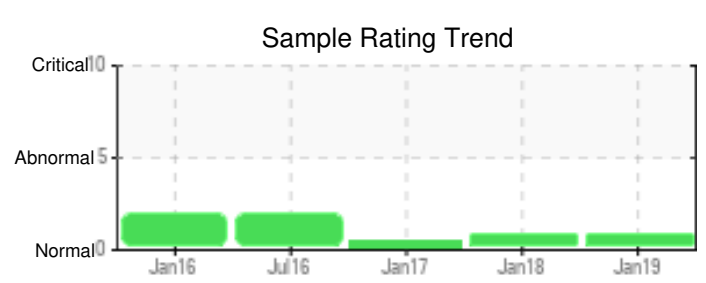
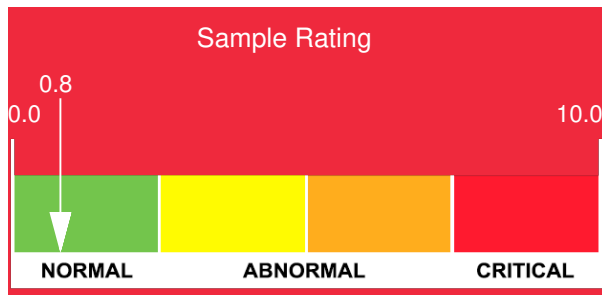
Customer: PTRHTF20062	System Information	Sample Information
Pembina Gas Services	System Volume: 40000 ltr	Lab No: 02265961
GRANDE PRAIRIE, AB T8V 7K2 Canada	Bulk Operating Temp: 500F / 260C	Analyst: Clinton Buhler
Attn: Nicolas Brooks	Heating Source:	Sample Date: 01/22/19
Tel: (403)874-8047	Blanket:	Received Date: 02/04/19
E-Mail: nbrooks@pembina.com	Fluid: PETRO CANADA CALFLO AF	Completed: 02/07/19
	Make: HEATECH	

Recommendation: Sample results indicate that the fluid is suitable for continued service. Please note iron levels have increased from last year. This can be related to erosion or corrosion. The fluid's Acid number has increased since last year yet remains below alarm limits. Investigate source of iron. Please re-sample in 12 months

Comments: Iron ppm levels are abnormal.

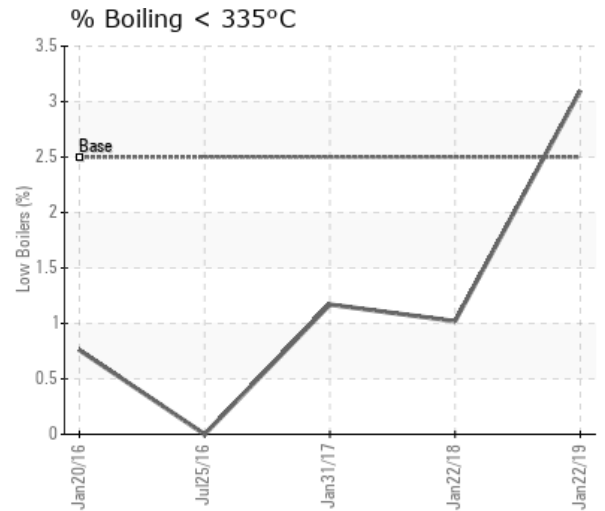
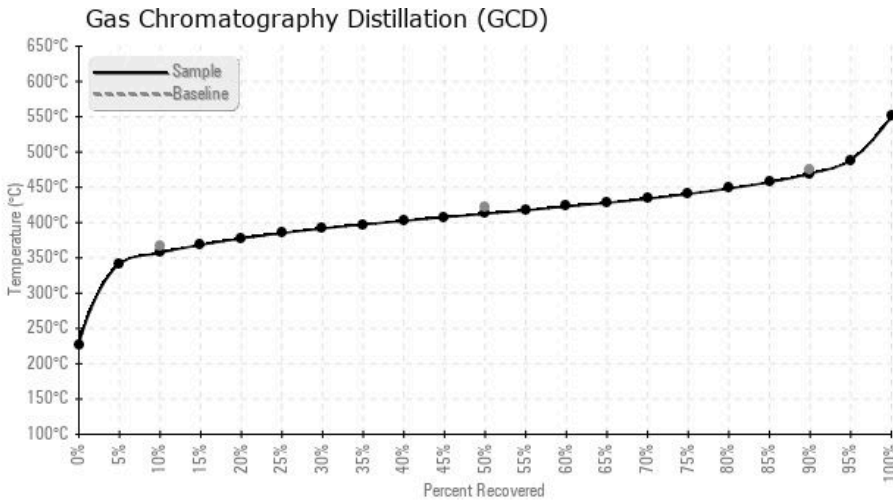
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/22/19	02/04/19	4y	FILTER POT	439 / 226	28.9	30.1	0.089	0.067	675 / 357	775 / 413	877 / 469	3.10
01/22/18	01/29/18	3y		424 / 218	0.00	30.4	0.02	0.083	706 / 375	804 / 429	904 / 484	1.02
01/31/17	02/13/17	2y	FLTR POT PMP DCHRG	428 / 220	6.9	30.7	0.02	0.031	700 / 371	797 / 425	901 / 483	1.17
07/25/16	07/28/16	2y	PUMP DISCHARGE	410 / 210	4.9	31.3	0.22	0.069	703 / 373	793 / 423	886 / 474	0.00
01/20/16	01/28/16	1y	FILTER CANISTER	426 / 219	9.1	31.7	0.028	0.114	710 / 377	810 / 432	929 / 498	0.76
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5





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
01/22/19	246	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	3	0	0	0	0	0	128	0
01/22/18	215	0	0	0	0	0	0	0	0	0	2	16	0	0	0	0	3	0	0	0	0	0	126	0
01/31/17	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	0
07/25/16	29	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	180	0
01/20/16	13	0	0	0	0	0	0	0	0	0	11	7	0	0	0	0	0	0	0	0	0	0	224	0
Baseline Data			0	0						0			0	0					0				270	

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



Historical Comments	
01/22/18	Sample results indicate that the HT fluid is healthy and suitable for continued service. However, please note the level of iron (215 PPM) in the fluid. Further investigation into the source of iron should be considered as this is abnormal. Iron ppm levels are abnormal.
01/31/17	Sample indicates that oil is in good condition and suitable for continued use. Resample in 6 months.
07/25/16	The fluid is in good condition and suitable for further use. Please re-sample in 6 months.
01/20/16	GCD is higher than normal indicating some heavier ends in the oil either from contamination or from thermal cracking. Continue to operate and resample in 6 months so a trend can be established. (GCD) 90% Distillation Point is severely high.

Petro-Canada makes no representation or warranty of any kind, either express or implied, as to the accuracy or completeness of the analysis and assumes no responsibility and shall have no liability whatsoever with respect to such analysis, or a party's use of it. Petro-Canada is a division of HollyFrontier Corporation.