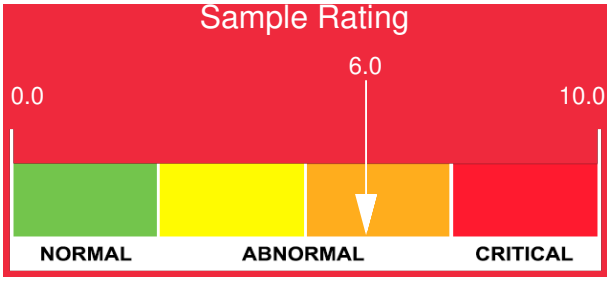
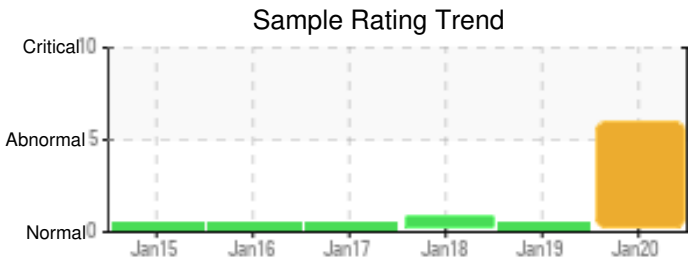




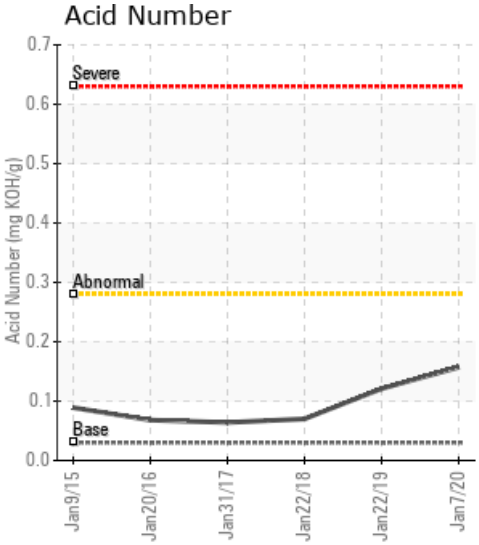
[Pembina Kakwa 8-13-63-5W6] Phase 1 Heat Medium

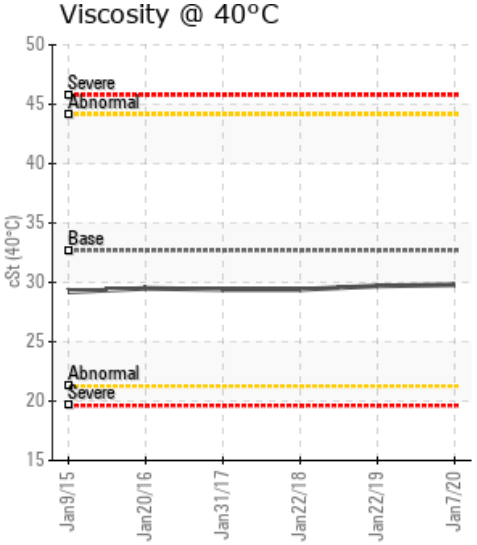
Customer: PTRHTF20062	System Information	Sample Information
Pembina Gas Services GRANDE PRAIRIE, AB T8V 7K2 Canada Attn: Nicolas Brooks Tel: (403)874-8047 E-Mail: nbrooks@pembina.com	System Volume: 0 gal Bulk Operating Temp: 400F / 204C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: PETRO-TECH	Lab No: 02335519 Analyst: Clinton Buhler Sample Date: 01/07/20 Received Date: 02/03/20 Completed: 02/19/20 Clinton Buhler Clinton.Buhler@PetroCanadaLSP.com

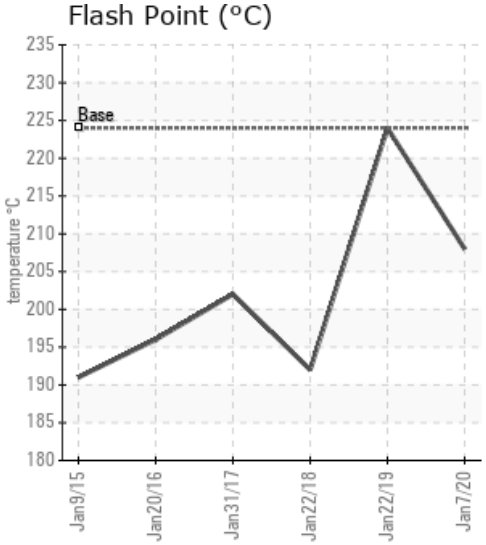
Recommendation: Sample results indicate excess water in the system. This may be from contamination but can also indicate a sample being drawn for a static low spot that may not have been purged before drawing the sample.Excess water needs to be carefully vented from the system as it can pose a risk of boil over. Water can also increase the rate of fluid oxidation and subsequent increase in Acid Number. Fluid is suitable for further service otherwise. Please vent system of steam and then re-sample in 3 months. Be cognizant of proper sampling technique- thoroughly purge out sample valve and piping to ensure sample is representative of system condition.

Comments: Water contamination levels are severely high. Water contamination levels are severely high.. ppm Water contamination levels are severely high.

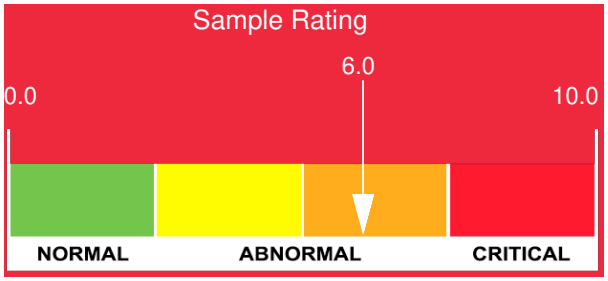
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/07/20	02/03/20	7y	SIGHT GLASS	406 / 208	13301.4	29.8	0.157	0.076	701 / 372	794 / 423	888 / 476	0.22
01/22/19	02/04/19	7y	PUMP SUCTION	435 / 224	340.8	29.7	0.121	0.095	666 / 352	772 / 411	873 / 467	4.73
01/22/18	01/29/18	6y		378 / 192	205.1	29.4	0.07	0.047	690 / 365	786 / 419	890 / 476	1.47
01/31/17	02/13/17	6y	PUMP SUCTION	396 / 202	13.0	29.4	0.064	0.035	689 / 365	793 / 423	896 / 480	2.46
01/20/16	01/28/16	4y	BEFORE FILTERS	385 / 196	57.6	29.5	0.068	0.088	688 / 364	795 / 424	896 / 480	2.92
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5

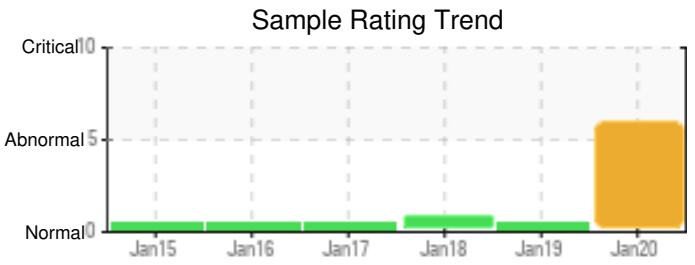






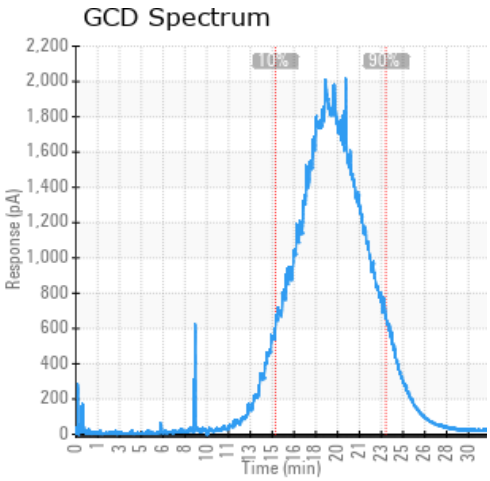
PETRO-CANADA LUBRICANTS

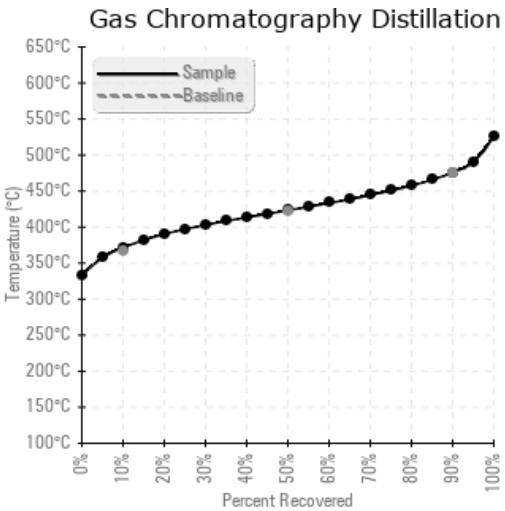


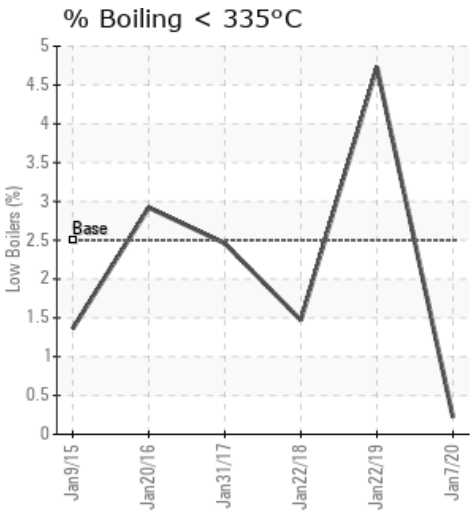


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
01/07/20	12	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	17	0
01/22/19	2	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	14	0
01/22/18	1	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	15	0
01/31/17	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	25	0
01/20/16	2	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	0	0	0	0	0	25	0
Baseline Data			0	0						0			0	0					0				270	

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







Historical Comments

01/22/19	Sample results indicate the fluid is suitable for continued service. Water content and acid number has increased- this can be associated with not fully purging sampling valves and related piping. Percent boil-off has increased from 1.47 to 4.73. This can be related to high blanket gas pressure or thermal degradation. Consider venting of expansion tank to reduce low boiling vapor molecules, but if high blanket gas pressure is required for positive pump suction head, venting may need to happen during an outage. Re-sample in 12 months
01/22/18	Flash point is marginally low. Otherwise, sample results indicate that fluid is suitable for continued service. Please re-sample in 12 months. COC Flash Point is marginally low.
01/31/17	This sample indicates the oil is in good condition and is suitable for continued use. Resample in 6 months.
01/20/16	Oil looks fine and suitable for continued use.