

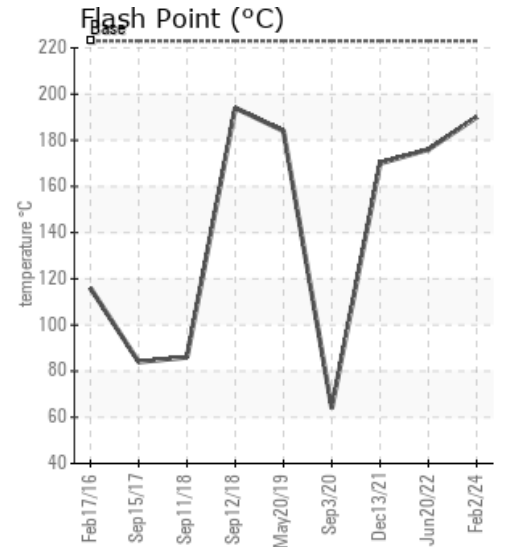
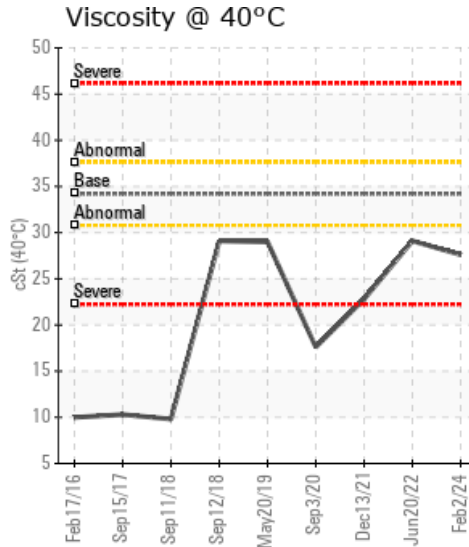
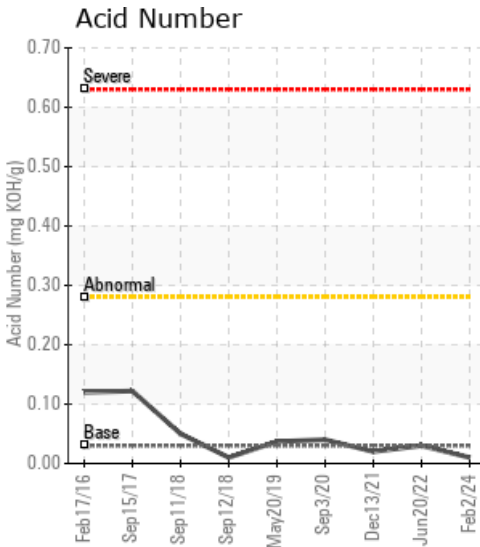
[6-10-44-12W5] HEAT TRANSFER

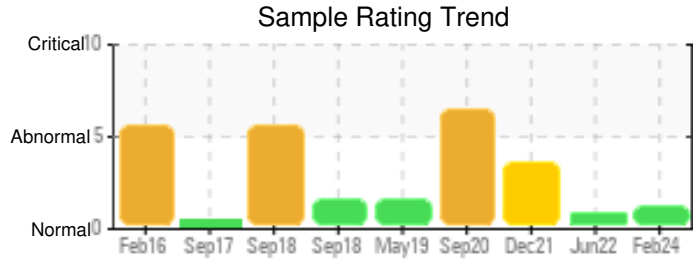
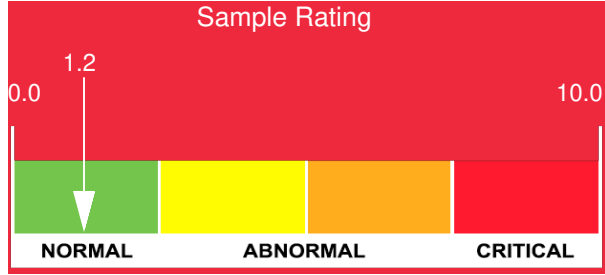
Customer: PTRHTF20171	System Information	Sample Information
Keyera Energy - Nordegg River Gas P... 06-10-044-12w5 Nordegg, AB T0M 2H0 CA Attn: Todd Kjorlien Tel: (780)514-8988 E-Mail: todd_kjorlien@keyera.com	System Volume: 42000 ltr Bulk Operating Temp: 356F / 180C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: STEARNS-ROGERS	Lab No: 02616105 Analyst: Lyle Dach Sample Date: 02/02/24 Received Date: 02/15/24 Completed: 02/23/24 Lyle Dach lyle.dach@HFSinclair.com

Recommendation: Viscosity has dropped slightly from last sample but flash point is continuing to improve. If venting is being done to reduce low boilers it has been helping to improve fluid condition. Continue current venting practice to attempt to increase viscosity and COC flash point while continuing to lower GCD %<335C. High blanket pressure can allow fuel gas be entrained in the fluid and cause a reduction in viscosity and flash point. Petro Canada Lubricants recommends blanket gas pressure of 2-3 PSI if pump NPSH is not artificially increased by high blanket gas pressure. Resample in 6 months.

Comments: Visc @ 40°C is abnormally low. COC Flash Point is marginally low.

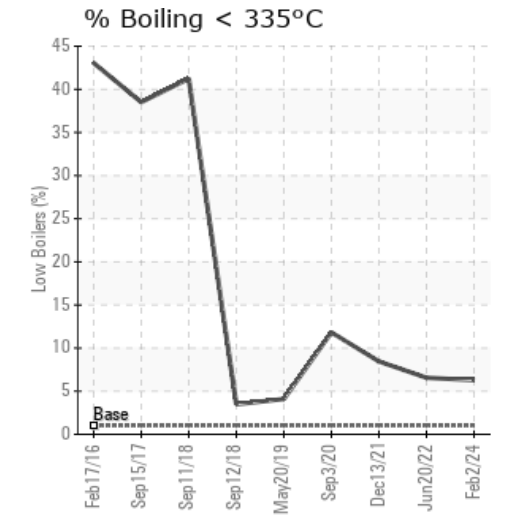
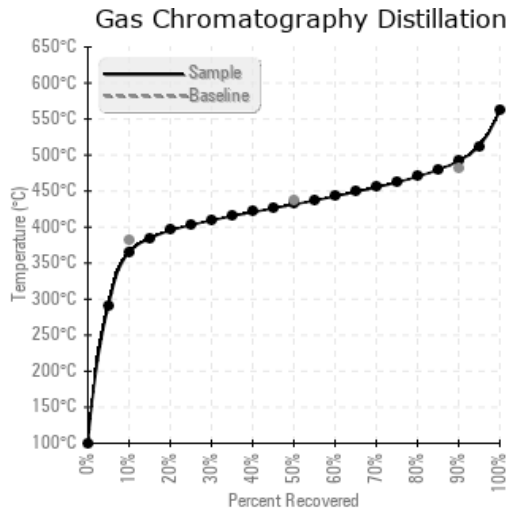
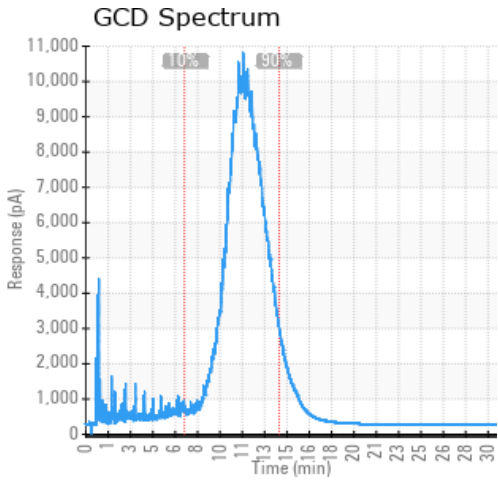
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
02/02/24	02/15/24	0.0y	p-14B discharge	374 / 190	4	27.6	0.01	0.066	690 / 365	809 / 431	917 / 492	6.28
06/20/22	06/28/22	0.0y		349 / 176	40.5	29.1	0.03	0.066	687 / 364	809 / 432	917 / 491	6.56
12/13/21	12/30/21	3.5y	pump dis	338 / 170	13.2	22.8	0.02	0.044	661 / 349	806 / 430	915 / 491	8.45
09/03/20	09/23/20	2.5y	OFF HOT OIL PUMP	147 / 64	31.4	17.6	0.04	0.069	548 / 287	802 / 428	912 / 489	11.82
05/20/19	05/21/19	0.0y		363 / 184	227.3	29.0	0.037	0.040	704 / 373	812 / 433	934 / 501	4.10
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
02/02/24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/20/22	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
12/13/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
09/03/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
05/20/19	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	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	
06/20/22	Fluid condition has improved from the last sample and overall is in good condition. If venting low boilers has been done this has helped improve fluid condition. Continue current venting practice to attempt to increase viscosity and COC flash point while continuing to lower GCD %<335C. Resample in 6 months. COC Flash Point is abnormally low.
12/13/21	Fluid has improved from last sample but fluids viscosity is still low, GCD%<335°C is on the high side, 10% distillation temperature is low and flash point is also low. Fluid is seeing some thermal degradation or could be contaminated by process fluid. Lower boilers (light ends) should be vented off at the expansion tank. If possible confirm the Petro-Therm has not been contaminated with process products. Resample in 6 months to ensure venting is helping improve fluid quality.
09/03/20	Very low viscosity & flash point are caused either by thermal cracking or possibly process exchanger leaking condensate into HT fluid. If thermal cracking is the cause there will be carbonaceous deposit in the system as a result. Contact PC Tech Services to discuss remedial action. Viscosity and flash point extremely low
05/20/19	Fluid condition generally very good overall. Viscosity & Flash Point are a little low, likely from previous residuals. Essentially no significant change from the previous sample Sept 2018. GCD 90% is just into the abnormal range

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