

## [KEYERA PARTNERSHIP / 3-12-46-14W5] PLANT 2

**Customer: PTRHTF30084**  
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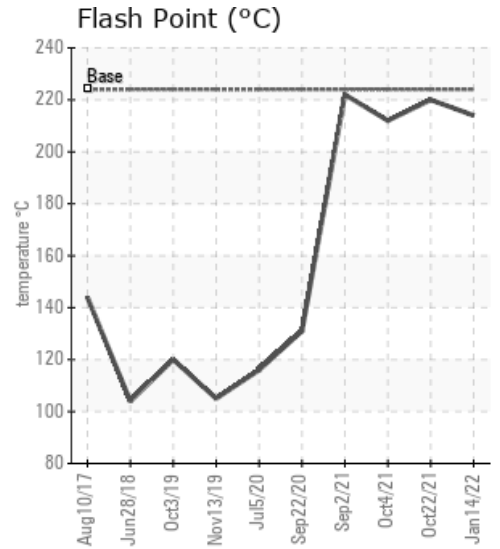
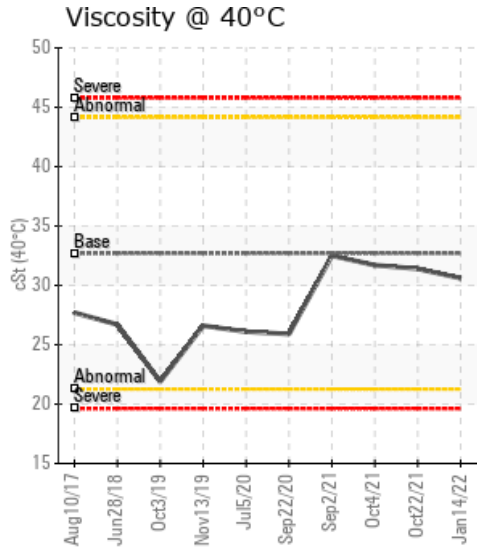
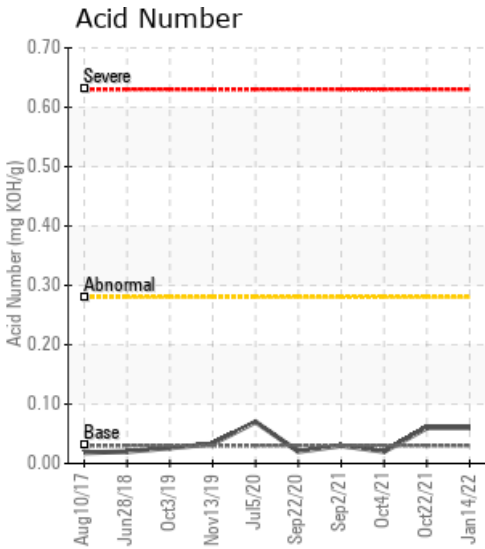
**System Information**  
 System Volume: 14000 ltr  
 Bulk Operating Temp: 455F / 235C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA CALFLO AF  
 Make: PETROTHERM ENG.

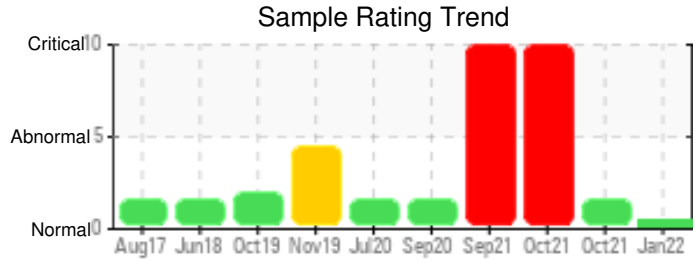
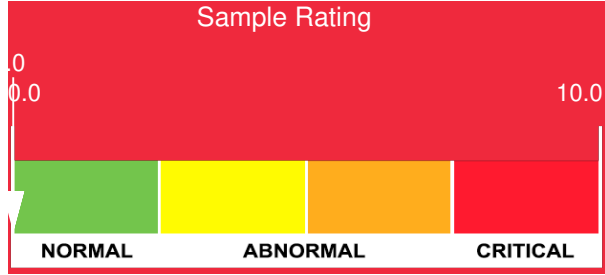
**Sample Information**  
 Lab No: 02470282  
 Analyst: Lyle Dach  
 Sample Date: 01/14/22  
 Received Date: 02/04/22  
 Completed: 02/11/22  
 Lyle Dach  
 lyle.dach@hollyfrontier.com

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Water content has been lowered successfully. Resample in 12 months

Comments:

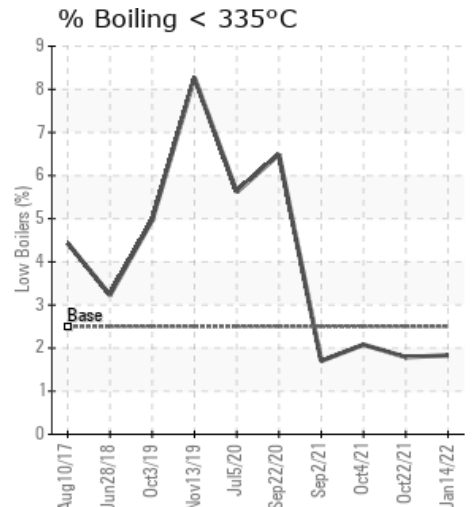
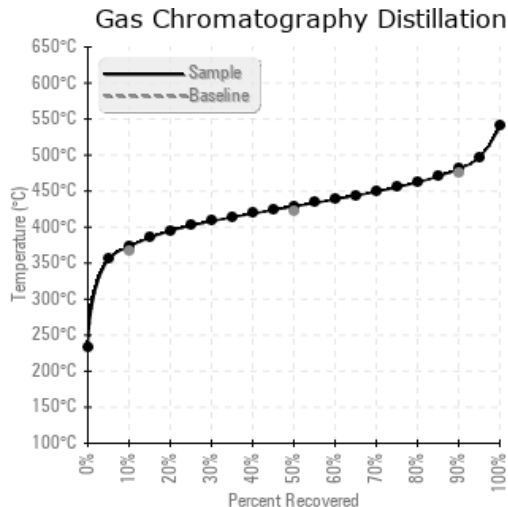
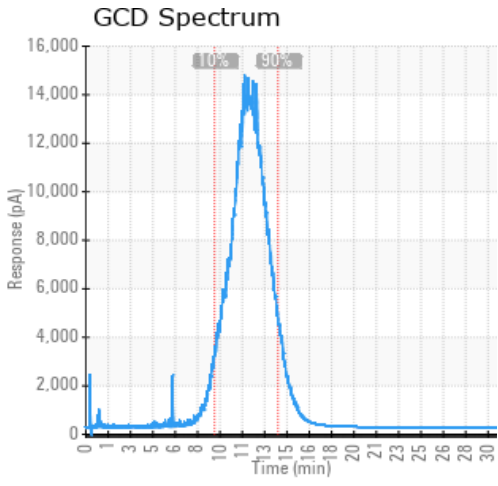
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/14/22	02/04/22	0.0y	hot oil pump	417 / 214	142.4	30.6	0.06	0.017	703 / 373	803 / 429	897 / 481	1.83
10/22/21	11/02/21	0.0y	HOT OIL PUMP PLANT 2	428 / 220	614.7	31.4	0.06	0.301	705 / 374	805 / 429	899 / 482	1.79
10/04/21	10/13/21	0.5y	after pump	414 / 212	966.8	31.7	0.02	0.441	705 / 374	805 / 429	898 / 481	2.08
09/02/21	09/20/21	14.0y		432 / 222	1255.2	32.5	0.03	0.408	707 / 375	806 / 430	900 / 482	1.70
09/22/20	09/29/20	0.0y	Slip stream filter	268 / 131	33.5	25.9	0.02	0.092	681 / 361	805 / 430	906 / 486	6.49
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
01/14/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	33	0
10/22/21	8	0	0	0	0	0	0	0	0	0	0	8	18	0	0	0	0	0	12	0	0	0	75	0
10/04/21	44	0	0	0	0	0	0	0	0	0	1	46	95	0	0	0	0	0	29	1	3	0	125	0
09/02/21	41	0	0	0	0	0	0	0	0	0	2	56	258	0	0	0	0	0	40	1	3	0	134	0
09/22/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	
10/22/21	Current sample has improved from the Oct 4 sample, water is still a concern and it would be beneficial to reduce the concentration further. Be sure to vent steam when boiling off water. Iron, sodium, potassium, boron and phosphorous are all down. Acid number is low and pentane insolubles continue to drop. Viscosity and flash point are in spec and GCD is good. System fluid is Calfo AF. Please resample in 6 months. Water contamination levels are abnormally high. ppm Water contamination levels are abnormally high.
10/04/21	Appears to have had coolant added to the system at some point in the last year, this sample has improved from Septembers. It is best to try and boil the water off the system and vent the steam as to reduce the chance of an unwanted boil over. Excess water could also lead to corrosion issues. System fluid is Calfo AF not HTF Potassium ppm levels are severely high. Water contamination levels are abnormally high. ppm Water contamination levels are abnormally high. Pentane Insolubles levels are abnormally high. Sodium ppm levels are severely high. Boron ppm levels are abnormally high.
09/02/21	Sample collected at an improper location and possibly a contaminated container. Keyera has collected a new sample waiting on results. Potassium ppm levels are severely high. Water contamination levels are severely high. ppm Water contamination levels are severely high. Pentane Insolubles levels are abnormally high. Sodium ppm levels are severely high. Boron ppm levels are abnormally high.
09/22/20	Fluid remains in good condition overall with very little change from the previous sample in July 2020. Viscosity is slightly low and the flash point is really low. Given the history of this system these lower values are likely from a previous exchanger leak. Flash point can be increased by venting the surge tank head space or partial fluid changeout. Continue to submit annual samples to proactively monitor fluid condition. COC Flash Point is severely low.

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