

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

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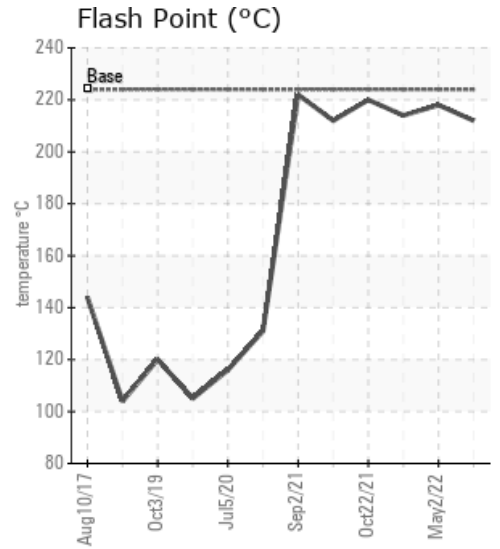
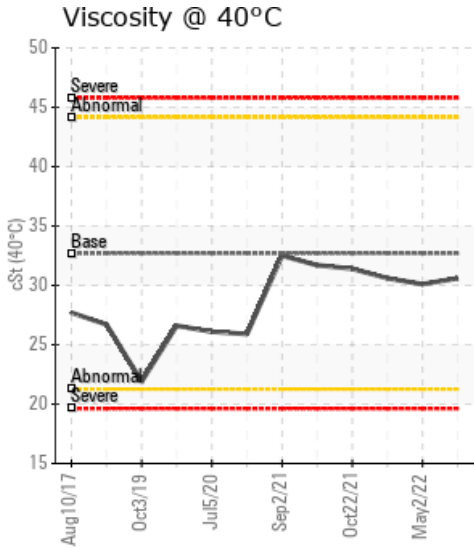
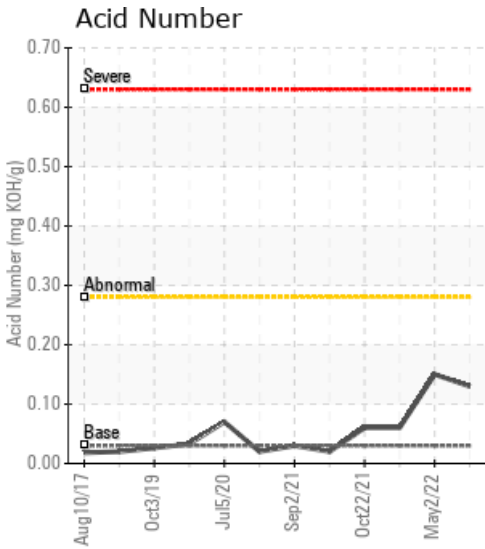
System Information
 System Volume: 14000 ltr
 Bulk Operating Temp: 455F / 235C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA CALFLO AF
 Make: PETROTHERM ENG.

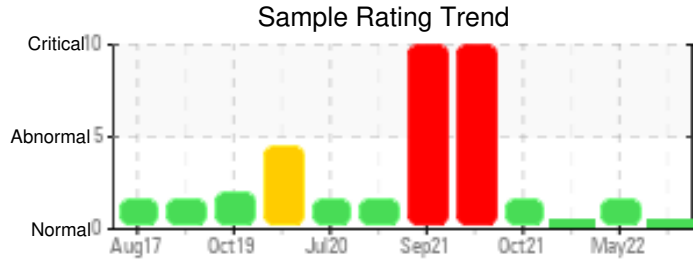
Sample Information
 Lab No: 02491082
 Analyst: Lyle Dach
 Sample Date: 05/18/22
 Received Date: 05/26/22
 Completed: 05/30/22
 Lyle Dach
 lyle.dach@hollyfrontier.com

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Resample in 12 months.

Comments:

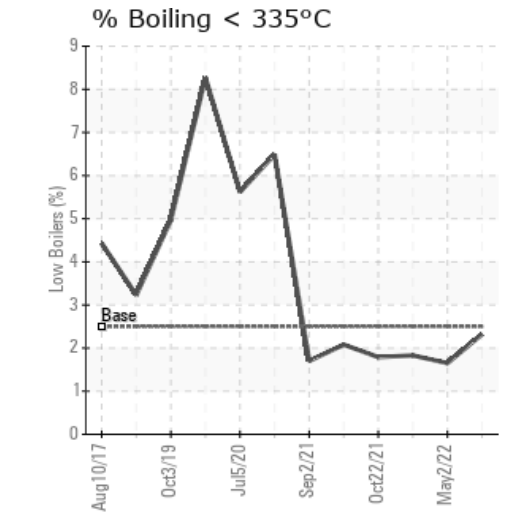
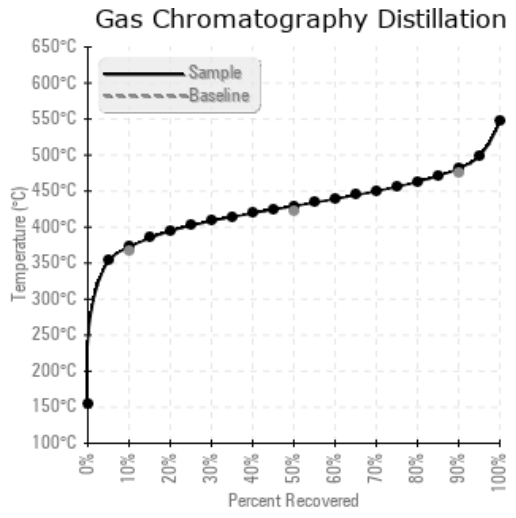
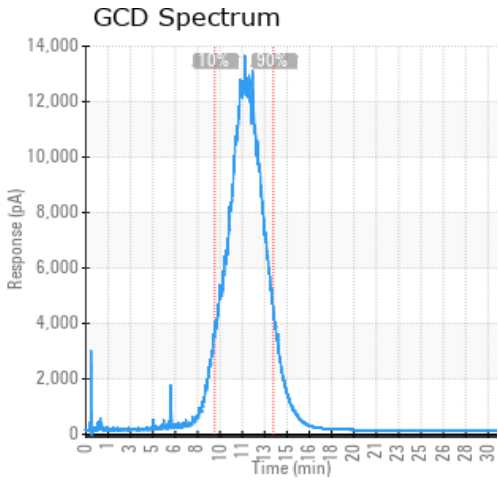
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/18/22	05/26/22	1.0y		414 / 212	173.5	30.6	0.13	0.080	702 / 372	804 / 429	899 / 481	2.32
05/02/22	05/09/22	1.0y	Hot oil filter	424 / 218	712.7	30.1	0.15	0.049	705 / 374	806 / 430	900 / 482	1.65
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
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
05/18/22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	33	0
05/02/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	33	0
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
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	
05/02/22	Water was flagged again, ensure any ingress points are closed up. Is there any process locations that could allow water to enter the heating fluid? It would be best to boil off excess water to reduce the corrosion risk, vent the steam to ensure there are no unwanted boil overs. Resample in 6 months Water contamination levels are abnormally high. ppm Water contamination levels are abnormally high.
01/14/22	Sample results indicate that the fluid is in suitable condition for continued service. Water content has been lowered successfully. Resample in 12 months
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.

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