

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

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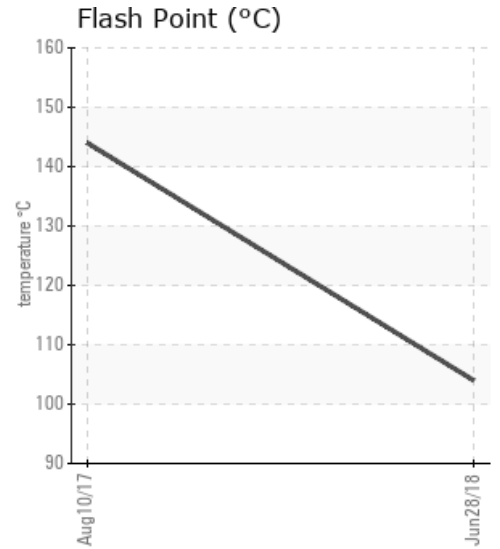
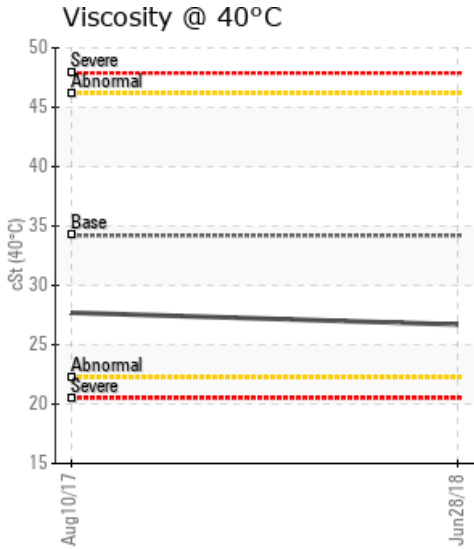
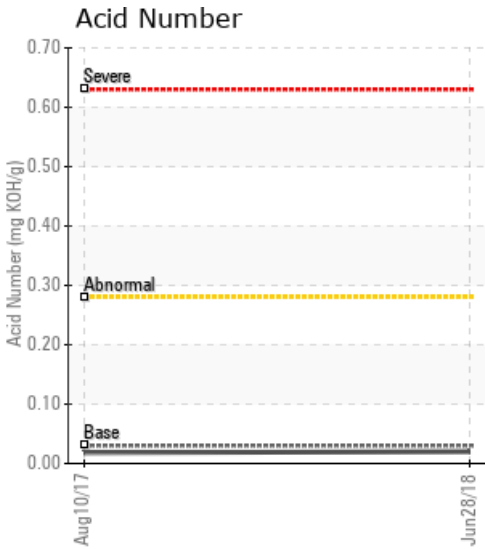
System Information
 System Volume: 14000 ltr
 Bulk Operating Temp: 455F / 235C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make: PETROTHERM ENG.

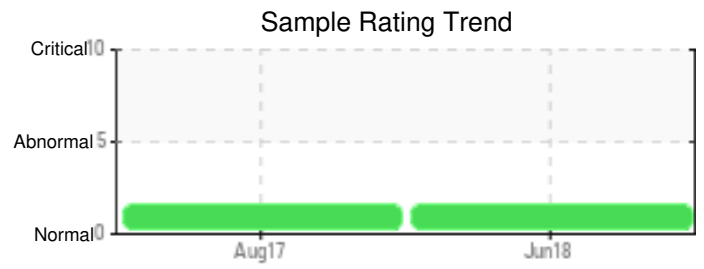
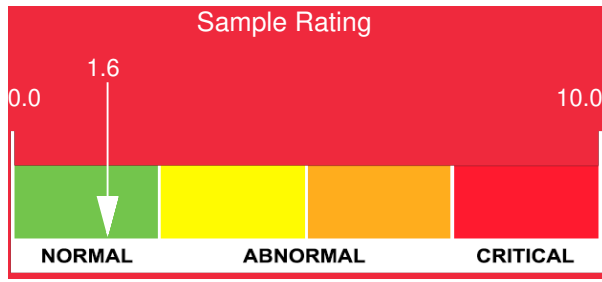
Sample Information
 Lab No: 02227254
 Analyst: Kevin McDermott
 Sample Date: 06/28/18
 Received Date: 07/10/18
 Completed: 07/12/18
 Kevin McDermott
 kevin.mcdermott@hollyfrontier.com

Recommendation: Flash point is very low, viscosity slightly lower, both caused by dilution from blanket gas, or early signs of thermal cracking. Suggest venting off light ends from fluid.

Comments: COC Flash Point is severely 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	%
06/28/18	07/10/18	0.0y	MAIN PUMP	219 / 104	37.9	26.7	0.02	0.016	700 / 371	806 / 430	904 / 484	3.23
08/10/17	08/22/17	2.0y	AT THE PUMP	291 / 144	16.9	27.7	0.018	0.027	689 / 365	801 / 427	903 / 484	4.43
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

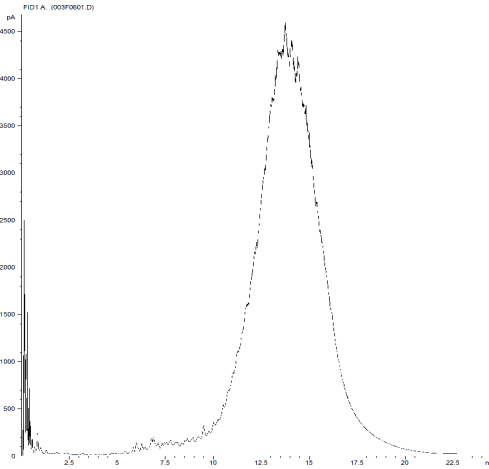




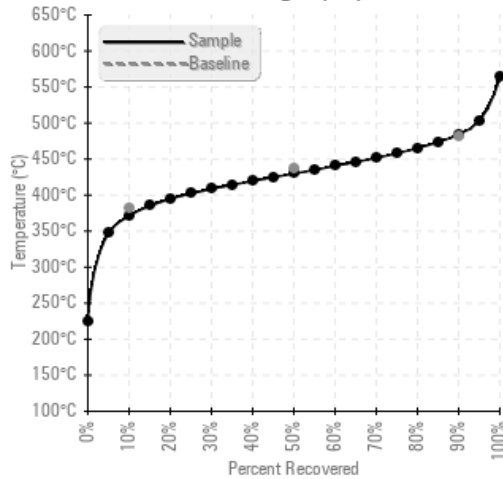
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
06/28/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/10/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseline Data			0	0						0			0	0					0				0	

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

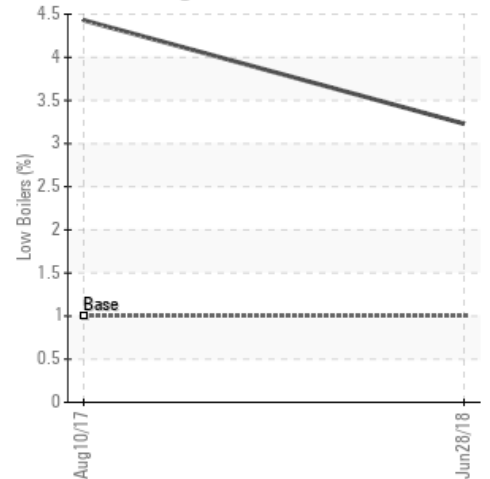
GCD Spectrum



Gas Chromatography Distillation



% Boiling < 335°C



Historical Comments

08/10/17	Reduced flash point and viscosity indicate that some thermal cracking of the fluid has taken place, which is caused by excessive skin film temperature at the heat source. However, fluid remains in good condition. Suggest annual sample submissions. COC Flash Point is severely low. Viscosity slightly low.

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