

[STORM RESOURCES / C-39-D/94-H-3] H-6300

Customer: PTRHTF20175
 QUADRA CHEMICALS
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 CLAIRMONT, AB T0H 0W0 Canada
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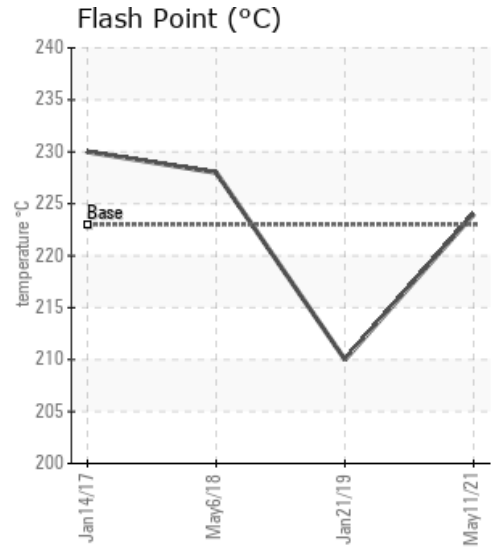
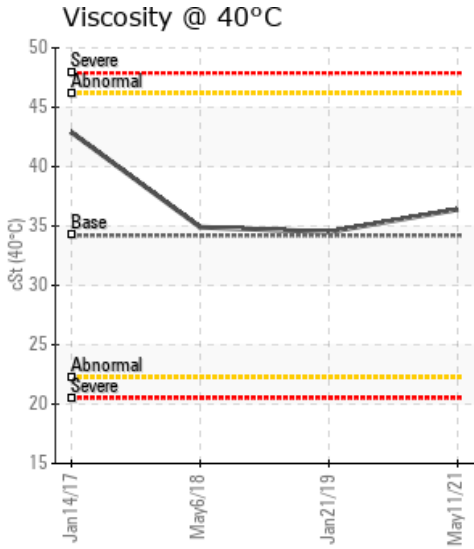
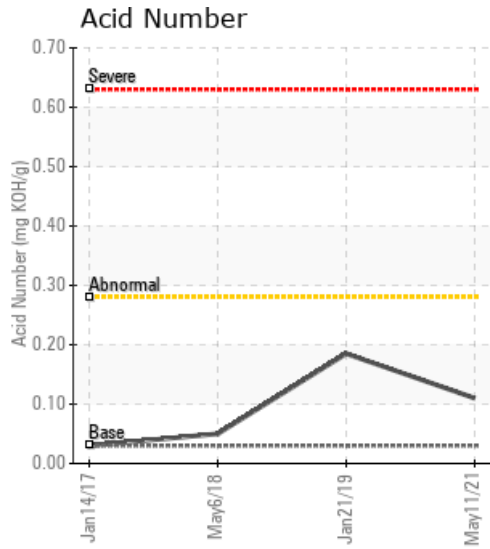
System Information
 System Volume: 14000 ltr
 Bulk Operating Temp: 518F / 270C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make: ALCO

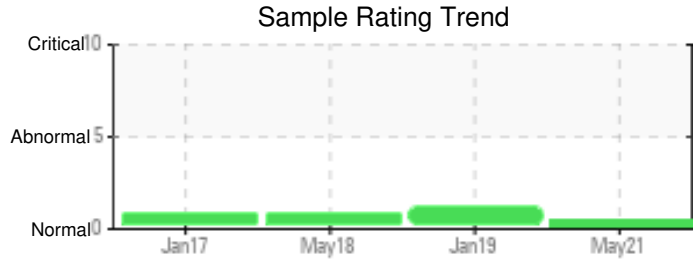
Sample Information
 Lab No: 02423512
 Analyst: Clinton Buhler
 Sample Date: 05/11/21
 Received Date: 05/26/21
 Completed: 05/28/21
 Clinton Buhler
 Clinton.Buhler@hollyfrontier.com

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Please re-sample in 12 months

Comments:

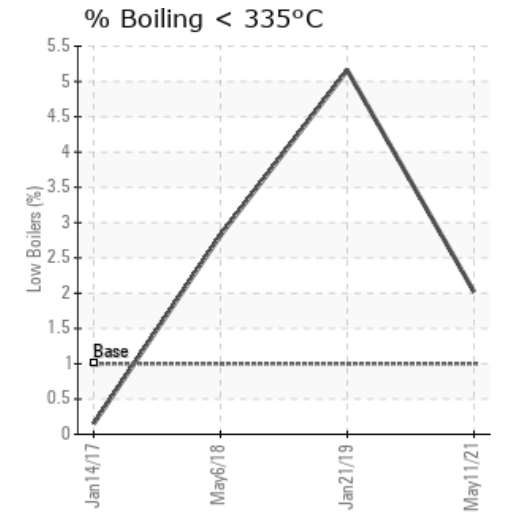
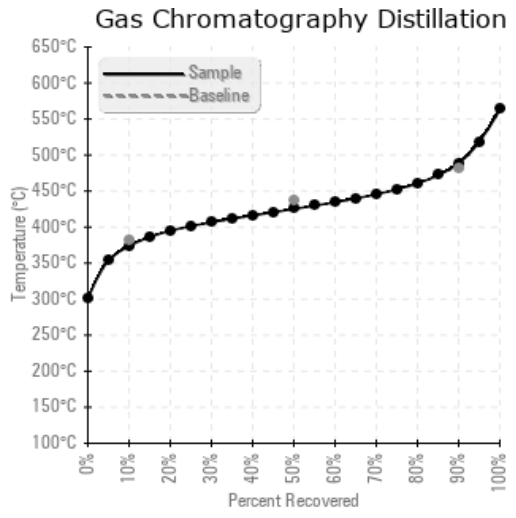
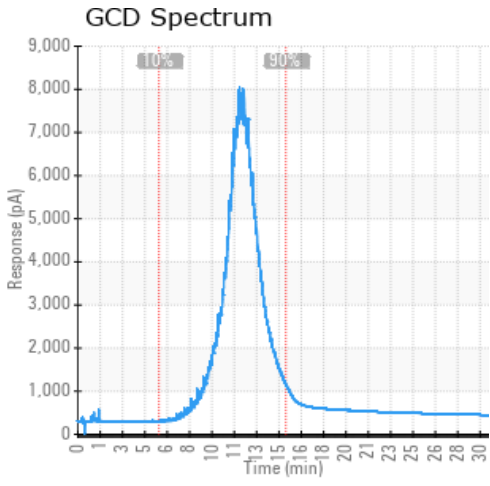
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/11/21	05/26/21	7.0y	Reboiler	435 / 224	17.2	36.4	0.11	0.148	704 / 374	797 / 425	911 / 488	2.02
01/21/19	02/01/19	4.0y		410 / 210	92.4	34.5	0.185	0.055	673 / 356	780 / 416	892 / 478	5.16
05/06/18	05/07/18	13000.0y		442 / 228	18.4	34.9	0.05	0.043	708 / 376	814 / 434	918 / 492	2.82
01/14/17	02/13/17	4.0y	SIGHT GLASS	446 / 230	13.5	42.9	0.03	0.062	727 / 386	813 / 434	907 / 486	0.15
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
05/11/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/21/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/06/18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/14/17	0	0	0	0	0	0	0	0	0	0	0	0	1	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%]



Historical Comments	
01/21/19	Sample results indicate that the fluid is suitable for continued service.increased % boil-off now at 5.15. This likely indicates thermal degradation or could be related to high blanket gas pressure.Vent expansion tank to remove low boiling vapors from system. If blanket gas is required for proper circulation pump suction head, venting may have to be performed during an outage.Re-sample in 12 months after thorough venting of expansion tank.
05/06/18	Sample results indicate that fluid is suitable for continued service.Please note the % boil-off below 335C: 2.82%. This can be an indication of thermal degradation while slightly increased 90% distillation value of 492C can be an indication of oxidation.As part of a robust thermal fluid maintenance program, perform regular venting of expansion tank to release the low boiling vapors. Ensure expansion tank blanket gas is operational after venting and set between 2-3 psi.Re-sample in 12 months. (GCD) 90% Distillation Point is marginally high.
01/14/17	(GCD) 90% Distillation Point is marginally low. TAN, Flashpoint and Viscosity all are within limits. Continue to operate and resample in 6 months. (GCD) 90% Distillation Point is marginally low.

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