

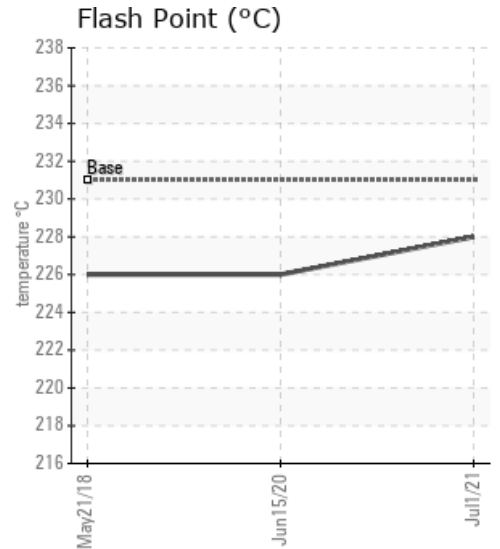
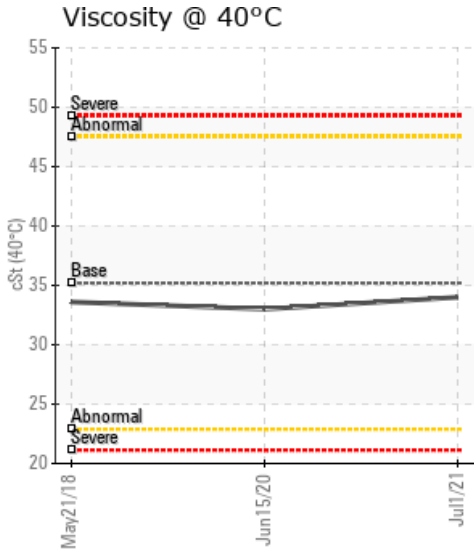
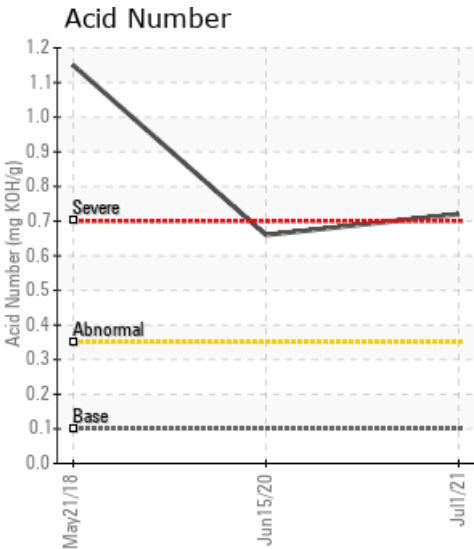
[7K AREA] 009-HE-102

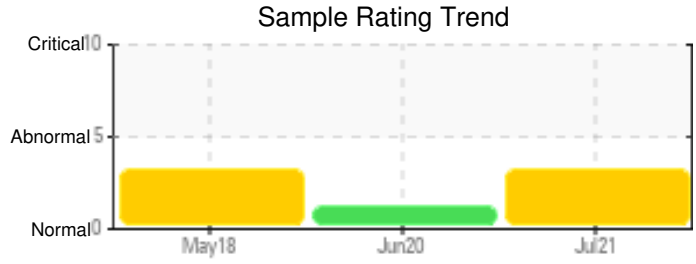
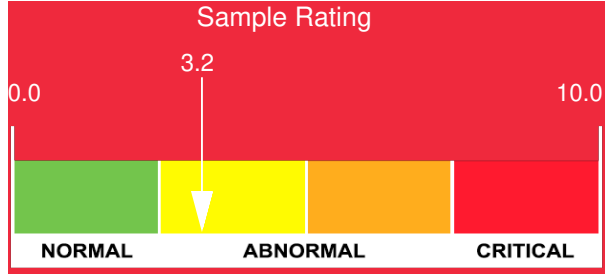
Customer: PTRHTF10177	System Information	Sample Information
Materia Inc 7629 State Hwy 75 South Huntsville, TX 77340 USA Attn: Robert Durr Tel: (713)447-9561 E-Mail: rdurr@materia-inc.com	System Volume: 30 gal Bulk Operating Temp: 32F / 0C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make: ADVANTAGE	Lab No: 02434455 Analyst: Garrett Bapp Sample Date: 07/01/21 Received Date: 07/22/21 Completed: 08/12/21 Garrett Bapp Garrett.Bapp@hollyfrontier.com

Recommendation: Acid number is severely high. Since system volume is only 30 gallons, recommended to replace total system volume to maintain system cleanliness.

Comments: Acid Number (AN) is severely high.

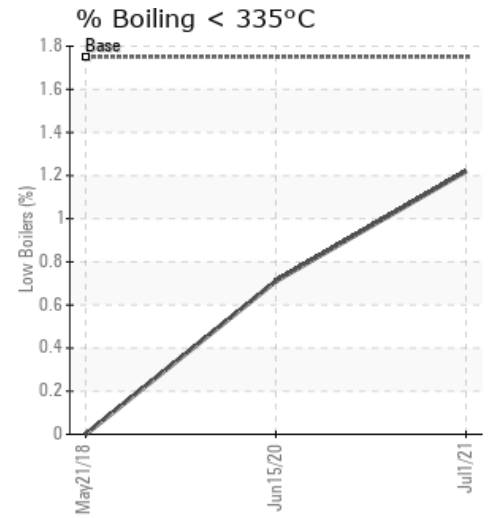
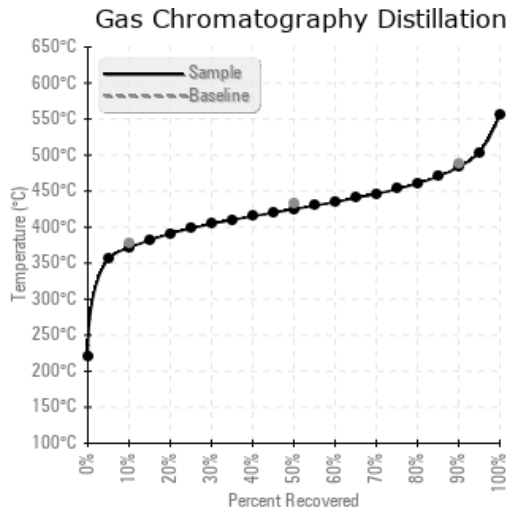
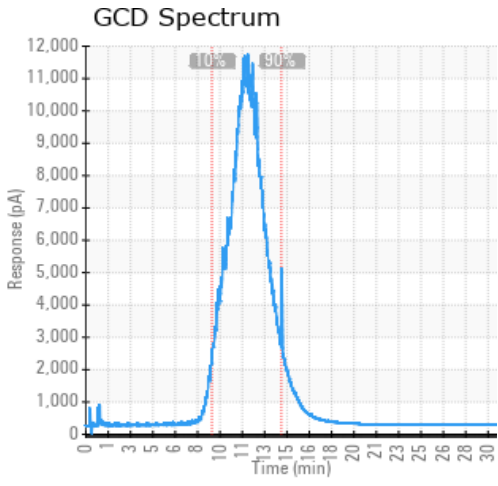
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
07/01/21	07/22/21	2.0y	STORAGE TANK	442 / 228	34.5	34.0	0.72	0.104	700 / 371	797 / 425	902 / 483	1.22
06/15/20	06/25/20	4.0y	TANK	439 / 226	3.4	33.0	0.66	0.113	706 / 375	802 / 428	901 / 483	0.71
05/21/18	06/06/18	0.0y		439 / 226	16.2	33.6	1.15	0.089	711 / 377	785 / 419	870 / 466	0.00
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75





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
07/01/21	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	248	2
06/15/20	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	253	0
05/21/18	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	226	0
Baseline Data			0	0						0			0	0				0	0				280	

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



Historical Comments

06/15/20	Acid Number (AN) is abnormally high. Fluid appears to be dehydrated, changed or sweetened over the last two years. There is evidence of mild thermal degradation. Because of the acid number, stay cognizant of possible system erosion. To address the high AN, a system fluid change is warranted. Otherwise, thermal transfer rates should not have changed much over the last two years. If it has, then inspect the immersion heater, and look for carbon deposits.
05/21/18	Total Acid Number is high without any other properties supporting a symptom with the fluid. Look for possible system contamination, change fluid, and resample in 6 months. Acid Number (AN) is severely high.

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