

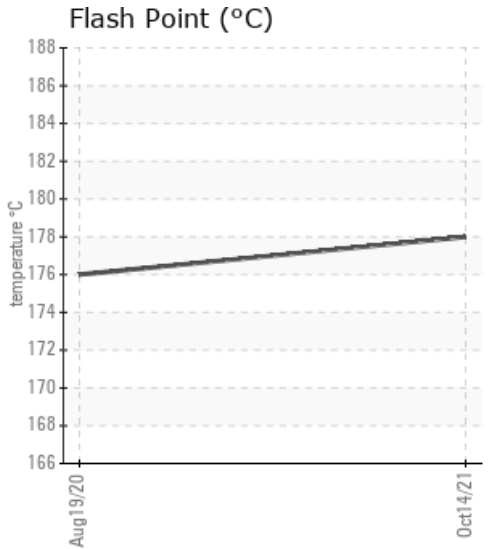
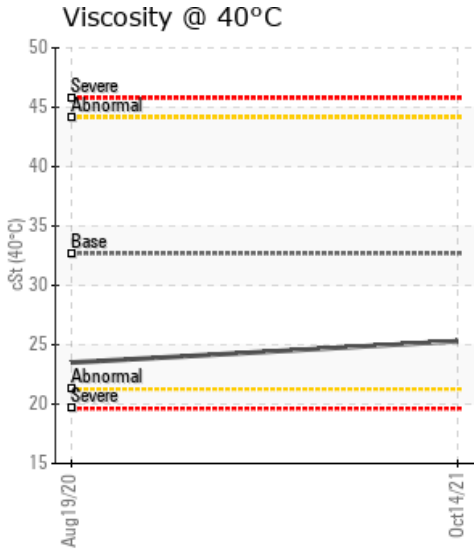
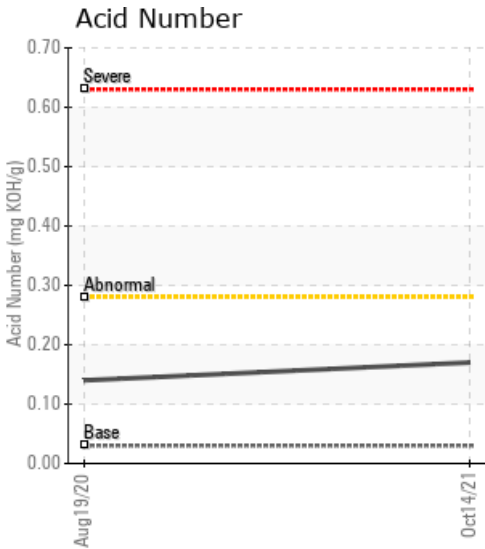
HEAT TRANSFER SYSTEM

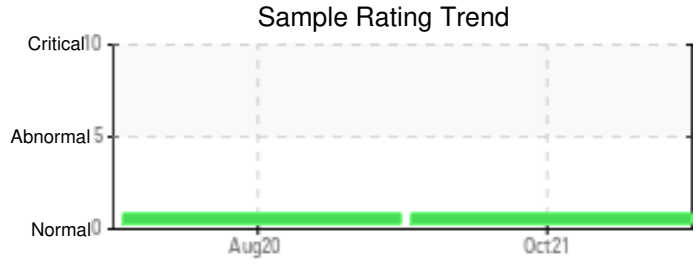
Customer: PTRHTF30154	System Information	Sample Information
Panolam Surface Systems 61 Domtar Road Huntsville, ON P1H 2J7 Canada Attn: MIKE GODDEN Tel: (705)789-9683 E-Mail: mike_godden@panolam.com	System Volume: 60480 ltr Bulk Operating Temp: 509F / 265C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: GEKA	Lab No: 02451713 Analyst: Adam Koscielak Sample Date: 10/14/21 Received Date: 10/22/21 Completed: 11/01/21 Adam Koscielak adam.koscielak@hollyfrontier.com

Recommendation: Sample indicates the presence of low boilers. GCD%<335°C was measured at 6.22%. Typical is 2.5%. Low Boilers can be reduced by following the heat transfer system manufacturers procedure for venting of the expansion tank. The higher % of low boilers has reduced the flash point to 178°C versus a typical of 224°C. Viscosity has also been reduced to 25.3 cSt@40°C from the typical of 32.3 for Calflo AF. GCD%@90% indicates some cracking of the fluid. Solids remain low at 0.047%. Next steps to consider: 1 - venting of the low boilers, following heat transfer system manufacturers recommended procedure. 2 - Sweetening the system by replacing approx 10% of the volume of the system, to help bring the viscosity and flash point up. However this should be done after the low boilers have been vented. Sample fluid after low boilers have been vented. Sample system before the planned change out in 2022.

Comments: COC Flash Point is abnormally low.

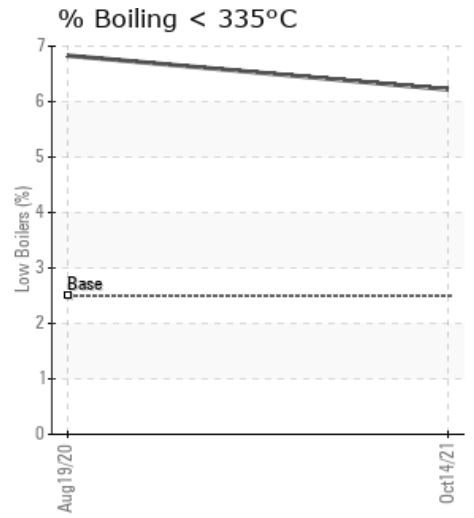
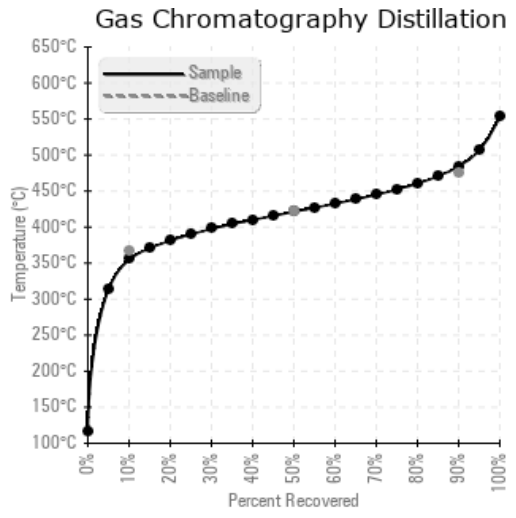
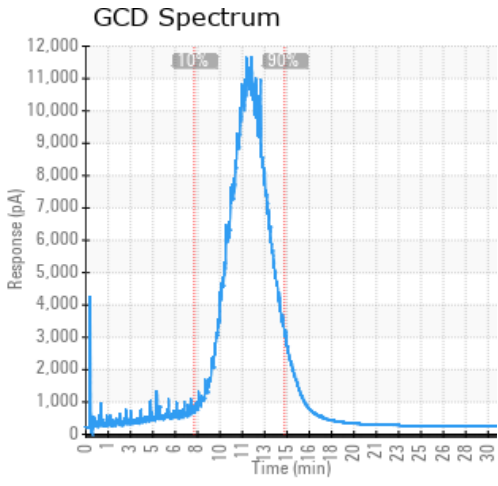
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
10/14/21	10/22/21	16.0y		352 / 178	87.4	25.3	0.17	0.047	671 / 355	790 / 421	904 / 484	6.22
08/19/20	08/26/20	6.0y	THERMAL OIL BUILDING	349 / 176	193.2	23.5	0.14	0.046	667 / 353	789 / 421	902 / 483	6.83
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
10/14/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0
08/19/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	27	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

08/19/20	the sample shows, lower viscosity, lower flash point, and higher oil evaporation below 335 C. have you added any oil into the system? It seems that there is a lower viscosity oil added to this system. at this stage, the low flash point is not a safety concern, but you need to monitor it. The system also does not show any acid formation and pipe corrosion. Please resample after 6 months. COC Flash Point is abnormally low.

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