

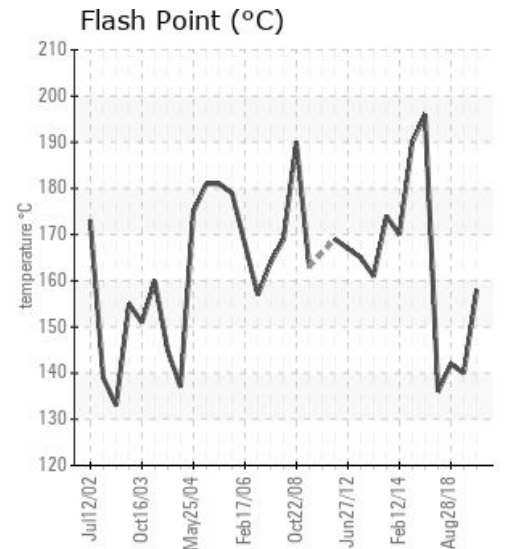
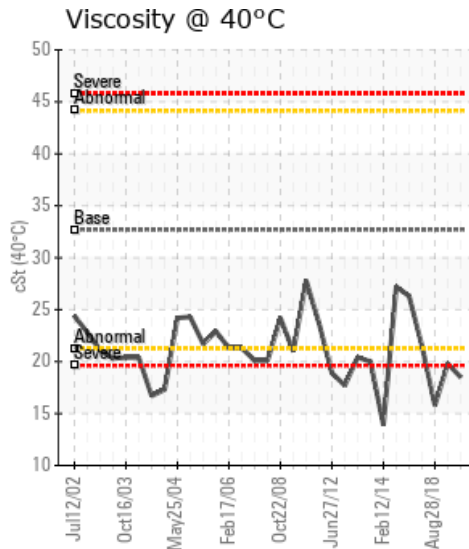
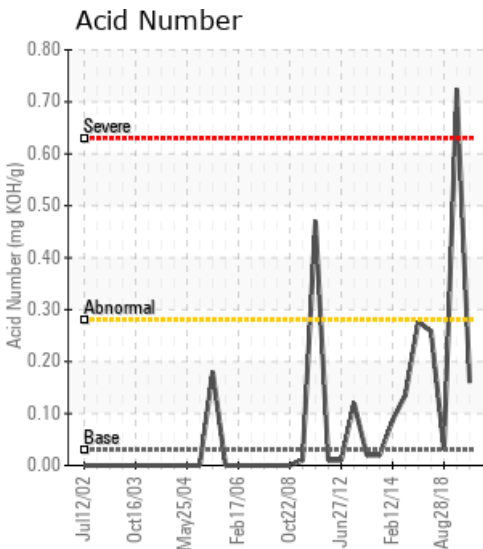
P1 HOT OIL BOILER

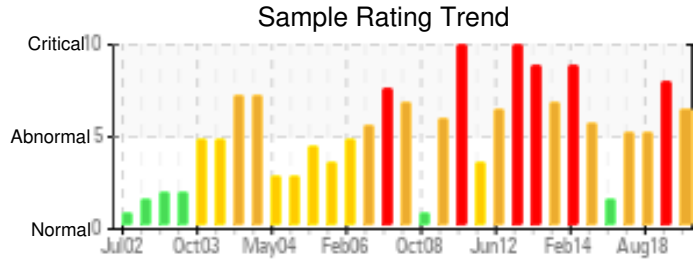
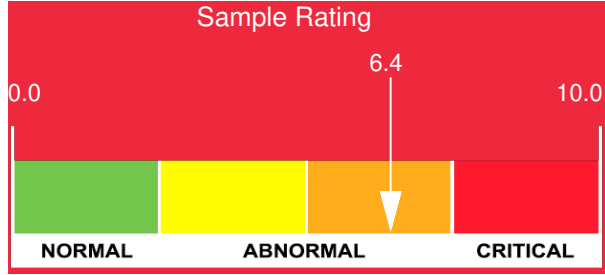
Customer: PTRHTF10083	System Information	Sample Information
KAO SPECIALTIES AMERICAS LLC 243 WOODBINE ST/PO BOX 2316 HIGH POINT, NC 27260 USA Attn: ROBERT WILLIAMS Tel: (336)878-4225 E-Mail: rwilliams@ksallc.com	System Volume: 7000 gal Bulk Operating Temp: 550F / 288C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: FIRST THERMAL	Lab No: 02385849 Analyst: Manny Garcia Sample Date: 11/02/20 Received Date: 11/06/20 Completed: 11/12/20 Manny Garcia manuel.garcia@petrocanadalsp.com

Recommendation: In the past we have recommended this system be vented to 'potentially correct/mitigate the issues mentioned with the fluid. Our records don't indicate the age of the fluid, but the product may have worked thru its useful life. Our recommendation is to drain, flush and re-charge the heat transfer system for improved efficiencies, safety and production levels.

Comments: (GCD) 10% Distillation Point is severely low & has been trending this way for the last 4 years. COC Flash Point is severely low & this could cause a fire in your facilities if not corrected - has been dangerously low for the last 4 years. Visc @ 40°C is severely low & has been for the last 4 years. (GCD) % < 335°C is abnormally high.

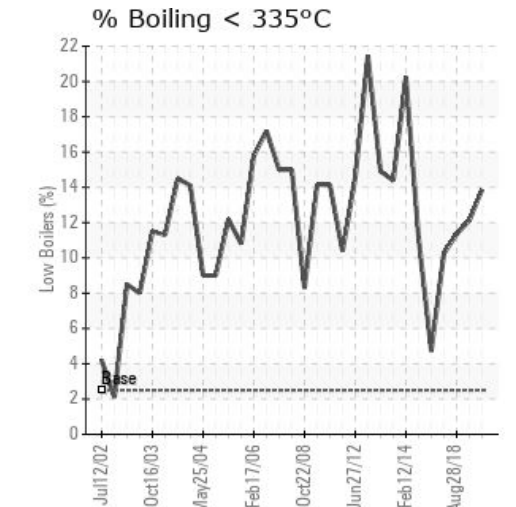
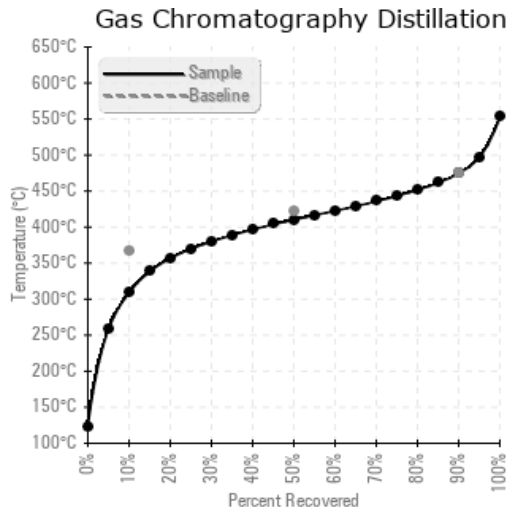
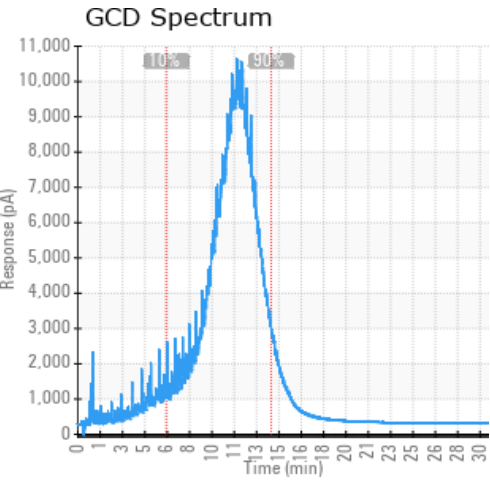
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/02/20	11/06/20	0y	Main hot oil pumps	316 / 158	18.0	18.5	0.16	0.344	588 / 309	770 / 410	886 / 475	13.87
03/03/20	03/11/20	0y	MAIN HOT OIL PUMP	284 / 140	16.4	19.8	0.724	0.243	610 / 321	775 / 413	894 / 479	12.12
08/28/18	10/02/18	0y		288 / 142	16.3	15.8	0.031	0.370	616 / 324	773 / 412	881 / 471	11.35
10/27/16	11/08/16	10y	DISCHARGE PUMP	277 / 136	43.4	21.5	0.258	0.468	627 / 331	779 / 415	890 / 477	10.26
01/25/16	02/01/16	0y	BOILER LOOP PUMP DIS	385 / 196	36.1	26.3	0.277	0.702	670 / 354	785 / 418	895 / 479	4.73
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
11/02/20	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	24	5
03/03/20	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0
08/28/18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0
10/27/16	32	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	35	0
01/25/16	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	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	
03/03/20	This fluid should be scheduled for a change-out as it has reached its useful life. Acid Number (AN) is severely high. COC Flash Point is severely low and at very dangerous levels of 140oC vs the design parameter of 217oC. (GCD) 10% Distillation Point is abnormally low. Visc @ 40°C is abnormally low at 19.8 CsT @ 40oC vs design parameter of 32.3 csT @ 40oC. (GCD) % < 335°C is marginally high.
08/28/18	The fluid needs to be vented to release low boilers found in fluid & potentially restore the fluid properties. This is a large volume system & condition is clearly at very dangerous levels. If venting is not possible this system should be considered for a complete drain and re-fill with Calflo AF. As a potential, more economical solution, 20% of the 7,000 gallons of fluid could be taken out and disposed of & replaced with virgin Calflo AF to improve system fluid parameters. Please include the time on the oil & the time on the component during any future samples submitted. The oil condition has not improved since the last sample was received two years ago. The viscosity has dropped to an ISO 15 which is half the design parameter of an ISO 32. The flash point is has dropped to 142oC below the design parameters of this fluid. The amount of low boilers keep increasing. CAUTION: A low flash point increases the risk of the fire point and autoignition temperatures. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high.
10/27/16	Fluid system should be 'vented' to bring the (GCD) distillation curve back down to normal values and assist in raising the flash point figures. Light silt visible in fluid sample. If the fluid is, in fact, 10 years+ or more, the system may require a complete cleaning with Petro-Canada Cleaning Fluid, Flush and re-fill with virgin Calflo AF. Cleaning will bring the internal components to bare metal and run more efficiently. Historically high Iron contaminant noticed in fluid. Water levels are at 43.4ppm/Viscosity is satisfactory/COC Flash Point is severely low at 136oC/(GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low/Contaminant levels are low, but pentane Insolubles levels are abnormally high/Very Light silt visible in fluid.
01/25/16	Water is in check and minimal; Total Acid Number is low; Viscosity is slightly low at 26.3 CsT; Flash Point is acceptable; Distillation curves are acceptable; Pentane solids are high and silt is light - recommend the oil condition can improve by filtering the oil during a convenient shut-down to get the oil cleaner. Wear metals are low. Re-submit sample in a year and include the age of the heat transfer system and the age of the oil in the system

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