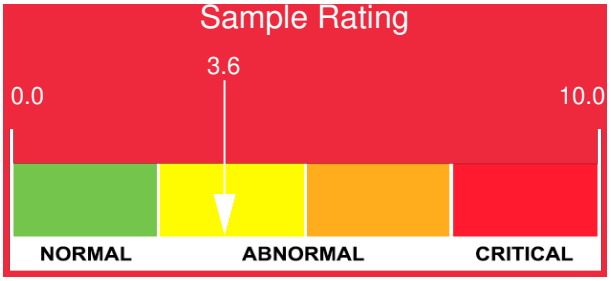
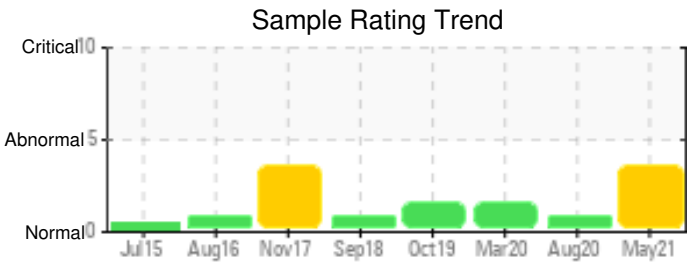




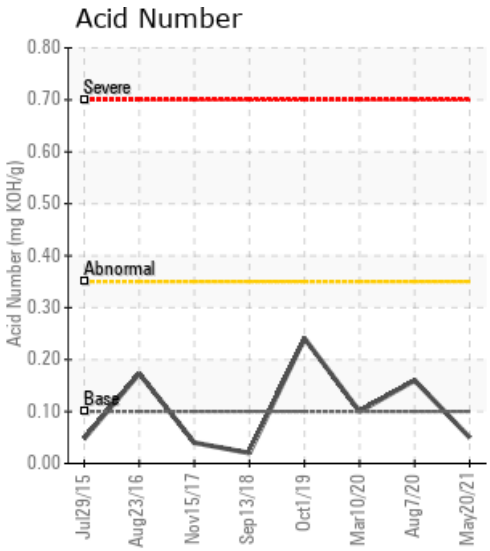
LINE 1

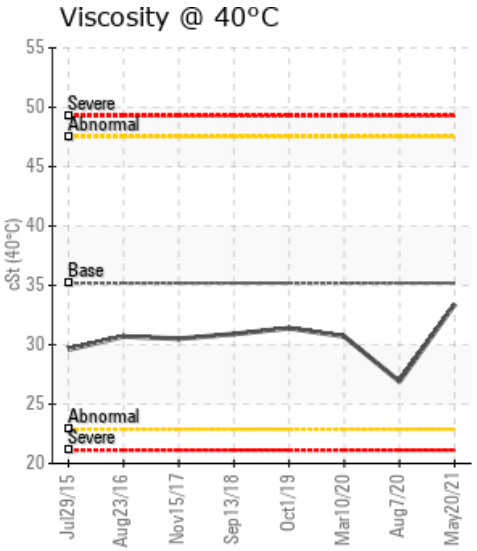
Customer: PTRHTF10164	System Information	Sample Information
Malarkey Roofing 3400 S. Council Rd OKLAHOMA CITY, OK 73179 USA Attn: Dillard Mathews Tel: (405)261-6900 E-Mail: dmathews@malarkeyroofing.com	System Volume: 600 gal Bulk Operating Temp: 565F / 296C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make: AMERICAN HEATING	Lab No: 02423957 Analyst: Garrett Bapp Sample Date: 05/20/21 Received Date: 05/28/21 Completed: 06/03/21 Garrett Bapp Garrett.Bapp@HFSinclair.com

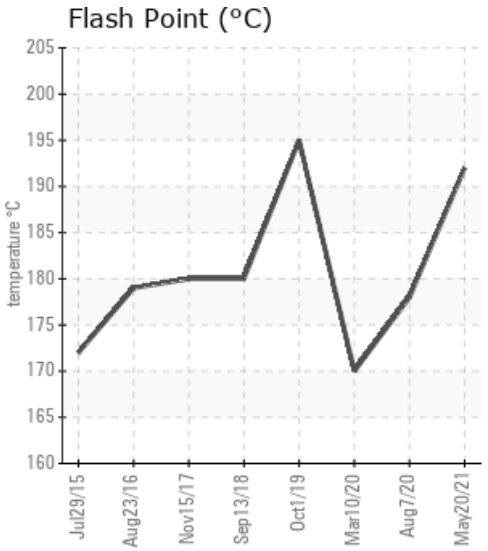
Recommendation: Thermal degradation of the fluid represented by GCD %<335°C, lower than normal COC Flash Point and Low GCD 10%. All other parameters are on spec. Recommended to vent light ends from the system and sweeten with 20% fluid volume.

Comments: (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high. COC Flash Point is marginally low.

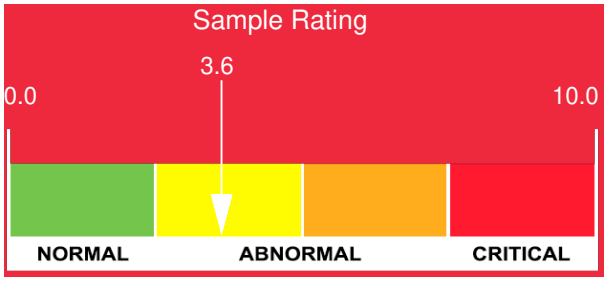
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/20/21	05/28/21	4.0y	Line #1	378 / 192	11.9	33.4	0.05	0.098	638 / 337	780 / 416	905 / 485	9.29
08/07/20	08/20/20	8.0y	EXIT EXCHANGE PORT	352 / 178	25.7	26.9	0.16	0.065	674 / 356	803 / 428	917 / 492	6.74
03/10/20	04/06/20	8.0y	SAMPLE PORT	338 / 170	6.5	30.7	0.10	0.154	697 / 370	805 / 430	919 / 493	3.72
10/01/19	10/15/19	5.0y		383 / 195	12.8	31.4	0.241	0.210	726 / 386	821 / 438	936 / 502	0.00
09/13/18	10/18/18	6.5y		356 / 180	16.5	30.9	0.02	0.054	705 / 374	791 / 422	895 / 480	0.36
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75

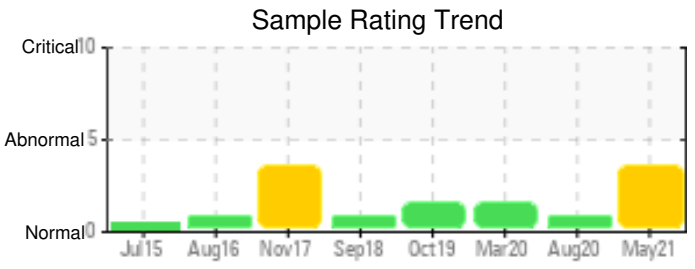






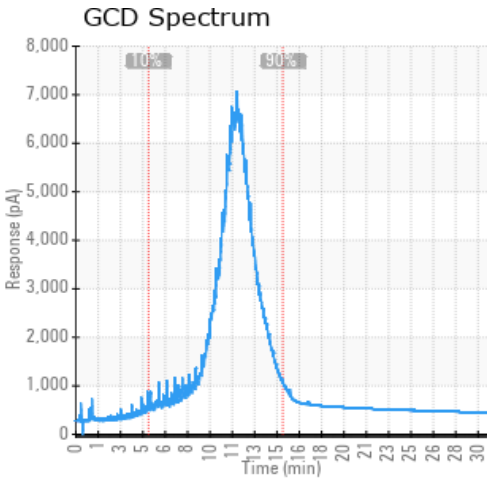
PETRO-CANADA LUBRICANTS

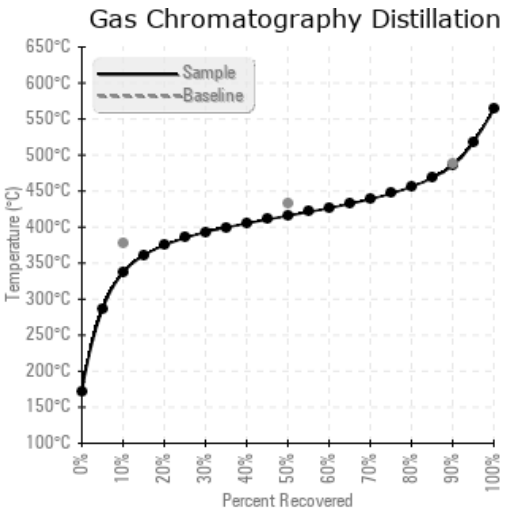


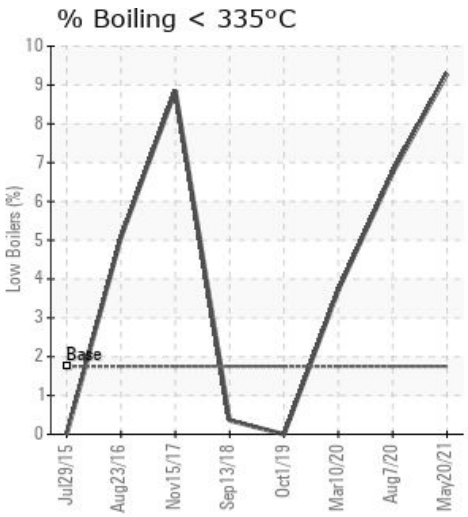


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
05/20/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
08/07/20	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
03/10/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
10/01/19	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
09/13/18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	30	0
Baseline Data			0	0						0			0	0				0	0				280	

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







Historical Comments

08/07/20	Fluid continues to show signs of thermal cracking but is suited for continued use. Recommend to vent light ends from system and sample at next interval. COC Flash Point is abnormally low.
03/10/20	System is in good health. Fluid continues to show signs of thermal degradation. COC Flash Point of 170°C is 61°C below new. All other parameters are within targets. Recommend venting of low boilers from the expansion tank. COC Flash Point is severely low.
10/01/19	Fluid is suitable for continued use. There is evidence of oxidation and thermal cracking. Acid number is rising. Viscosity is slightly reduced but still within viscosity grade. Flash point is 36°C lower than specified for new fluid. (GCD) 90% Distillation Point is slightly elevated. Pentane Insolubles has increased from previous sample. To increase the longevity of fluid, vent low boilers and a 20% drain and refill during the next system shutdown should help. Continue monitoring and yearly sampling.System wear in good health. System contaminants in good health. (GCD) 90% Distillation Point is marginally high. COC Flash Point is marginally low.
09/13/18	Fluid is suitable for continued use. There is evidence of thermal degradation. Viscosity is slightly reduced from original viscosity, yet remains an ISO 32 fluid. Flash Point has decreased. Pentane insolubles and debris have increase. Recommend venting of low boilers, as a minimum action. To increase the longevity of the bulk fluid, a 20% drain and refill during the next system shutdown should help. Continue to submit annual heat transfer fluid samples. COC Flash Point is abnormally low.