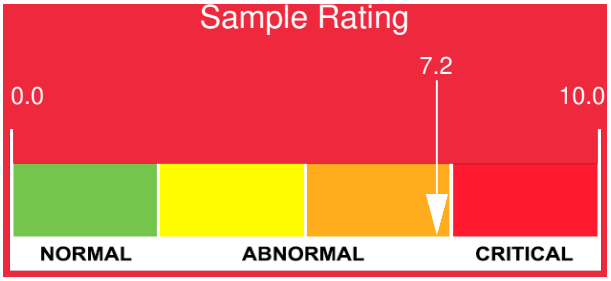
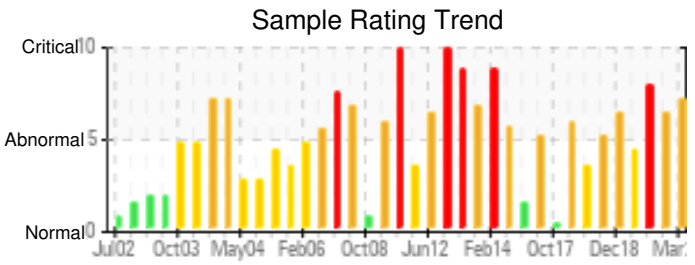




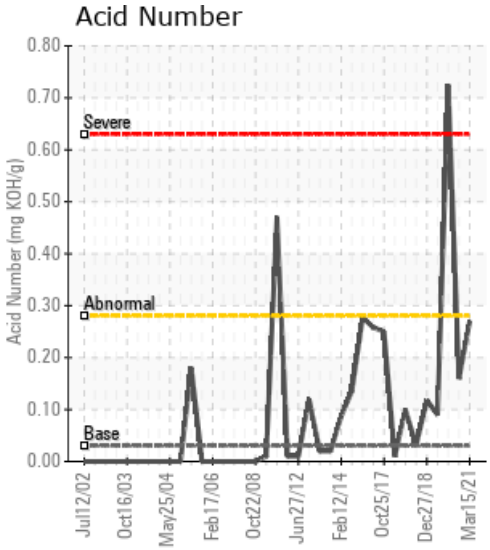
P1 HOT OIL BOILER

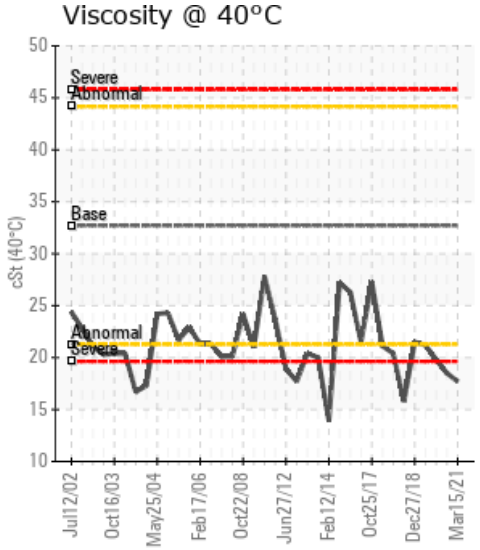
Customer: PTRHTF10083	System Information	Sample Information
KAO SPECIALTIES AMERICAS LLC 243 WOODBINE ST/PO BOX 2316 HIGH POINT, NC 27260 USA Attn: ROBERT WILLIAMS Tel: (336)878-4225 E-Mail: rwilliams@ksallc.com	System Volume: 7000 gal Bulk Operating Temp: 550F / 288C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: FIRST THERMAL	Lab No: 02410565 Analyst: Manny Garcia Sample Date: 03/15/21 Received Date: 03/22/21 Completed: 03/30/21 Manny Garcia manuel.garcia@hollyfrontier.com

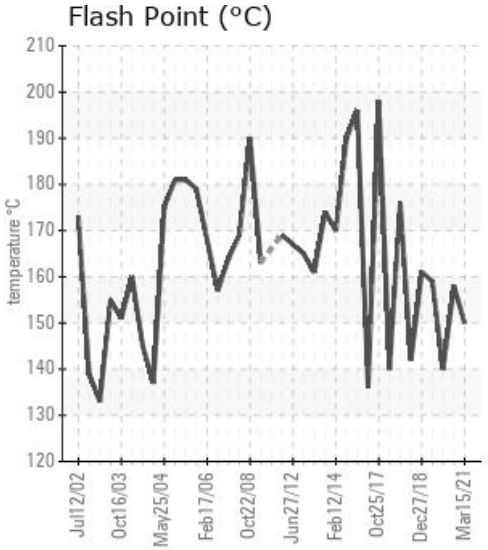
Recommendation: The past samples for this Fluid charge have consistently shown that the useful life of the fluid has been exceeded & should be considered for a fluid change-out.

Comments: (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. Visc @ 40°C is severely low. (GCD) % < 335°C is abnormally high. (GCD) 90% Distillation Point is marginally high.

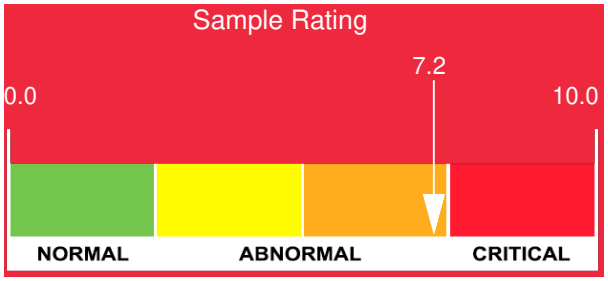
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/15/21	03/22/21	0.0y		302 / 150	17.3	17.7	0.27	0.224	568 / 298	772 / 411	906 / 485	15.49
11/02/20	11/06/20	0.0y	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	0.0y	MAIN HOT OIL PUMP	284 / 140	16.4	19.8	0.724	0.243	610 / 321	775 / 413	894 / 479	12.12
03/15/19	03/27/19	0.0y	G-1533	318 / 159	29.4	21.2	0.090	0.137	612 / 322	771 / 410	884 / 473	11.78
12/27/18	01/10/19	0.0y		322 / 161	8.4	21.5	0.118	0.150	596 / 313	750 / 399	866 / 463	14.33
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5

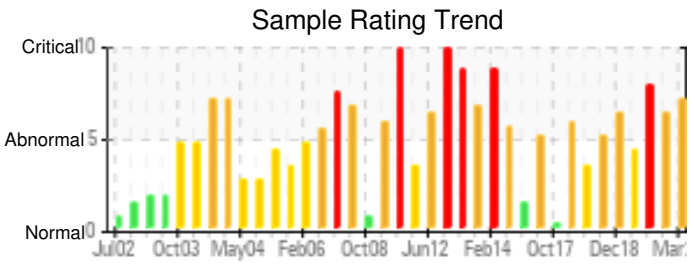






PETRO-CANADA LUBRICANTS

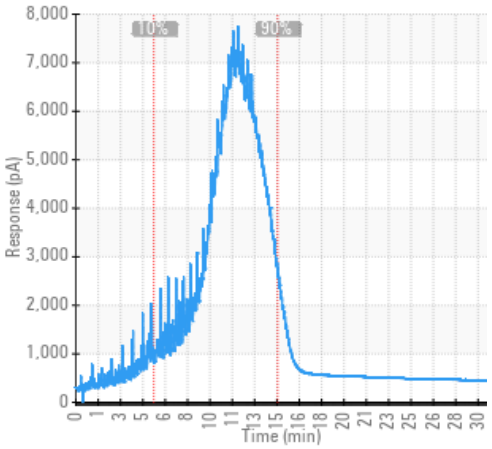




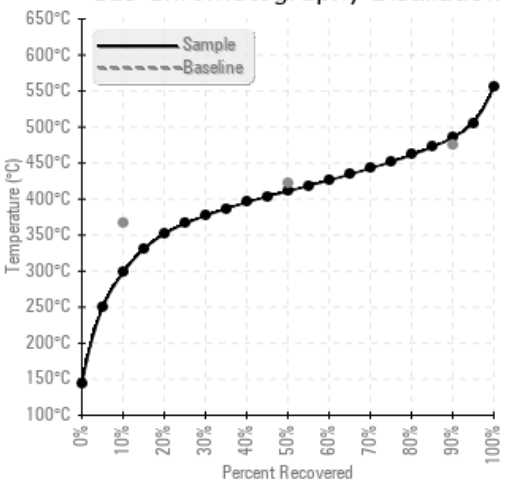
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
03/15/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
11/02/20	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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
03/15/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
12/27/18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Baseline Data			0	0						0			0	0					0				270	

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

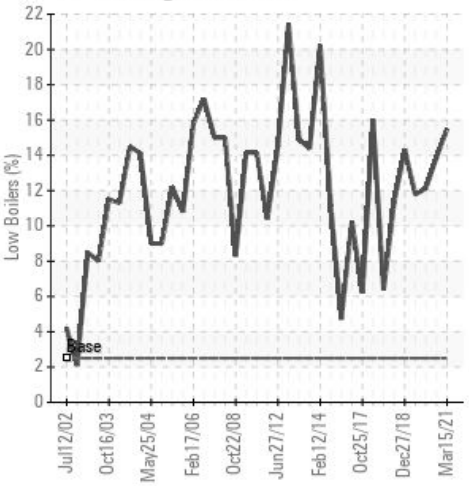
GCD Spectrum



Gas Chromatography Distillation



% Boiling < 335°C



Historical Comments

11/02/20	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.(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.
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.
03/15/19	Depending on the age of the fluid in use and the age of the heat transfer system, this oil may be a candidate for full fluid drain, flush and fill with virgin oil. Please submit Sample for analysis in march 2020Venting the system was recommended for the sample submitted on December 2017. This fluid sample appears to be in worse condition 3+ months later. Venting is recommended again. COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high. If venting was completed and nothing changed we could replace 10% of the fluid with virgin Calflo AF to get the fluid parameters aligned again.
12/27/18	Normally 'venting' the system may get the distillation points in line and possibly increase the COC Flash Point, but in this case the oil should be considered for change-out because it has very poor parameters in many critical areas. Please include the age of the fluid and the age of the component during the next annual sample submission.(GCD) 10% Distillation Point is severely low. COC Flash Point is severely low by a total of 73oC (163oF) and at very dangerous levels = 161oC (321oF). (GCD) % < 335°C is abnormally high. (GCD) 90% Distillation Point is marginally low. The viscosity of the fluid is 1 ISO grade lower at an ISO 22 instead of the formulated ISO 32. Fluid has light debris and white metal. Fluid Flash Point is at a dangerously low 73oC (163oF) levels.