

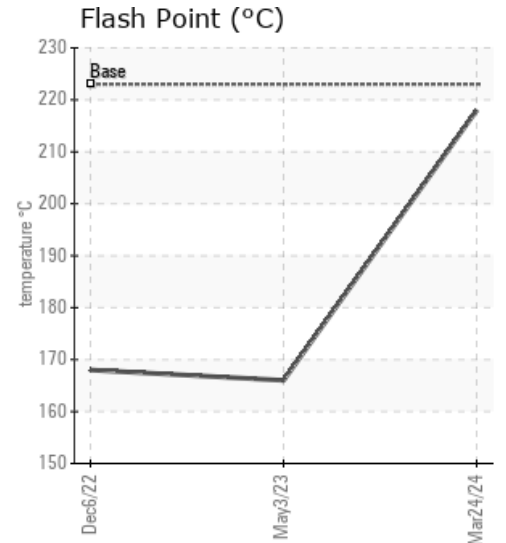
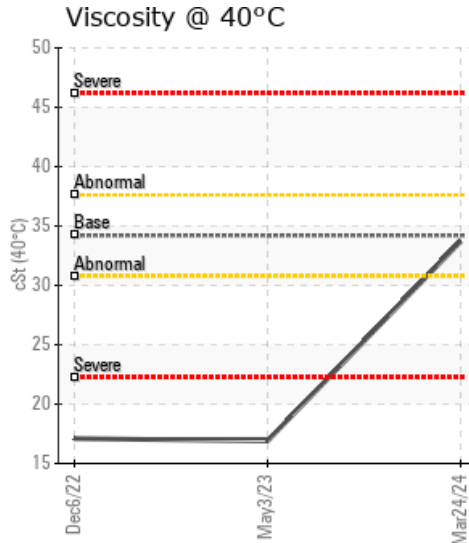
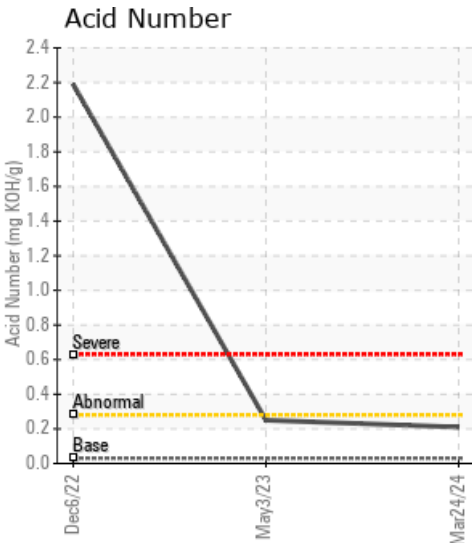
[A-72-F/94-H-3] TOURMALINE CONDY REBOILER

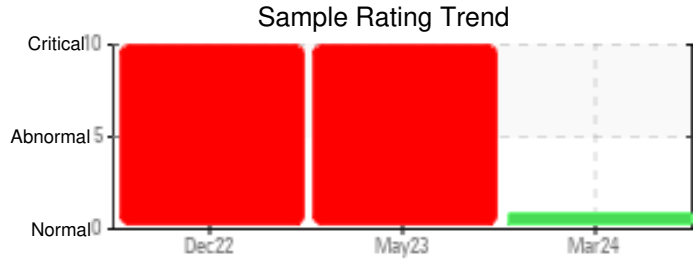
Customer: PTRHTF60071	System Information	Sample Information
Tourmaline Oil A-72-F/94-H-3 6604 100 Ave Fort St. John, BC V0C 1C0 CA Attn: Tel: E-Mail:	System Volume: 6000 ltr Bulk Operating Temp: 302F / 150C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: ARJEE	Lab No: 02626252 Analyst: Clinton Buhler Sample Date: 03/24/24 Received Date: 04/02/24 Completed: 04/10/24 Clinton Buhler Clinton.Buhler@HFSinclair.com

Recommendation: Sample results indicate the fluid is in suitable condition for continued service. Please re-sample in 12 months. Please carefully purge the sample point before taking the sample.

Comments:

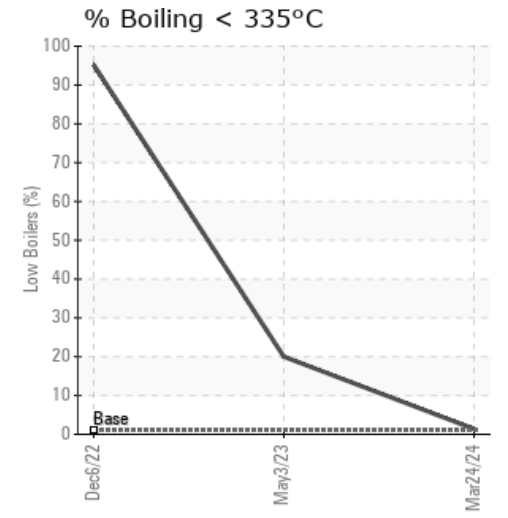
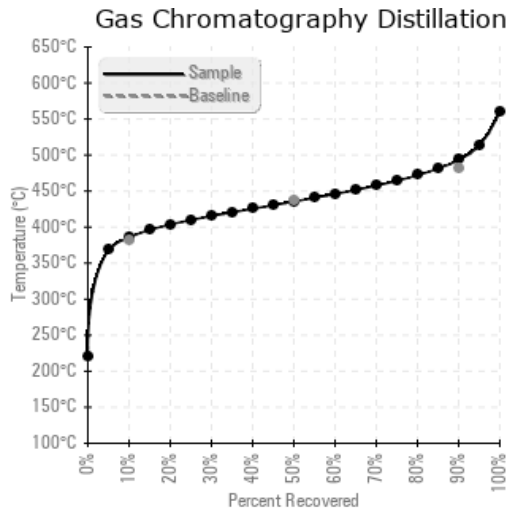
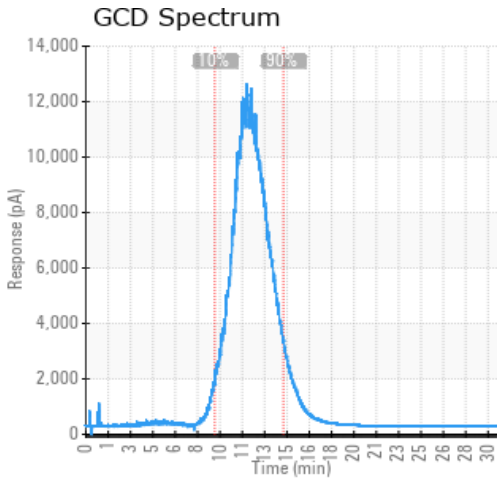
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/24/24	04/02/24	0.5y		424 / 218	37	33.7	0.21	0.102	726 / 386	816 / 436	920 / 493	1.36
05/03/23	05/23/23	0.0y		331 / 166	70.4	16.9	0.25	0.452	511 / 266	762 / 406	872 / 467	20.01
12/06/22	01/13/23	8.0y	LINE HEATER	334 / 168	22812.2	17.1	2.19		351 / 177	469 / 243	510 / 266	95.18
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00





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
03/24/24	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/03/23	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/06/22	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseline Data			0	0						0			0	0					0				0	

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



Historical Comments	
05/03/23	Sample results indicate potential thermal degradation and/or mixture with lighter hydrocarbon- note reduced fluid viscosity, flash point and 10% GCD temperature as well as very elevated low boiling vapor content of 20%. Thorough venting of the system expansion tank is required to help restore these properties. Note solids content is at 0.452%, near the limit of 0.5%. This indicates ongoing system fouling, likely due to thermal degradation. Please thoroughly vent expansion tank of low boiling vapors; make sure blanket gas is operational after venting sessions and re-sample system in 3 months. Please also eliminate any potential source of condensate getting into the heating system. Pentane Insolubles levels are abnormally high. (GCD) % < 335°C is severely high. (GCD) 10% Distillation Point is severely low. Visc @ 40°C is severely low. COC Flash Point is abnormally low. (GCD) 90% Distillation Point is abnormally low. (GCD) 50% Distillation Point is marginally low.
12/06/22	Sample results indicate excessive water contamination. It is advised to re-sample system immediately, but ensure that sample is drawn from a representative area that reflects hot fluid (ideally hot fluid in turbulent flow area if equipped with pumps). Do not sample from cool, low points. Thoroughly purge sample valve and related piping/tubing until hot fluid is coming out before drawing sample. If re-sample indicates the same, fluid replacement will be necessary, but we need to ascertain if this was a poor sample or not first. Drain any low points of potential free water and take measures to restrict entry of water into system. Water contamination levels are severely high. ppm Water contamination levels are severely high. (GCD) % < 335°C is severely high. Acid Number (AN) is severely high. (GCD) 10% Distillation Point is severely low. (GCD) 50% Distillation Point is severely low. (GCD) 90% Distillation Point is severely low. Visc @ 40°C is severely low. COC Flash Point is abnormally low.

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