

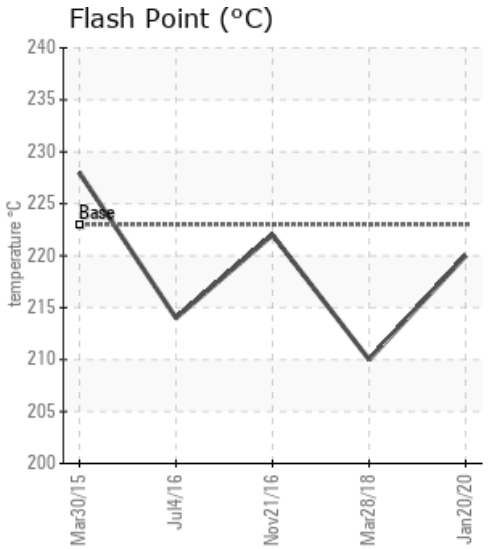
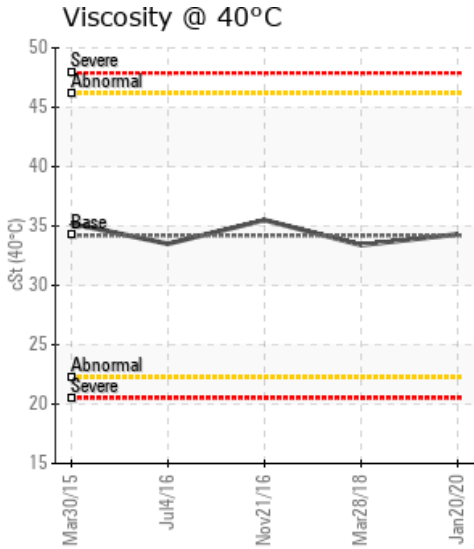
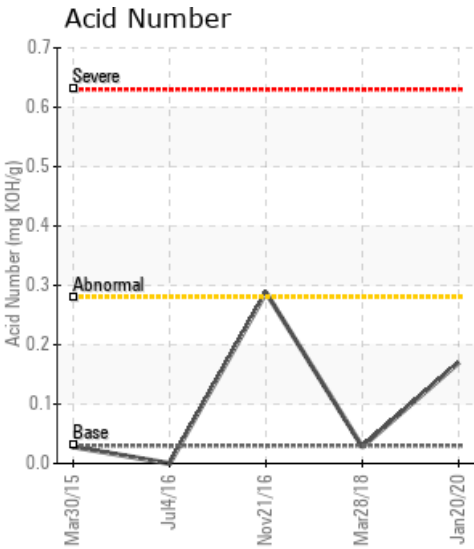
## [13-25-80-16-W6M] H-5500-2 Train 2

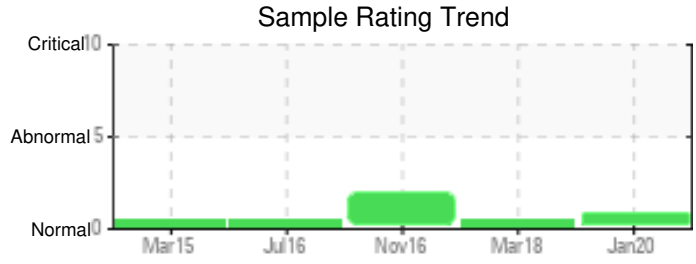
Customer: PTRHTF20156	System Information	Sample Information
TOURMALINE OIL 9920 98a Ave FORT ST. JOHN, BC V1J 1S2 Canada Attn: Brandon Braun Tel: (250)262-5420 E-Mail: Brandon.braun@tourmalineoil.com	System Volume: 55000 ltr Bulk Operating Temp: 464F / 240C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: PROPAK	Lab No: 02353744 Analyst: Clinton Buhler Sample Date: 01/20/20 Received Date: 05/13/20 Completed: 08/25/20 Clinton Buhler Clinton.Buhler@PetroCanadaLSP.com

Recommendation: Sample results indicate that the fluid is suitable for continued service. However, Solids content is at 0.422%; we usually alarm >0.5%. Solids can be related to degradation byproducts due to oxidation or thermal degradation. The other test results do not appear to support any concerning oxidation or thermal degradation. At next sample interval, please ensure sample is drawn from pump discharge (turbulent zone) and that sample valve and tubing is thoroughly purged prior to taking the sample. Please sample in 6 months

Comments: Pentane Insolubles levels are abnormally high.

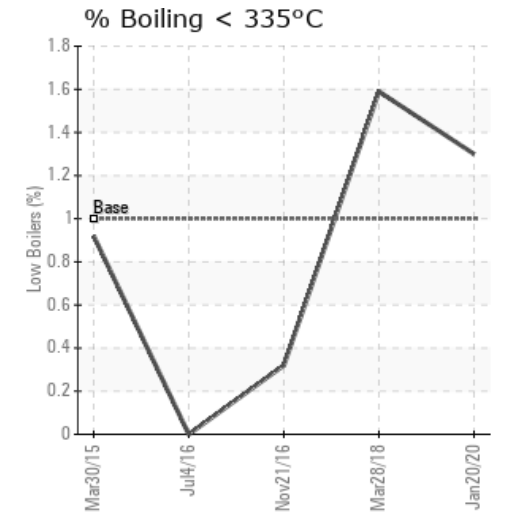
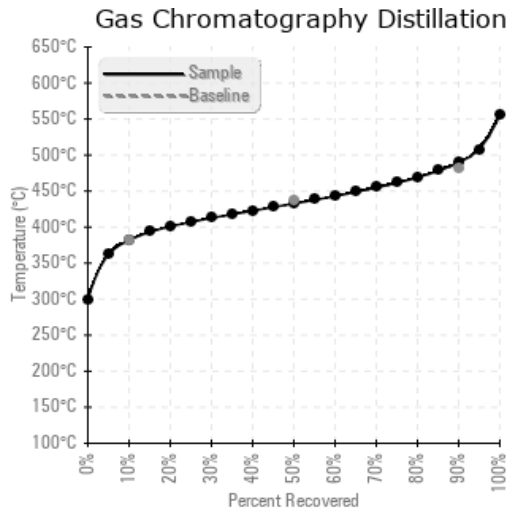
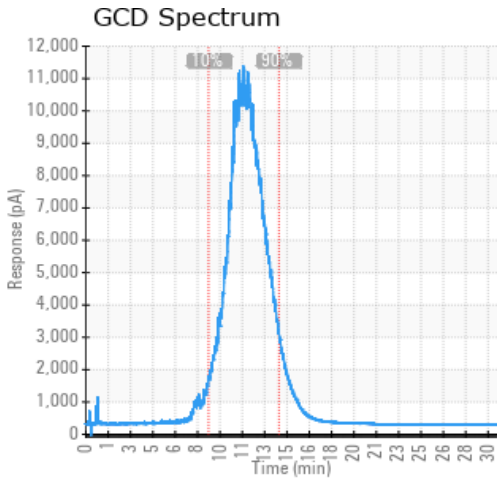
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/20/20	05/13/20	48y	DISCHARGE OFF PUMP	428 / 220	19.0	34.3	0.17	0.422	719 / 382	811 / 433	913 / 490	1.30
03/28/18	04/06/18	5y		410 / 210	0.00	33.4	0.028	0.016	709 / 376	806 / 430	906 / 486	1.59
11/21/16	11/24/16	0y	DISCHARGE PUMP	432 / 222	197.2	35.5	0.288	0.062	722 / 383	816 / 435	923 / 495	0.32
07/04/16	07/15/16	3y	PUMP SUCTION	417 / 214	0.00	33.5	0.000	0.089	715 / 380	800 / 427	901 / 483	0.00
03/30/15	04/17/15	0y	PUMP SUCTION	442 / 228	0.00	35.2	0.028	0.021	714 / 379	810 / 432	906 / 485	0.92
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
01/20/20	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0
03/28/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
11/21/16	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
07/04/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
03/30/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Baseline Data</b>			0	0						0			0	0					0				0	

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



Historical Comments	
03/28/18	sample results indicate that the thermal fluid is suitable for continued service. GCD %<335°C value of 1.59 is an indicator of thermal degradation. As part of good maintenance practice, perform regular venting of expansion tank to allow any low boiling vapors to be released. Re-sample in 12 months
11/21/16	TAN is starting to increase likely due to the water in the sample. GCD temp at 90% is starting to rise indicating some heavier ends in the sample. Resample in 3-4 months. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally high.
07/04/16	The fluid is in good condition. Please re-sample in 6 months.
03/30/15	No action needed at this time. Recommend system be resampled in 1 year, or at the onset of changes in the condition of the unit.

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