

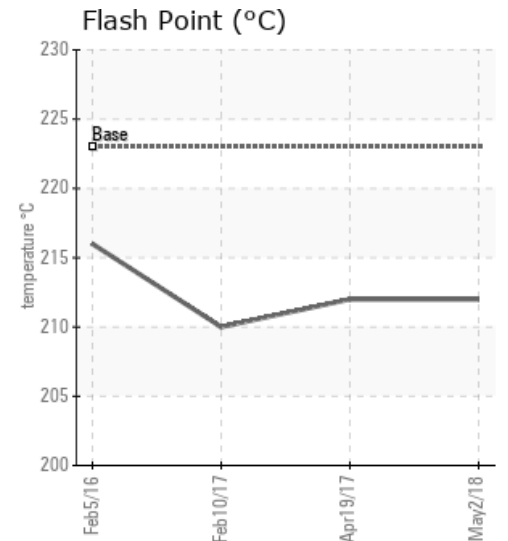
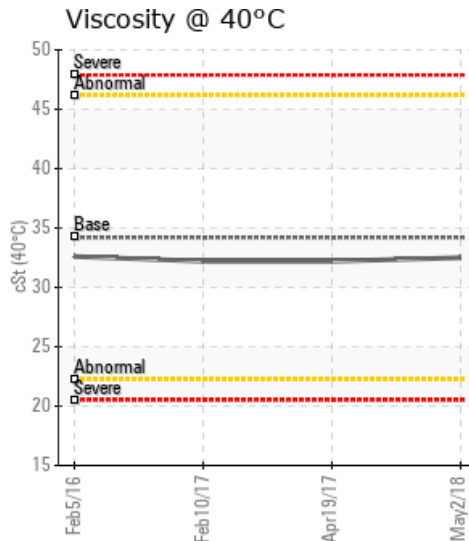
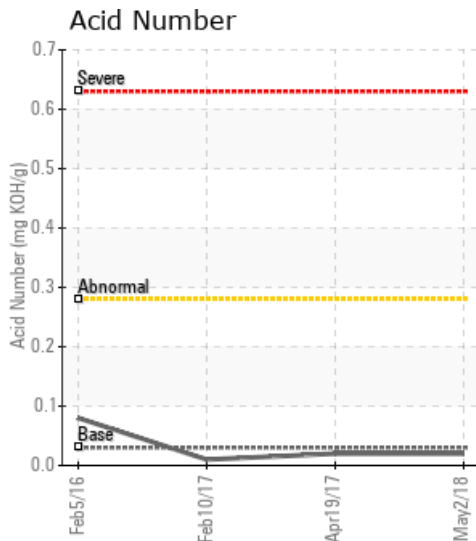
[TOURMALINE / 06-03-78-07W6M] HEAT TRANSFER

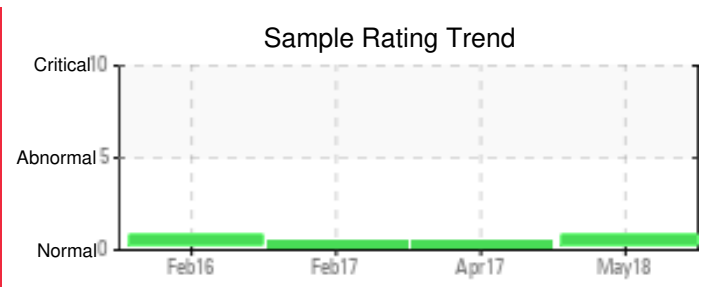
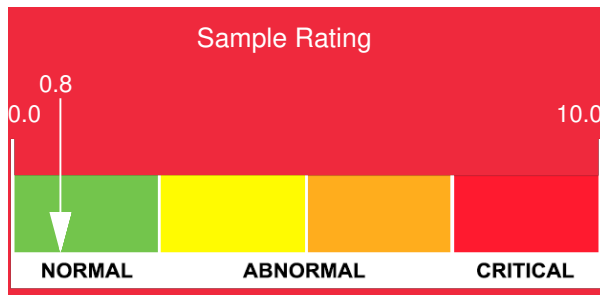
Customer: PTRHTF20155	System Information	Sample Information
TOURMALINE OIL 6-3-78-7-W6 BOX 748 SPIRIT RIVER, AB T0H 3G0 Canada Attn: Trent McKeage Tel: (780)864-5491 E-Mail: mckeage@tourmalineoil.com	System Volume: 4000 ltr Bulk Operating Temp: 248F / 120C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: HEAT TECH	Lab No: 02215186 Analyst: Clinton Buhler Sample Date: 05/02/18 Received Date: 05/09/18 Completed: 05/11/18 To discuss this report contact Clinton Buhler at 780-516-9920

Recommendation: Sample results indicate that the fluid is suitable for continued service. % boil off <335°C can be an indication of thermal degradation. Perform venting of expansion tank to release low boiling vapors. Slightly increased 90% Distillation point can be an indication of oxidation. Ensure blanket gas is operational in expansion tank. Re-sample within 12 months (please ensure venting has been completed before obtaining next sample)

Comments: (GCD) 90% Distillation Point is marginally high.

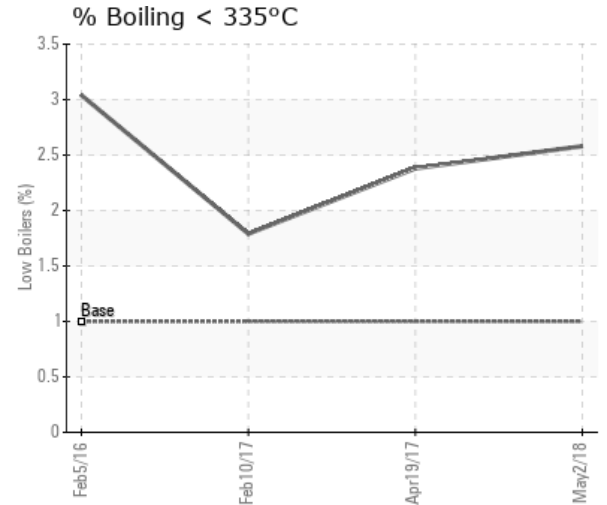
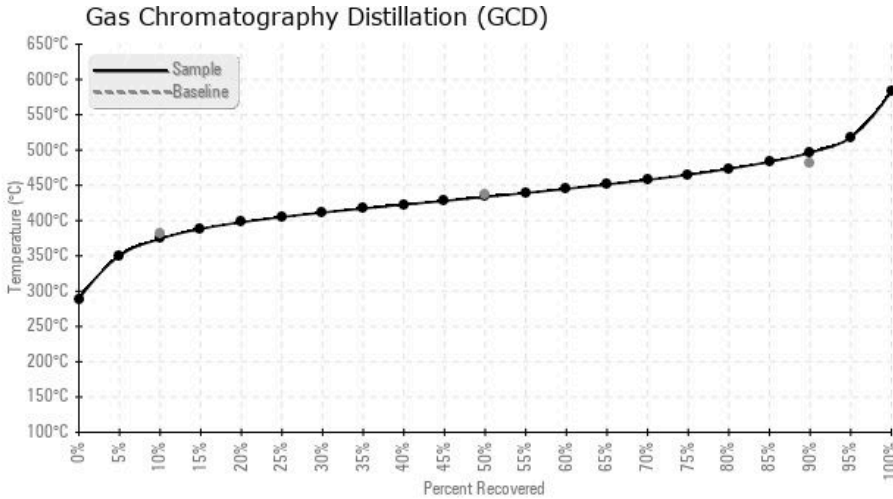
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/02/18	05/09/18	4y	PUMP OUTLET	414 / 212	7.6	32.5	0.02	0.023	706 / 374	812 / 434	925 / 496	2.58
04/19/17	04/27/17	0y		414 / 212	2.4	32.2	0.02	0.038	709 / 376	811 / 433	915 / 491	2.38
02/10/17	02/16/17	30y	PUMP OUTLET	410 / 210	9.0	32.2	0.01	0.058	710 / 377	807 / 431	914 / 490	1.79
02/05/16	02/11/16	0y	PUMP OUTLET	421 / 216	111.6	32.6	0.08	0.103	705 / 374	811 / 433	921 / 494	3.04
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
05/02/18	6	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	6	0
04/19/17	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	0
02/10/17	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	6	0
02/05/16	24	0	0	0	0	0	0	0	0	0	1	4	2	0	0	0	0	0	1	0	0	0	8	1
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	
04/19/17	results indicate that fluid is suitable for continued use. % GCD <335C and 10% distillation point indicate that thermal degradation may be beginning. Consider venting expansion tank of low boiling vapors. Re-sample within 12 months (please ensure venting has been completed before obtaining next sample)For future analysis, please include time on oil, component age and blanket gas type
02/10/17	Sample indicates that fluid is in good condition and is suitable for continued use. Resample in 12 months.
02/05/16	Sample is marginally high in the GCD 90% indicating some heavier ends in the oil. Otherwise the oil is good for continued use. Resample in 12 months. (GCD) 90% Distillation Point is marginally high.

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