

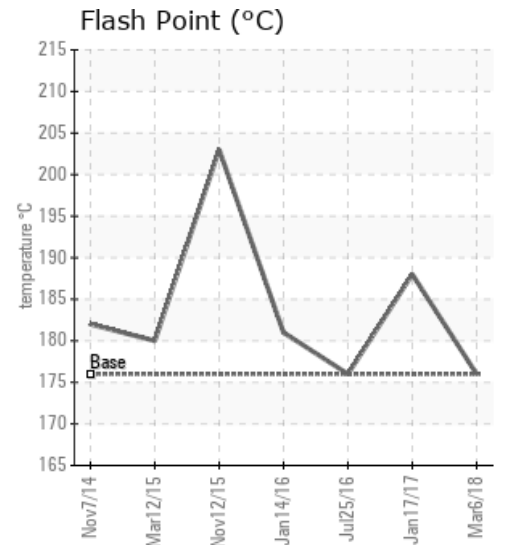
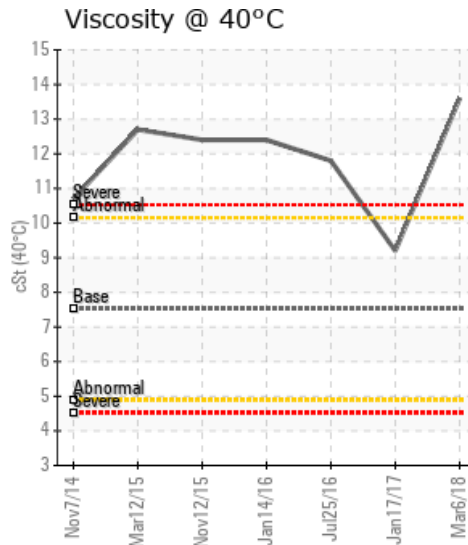
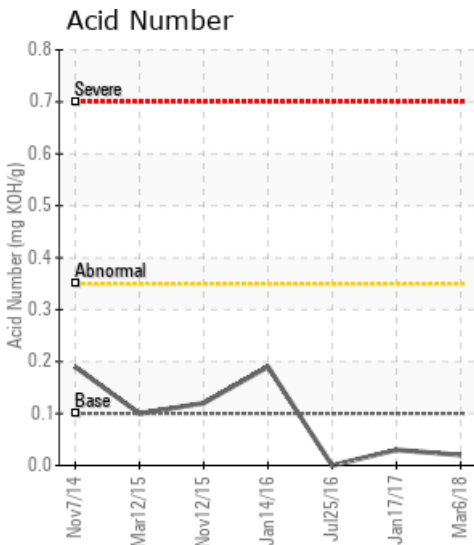
[TOURMALINE OIL CORP / 9-13-62-6-W6] MUSREAU 9-13

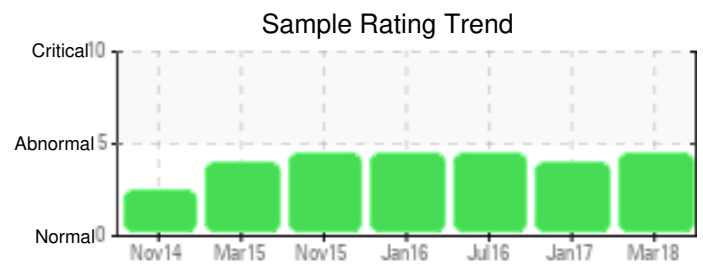
Customer: PTRHTF20149	System Information	Sample Information
TOURMALINE OIL MUSREAU 9-13-62-6-W6 GRAND PRARIE, AB Canada Attn: Anthony Mccoy Tel: (780)512-8408 E-Mail: mccoy@tourmalineoil.com	System Volume: 34000 ltr Bulk Operating Temp: 410F / 210C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO LT Make: ZIRCO 5500	Lab No: 02203925 Analyst: Clinton Buhler Sample Date: 03/06/18 Received Date: 03/14/18 Completed: 03/21/18 To discuss this report contact Clinton Buhler at 780-516-9920

Recommendation: Sample results indicate that the fluid is suitable for continued service. Please note 50% and 90% distillation point is consistently higher than expected as is the fluid's viscosity. This can be an indication of Oxidation, but the fluid's Total Acid Number is very low, so it is more likely that a heavier fluid has been possibly mixed in. Investigate the cause of oil thickening. It is good practice to ensure a blanket gas is applied to the expansion tank and set at 2-3 psi. Re-sample in 12 months.

Comments: (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is 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	%
03/06/18	03/14/18	5y		349 / 176	10.2	13.6	0.02	0.110	616 / 325	703 / 373	837 / 447	25.99
01/17/17	01/23/17	4y	PUMP DISCHARGE	370 / 188	35.5	9.2	0.03	0.063	613 / 323	705 / 374	856 / 458	27.09
07/25/16	07/28/16	3y	PUMP DISCHARGE	349 / 176	79.8	11.8	0.000	0.061	617 / 325	715 / 379	874 / 468	22.83
01/14/16	01/21/16	11000y	PUMP SUCTION	358 / 181	61.6	12.4	0.190	0.077	616 / 324	709 / 376	859 / 460	24.83
11/12/15	11/19/15	12y	DISCHARGE PUMP	397 / 203	301.0	12.4	0.12	0.077	615 / 324	704 / 374	856 / 458	26.56
03/12/15	03/20/15	6y	Y STRAINER	356 / 180	90.2	12.7	0.10	0.162	616 / 324	698 / 370	832 / 445	26.50
Baseline Data				349 / 176		7.52	0.1		604 / 318	640 / 338	734 / 390	35.0

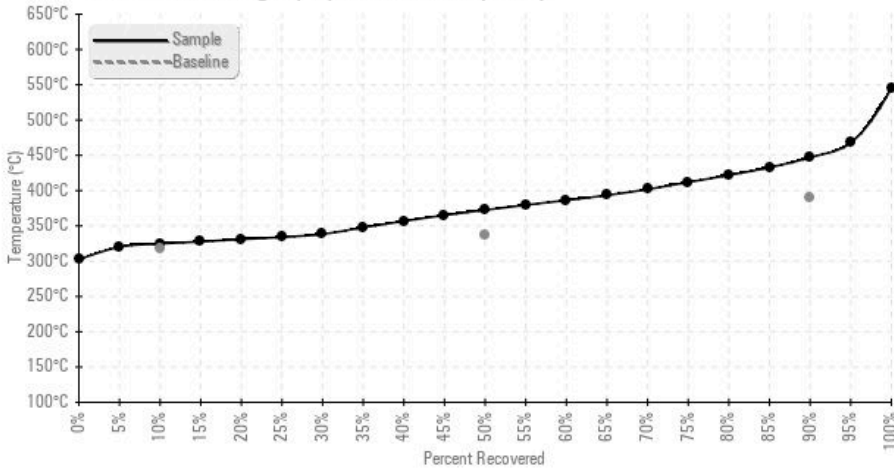




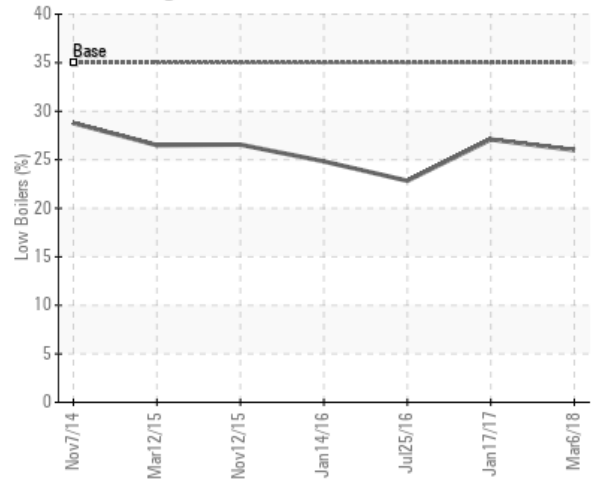
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
03/06/18	24	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	33	0
01/17/17	28	0	0	0	0	0	1	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	38	0
07/25/16	43	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	41	0
01/14/16	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	41	1
11/12/15	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	41	1
03/12/15	5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	41	1
Baseline Data			0	0						0			0	0					0				270	

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

Gas Chromatography Distillation (GCD)



% Boiling < 335°C



Historical Comments

01/17/17	Oil Condition: (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Sample has improved slightly since last sampled in July. Resample in 6 months (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high.
07/25/16	The viscosity of the fluid is high. This in combination with high 50% and 90% GCD temperatures indicates degradation of the fluid by oxidation or ingress of a heavier fluid. The fluid is suitable for further use. Please re-sample in 6 months. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high.
01/14/16	(GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high. Suspect that some heavier end in the oil either from contamination or thermal cracking. Oil does not appear to be getting any worse than previous samples. Continue to operate and resample in 6-9 months. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high.
11/12/15	GCD at 50% and 90% is high indicating that it could be some thermal cracking or contamination. Continue to operate and resample in 6 months. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high.
03/12/15	The GCD temperatures at 50% and 90% are high. This in combination with a significant increase in viscosity indicates fluid oxidation. Please check for proper operation of the blanket gas system. The fluid is suitable for further use. Please re-sample in 6 months. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high. (GCD) 50% Distillation Point is notably high.

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