

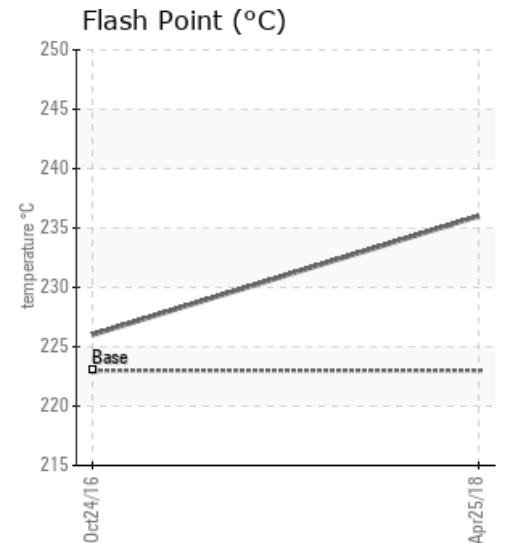
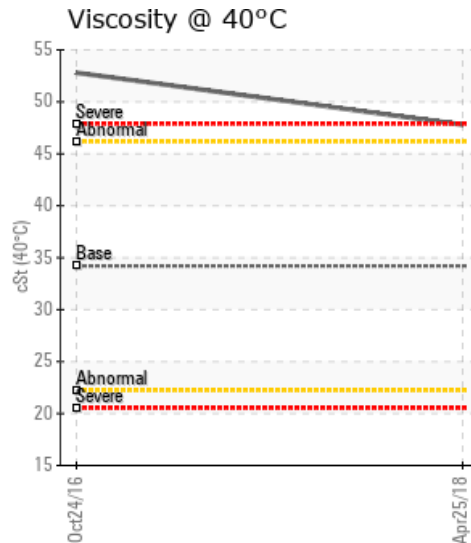
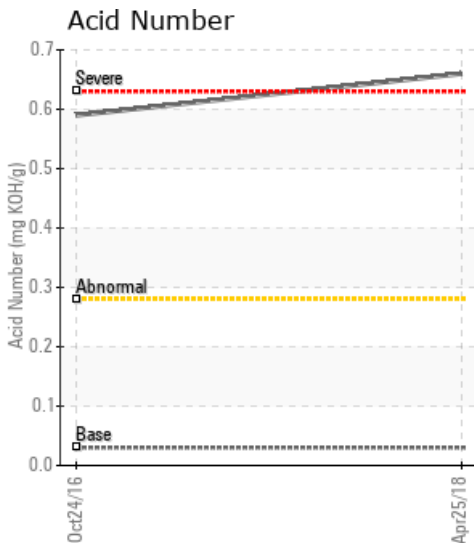
KONUS #1, 2 & 3

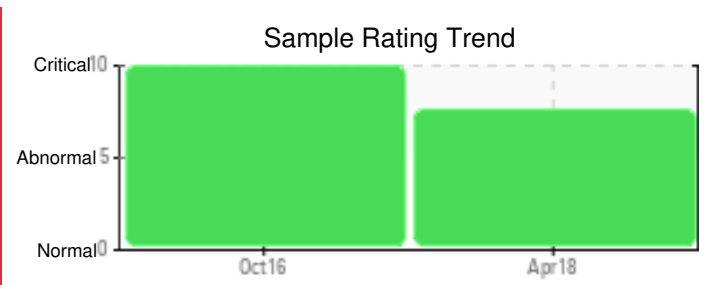
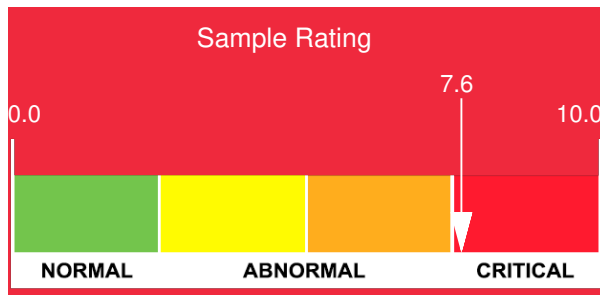
Customer: PTRHTF20179	System Information	Sample Information
Canadian Forest Products 36654 Hart Highway General Delivery Bear Lake, BC V0J 3G0 Canada Attn: Robert J.C Bigham Tel: (778)349-3987 E-Mail: robert.bigham@canfor.com	System Volume: 120000 ltr Bulk Operating Temp: 446F / 230C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: KONUS	Lab No: 02213744 Analyst: Ray Rolston Sample Date: 04/25/18 Received Date: 05/02/18 Completed: 05/09/18 To discuss this report contact Ray Rolston at (250)893-4496

Recommendation: Iron wear has remained at 57 ppm, while other wear metals are at low levels. The presence of additive metals sodium and calcium are unexpected, but their concentration has dropped since the last sample in October 2016. The oil's viscosity and Gas Chromatography Distillation (GCD) results have also improved since the last sample. The Total Acid Number (TAN) has increased to 0.66 mg KOH/g, above the condemning limit of 0.60, and Pentane Insolubles value of 4.88 (previously 5.99) suggests that the oil has oxidized and a significant volume of sediment is present. Petro-Canada Lubricants recommends that the Petro-Therm heat transfer fluid be drained, flushed and replaced as soon as practical.

Comments: Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Calcium ppm levels are severely high. Sodium ppm levels are abnormally high. Visc @ 40°C is abnormally high.

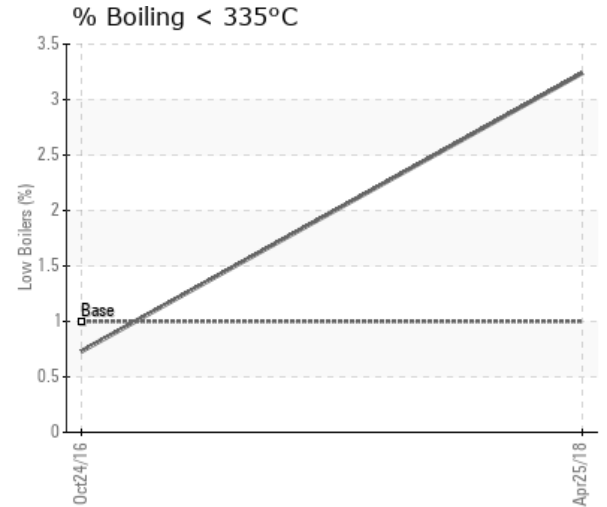
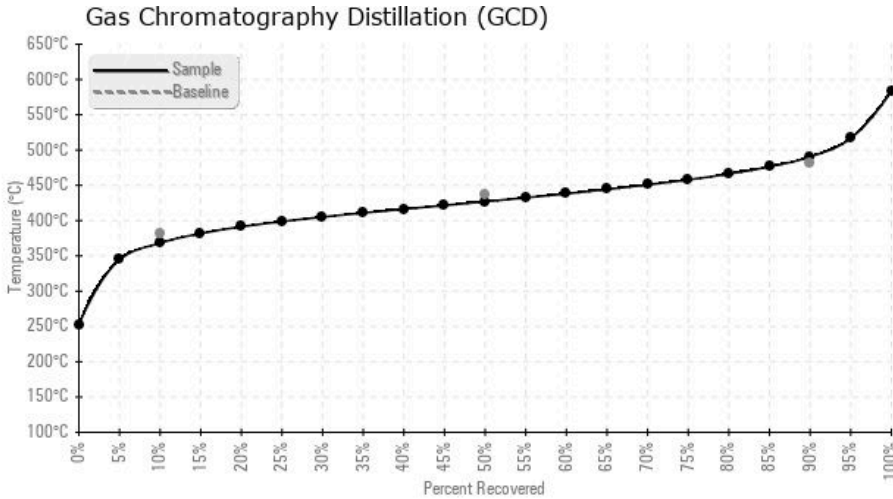
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/25/18	05/02/18	0y		457 / 236	315.9	47.8	0.66	4.88	695 / 368	800 / 427	915 / 490	3.24
10/24/16	11/11/16	8y		439 / 226	979.7	52.8	0.59	5.99	721 / 383	819 / 437	934 / 501	0.73
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
04/25/18	57	0	0	0	1	1	0	65	0	0	1	33	0	0	0	1	1	0	0	0	65	0	6	9
10/24/16	57	0	0	1	0	0	1	99	0	0	1	47	2	0	0	0	1	0	2	0	99	0	9	11
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

10/24/16	The sample shows a high level of acids through high Acid Number, a high amount of water as well as high concentrations of sodium and calcium. If this is truly a representative sample of what is flowing through this system this is extremely concerning. However, experience shows it might come from a sampling valve that was improperly flushed. Either way, we recommend to re-sample after making sure a good 4L (1 gal.) of oil is drained out before collecting the sample. Pentane Insolubles levels are severely high. ppm Water contamination levels are abnormally high. Water contamination levels are abnormally high. Sodium ppm levels are severely high. Calcium ppm levels are severely high. Visc @ 40°C is severely high. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally high.

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