

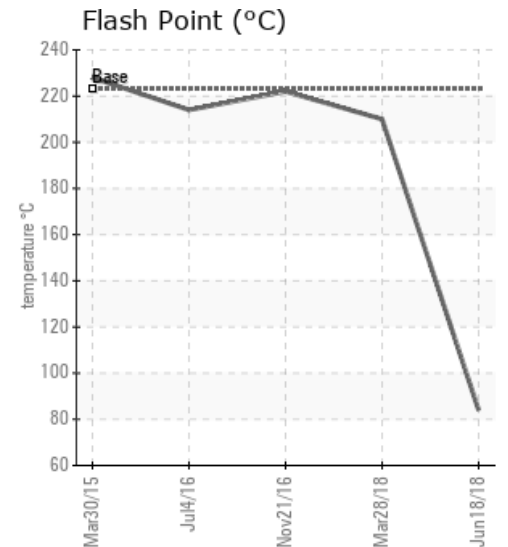
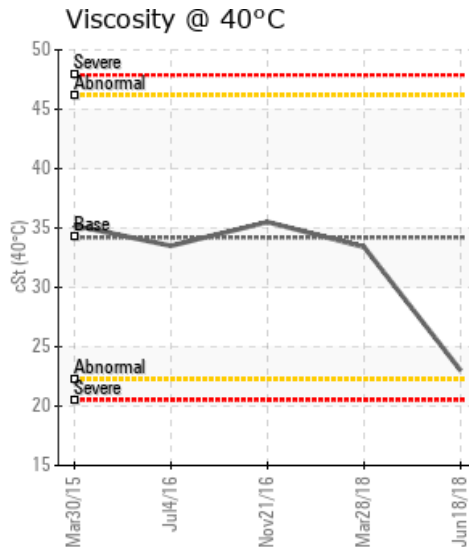
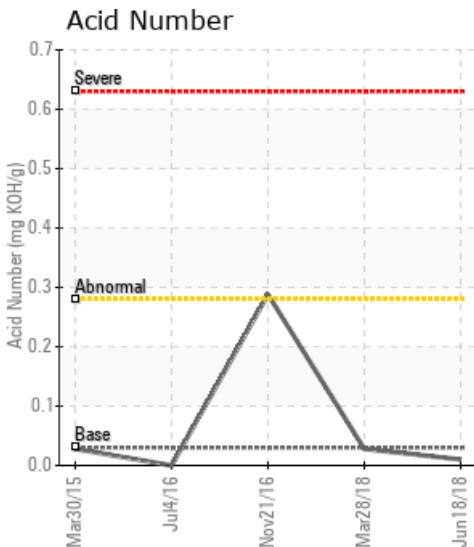
[13-25-80-16-W6M] TRAIN #1 HEAT MEDIUM

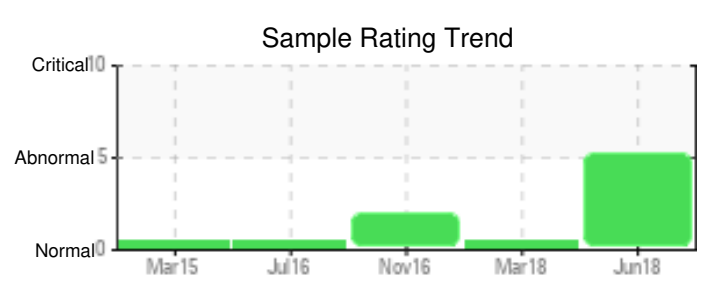
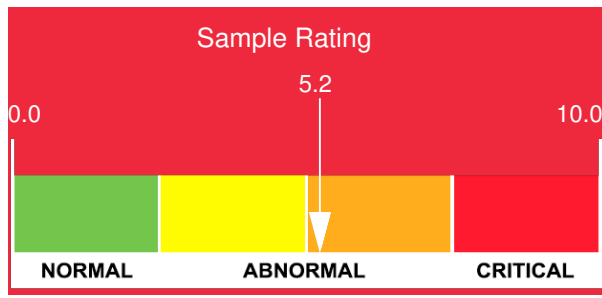
Customer: PTRHTF20156	System Information	Sample Information
TOURMALINE OIL 13-25-80-16W6 9920 98a Ave FORT ST. JOHN, BC V1J 1S2 Canada Attn: Brandon Braun Tel: (250)262-5420 E-Mail:	System Volume: 40000 ltr Bulk Operating Temp: 383F / 195C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: PROPAK	Lab No: 02223207 Analyst: Clinton Buhler Sample Date: 06/18/18 Received Date: 06/20/18 Completed: 06/22/18

Recommendation: Sample results indicate the this heat transfer fluid is not suitable for continued service. Most concerning is the extremely low Flash Point value of 84C. This poses a safety hazard to continue use. Flash point has gone from 210C in the previous sample to 84C, fluid viscosity has gone from 33.4 to 23 cSt and % of fluid boil off < 335C has gone from 1% to more than 9%. Fluid replacement is recommended and mitigation of the source of dilution is required. After the entire system has been cleaned and new fluid has been filled, obtain a sample from the system before start-up. Once system has been in operation at normal temperatures for 24 hours, please obtain a second fluid sample to establish new trend. Please contact Petro-Canada Lubricants for further support

Comments:

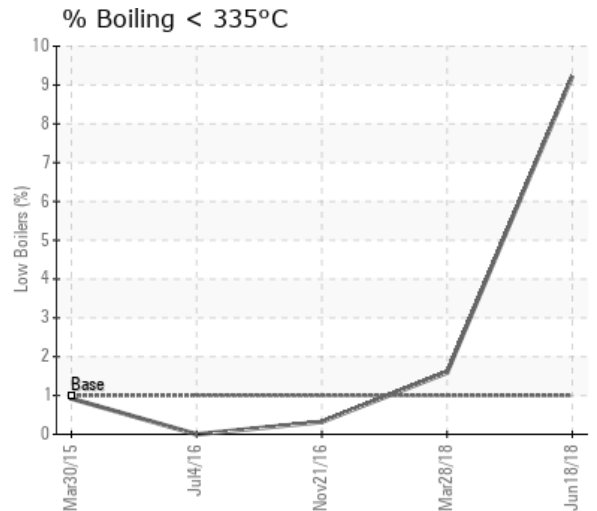
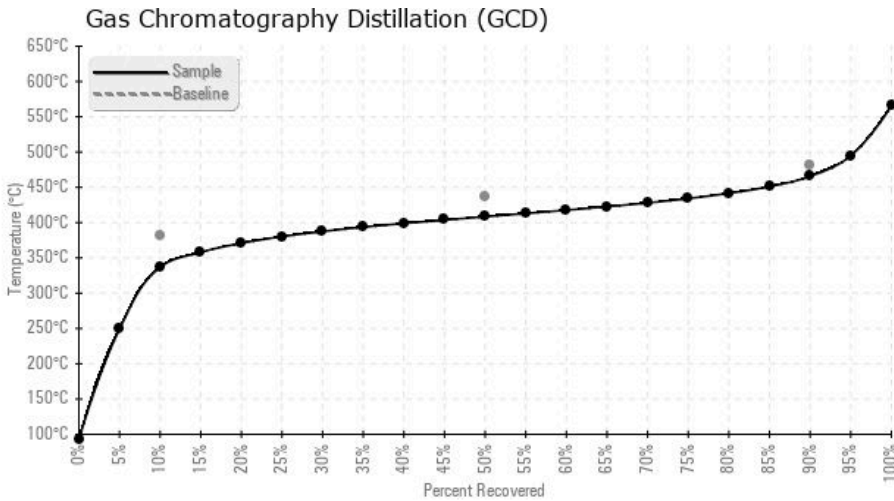
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
06/18/18	06/20/18	5y	13-25-80-16-W6M	183 / 84	27.5	23.0	0.01	0.048	639 / 337	767 / 408	870 / 466	9.23
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
06/18/18	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	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
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	
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.

Petro-Canada makes no representation or warranty of any kind, either express or implied, as to the accuracy or completeness of the analysis and assumes no responsibility and shall have no liability whatsoever with respect to such analysis, or a party's use of it. Petro-Canada is a division of HollyFrontier Corporation.