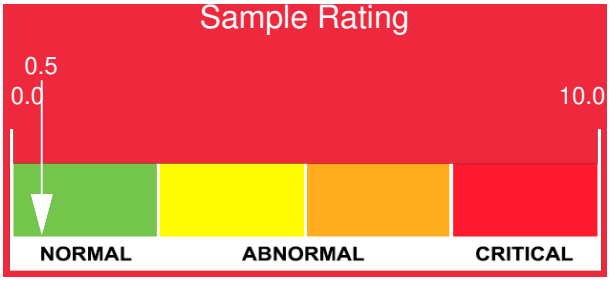
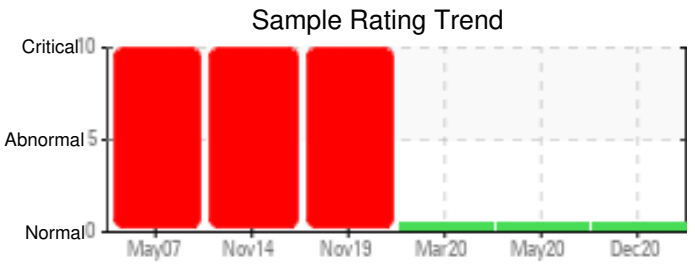




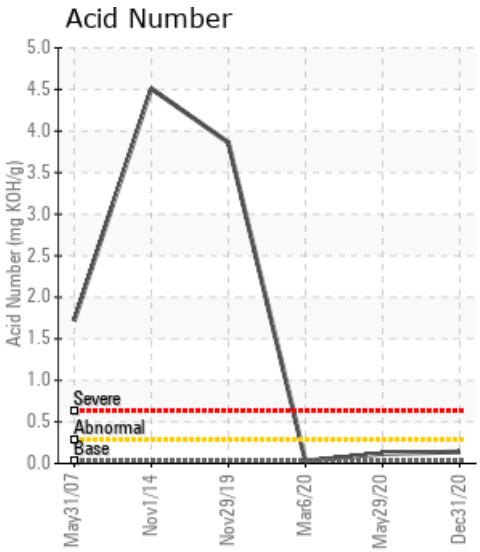
ASHCROFT

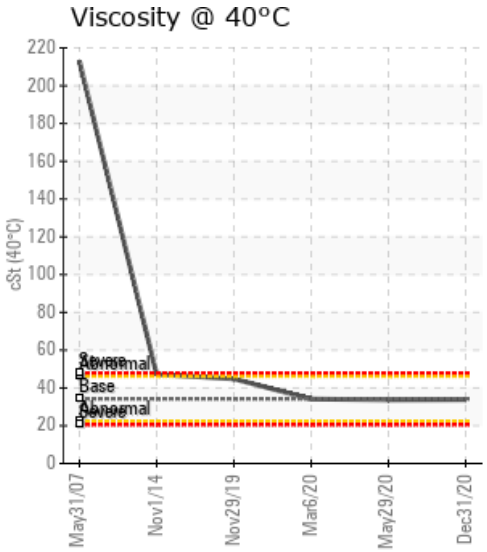
Customer: PTRHTF20075	System Information	Sample Information
KOPPER ASHCROFT INC. PO BOX 1510 ASHCROFT, BC V0K 1A0 Canada Attn: Darcy Klages Tel: E-Mail: klagesdk@koppers.com	System Volume: 5000 ltr Bulk Operating Temp: 410F / 210C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: GEKA	Lab No: 02397473 Analyst: Rob Spiller Sample Date: 12/31/20 Received Date: 01/13/21 Completed: 01/15/21 Rob Spiller Rob.Spiller@petrocanadalsp.com

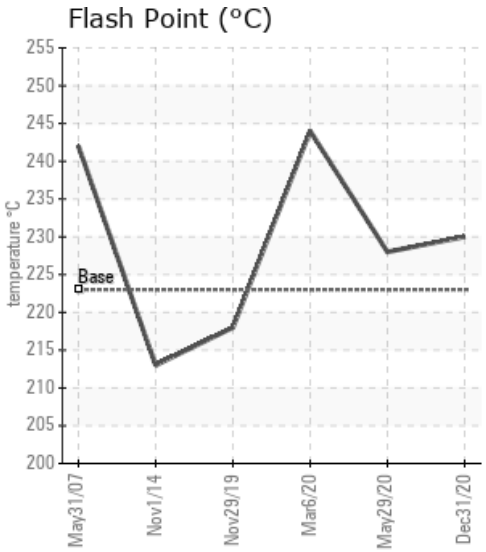
Recommendation: Petro-Therm fluid is still in very good condition after 1 year of service, slight increase in solids (pentane insolubles) but no significant changes in properties from the new fluid. Recommend sampling again in 6 months for continued system monitoring.

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	%
12/31/20	01/13/21	365d	DRAIN PORT	446 / 230	36.1	33.8	0.14	0.159	738 / 392	824 / 440	918 / 492	1.03
05/29/20	06/10/20	12d	PUMP PORT	442 / 228	54.0	33.7	0.12	0.087	741 / 394	820 / 438	902 / 484	0.71
03/06/20	06/10/20	1d	PUMP	471 / 244	30.4	34.1	0.03	0.086	738 / 392	823 / 440	917 / 492	1.08
11/29/19	12/05/19	2d	PUMP	424 / 218	370.6	44.8	3.86	7.31	552 / 289	770 / 410	893 / 478	15.56
11/01/14	11/10/14	0d	THERMAL OIL PUMP	415 / 213	7190.6	47.2	4.51	10.2	724 / 385	817 / 436	918 / 492	0.00
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00







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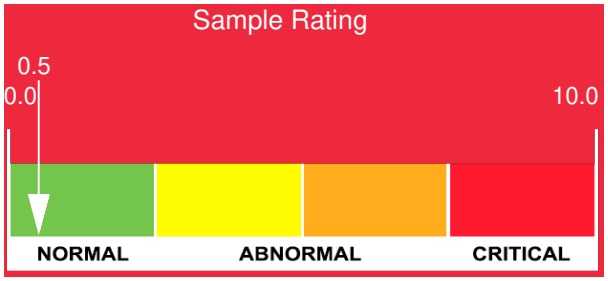
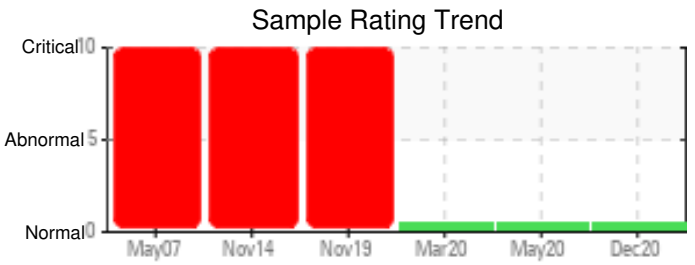
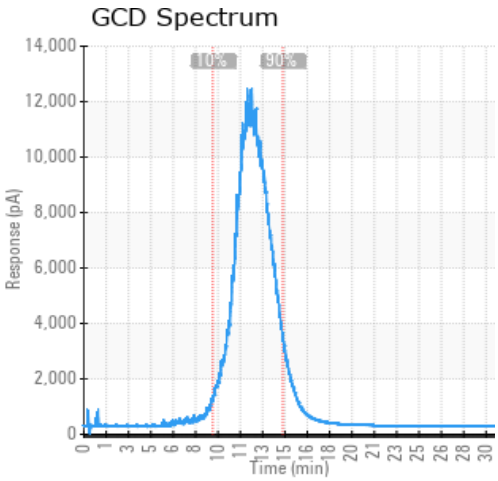
PETRO-CANADA LUBRICANTS

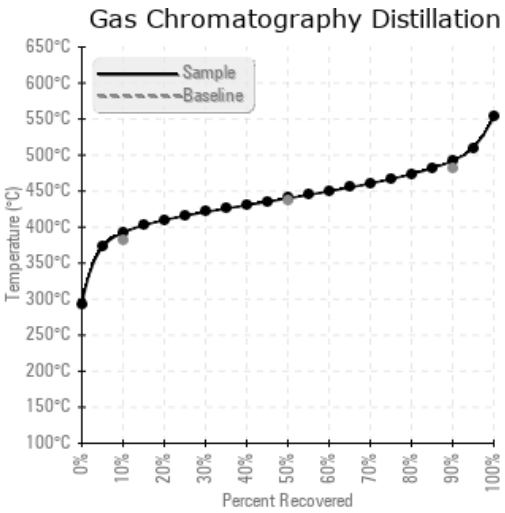


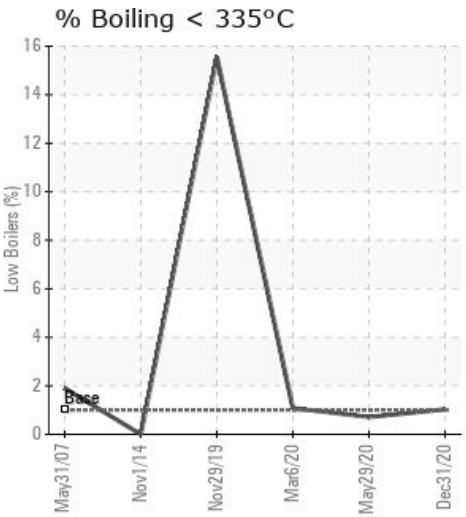


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
12/31/20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/29/20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/06/20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
11/29/19	794	0	0	0	4	4	0	0	0	0	2	0	0	0	0	0	9	0	0	0	0	0	0	2
11/01/14	963	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	5	0	4	0	5	0	2	2
Baseline Data			0	0						0			0	0					0				0	

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







Historical Comments

05/29/20	Petro-Therm is in excellent condition after 3 months of service, no significant changes in properties from the new fluid. Recommend sampling again in 6-12 months for continued system monitoring.
03/06/20	Sample of new fill of Petro-Therm right after cleaning and flushing procedure shows that cleaning was very effective. No signs of old degraded fluid or solids in the system.
11/29/19	GCD analysis and high solids (insolubles) shows evidence of extensive thermal degradation of oil. Increase in acid number also shows significant oxidation is occurring. The high iron (Fe) is due to corrosion from acidic compounds in the oil caused by oxidation, the acid number is 3.86 while the condemning limit is 1.0. Full system cleaning (minimum 2 runs) is required. Recommend measures to mitigate oxidation, such as inert gas blanket on expansion tank. Also strongly recommend investigating cause of thermal degradation, and then taking actions to correct the cause.Iron ppm levels are severe. PQ levels are severe. Pentane Insolubles levels are severely high. Water contamination levels are marginally high. ppm Water contamination levels are marginally high. Acid Number (AN) is severely high. (GCD) 10% Distillation Point is severely low. (GCD) % < 335°C is abnormally high.
11/01/14	Fluid should be changed out and system cleaned very soon! Extremely high Total Acid Number and Solids levels will cause damage to the system. Recommend draining fluid, performing cleaning and flushing procedure on the system, and refilling with new Petrotherm.Iron ppm levels are severe. Water contamination levels are severely high. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high. (GCD) 90% Distillation Point is marginally high.

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