

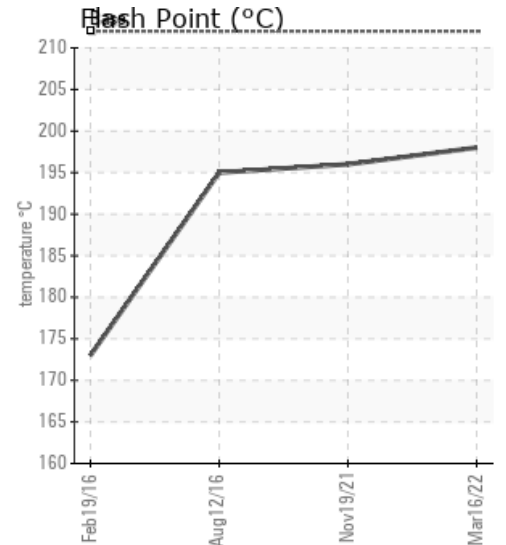
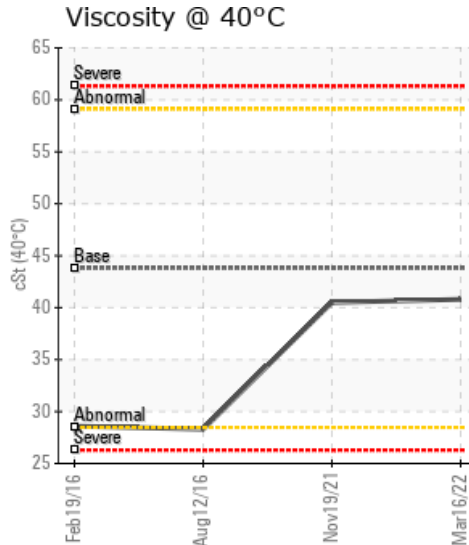
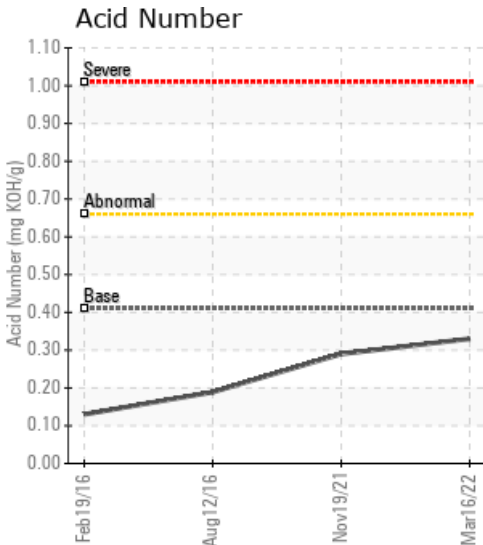
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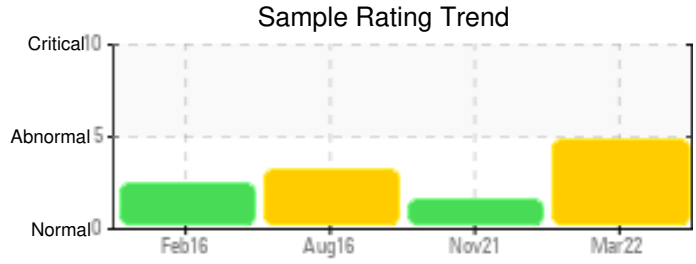
Customer: PTRHTF10170	System Information	Sample Information
TYREE OIL CO. INC. 2429 N. BORTHWICK AVE PORTLAND, OR 97227 USA Attn: Tom Taft Tel: (503)991-8708 E-Mail: tom@tyreeoil.com	System Volume: 1700 gal Bulk Operating Temp: 400F / 204C Heating Source: Blanket: Fluid: HEAT TRANSFER FLUID ISO 46 Make:	Lab No: 02480747 Analyst: Ron LeBlanc Sample Date: 03/16/22 Received Date: 03/31/22 Completed: 04/27/22 Ron LeBlanc Ronald.LeBlancSr@hollyfrontier.com

Recommendation: (GCD) 10% Distillation Point is severely low which can lower flash point of the fluid. The report shows flash point is lowered. The GCD % is marginally above new fluid specification. Viscosity is below new oil specification indicating Thermal Degradation. Pentane insolubles elevated can indicate sludge formation. The GCD Profile indicates Thermal Cracking. Adding new oil could be a help in this case to sweeten the overall fluid condition.

Comments: Pentane Insolubles levels are abnormally high. (GCD) 10% Distillation Point is severely low. (GCD) % < 335°C is marginally high.

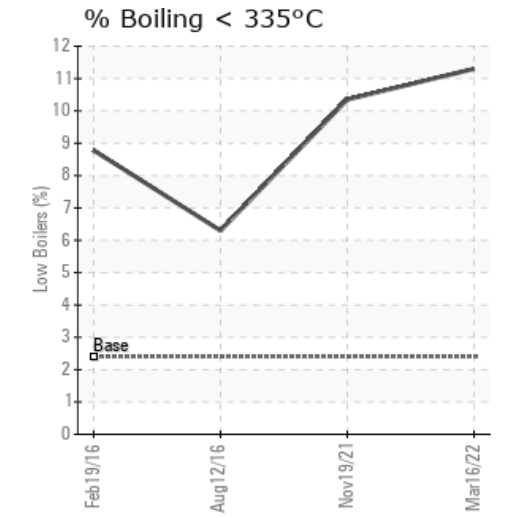
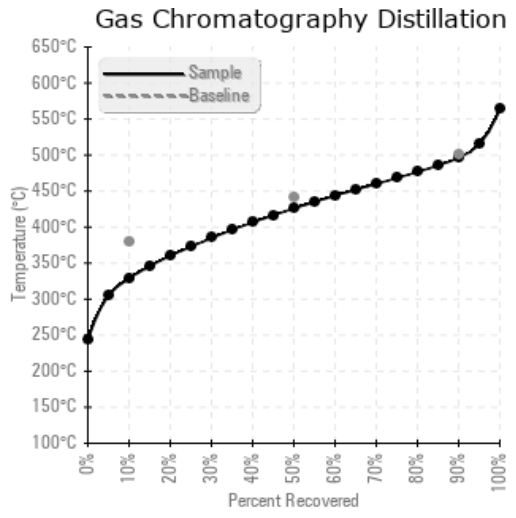
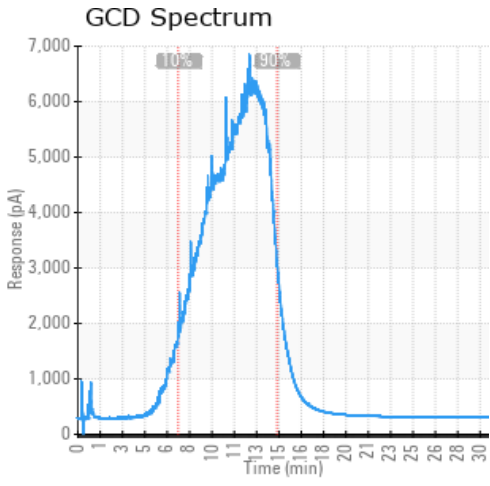
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/16/22	03/31/22	0.0d		388 / 198	6.5	40.8	0.33	0.391	623 / 329	798 / 426	925 / 496	11.30
11/19/21	12/01/21	6.0d	after pump, inline	385 / 196	31.7	40.5	0.29	0.537	629 / 332	802 / 428	925 / 496	10.35
08/12/16	09/06/16	0.0d	DISCHARGE SIDE#20&21	383 / 195	28.1	28.3	0.189	0.105	661 / 350	791 / 422	900 / 482	6.30
02/19/16	03/02/16	0.0d	DISCHRG SIDE #20&#21	343 / 173	169.0	28.6	0.13	0.095	641 / 338	779 / 415	889 / 476	8.78
Baseline Data				414 / 212		43.8	0.41		716 / 380	826 / 441	932 / 500	2.4





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
03/16/22	13	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0
11/19/21	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
08/12/16	8	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	77	210	0	0
02/19/16	12	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	93	213	0	0
<b>Baseline Data</b>				0	0					0			0	0					5				250	

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



Historical Comments	
11/19/21	Pentane Insolubles are abnormally high indicating sludge and deposits. (GCD) 10% point is abnormally low indicating Low boilers. COC Flash point is low. This could be due to a cleaning type fluid that was added to the system. Venting the system could possibly purge the lighter fractions. Cleaning, flushing and filling with fresh oil is a consideration. Pentane Insolubles levels are abnormally high. (GCD) 90% Distillation Point is abnormally high.
08/12/16	Barium ppm levels are severely high. Calcium ppm levels are severely high. (GCD) 90% Distillation Point is marginally high. These levels remain consistent with the previous sample. Barium ppm levels are severely high. Calcium ppm levels are severely high. (GCD) 90% Distillation Point is marginally high.
02/19/16	Calcium and Barium levels are severely high. Check for leak of process fluids into the system. Re-sample to confirm results. Make sure to purge oil out of sample port before collecting in sample container to make sure of getting a high quality sample. Barium ppm levels are severely high. Calcium ppm levels are severely high.

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