

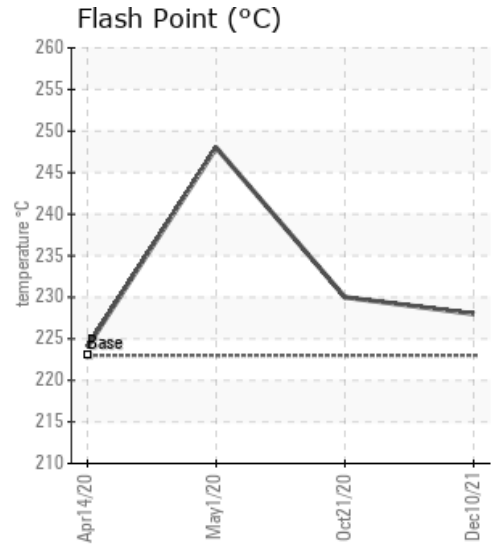
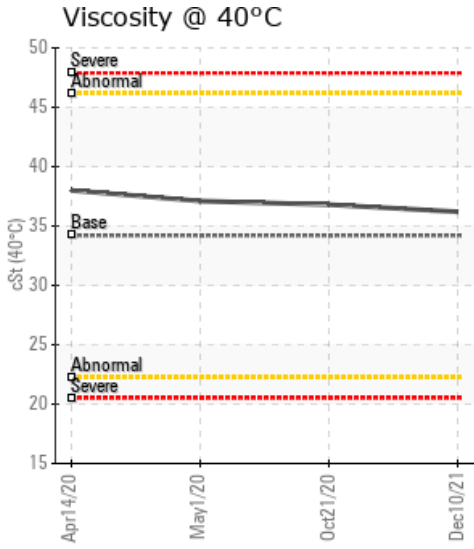
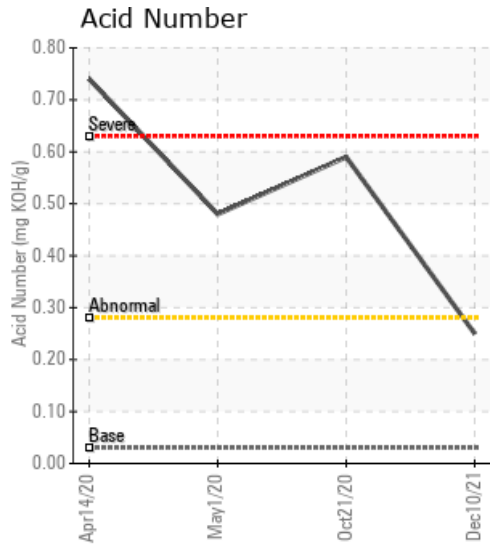
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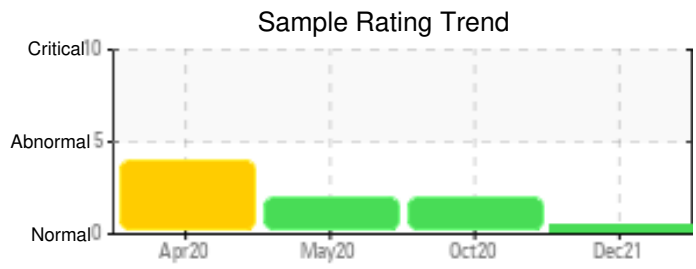
Customer: PTRHTF10232	System Information	Sample Information
LINDAHL BROTHERS INC 6525 99TH ST CHICAGO RIDGE, IL 60415 USA Attn: Glen Shaler Tel: (708)243-9392 E-Mail: gshaler@lindahlbros.com	System Volume: 400 ltr Bulk Operating Temp: 626F / 330C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: HY-WAY	Lab No: 02463463 Analyst: Yvette Trzcinski Sample Date: 12/10/21 Received Date: 12/21/21 Completed: 01/03/22 Yvette Trzcinski yvette.trzcinski@HFSinclair.com

Recommendation: Heat Transfer sample specification are all at acceptable levels viscosity, acid number and GCD 10%, 50 %, 90% and insolubles. resample at the next recommended sampling interval 9-12 months

Comments:

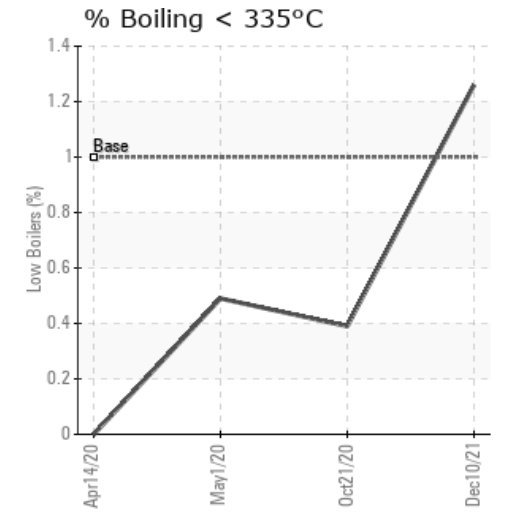
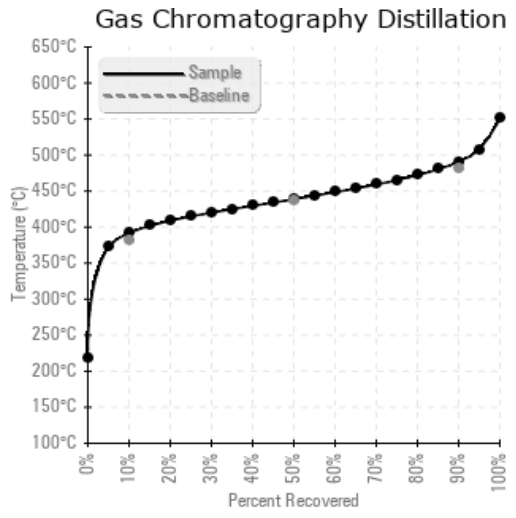
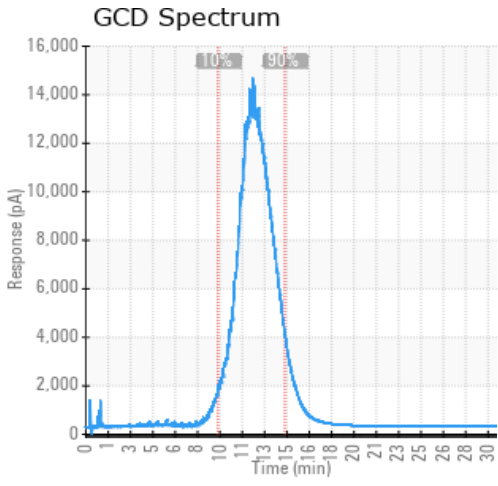
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/10/21	12/21/21	1.0y		442 / 228	5.1	36.2	0.25	0.074	737 / 392	822 / 439	915 / 491	1.26
10/21/20	11/03/20	0.5y	Jumper line to drum	446 / 230	17.0	36.8	0.59	0.109	739 / 393	827 / 442	925 / 496	0.39
05/01/20	05/15/20	1.0y	JUMPER LINE	478 / 248	30.4	37.1	0.48	0.208	736 / 391	828 / 442	930 / 499	0.49
04/14/20	04/23/20	1.0y	JUMPER LINE	435 / 224	43.5	38.0	0.74	0.209	736 / 391	826 / 441	929 / 498	0.00
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
12/10/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/21/20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
05/01/20	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4
04/14/20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2
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	
10/21/20	The fluid shows signs of degradation the AN total acid number is high and there is oxidation and large molecules apparent in the system. Recommend draining and flushing the system within the next 6-12 months and then resample the new fluid at 6 months. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally high.
05/01/20	The Acid number is high and the fluid does show signs of oxidation but the flash point and viscosity are acceptable for continued service. Re sample in 6 months Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally high.
04/14/20	It appears the fluid is oxidizing due to the very high acid number and the increase in the boiling temperature of the fluid at GCD 90% - the high acid number will lead to further degradation of the fluid and create the potential for oxidation material and sludge deposits to collect in low flow areas of the system and in the heater causing system inefficiencies - Based on the acid number we would recommend sweetening or changing the fluid depending on the size of the system Acid Number (AN) is severely high. (GCD) 90% Distillation Point is abnormally high.

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