

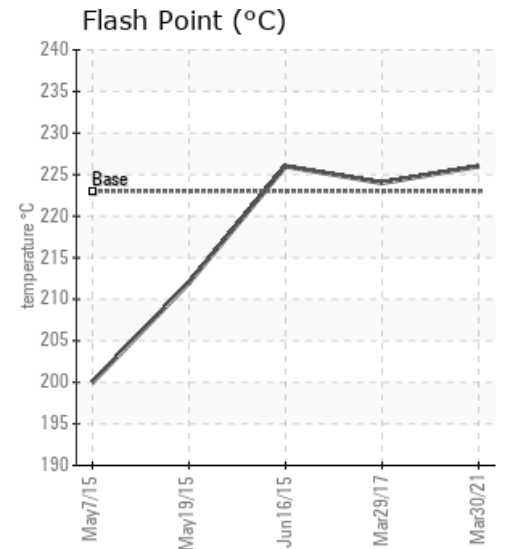
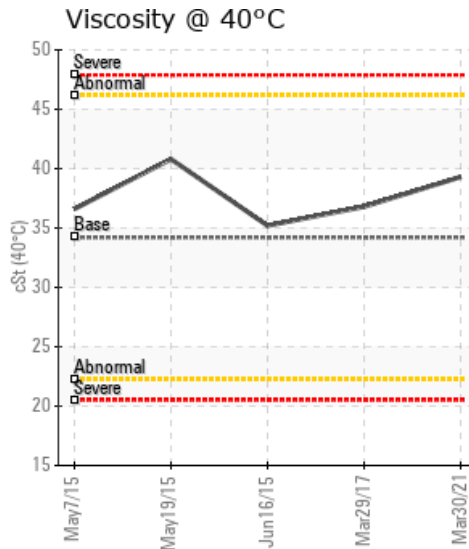
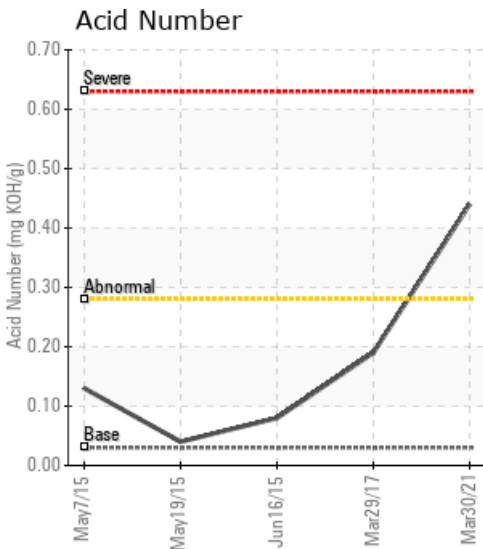
## [01-34-51-18W5] TOURMALINE ANSELL PLANT HM-1

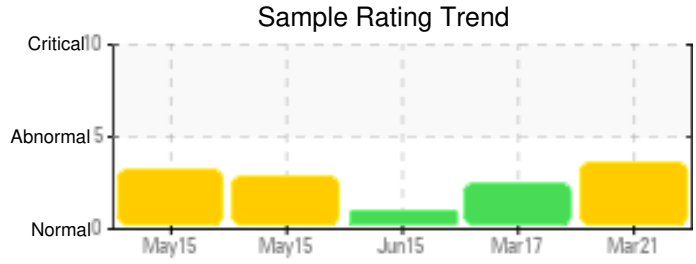
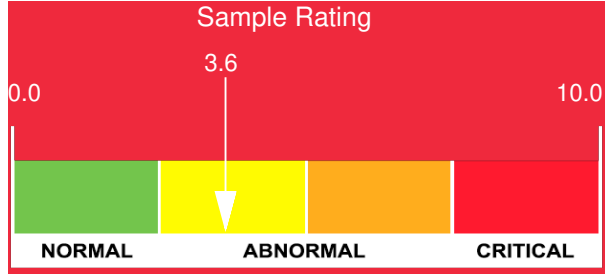
Customer: PTRHTF20046	System Information	Sample Information
QUADRA CHEMICALS 12925 146TH STREET EDMONTON, AB T5L 2H6 CANADA Attn: Quadra Samples Tel: E-Mail: quadra_samples@quadra.ca	System Volume: 15000 ltr Bulk Operating Temp: 401F / 205C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02412291 Analyst: Kevin McDermott Sample Date: 03/30/21 Received Date: 03/30/21 Completed: 04/08/21 Kevin McDermott kevin.mcdermott@hollyfrontier.com

Recommendation: Solids content severely high. Acid Number (AN) is also higher than normal. This combined with viscosity increase indicates fluid degradation due to oxidation. Oxidation happens when hot fluid gets exposed to air. Recommend ensuring there is a functioning blanket gas in place at all times. Filtration can help bring the solids content down but the AN can only be improved by full or partial fluid changeout.

Comments: Pentane Insolubles levels are severely high. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally high.

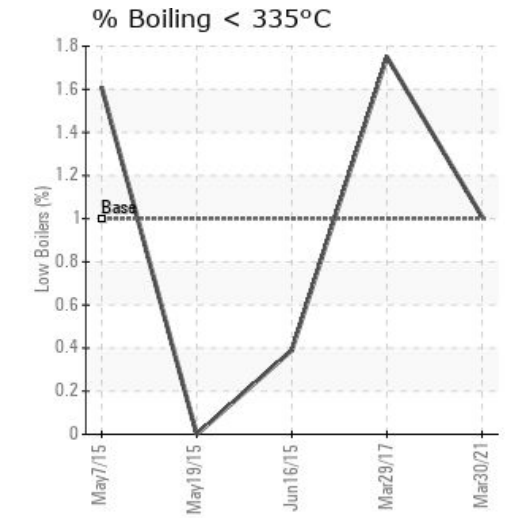
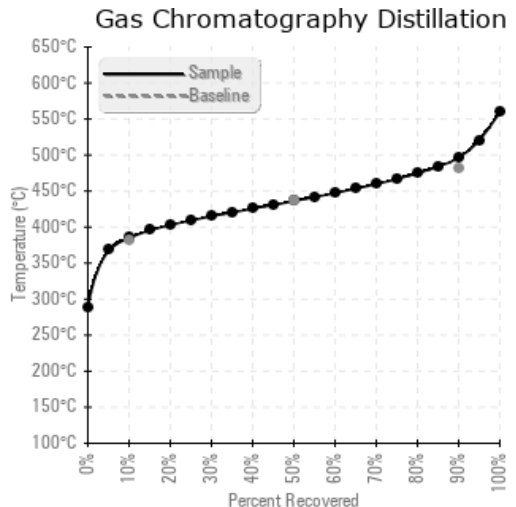
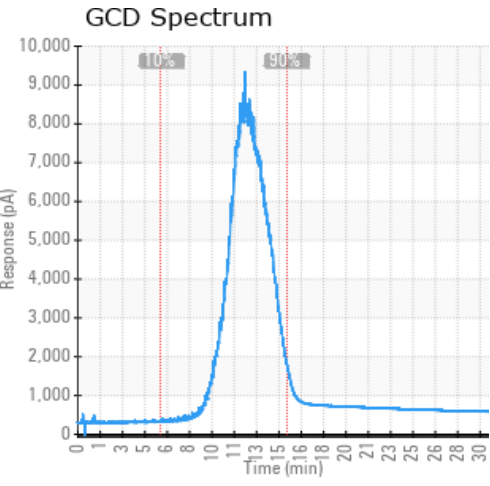
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/30/21	03/30/21	10.0y	Pump suction	439 / 226	12.9	39.3	0.44	0.613	724 / 385	817 / 436	925 / 496	1.01
03/29/17	03/30/17	0.0y		435 / 224	93.1	36.8	0.19	0.948	719 / 382	817 / 436	915 / 491	1.75
06/16/15	06/17/15	3.0y		439 / 226	41.0	35.2	0.08	0.066	731 / 389	822 / 439	919 / 493	0.39
05/19/15	05/21/15	1.0y	TRAIN 2	414 / 212	55.9	40.8	0.04	0.443	733 / 390	814 / 435	944 / 507	0.00
05/07/15	05/12/15	2.0y	RETURN LINE	392 / 200	87.5	36.6	0.13	0.703	701 / 372	807 / 431	926 / 497	1.61
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
03/30/21	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/29/17	17	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/16/15	4	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	38	0	0
05/19/15	52	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	0	0
05/07/15	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	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	
03/29/17	The fluid is in a reasonable condition and suitable for further use but the Pentane Insoluble (solids) content has exceeded the warning limit of 0.5%. Therefore it is recommended to filter the fluid. Please resample after filtration. Pentane Insolubles levels are severely high.
06/16/15	The fluid is in good condition. 90% GCD temperature is slightly high. This can be the influence of previous residual fluid. Please re-sample in 6 months. (GCD) 90% Distillation Point is marginally high.
05/19/15	The 90% GCD temperature is high which indicates fluid degradation by oxidation. TAN does not support this. Fluid viscosity, decrease in Flash Point, lower 10% GCD temperature in combination with an elevated solids content of 0.44% means that thermal degradation has occurred. It was reported that this fluid circulates through the same process system as the previous fluid represented by the sample taken on May 7th. The condition of this batch of fluid (sample May 19th) is most likely influenced by the left over of the previous fill. Based on the moderate Pentane Insoluble (solids) content of the fluid it is not recommended to replace the fluid by 'drain and fill'. A system flush before filling with fresh fluid is a minimum requirement. Alternatively the fluid can be restored to a 'suitable for use' condition by filtration. Whether a system cleaning is required depends on the following: Amount of carbonaceous material found in the heater, efficiency of heat transfer, heat exchanger bundle plugging and condition of mechanical seals of the heat medium pumps. Please contact your Petro-Canada Technical Service Advisor to discuss this. Pentane Insolubles levels are abnormally high. (GCD) 90% Distillation Point is severely high.
05/07/15	Noco 21 fresh fluid viscosity is 50.2 cSt@40C. The viscosity of the fluid in use is 36.6 cSt@40C. This in combination with a decrease in Flash Point, a lower 10% GCD temperature and a high solids content of the fluid indicates fluid degradation by thermal cracking. The solids content is above the warning limit of 0.5%. This is a concern as it will result in carbonaceous material depositing on the system internals resulting in heat exchanger bundle plugging and possible leaking of heat medium pump mechanical seals. The fluid can be filtered to lower the solids content but because it is thermally degraded it would be better to change the fluid. In that case the heater vessel has to be inspected for presence of carbonaceous material (coke) and cleaned if required. This condition may also require a system cleaning/flushing. Please contact your Petro-Canada Tech Service Advisor for more information. Pentane Insolubles levels are severely high. (GCD) 10% Distillation Point is abnormally low. (GCD) 90% Distillation Point is marginally high.

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