

[STRATHCONA RESOURCES / 6-8-62-3W6] U-5000 HEAT MEDIUM

Customer: PTRHTF20175
 QUADRA CHEMICALS
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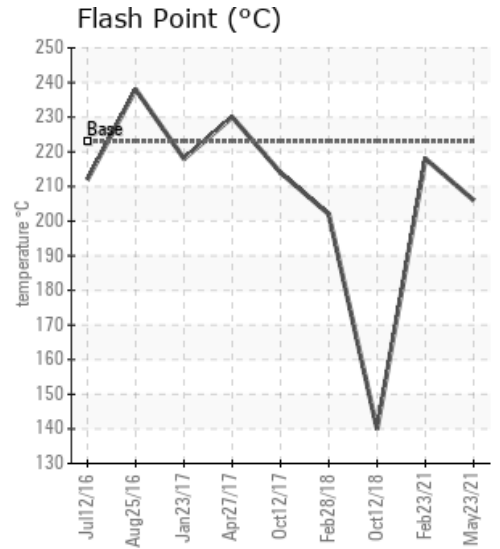
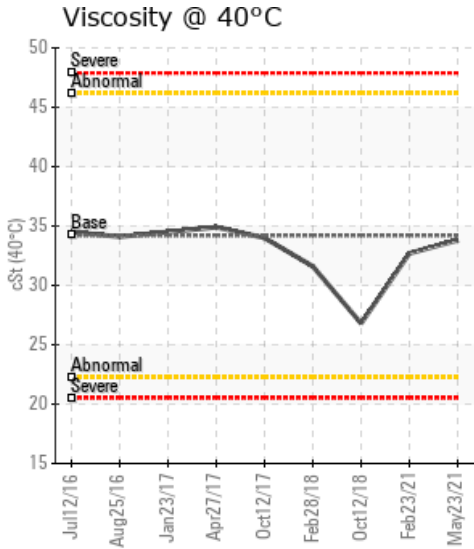
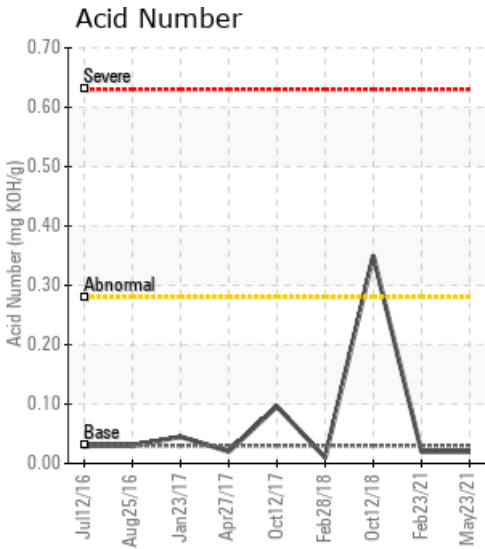
System Information
 System Volume: 19300 gal
 Bulk Operating Temp: 482F / 250C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make: OEL

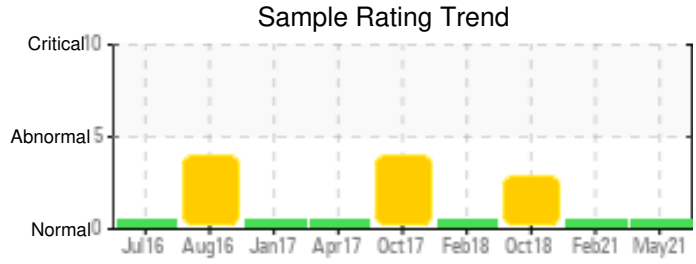
Sample Information
 Lab No: 02425925
 Analyst: Clinton Buhler
 Sample Date: 05/23/21
 Received Date: 06/08/21
 Completed: 06/11/21
 Clinton Buhler
 Clinton.Buhler@hollyfrontier.com

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Please re-sample in 12 months.

Comments:

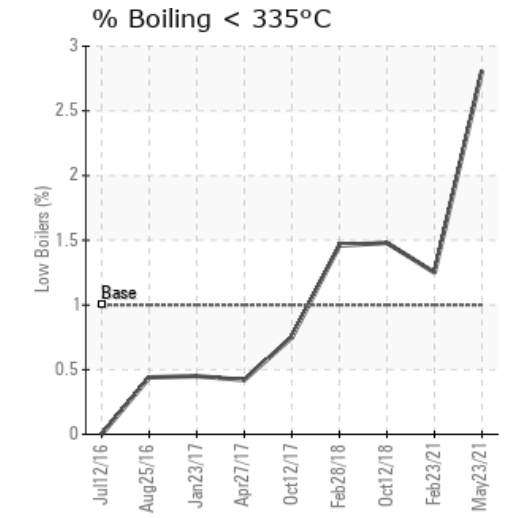
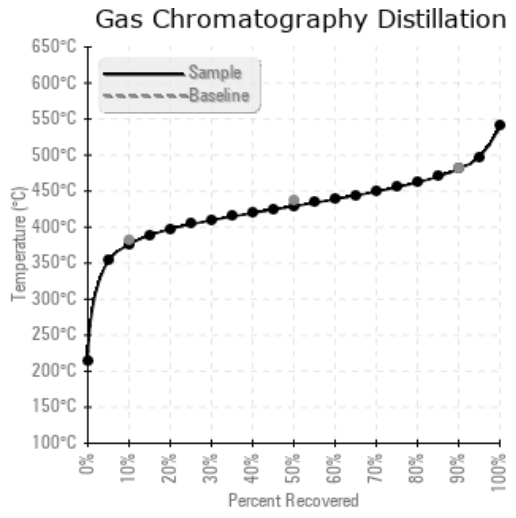
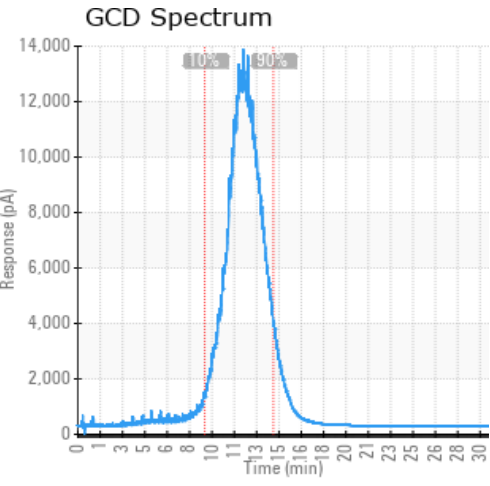
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/23/21	06/08/21	24.0m	Condy line heater	403 / 206	17.1	33.8	0.02	0.062	709 / 376	804 / 429	897 / 481	2.81
02/23/21	03/05/21	24.0m	off pump	424 / 218	9.1	32.7	0.02	0.044	725 / 385	814 / 435	915 / 490	1.25
10/12/18	10/19/18	37.0m		284 / 140	2.5	26.8	0.35	0.035	714 / 379	801 / 427	899 / 482	1.48
02/28/18	03/12/18	28.0m		396 / 202	45.8	31.6	0.01	0.042	724 / 385	820 / 438	911 / 489	1.46
10/12/17	10/18/17	25.0m		417 / 214	1774.0	34.0	0.096	0.044	723 / 384	813 / 434	910 / 488	0.75
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
05/23/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/23/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/12/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/28/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/12/17	0	0	0	0	0	0	0	0	0	0	4	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	
02/23/21	Sample results indicate that the fluid is in suitable condition for continued service. Please re-sample in 12 months
10/12/18	It is understood that there was recently a condensate leak into the HTF system. This may explain the reduced flash point. A reduced flash point can be a safety concern. Following all safety protocol, venting of the low boiling vapors will help restore the flashpoint level to acceptable levels. Blanket gas cannot be in service during venting. Investigate if blanket gas pressure of 210 kpa is required for circulating pump suction head. If so, further investigation into venting is needed. Increased Acid Number generally is associated to oxidation of the fluid. Acid Number is at 0.35 yet iron remains at 0, so corrosion doesn't seem to be ongoing. Generally, sweetening is recommended around an Acid Number of 0.4. In this case, please plan to re-sample system in 6 months once all condensate has been safely removed and the Acid Number can be re-evaluated. COC Flash Point is severely low. Acid Number (AN) is abnormally high.
02/28/18	Sample results indicate that the fluid is suitable for continued service and has improved since last sample as both water and total Acid Number have reduced significantly. The percentage boil off <335C has increased from 0.75 to 1.46 and there has been a slight reduction in flash point. This can indicate possible thermal degradation or contamination. Consider regular venting of the expansion tank after which time the blanket gas is turned back on. Re-sample in 6-12 months.
10/12/17	Water contamination can be a result of the expansion tank being exposed to precipitation. Slight increase in silicon (dirt/dust) may support this. Ensure points of ingress are sealed. Also confirm that sample was not drawn from a dead leg. Please always ensure a thorough purge before drawing sample. Allow water to boil off from expansion tank before putting blanket gas back into use. Aside from the water level in the oil, sample results indicate that the fluid is fit for continued service. Once water contamination has been vented and resolved, re-sample system in 6 months. Water contamination levels are severely high.

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