

[LSD 09-27-31-04W5] ALTAGAS HARMATTAN

Customer: PTRHTF20169
 HARMATTAN GAS PROCESSING LTD
 PARTNE...
 BOX 2280
 DIDSBURY, AB T0M 0W0 CA
 Attn: Leeland Sundster
 Tel: (403)335-7542
 E-Mail: leeland.sundster@altagas.ca

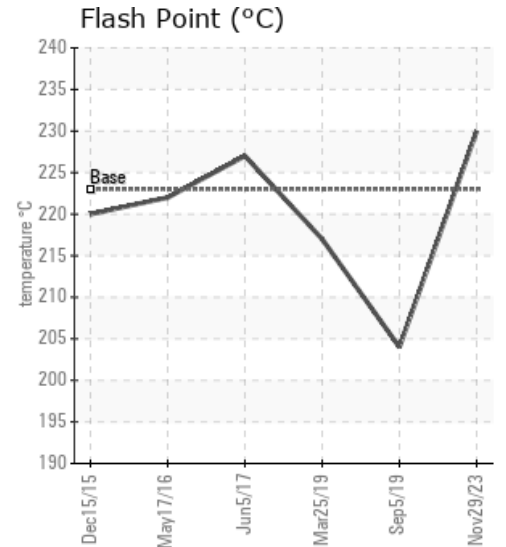
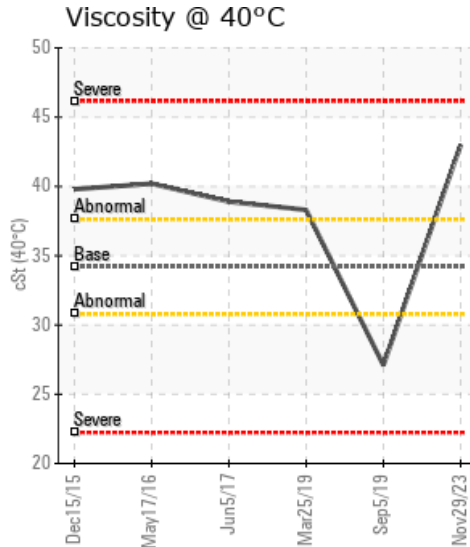
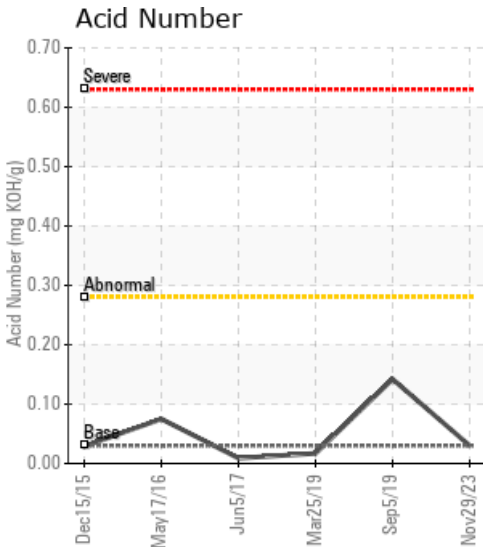
System Information
 System Volume: 90000 ltr
 Bulk Operating Temp: 464F / 240C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make: DIRECT FIRE HEATER

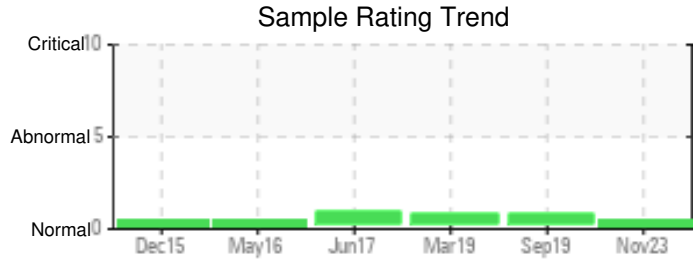
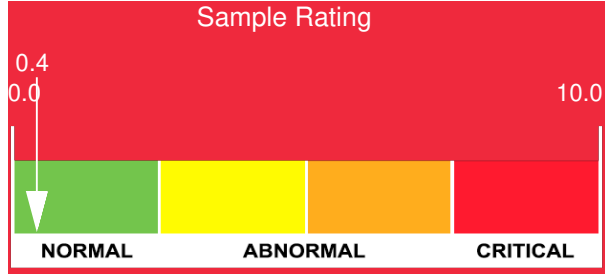
Sample Information
 Lab No: 02602460
 Analyst: Lyle Dach
 Sample Date: 11/29/23
 Received Date: 12/11/23
 Completed: 12/19/23
 Lyle Dach
 lyle.dach@HFSinclair.com

Recommendation: Fluid viscosity is off spec, confirm blanket gas is working properly as oxidation could cause an increase in viscosity. Another possibility would be a heavier fluid was added to the system, confirm only Petro Therm has been added to this heater. Sulfur is also higher than the reference. Higher viscosity can cause reduced fluid performance. All other parameters look to be within specifications. Resample in 6 months.

Comments: Visc @ 40°C is abnormally high.

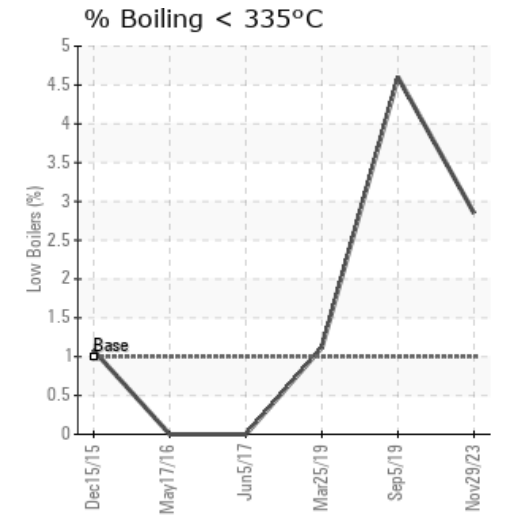
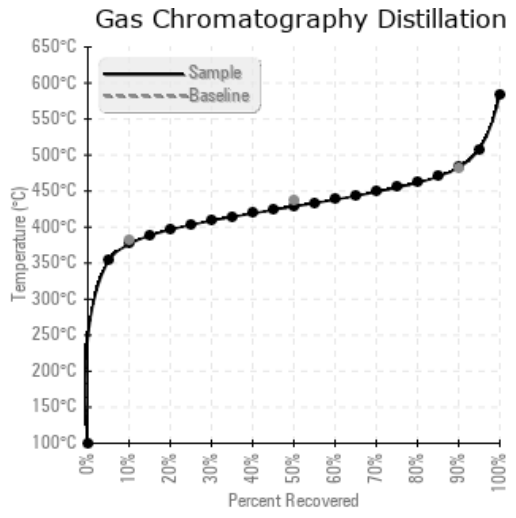
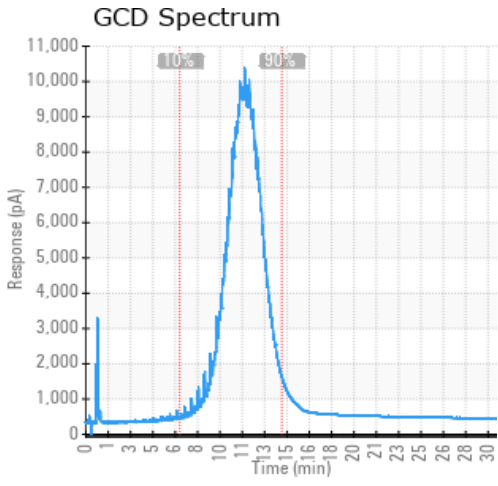
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/29/23	12/11/23	20.0y		446 / 230	24	43.0	0.03	0.070	709 / 376	803 / 429	901 / 483	2.85
09/05/19	09/17/19	20.0y	DISCHARGE CIRC. PUMP	399 / 204	11.3	27.1	0.142	0.304	710 / 377	825 / 441	942 / 506	4.60
03/25/19	03/26/19	0.0y	CL1903-0258	423 / 217	11.5	38.3	0.017	0.017	718 / 381	812 / 433	921 / 494	1.12
06/05/17	08/03/17	0.0y	HOT OIL PUMP SUCTION	441 / 227	5.0	38.9	0.009	0.041	735 / 391	826 / 441	946 / 508	0.00
05/17/16	05/18/16	17.0y		432 / 222	0.00	40.2	0.075	0.013	730 / 388	823 / 440	932 / 500	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
11/29/23	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/05/19	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
03/25/19	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/05/17	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/17/16	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	1
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	
09/05/19	Several fluid properties have changed noticeably since the previous sample due to recent exchanger leak however fluid condition remains in good condition for further service and no action needs to be taken. Suggest to continue with annual samples or sooner if there are suspected process conditions that could stress or contaminate the fluid.
03/25/19	Fluid remains in very good condition. No significant change from the previous sample June 2017. Suggest to continue submitting samples of used fluid annually to proactively monitor the condition. (GCD) 90% Distillation Point is marginally high.
06/05/17	Viscosity @ 40c a little higher than expected as in previous samples. The GCD 90% number is also high. Fluid remains in good condition overall and fit for continued use. Resample in a year or so. Or sooner if the fluid gets exposed to harsh conditions such as overheating, lack of circulation or absence of blanket gas.
05/17/16	Viscosity @ 40c is a little higher than expected but no change since Dec 2015 sample. Otherwise fluid in very good condition. Resample in 12 months to proactively monitor fluid condition.

Petro-Canada makes no representation or warranty of any kind, either express or implied, as to the accuracy or completeness of the analysis and assumes no responsibility and shall have no liability whatsoever with respect to such analysis, or a party's use of it. Petro-Canada is a division of HollyFrontier Corporation.