

[North River Midstream / LSD 16-11-82-9W6] 4TH CREEK PLANT #2

Customer: PTRHTF20127
 SPECTRA ENERGY
 BAG 6180
 FORT ST JOHN, BC V1J 4H7 Canada
 Attn:
 Tel: (780)351-2131
 E-Mail: mdmoxness@spectraenergy.com

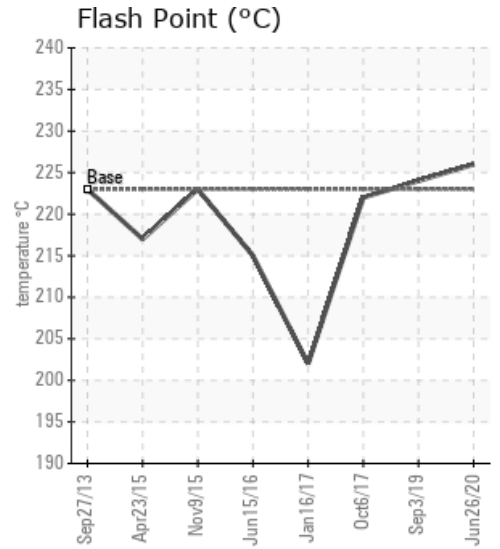
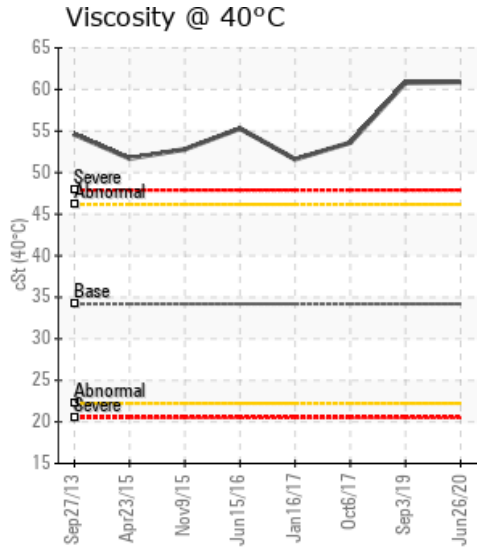
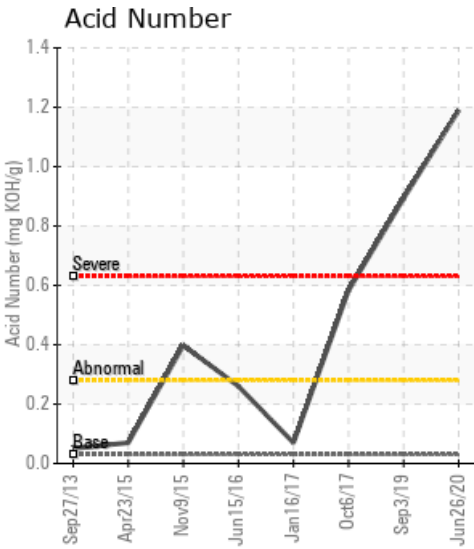
System Information
 System Volume: 45000 ltr
 Bulk Operating Temp: 383F / 195C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make: RUSHTON

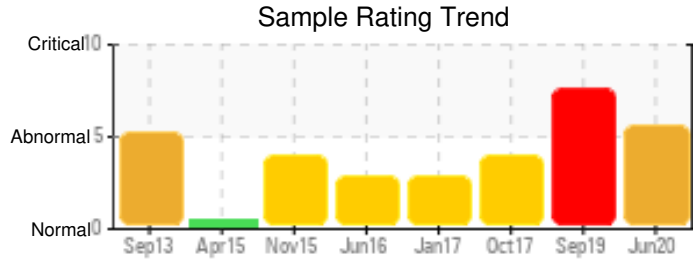
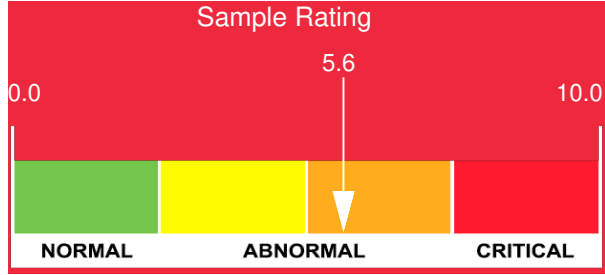
Sample Information
 Lab No: 02363210
 Analyst: Clinton Buhler
 Sample Date: 06/26/20
 Received Date: 07/07/20
 Completed: 07/13/20
 Clinton Buhler
 Clinton.Buhler@PetroCanadaLSP.com

Recommendation: Sample results indicate continued system fouling as Solids content has increased from 1.92% to 4%. The fluid's acidity (AN) has increased to 1.19 along with elevated viscosity at 60.9 cSt indicates oxidation degradation. It is recommended to perform a system cleaning and fluid replacement before conditions degrade even further.

Comments:

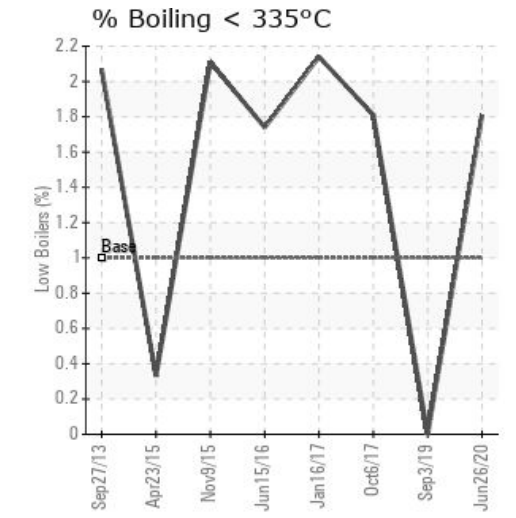
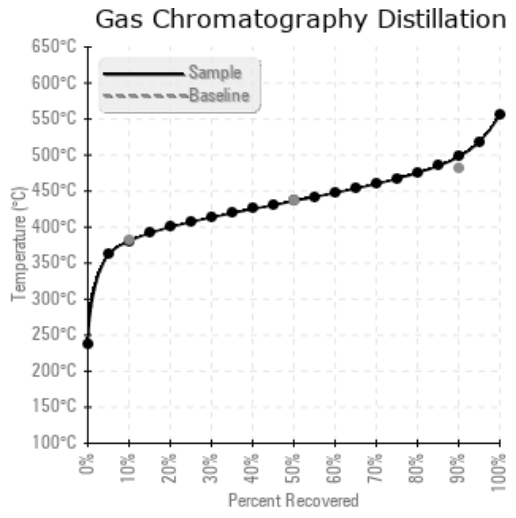
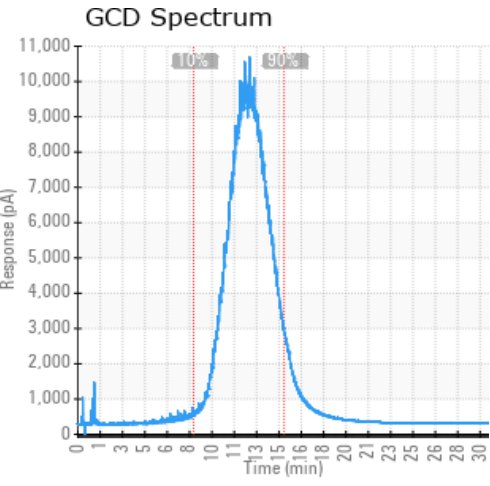
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
06/26/20	07/07/20	21y	RECYCLE BUILDING	439 / 226	65.8	60.9	1.19	4.00	717 / 380	817 / 436	927 / 497	1.81
09/03/19	09/10/19	0y	UPSTREAM OF PUMP	435 / 224	78.5	60.8	0.893	1.92	728 / 387	826 / 441	939 / 504	0.00
10/06/17	10/17/17	20y		432 / 222	46.8	53.6	0.583	0.957	708 / 375	811 / 433	934 / 501	1.81
01/16/17	01/23/17	0y	UPSTREAM OF PUMP	396 / 202	92.3	51.6	0.07	1.79	709 / 376	816 / 436	934 / 501	2.14
06/15/16	06/23/16	19y	RECYCLE COMP BLDG	419 / 215	76.4	55.3	0.26	1.70	708 / 376	812 / 433	924 / 496	1.74
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
06/26/20	27	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	2	0	0	0
09/03/19	28	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	2	0	0	2
10/06/17	25	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2	0	0	4
01/16/17	24	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0
06/15/16	29	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	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

09/03/19	Sample results indicate that the fluid is experiencing degradation. The fluid's acidity (TAN) has increased from 0.583 to 0.893 and viscosity has increased from 53.6 cSt to 60.8 cSt, both indicating possible oxidation degradation. The increase in Fe may support ongoing corrosion. For large systems, sweetening of the fluid should begin around a TAN of ~0.4. Pentane insolubles (Solids) continues to increase since the last sweetening, from 0.957 up to 1.92 %. This is indicating that system fouling continues. Ensuring blanket gas is in operation in the expansion tank is critical to reduce the rate of oxidation (ideally 2-3 psi). Plans and discussion should begin to plan for a system cleaning and fluid replacement. Please re-sample in 6 months. Contact Petro-Canada Lubricants Technical Services for further assistance.
10/06/17	Sample results indicate that the solids levels are still high although improved from previous sample. This is likely due to the cleaning of the heater vessel and fire tube replacement along with the addition of 13 barrel of fresh fluid during the June 2017 turnaround. Current levels may indicate organic solids from oxidation and/or inorganic solids such as iron (25ppm). Acid Number of 0.583 indicate oxidation degradation of the HT fluid and the slight increase in viscosity and elevated 90% distillation point supports this. Sweetening of the system should be considered to bring the AN down. Increased AN can cause corrosion. Aside from solids and high Acid Number, thermal fluid is stable. Ensure nitrogen blanket is functioning properly to mitigate oxygen reacting with the fluid. Begin sweetening to reduce Acid Number. Re-sample in 6 months. Pentane Insolubles levels are severely high. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally high.
01/16/17	GCD @ 90% is elevated as is the Pentane Insoluble indicating that some oxidation may be occurring. Viscosity is still elevated albeit lower than previous sample. Flash point has reduced significantly. Ensure Nitrogen blanket is in place and continue to operate. Resample in 6 months. Pentane Insolubles levels are severely high. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally high.
06/15/16	Oil Viscosity is coming up slightly but flash point and TAN are still OK. Pentane Insoluble is high but are coming down since the last samples. Continue to operate and resample in 6 months. Pentane Insolubles levels are severely high. Visc @ 40°C is abnormally high. (GCD) 90% Distillation Point is marginally high.

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