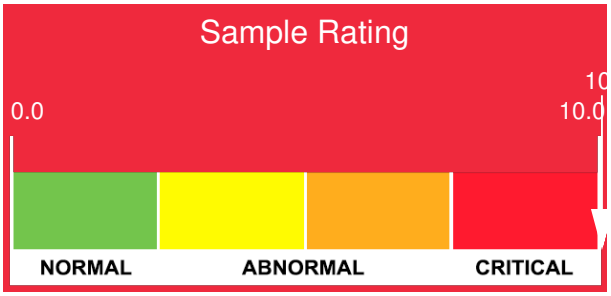
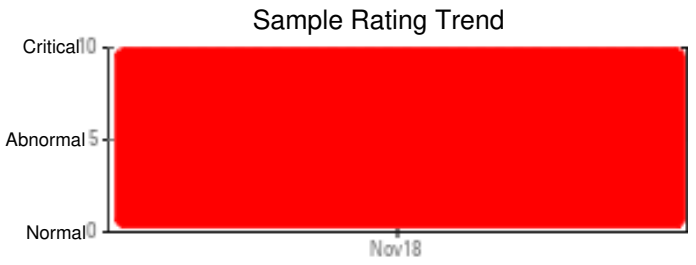




[Orlen Upstream Canada / 16-7-63-5W6] 1340

Customer: PTRHTF20175

QUADRA CHEMICALS
7802 98 STREET
CLAIRMONT, AB T0H 0W0 Canada
Attn: Quadra Samples
Tel:
E-Mail: quadra_samples@quadra.ca

System Information

System Volume: 20000 ltr
Bulk Operating Temp: 365F / 185C
Heating Source:
Blanket:
Fluid: PETRO CANADA PETRO-THERM
Make:

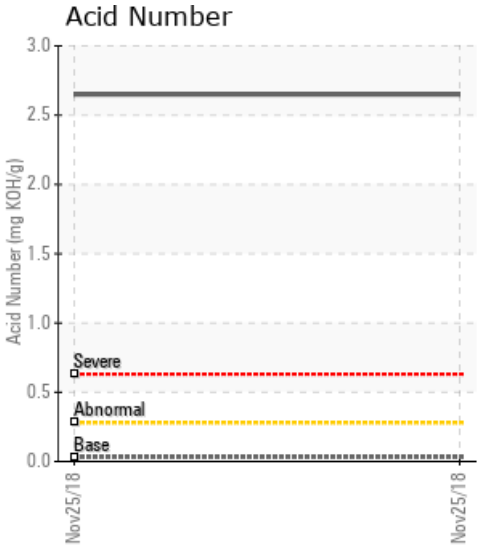
Sample Information

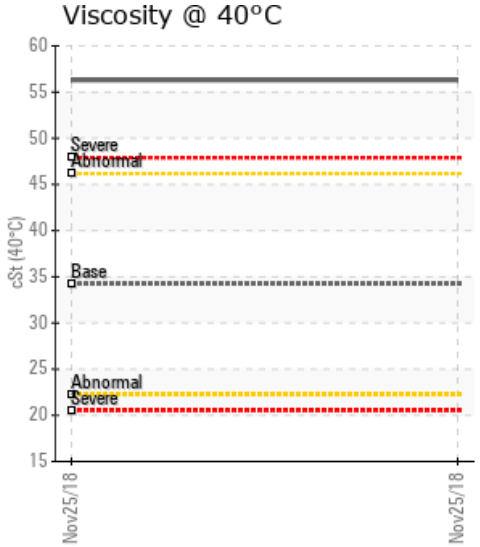
Lab No: 02257509
Analyst: Peter Harteveld
Sample Date: 11/25/18
Received Date: 12/14/18
Completed: 12/19/18

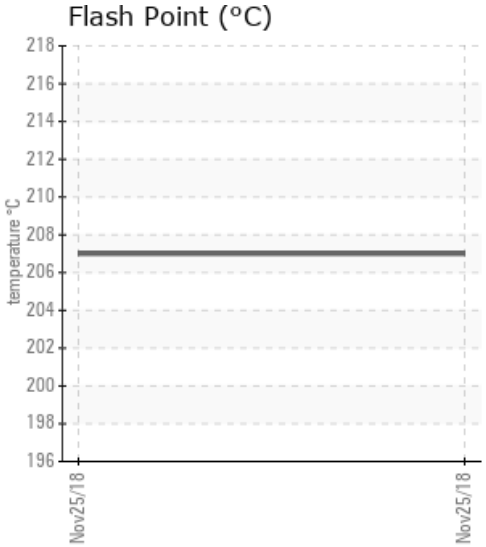
Recommendation: Orlen has reported that gurgling sounds from the system can be heard at times. The system is a non-circulated system with a fire tube inside the heater vessel. Above the fire tube is a process fluid coil installed. Gurgling sounds are usually associated with high water content in the heat medium fluid. The water content of the fluid is moderately high (404 ppm.) but this is not necessarily accurate as it is difficult to draw a sample that is representative for the system fill from a non-circulated system. The Petro-Therm heat medium fluid shows signs of degradation by oxidation. For a fluid with only 3 months of service life the following parameters are high and indicative of oxidation:Acid Number, Viscosity, Pentane Insolubles (solids content) and 90% GCD temperature. The high AN in combination with 1090 ppm of Fe indicates the fluid has become acidic and corrosion is taking place. Based on these analysis results it is recommended to replace the fluid. However since the sample may not be representative for the system fill, another sample will be taken to base the decision on. As discussed please flush at least 20 ltr of Petro-Therm through the sample line before taking the sample. The sampled fluid has to be hot. System ID will be corrected to show 1350 instead of 1340.

Comments: Iron ppm levels are severe. Pentane Insolubles levels are severely high. Water contamination levels are marginally high. ppm Water contamination levels are marginally high. Acid Number (AN) is severely high. Visc @ 40°C is severely high. (GCD) 90% Distillation Point is marginally high.

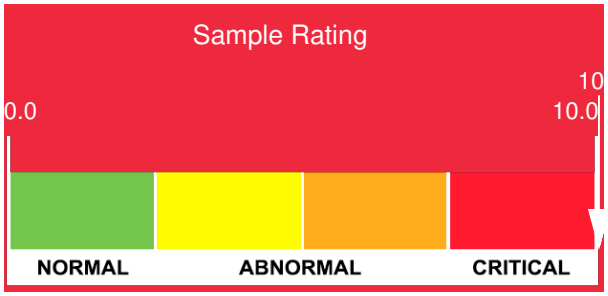
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/25/18	12/14/18	3m		405 / 207	404.6	56.3	2.65	1.72	730 / 388	817 / 436	920 / 494	0.42
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

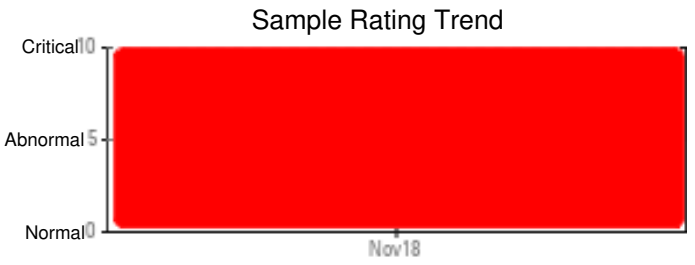






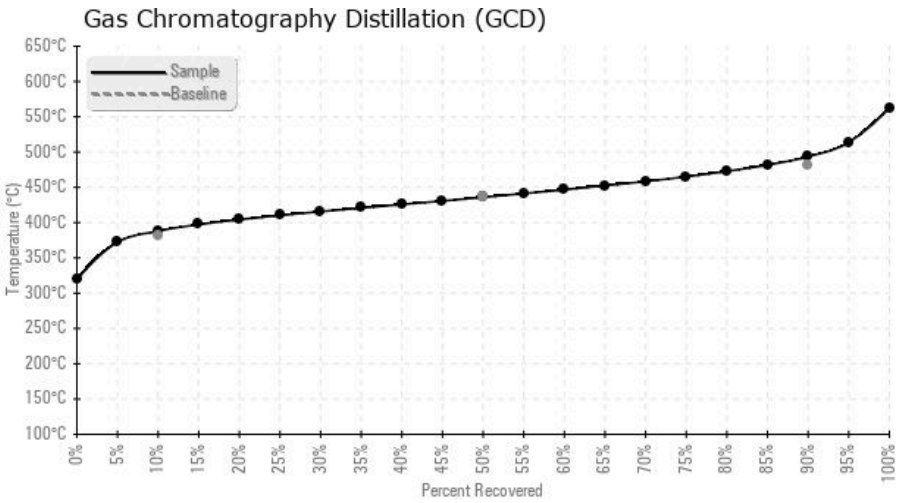
PETRO-CANADA LUBRICANTS

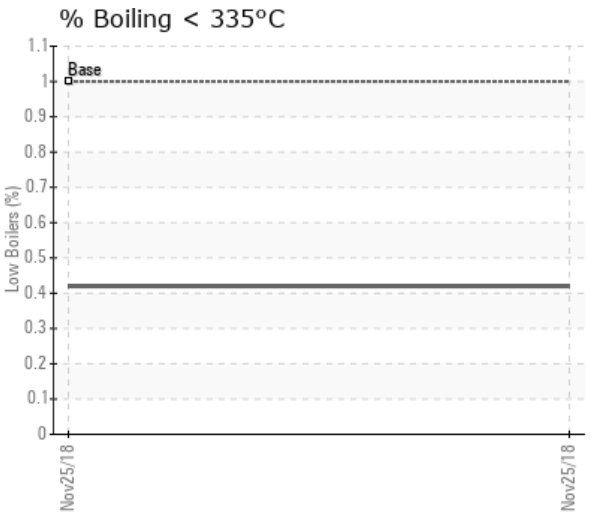




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/25/18	1090	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	24	24
Baseline Data			0	0						0			0	0					0				0	

Elemental anaysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]





Historical Comments
