

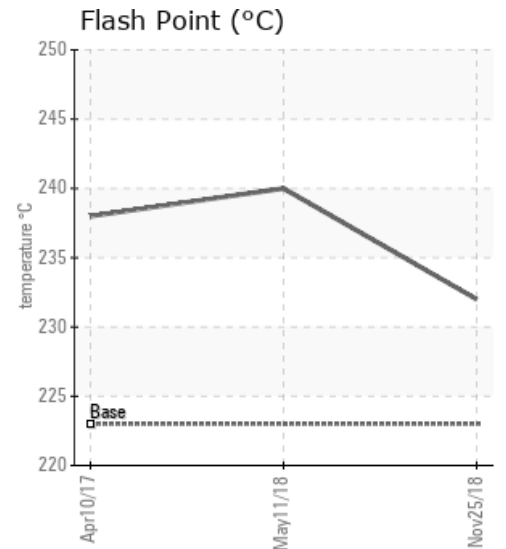
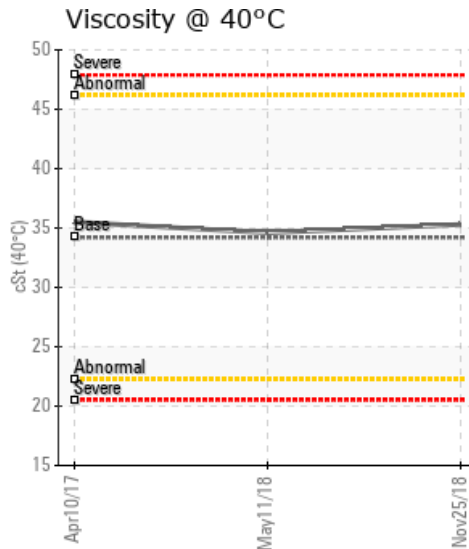
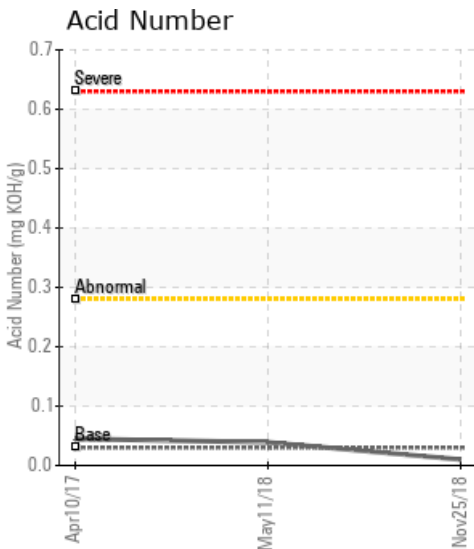
[Orlen Upstream Canada / 16-7-63-5w6] HEAT MEDIUM

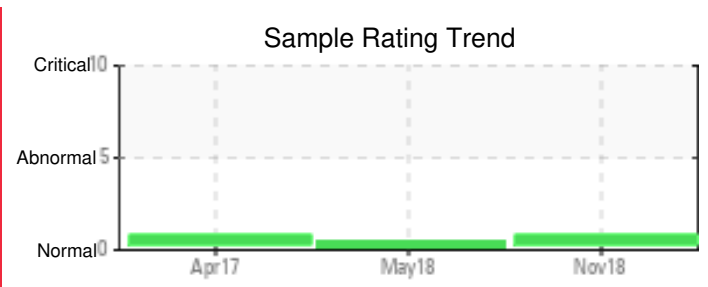
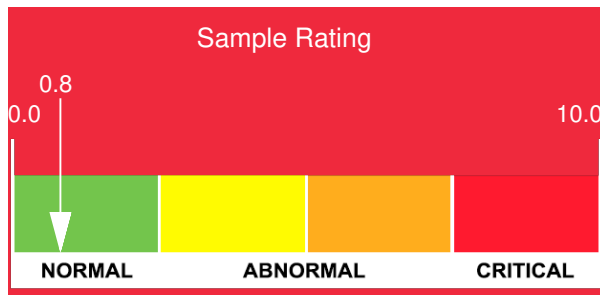
Customer: PTRHTF20175	System Information	Sample Information
QUADRA CHEMICALS 7802 98 STREET CLAIRMONT, AB T0H 0W0 Canada Attn: Quadra Samples Tel: E-Mail: quadra_samples@quadra.ca	System Volume: 10000 ltr Bulk Operating Temp: 374F / 190C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: RUSHTON	Lab No: 02257510 Analyst: Peter Harteveld Sample Date: 11/25/18 Received Date: 12/14/18 Completed: 12/19/18

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

Comments: (GCD) 90% Distillation Point is marginally high.

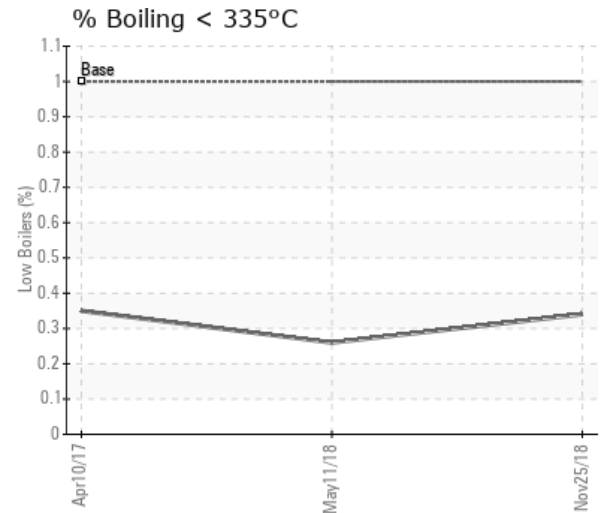
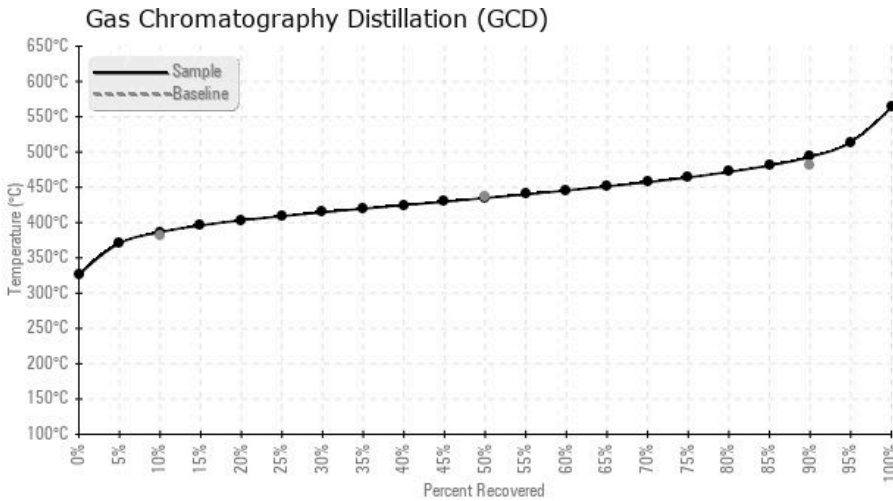
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/25/18	12/14/18	18m		450 / 232	14.9	35.3	0.01	0.055	728 / 386	815 / 435	920 / 493	0.34
05/11/18	05/30/18	12m	ORLEN UPSTREAM	464 / 240	11.5	34.6	0.039	0.030	726 / 385	814 / 435	903 / 484	0.26
04/10/17	05/26/17	14m	REBOILER HIGH POINT	460 / 238	32.3	35.5	0.045	0.048	725 / 385	817 / 436	921 / 494	0.35
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
11/25/18	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/11/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/10/17	0	0	0	0	0	0	0	0	0	0	0	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	
05/11/18	Sample results indicate that fluid is suitable for continued service. Re-sample in 12 months.
04/10/17	90% distillation point increase can indicate oxidation of the heat transfer fluid. Ensure blanket gas system is operational to reduce the fluid interface with oxygen. Re-sample fluid in 6-12 months (GCD) 90% Distillation Point is marginally high.

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.