

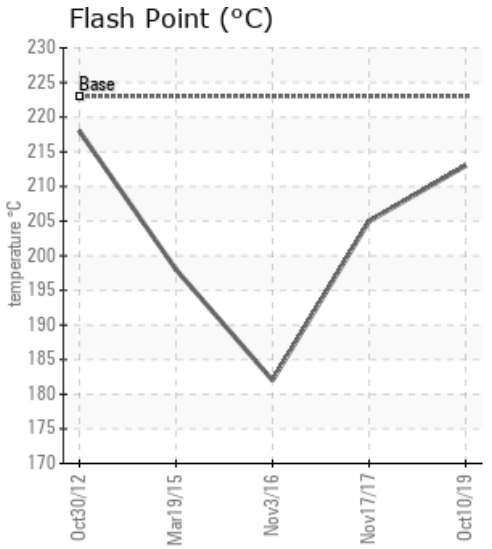
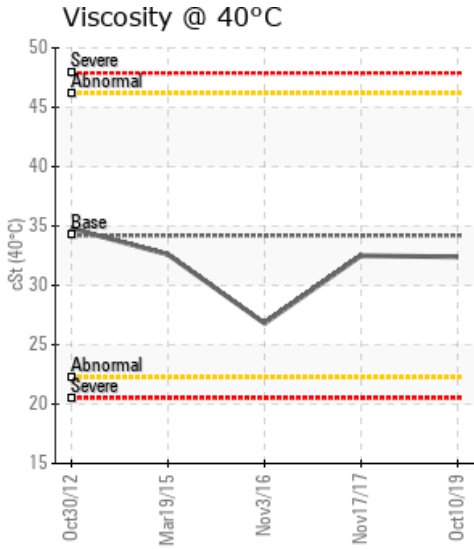
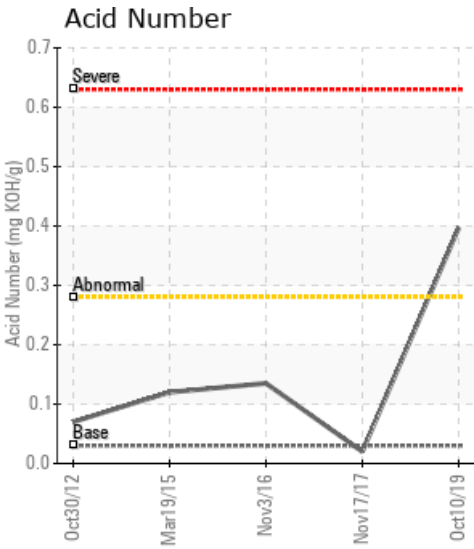
TPC450LN-MP

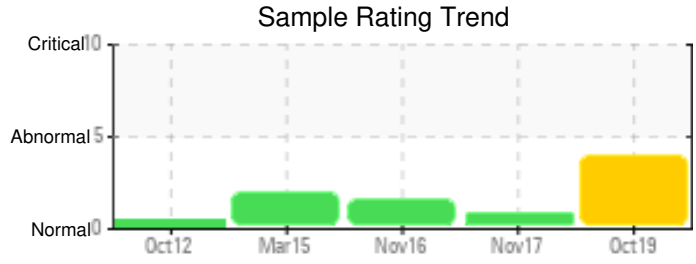
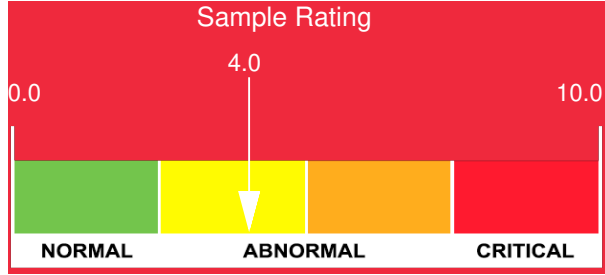
Customer: PTRHTF40102	System Information	Sample Information
BOLSCHER BV STROOTS WEG 40 ENSCHDEDE, TH Attn: WILBERT SNYERS Tel: E-Mail:	System Volume: 1500 ltr Bulk Operating Temp: 275F / 135C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: WANSON	Lab No: 02314615 Analyst: Philip Riley Sample Date: 10/10/19 Received Date: 10/16/19 Completed: 11/05/19

Recommendation: Acid number high that can lead to other issues around oxidation and oil life in general. Whilst flash point remains good, other parameters regarding the GCD Distillation show signs of deterioration. Recommend sample at 6 months to monitor acidity in particular.

Comments: (GCD) 90% Distillation Point is severely high. Acid Number (AN) is abnormally high. (GCD) 10% Distillation Point is marginally high.

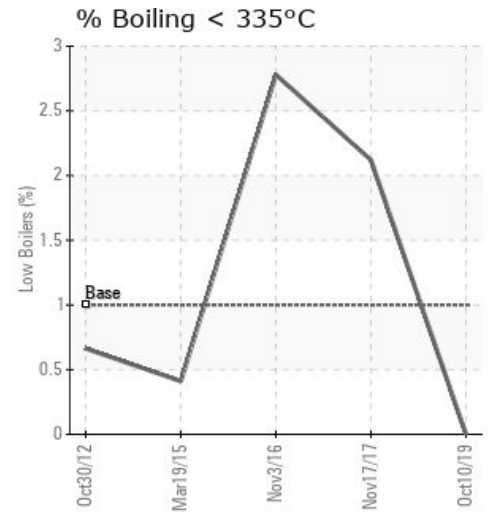
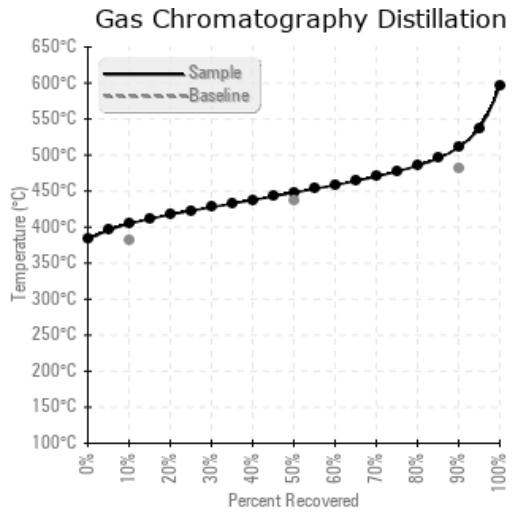
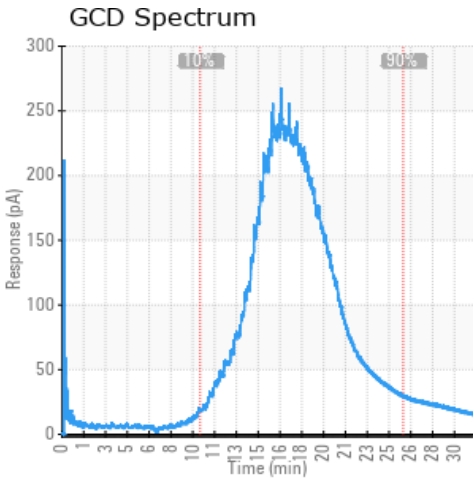
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
10/10/19	10/16/19	6y		415 / 213	8.4	32.4	0.397	0.088	760 / 405	838 / 448	951 / 511	0.00
11/17/17	11/21/17	5y		401 / 205	8.1	32.5	0.02	0.060	710 / 377	816 / 436	921 / 494	2.12
11/03/16	11/11/16	4y		360 / 182	13.8	26.8	0.135	0.080	702 / 372	812 / 433	922 / 495	2.78
03/19/15	06/25/15	3y		388 / 198	12.9	32.6	0.12	0.021	717 / 380	815 / 435	923 / 495	0.41
10/30/12	11/12/12		NA	424 / 218	34	34.8	0.07	0.028	719 / 382	809 / 432	920 / 493	0.663
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
10/10/19	11	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	8	11
11/17/17	15	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	10	20
11/03/16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3
03/19/15	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	10	0
10/30/12	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	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

11/17/17	Fluid is fit for use, continue sampling at planned interval (GCD) 90% Distillation Point is marginally high.
11/03/16	The oil is fit for further service. Suggest sample at next scheduled maintenance interval. (GCD) 90% Distillation Point is marginally high. COC Flash Point is marginally low.
03/19/15	Oil appears to be fit for further service. Sample at next scheduled maintenance interval. (GCD) 90% Distillation Point is marginally high.
10/30/12	Oil fit for further service

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.