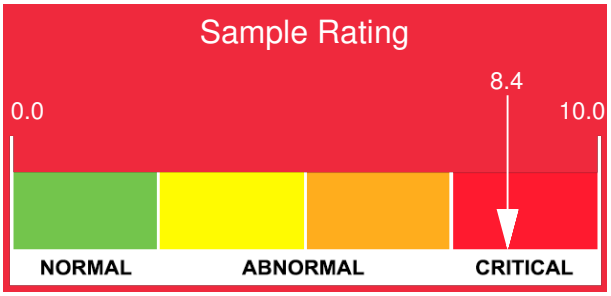
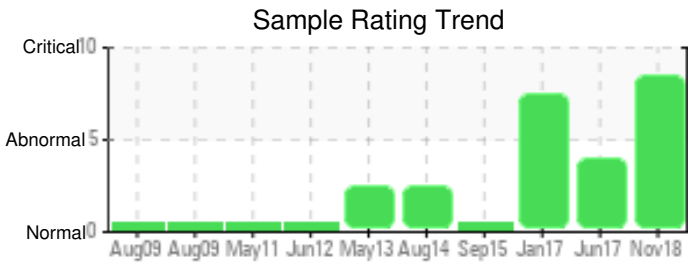
PETRO-CANADA LUBRICANTS





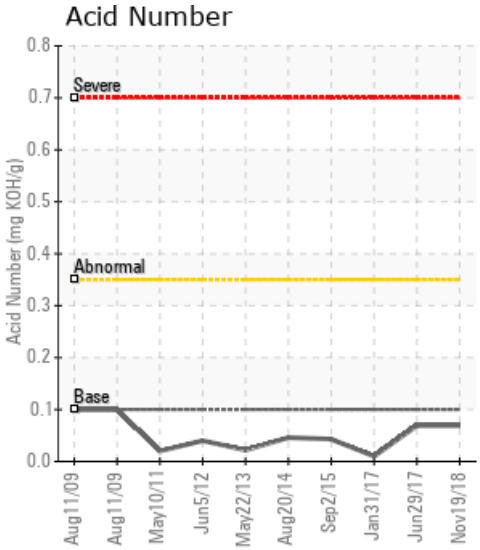
UNIT A

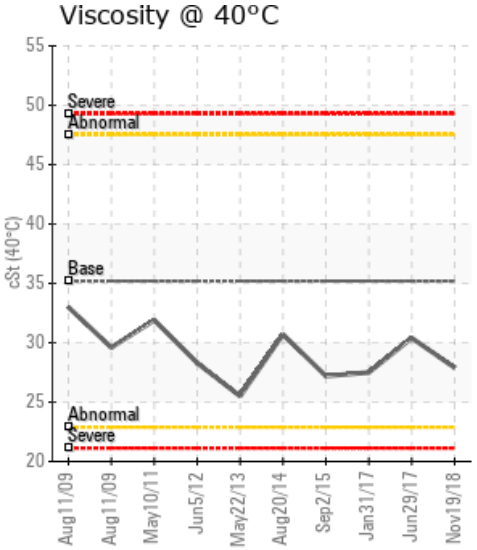
Customer: PTRHTF30035	System Information	Sample Information
VEOLIA WATER 9 LESLIE STREET TORONTO, ON M4M 3M9 CANADA Attn: MICHAEL VULJICIC Tel: (416)406-0801 E-Mail: michael.vujicic@veoliawaterna.com	System Volume: 6000 ltr Bulk Operating Temp: 280F / 138C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make:	Lab No: 02252512 Analyst: Behshad Sabah Sample Date: 11/19/18 Received Date: 11/20/18 Completed: 11/26/18

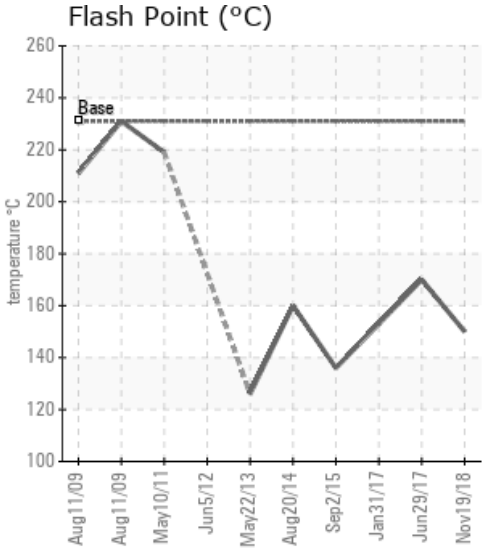
Recommendation:

Comments: The oil is about 10 years old based on 2017 report. The low flash point indicates the degradation of the fluid and braking down the hydrocarbon chains to smaller ones. Your operating temperature is 280 F or 138 C. the open cup flash point is 150 C. These numbers getting very close. It will be a fire hazard if there is a leak into the open air. Acid number is very low which indicates there is not corrosion happening in the system. Have you added fresh oil to the system during 2018? It seems that you did add some oil in Q2 2017 but nothing during the 2018. (GCD) 10% Distillation Point is severely low. (GCD) 90% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high. (GCD) 50% Distillation Point is abnormally low.

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	%
11/19/18	11/20/18	0y		302 / 150	31.8	27.9	0.069	0.008	618 / 326	736 / 391	833 / 445	12.59
06/29/17	07/12/17	0y		338 / 170	33.3	30.4	0.069	0.042	685 / 363	799 / 426	895 / 479	4.94
01/31/17	02/15/17	9y		307 / 153	12.4	27.5	0.01	0.043	680 / 360	796 / 425	894 / 479	5.25
09/02/15	09/17/15	7y		277 / 136	11.0	27.2	0.043	0.047	676 / 358	786 / 419	886 / 475	4.88
08/20/14	08/29/14	6y		320 / 160	29.1	30.7	0.046	0.102	726 / 386	805 / 429	882 / 472	0.00
05/22/13	05/24/13	5y		259 / 126	7.8	25.5	0.022	0.031	720 / 382	803 / 429	886 / 474	0.00
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75







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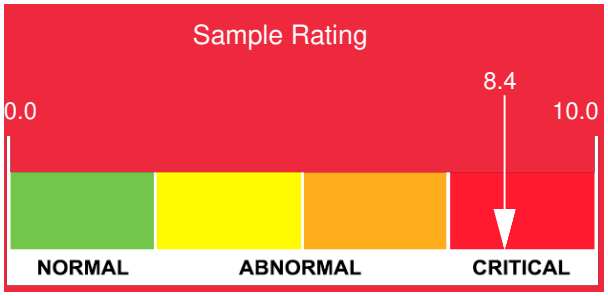
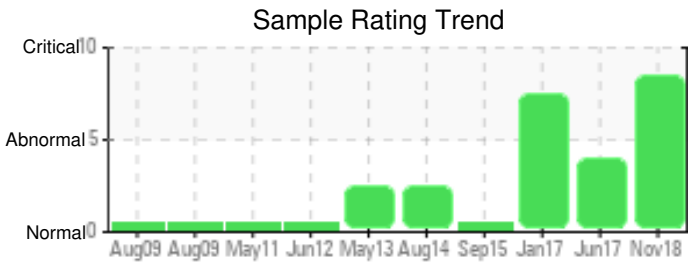
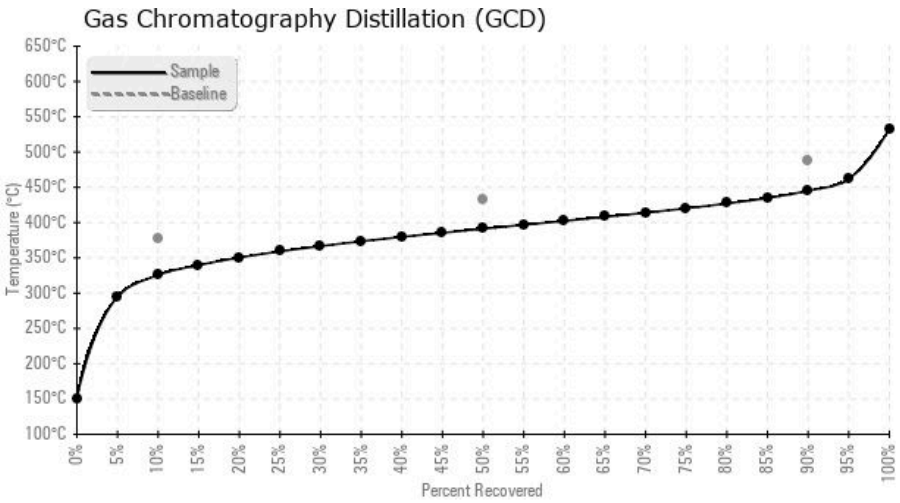
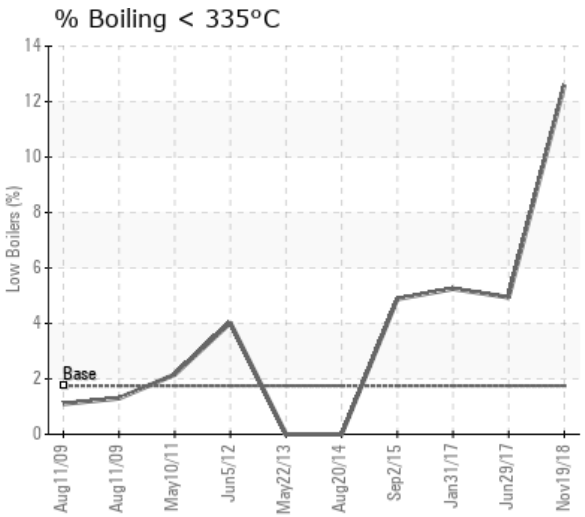




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/19/18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0
06/29/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0
01/31/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0
09/02/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
08/20/14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	17	1
05/22/13	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	19	3
Baseline Data			0	0						0			0	0					0				280	

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





Historical Comments

06/29/17	Sample as provided indicates that the fluid is not oxidized and the viscosity is within a normal range, however is slightly lower than original Calflo HTF (35.2 cSt). The reduction in viscosity may be due to the presence of low boiling components as indicated by a reduced flash point of 170°C (typical flash point is 231°C) and a higher percentage of material detected by GCD <335°C @ 4.94%. Remainder of the distillation profile is consistent with Calflo HTF.Recommended course of action is to vent the expansion tank to release and remove the low boilers helping to increase the flash point, reduce the <335°C materials and help increase the viscosity. Venting of the expansion tank should only be carried out using the proper established procedures for your system design. Sample should be collected after venting of the expansion tank, and sent in for analysis to determine the effectiveness. COC Flash Point is severely low.
01/31/17	Low flash point of the heat transfer fluid has been determined. A high amount of lights ends (%<335°C) has also been determined in the Calflo HTF.Pentane Insoluble is very low, indicating possible cracking of the HTF due to localized hot spots within the heat transfer system. Venting of the expansion tank should be undertaken safely following appropriate operating procedures to allow venting of the low boiling components to help restore the flash point(approx. 230°C) and reduce the amount of light boiling components (%<335°C) from 5.25% to the appropriate level of less than 1.75%.Resample after venting of the expansion tank to determine flash point and amount of light boilers. COC Flash Point is severely low.
09/02/15	The flash point is flagged as being severely low. The GCD results indicate a sharp increase in the low boilers to 4.88%. The system needs venting, i.e. to let the low boilers escape, in order to restore the flash point and viscosity closer to fresh oil data. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally low.
08/20/14	Flash and viscosity reults have improved since last sample, however thay are still low due to the accumulation of low boilers. Continue with the venting procedure to reduce the amount of low boilers in the system. COC Flash Point is severely low. (GCD) 90% Distillation Point is abnormally low.
05/22/13	The accuracy of the results is questionable, specially the low flash point and strange GCD results. We will have a discussion with the lab about this. The oil shows 0 low boilers, 4% less that the last sample yet the viscosity dropped by another 10%. The system needs venting, ie to let the low boilers escape in order to restore the flash point and viscosity closer to fresh oil data. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally low.

