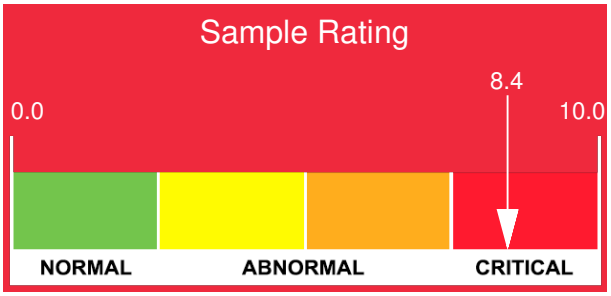
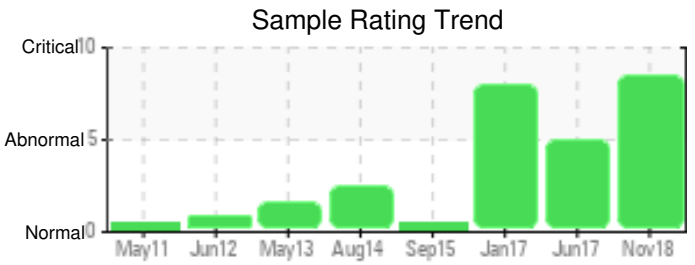
PETRO-CANADA LUBRICANTS





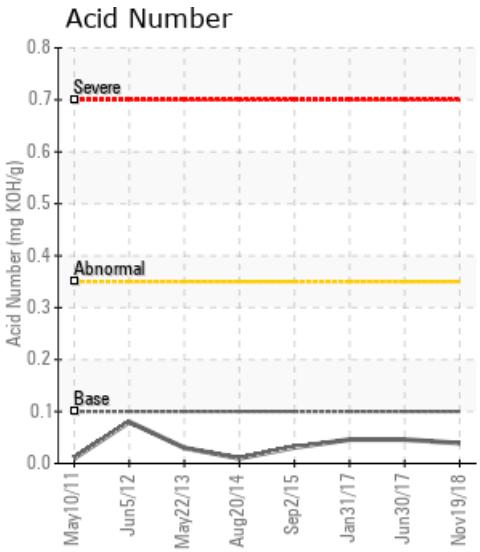
UNIT B

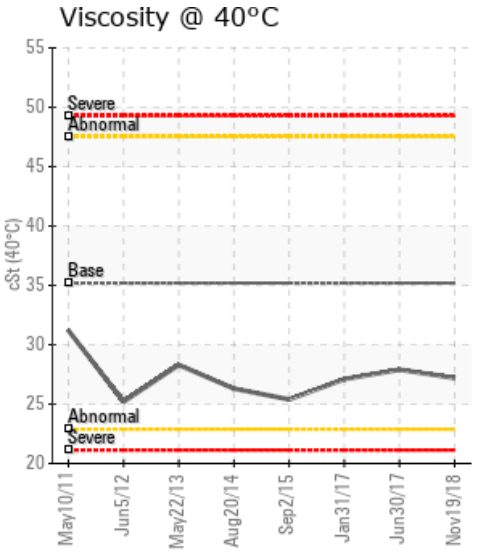
Customer: PTRHTF30035	System Information	Sample Information
VEOLIA WATER 9 LESLIE STREET TORONTO, ON M4M 3M9 CANADA Attn: MICHAEL VULJICIC Tel: (416)406-0801 E-Mail: michael.vujicic@veoliawaterna.com	System Volume: 6000 ltr Bulk Operating Temp: 280F / 138C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make:	Lab No: 02252513 Analyst: Behshad Sabah Sample Date: 11/19/18 Received Date: 11/20/18 Completed: 11/26/18

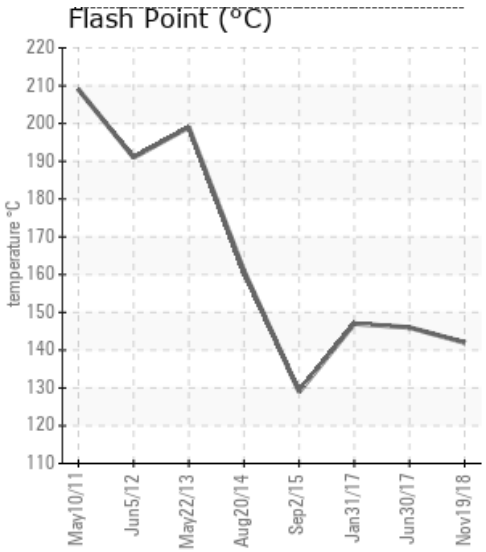
Recommendation:

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 any fresh product to the system during 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 marginally 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		288 / 142	18.9	27.2	0.039	0.016	616 / 325	738 / 392	833 / 445	12.84
06/30/17	07/12/17	0y		295 / 146	24.6	27.9	0.046	0.050	680 / 360	794 / 423	884 / 474	5.24
01/31/17	02/15/17	9y		297 / 147	12.3	27.1	0.046	0.003	679 / 359	795 / 424	894 / 479	5.39
09/02/15	09/17/15	7y		264 / 129	12.0	25.4	0.031	0.044	675 / 357	799 / 426	898 / 481	5.68
08/20/14	08/29/14	6y		322 / 161	25.4	26.3	0.01	0.065	691 / 366	794 / 424	888 / 475	3.05
05/22/13	05/24/13	5y		390 / 199	18.6	28.3	0.030	0.040	711 / 377	803 / 428	889 / 476	0.00
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75







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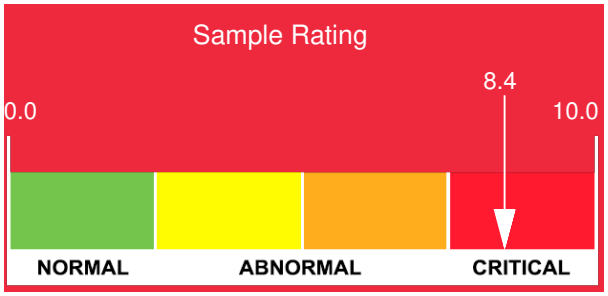
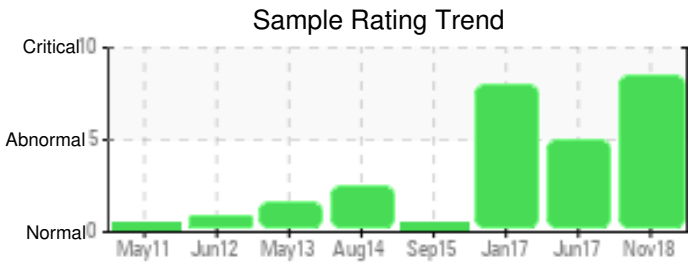
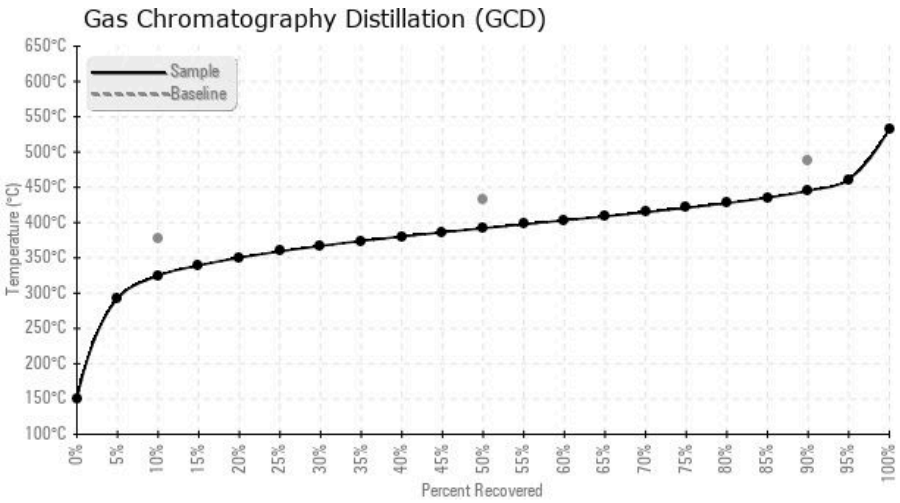
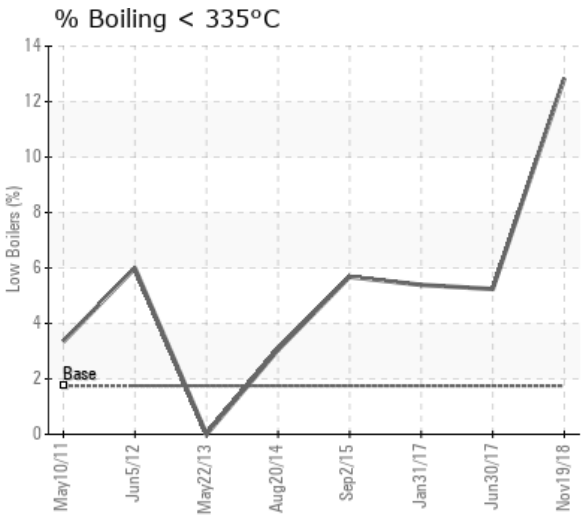




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/19/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0
06/30/17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0
01/31/17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	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	17	0
08/20/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	21	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	21	0
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

06/30/17	Sample as provided indicates that the fluid is not oxidized but the viscosity is reduced to 27.9 cSt, 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 146°C (typical flash point is 231°C) and a higher percentage of material detected by GCD <335°C @ 5.24%. 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. (GCD) 90% Distillation Point is marginally low.
01/31/17	Check procedures to ensure Calflo HTF is being added.Vent expansion tank to release low boilers.Ensure Nitrogen Blanket is on.Check operating parameters to ensure heat transfer system is operating within specification.If possible check for hot spots or areas where fluid may be overheated to cause the formation of low boilers due to cracking of the Calflo HTF, which is indicated by the elevated presence of components <335°C and a drop in viscosity from 35 cSt @ 40°C to 27 cSt @ 40°C.Resample in 3 months after venting.No wear metals detected COC Flash Point is severely low. Fluid Viscosity is no longer an ISO 32. Typical viscosity is 35.2 cSt @40°C, sample was measured at 27.1 cSt @40°C.Initial boiling point (IBP) has dropped from 188 to 153°C, indicating the presence of low boiling components.Percentage of components <335°C is at 5.39%, indicating the presence of low boiling components.Acid number still below 0.1.
09/02/15	The flash point has shown a steady decrease over the last three samples. Additionally, this is supported by GCD results, showing an increase in the low boilers from 3.05% to 5.68%. 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.
08/20/14	Flash and viscosity reults are low due to the accumulation of low boilers. Additionally the GCD results support this, showing an increase of 3.05% <335°C from the previous sample. The system requires venting reduce the amount of low boilers. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally low.
05/22/13	The oil is still in excellent condition, as it shows no alarming signs of degradation. Pls resample same time next year. COC Flash Point is marginally low. (GCD) 90% Distillation Point is marginally low.