

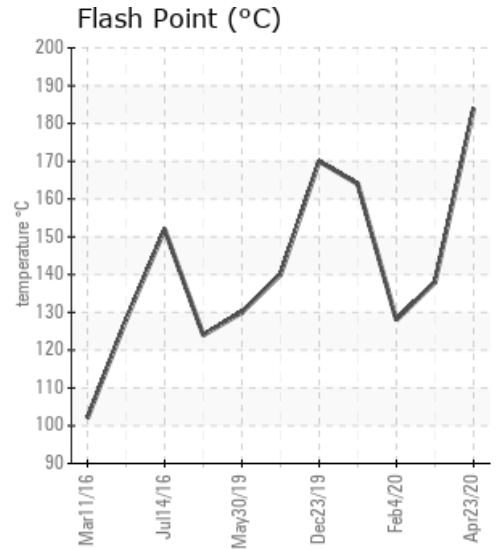
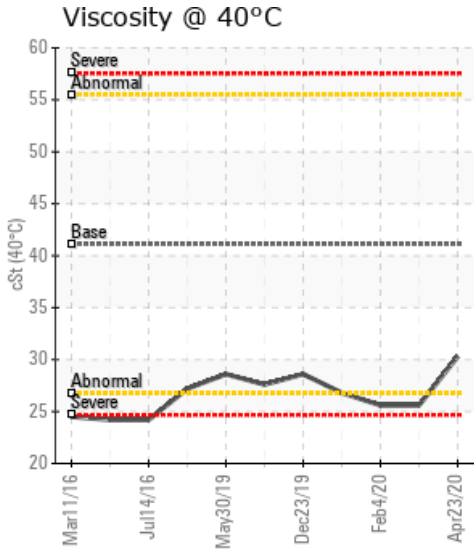
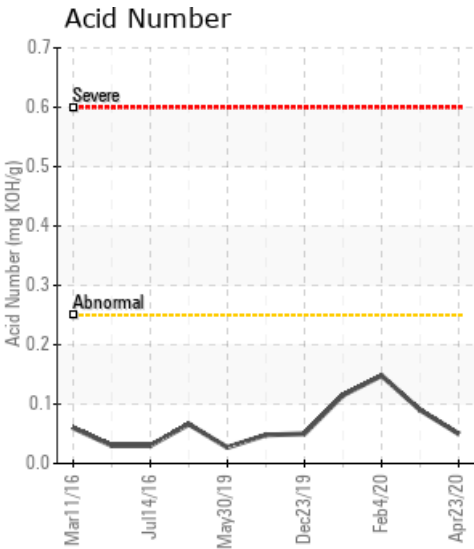
VEOLIA NORTH AMERICA CHICAGO BIOSOLIDS

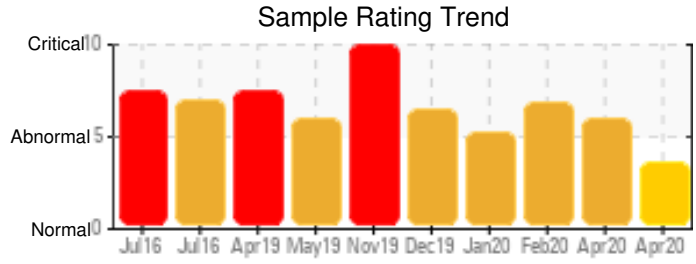
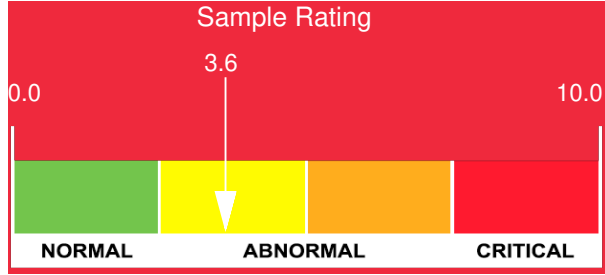
Customer: PTRHTF30090	System Information	Sample Information
VEOLIA NORTH AMERICA 6001 W. PERSHING RD CICERO, IL 60804 USA Attn: Richard Jania Tel: (708)652-0575 E-Mail: richard.jania@veolia.com	System Volume: 38200 gal Bulk Operating Temp: 585F / 307C Heating Source: Blanket: Fluid: CHEVRON HEAT TRANSFER OIL 46 Make: GTS ENERGY INC	Lab No: 02351483 Analyst: Yvette Trzcinski Sample Date: 04/23/20 Received Date: 04/30/20 Completed: 05/06/20 Yvette Trzcinski yvette.trzcinski@petrocanadalsp.com

Recommendation: This sample is from the 50,000 gallon thermal oil holding tank - the fluid has a very low flash point 20% lower than new fluid. The viscosity and boiling points of the fluid show signs of fluid in the tank that is thermally cracked and that has 7% light ends

Comments: COC Flash Point is abnormally low. (GCD) % < 335°C is marginal. (GCD) 10% Distillation Point is marginally low.

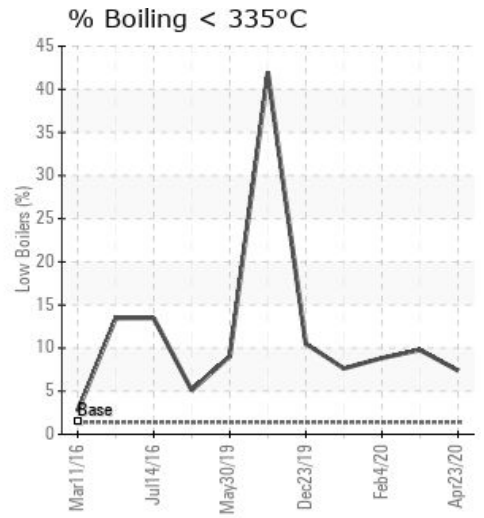
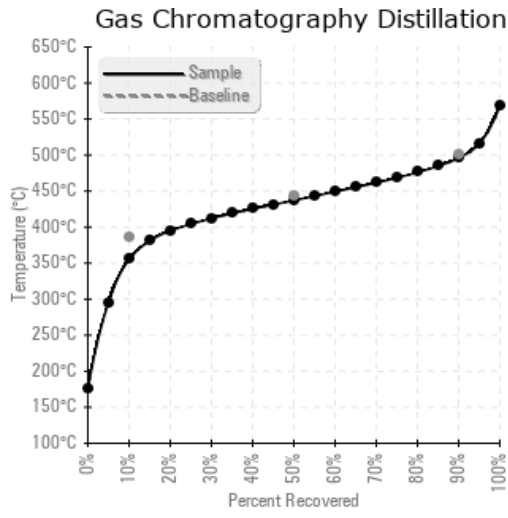
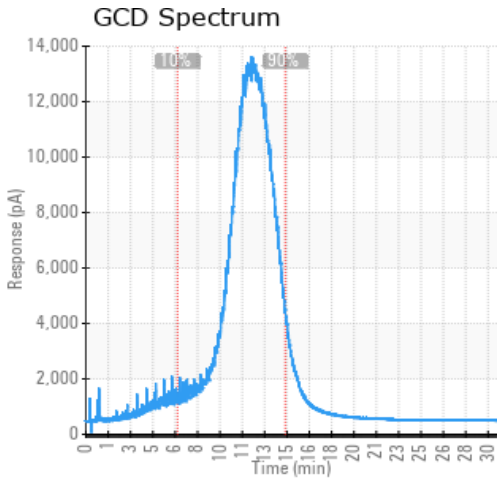
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/23/20	04/30/20	4y	STORAGE TANK	363 / 184	27.7	30.3	0.05	0.054	671 / 355	819 / 437	924 / 496	7.40
04/21/20	04/22/20	0y		280 / 138	13.0	25.6	0.09	0.090	630 / 332	814 / 434	925 / 496	9.78
02/04/20	02/13/20	4y	ANVBAR	262 / 128	7.5	25.6	0.148	0.105	642 / 339	781 / 416	884 / 474	8.84
01/10/20	01/21/20	4y	RETURN LINE	327 / 164	10.1	26.8	0.115	0.030	661 / 349	803 / 428	905 / 485	7.63
12/23/19	12/30/19	0y	RETURN	338 / 170	5.0	28.6	0.050	0.087	622 / 328	790 / 421	909 / 487	10.50
Baseline Data				464 / 240		41.1			727 / 386	828 / 442	932 / 500	1.4





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
04/23/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/21/20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/04/20	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
01/10/20	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/23/19	7	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	
04/21/20	thermal cracking is still occurring at the GCD 10% boiling range it is 14% lower than new oil. the viscosity and flash point seem to be holding similar to the figures from February the viscosity has dropped 37% and the flash point 42% lower than new oil. it is important that the hot oil system bulk oil operating range is held below 550 F/ 287 C to slow the thermal cracking of the fluid further (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. Visc @ 40°C is abnormally low. (GCD) % < 335°C is marginally high.
02/04/20	The fluid is continuing to thermally degrade - indicated by the continued drop in viscosity, flash point and boiling points of the fluid (GCD) The venting appears to be holding the low boilers at 8-9% but the thermal cracking of the fluid is still causing a severely low flash point and will develop carbonaceous material that will begin to deposit in the system, affecting the efficiency of the system and it's performance (GCD) 90% Distillation Point is severely low. COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. Visc @ 40°C is abnormally low. (GCD) % < 335°C is marginally high.
01/10/20	Venting is helping to remove the light ends and vapors from the system, but the fluid is continuing to break down - as can be seen by the reduction in viscosity moving from an ISO 46 to ISO 32 to an ISO 22 in this last sample. The GCD 90% distillation point is still below the temperature it should be indicating the system operation is continuing to thermally break down the lubricant molecules into smaller molecule sizes lowering the boiling point of the fluid as well as the flash point at very low levels. Recommend scheduling a system change out to a heat transfer fluid that is rated for your system bulk operating temperature COC Flash Point is severely low. (GCD) 90% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
12/23/19	The venting has helped to reduce the low boilers from 42% down to 10% which has helped to increase the flash point from 140 C/284 F to 170 C/338 F though it is still critically low. The initial boiling range of the heat transfer fluid has dropped by close to 15%. The fluid will continue to degrade affecting the equipment operation and system performance and the flash point is still critically low. Recommend continuing to vent the system regularly and consider changing the fluid to one that is designed to operate under the specifications of the operating system - resample in 1 month (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 90% Distillation Point is marginally low.

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