

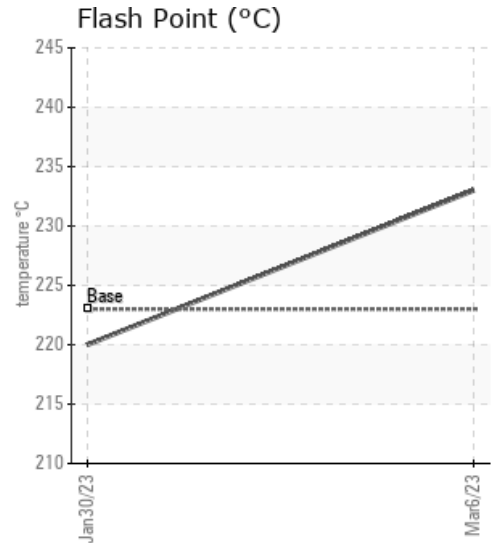
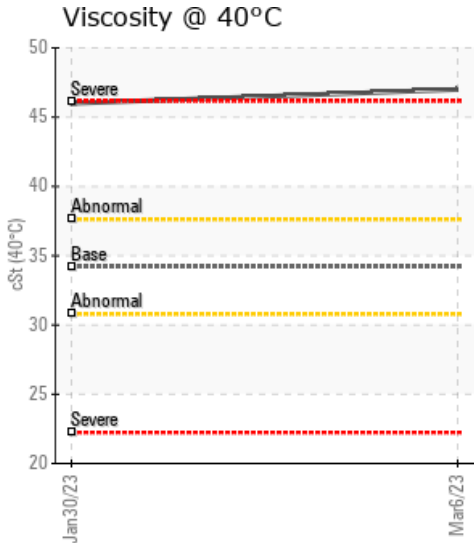
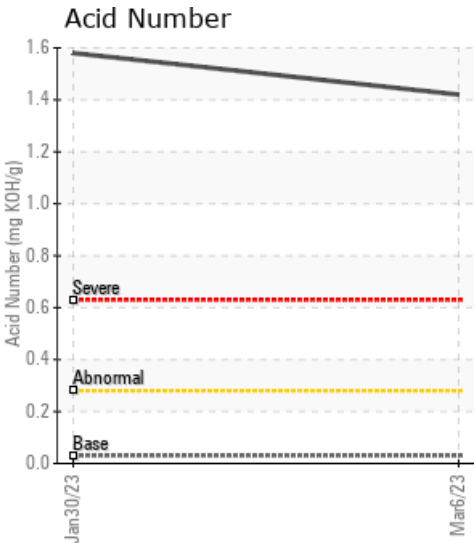
STATEN ISLAND NY

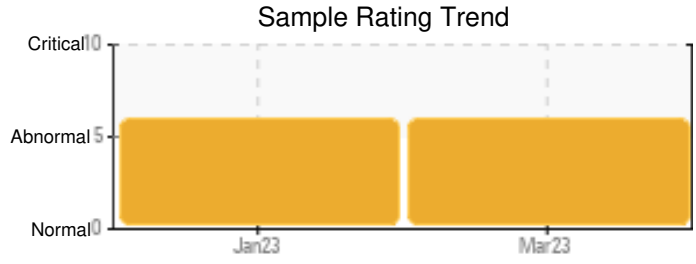
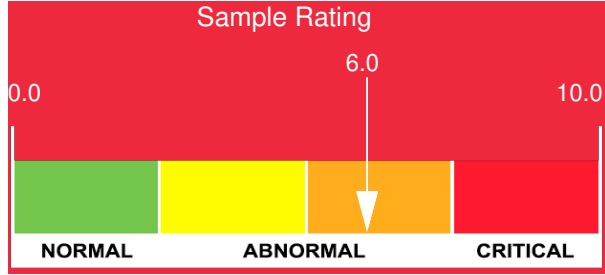
Customer: PTRHTF10211	System Information	Sample Information
City Asphalt 1900 South Ave Staten Island, NY 10314 US Attn: Matthew Cruz Tel: (732)290-0700 E-Mail: mcruz@cityasphalt.com	System Volume: 715 gal Bulk Operating Temp: 400F / 204C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: HYWAY (GENCOR)	Lab No: 02545908 Analyst: Greg Fernandez Sample Date: 03/06/23 Received Date: 03/16/23 Completed: 03/21/23 Greg Fernandez gregory.fernandez@hfsinclair.com

Recommendation: Acid Number (AN) and Viscosity remain abnormally/severely high. Otherwise, overall results for this sample are marginally better than the initial sample from Late Jan/Early Feb 2023, with AN slightly lower, Insolubles slightly lower, and Flash Point slightly higher, which are all minor improvements over the initial sample. However, the elevated AN and Viscosity values remain concerning and will need to be addressed. The recommendation to partially drain and replace some of the fluid to lower the Viscosity remains, with a full drain and refill possible/likely for when business conditions allow.

Comments: No indication of wear metals being generated or introduced into the system. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is notably high. (GCD) 90% Distillation Point is marginally high.

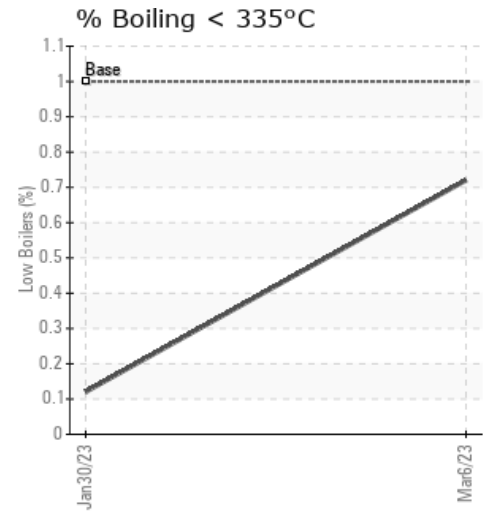
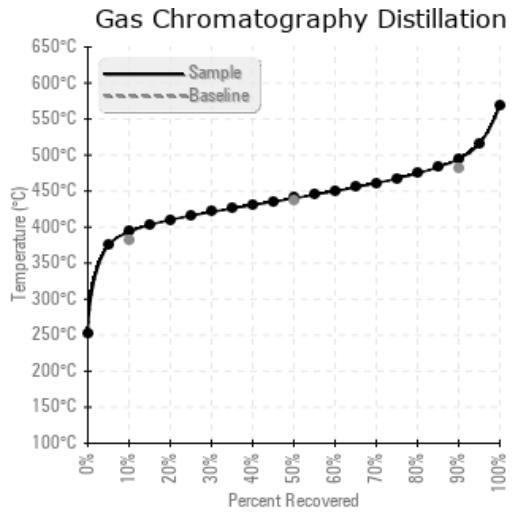
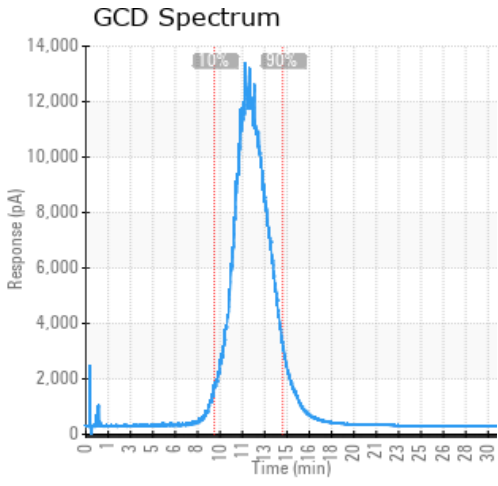
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/06/23	03/16/23	36.0m		451 / 233	67.9	47.0	1.42	2.13	740 / 393	824 / 440	922 / 495	0.72
01/30/23	02/09/23	36.0m		428 / 220	52.0	46.0	1.58	2.42	746 / 397	825 / 441	923 / 495	0.12
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
03/06/23	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
01/30/23	132	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	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	
01/30/23	Acid Number (AN) and Viscosity are both abnormally high. Aside from this and one marginally high GCD value (90% Distillation Point), the sample appears to be in generally good condition and free from contamination. It was hoped that the system would be a good candidate for topping off with fresh fluid to bring the Viscosity of the reservoir lower and closer to the level expected for typical in-service Petro Therm fluid. However, given the surprisingly high AN for the sample, it is advised instead to drain the system and start new with fresh fluid. This is because adding fresh fluid will in fact lower the AN of the system, but not to the point that the oil would be expected perform well in service over an extended period of time. Given that AN increase is an exponential process and that the system would still remain at an elevated level after topping off, it is advised to drain the system and begin anew with fresh fluid. More frequent sampling of the system would then be recommended to monitor the system and the fluid going forward. Continued anomalies of the fluid in this regard would then be an indication of some system design or maintenance concern that would require further investigation. There is some underlying cause of these elevated AN and Viscosity increase values that cannot be determined through oil analysis alone. Wear metal rates are all low or not present, indicating that the system is not generating wear metals at this time. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high. (GCD) 90% Distillation Point is marginally high.

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