

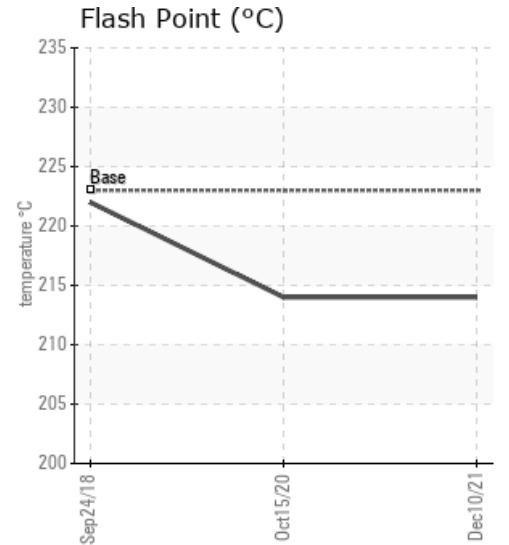
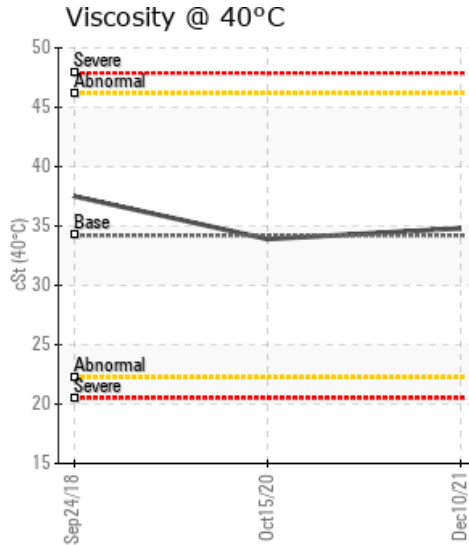
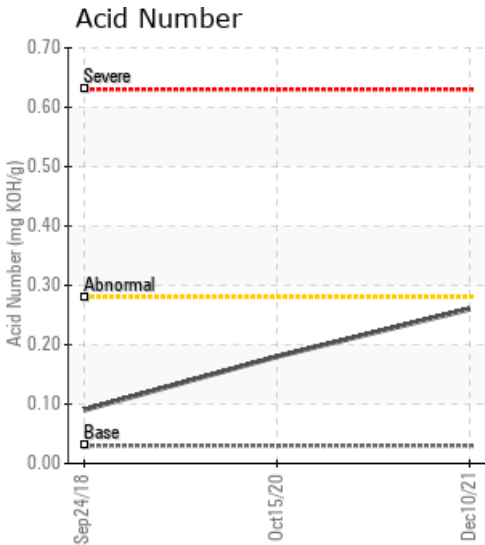
## CHICAGO OGDEN PLANT

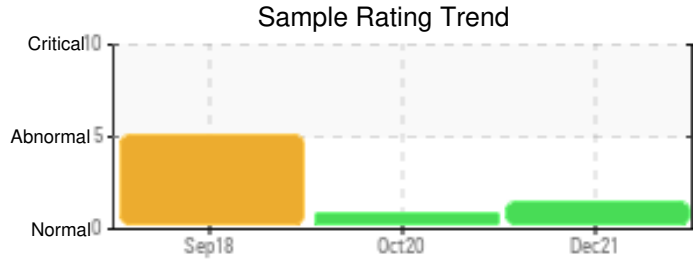
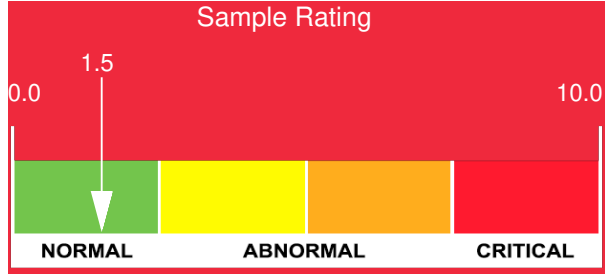
Customer: PTRHTF30109	System Information	Sample Information
RELIABLE MATERIALS LLC 5500 S PULASKI CHICAGO, IL 60629 USA Attn: Bob Madden Tel: (630)774-4120 E-Mail: rmadden@biganepaving.com	System Volume: 600 gal Bulk Operating Temp: 325F / 163C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02463462 Analyst: Yvette Trzcinski Sample Date: 12/10/21 Received Date: 12/21/21 Completed: 01/04/22 Yvette Trzcinski yvette.trzcinski@hollyfrontier.com

Recommendation: The viscosity, Acid Number, Flash point are at acceptable levels. The GCD boiling point at 10% and 50 % are within specification the GCD boiling point at 90% is marginally high which indicates some oil oxidation and degradation but oil is acceptable for continued service. Resample at the next sampling interval 9 - 12 months

Comments: (GCD) 90% Distillation Point is marginally high.

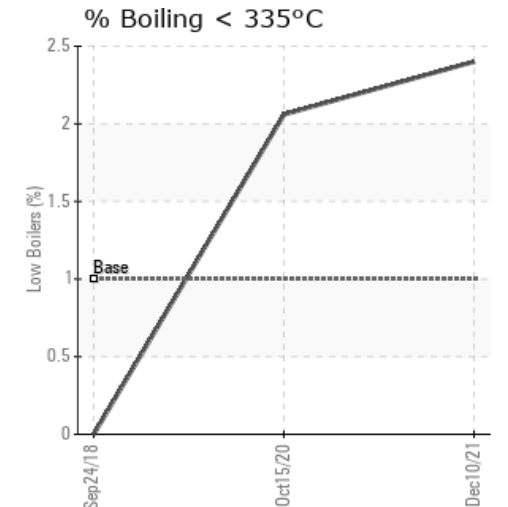
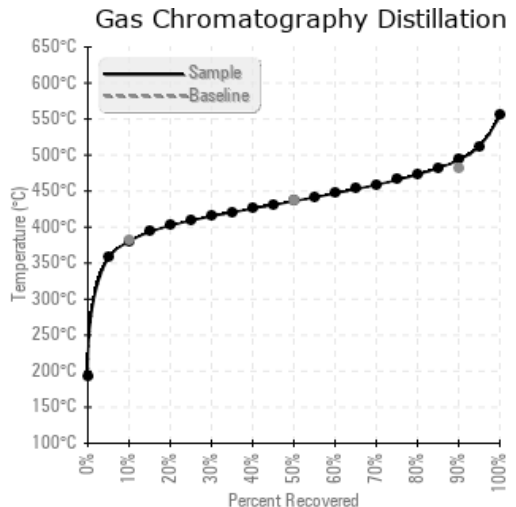
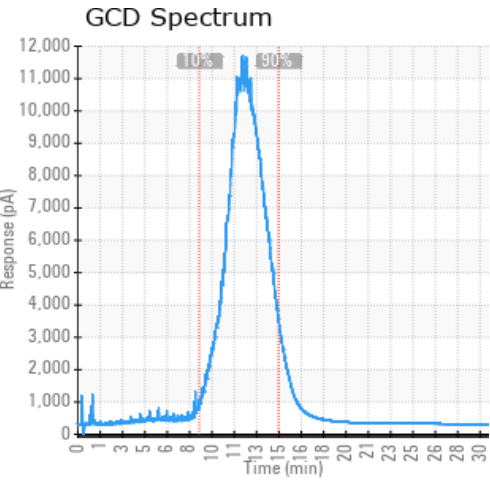
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/10/21	12/21/21	3.0y		417 / 214	14.8	34.8	0.26	0.135	716 / 380	817 / 436	920 / 493	2.40
10/15/20	11/09/20	1.0y	Boiler	417 / 214	12.1	33.9	0.18	0.115	718 / 381	818 / 437	919 / 493	2.06
09/24/18	10/03/18	4.0y		432 / 222	42.3	37.5	0.09	0.317	687 / 364	792 / 422	898 / 481	0.00
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
12/10/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/15/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/24/18	5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	145	0	0	2
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	
10/15/20	There is some slight degradation of the fluid but the fluid is suitable for continued service. Resample in 6 - 12 months (GCD) 90% Distillation Point is marginally high.
09/24/18	The sample shows signs of thermal cracking - the GCD distillation points at 10% and 90% are lower than for new oil the fluid is thermally degrading creating lighter/shorter hydrocarbons lowering viscosity which is 10% lighter than new fluid and can lead to heavy carbonaceous deposits that can foul the system leading to system inefficiencies. (GCD) 90% Distillation Point is severely low. Calcium ppm levels are severely high.

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