

[11-34-79-12W6] ARC RESOURCES

Customer: PTRHTF20257
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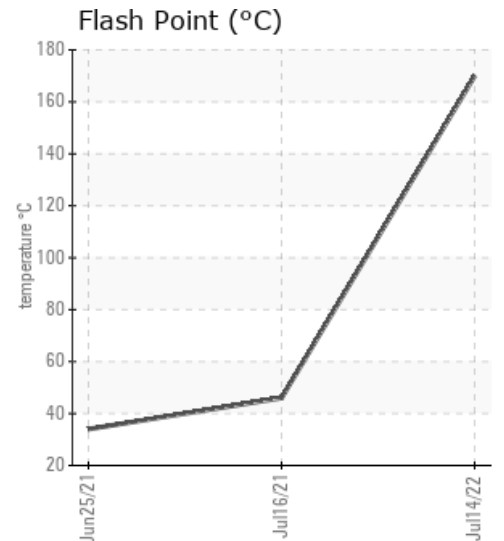
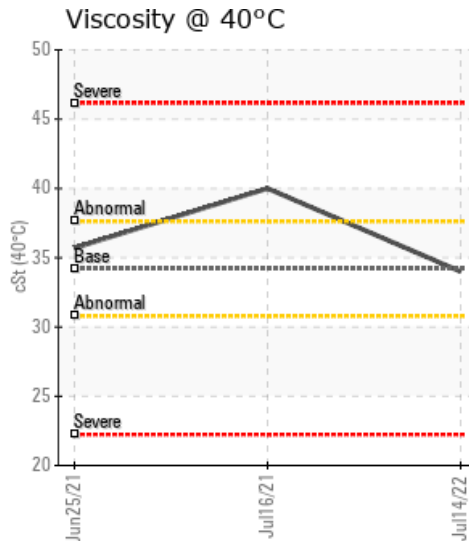
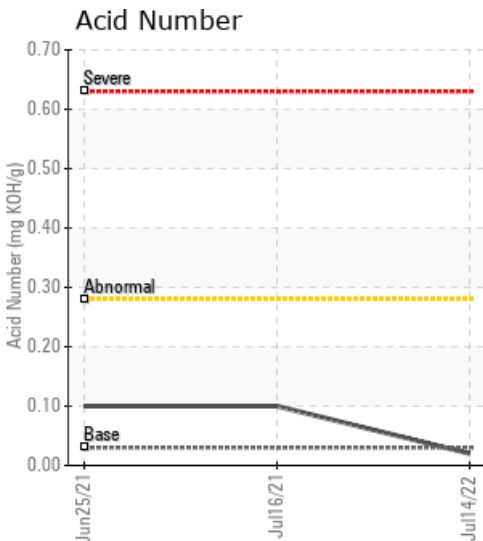
System Information
 System Volume: 4000 ltr
 Bulk Operating Temp: 302F / 150C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PETRO-THERM
 Make:

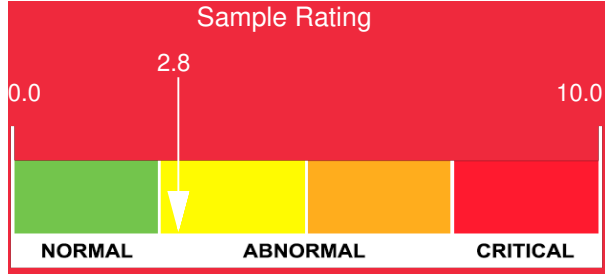
Sample Information
 Lab No: 02501865
 Analyst: Clinton Buhler
 Sample Date: 07/14/22
 Received Date: 07/25/22
 Completed: 07/27/22
 Clinton Buhler
 Clinton.Buhler@hollyfrontier.com

Recommendation: Sample results have greatly improved from a year ago due to a needed fluid changeout. There remain some residual aspects from the previous fluid: some iron (12 ppm) and sodium (19 ppm), lower flash point and 3.44% low boiler vapor content. As a good practice, it is recommended to perform routine venting of the expansion tank to remove the low boilers and help restore the fluid's flash point. Please ensure blanket gas is operational before and after periods of venting. Please re-sample in 12 months.

Comments: (GCD) 90% Distillation Point is severely high. COC Flash Point is abnormally low.

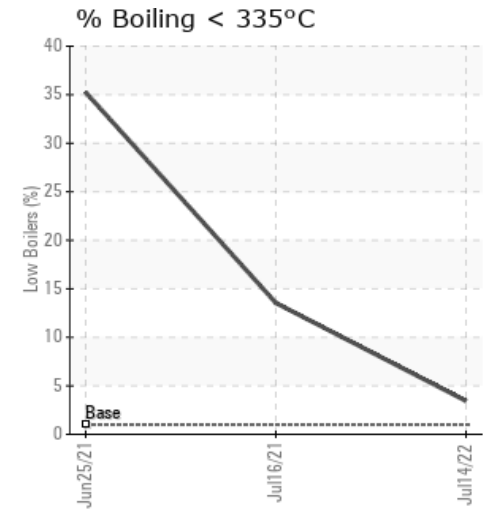
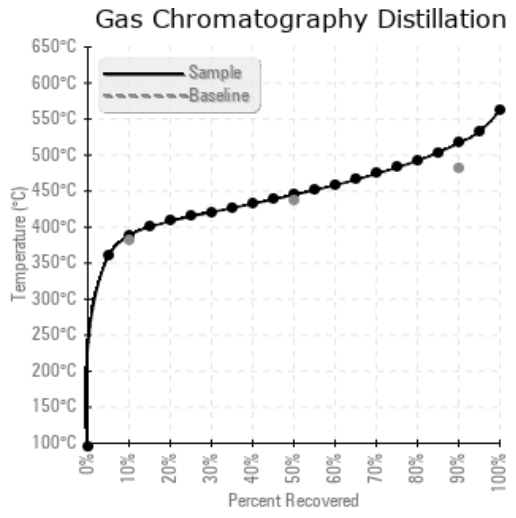
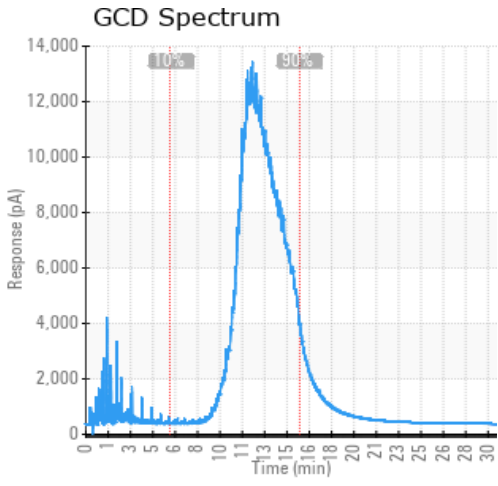
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
07/14/22	07/25/22	12.0m		338 / 170	46.3	34.0	0.02	0.035	731 / 389	832 / 445	962 / 517	3.44
07/16/21	07/23/21	60.0m	discharge of boiler	115 / 46	55.6	40.0	0.10	0.322	327 / 164	911 / 488	1010 / 543	13.54
06/25/21	07/06/21	24.0m		93 / 34	63.2	35.7	0.10	0.034	240 / 116	781 / 416	938 / 503	35.25
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
07/14/22	12	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	3	0	7	2
07/16/21	102	0	0	0	0	0	0	0	0	0	4	179	2	0	0	0	1	0	0	1	21	0	69	4
06/25/21	48	0	0	0	0	0	1	0	0	0	1	108	2	0	0	0	0	0	0	0	13	0	24	3
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

07/16/21	This is a re-sample after the June 25, 2021 sample: Sample results indicate that the fluid is not in good condition. It is contaminated with sodium and has a drastically reduced flash point (46C) which is a safety concern. The fluid has 13.54% low boiling vapors and very reduced 10% GCD temperature which may be due to thermal degradation or mixture with process fluid. It is advised to change out this fluid at the nearest opportunity. Please contact Petro-Canada Lubricants technical services for further discussion. Sodium ppm levels are severely high. (GCD) % < 335°C is severely high. (GCD) 90% Distillation Point is severely high. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low.
06/25/21	Sample results indicate that the fluid is not in good condition. It is contaminated with sodium, but of more concern is the fluid's drastically reduced flash point (34C). The fluid has 35.25% low boiling vapors and very reduced 10% GCD temperature which may be due to thermal degradation of mixture with process fluid. If this sample is pulled from a representative zone, the fluid needs to be replaced. Please contact Petro-Canada Lubricants technical services for further discussion. Sodium ppm levels are severely high. (GCD) % < 335°C is severely high. (GCD) 90% Distillation Point is severely high. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low.

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