

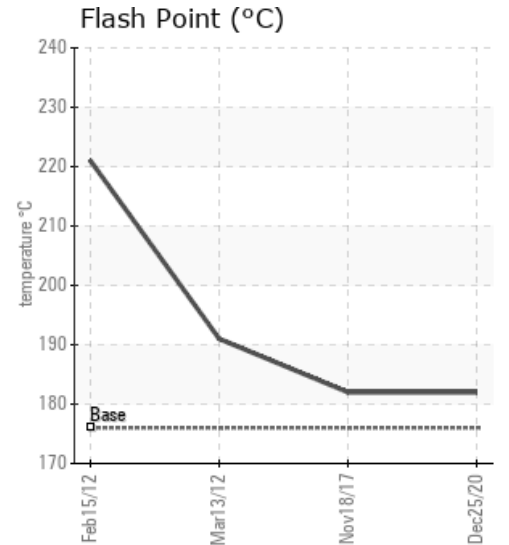
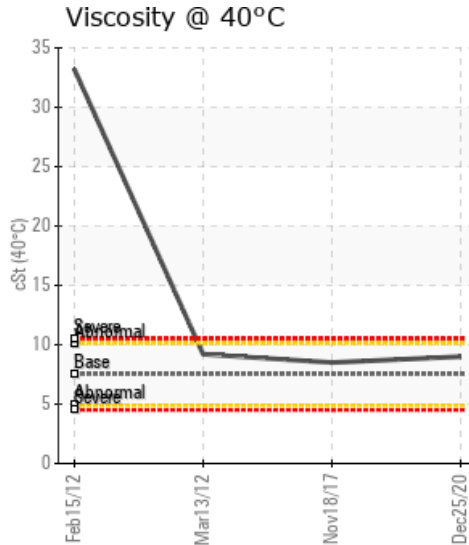
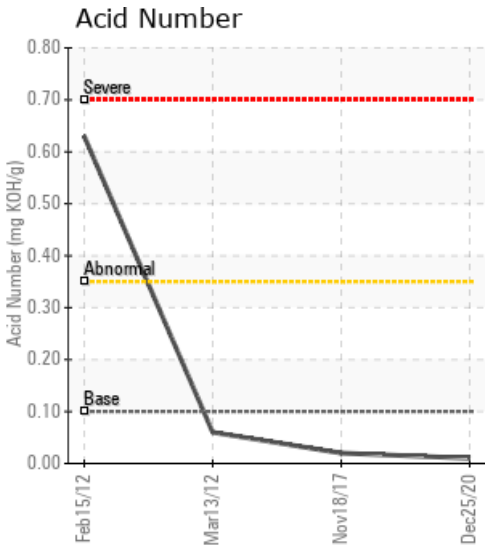
## VAPORIZER #2

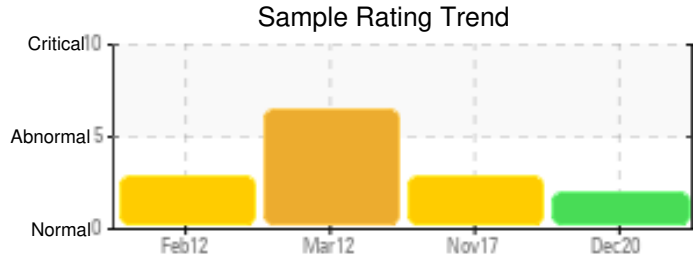
Customer: PTRHTF10092	System Information	Sample Information
<b>REC GROUP</b> 119410 RICK JONES WAY BUTTE (SILVER BOW), MT 59750 USA Attn: Bill Telling Tel: (406)496-9929 E-Mail: bill.telling@recsilicon.com	System Volume: 120 gal Bulk Operating Temp: 400F / 204C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO LT Make: WELLMAN	Lab No: 02397478 Analyst: Ron LeBlanc Sample Date: 12/25/20 Received Date: 01/14/21 Completed: 01/20/21 Ron LeBlanc Ronald.LeBlancSr@petrocanadalsp.com

Recommendation: (GCD) 90% indicates thermal degradation. (GCD) 50% Low boilers are slightly high. Remove low boilers via the expansion tank. High boilers can lead to deposits fouling heat exchanger surfaces. Sample again in 3 months.

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

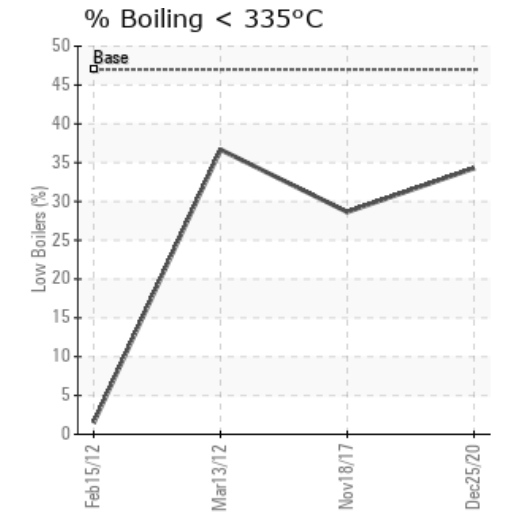
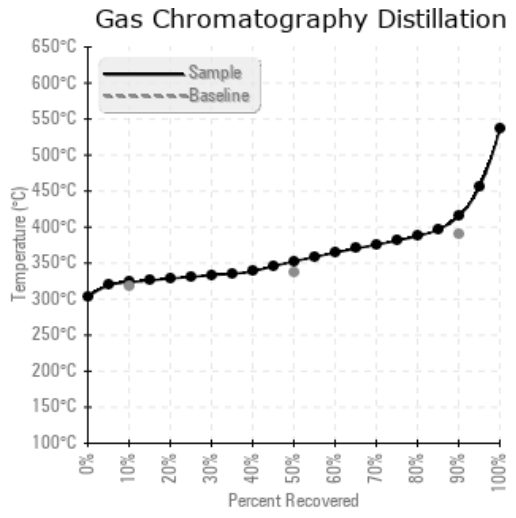
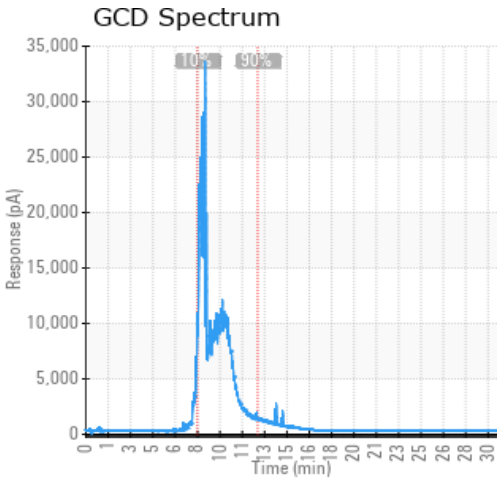
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/25/20	01/14/21	8y	SST2	360 / 182	0.00	9.0	0.01	0.106	614 / 324	666 / 352	778 / 415	34.28
11/18/17	12/04/17	0y		360 / 182	2.2	8.5	0.020	0.028	614 / 324	682 / 361	848 / 454	28.64
03/13/12	03/19/12		BOTTOM DRAIN	376 / 191	1507	9.2	0.06	0.006	612 / 322	666 / 352	778 / 414	36.68
02/15/12	02/22/12		BOTTOM DRAIN	430 / 221	10	33.2	0.63	0.055	693 / 367	785 / 418	888 / 475	1.509
Baseline Data				349 / 176		7.52	0.1		604 / 318	640 / 338	734 / 390	47.0





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	
12/25/20	0	0	0	0	0	2	0	0	0	0	6	7	0	0	0	0	0	0	0	0	0	0	255	0	
11/18/17	0	0	0	0	0	4	0	0	0	0	6	8	0	0	0	0	0	0	0	0	0	0	0	267	0
03/13/12	0	0	0	0	0	0	1	0	0	0	5	4	0	0	0	0	0	0	0	0	0	2	228	2	
02/15/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	204	2	
Baseline Data			0	0						0		0	0				0	0					270		

Elemental analysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]



Historical Comments	
11/18/17	(GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high. Silicon is elevated over last 2 samples. Possible process leak. Water has been removed in comparison to last sample. (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.
03/13/12	The oil would look fine, with perhaps a small amount of left-over from the previous product which explains the slightly higher viscosity compared to fresh Cafflo LT. However, the water content is 0.15% (1500 ppm) which is high for heat transfer systems. Chances are that it is noticeable in the way the system operates and behave when heated above 212F. If no water based material was used to clean, perhaps it was just a dirty sample port. Feel free to re-sample but make sure to allow a good 1/2 to 3/4 gallon of oil to flow through the valve before collecting the sample.
02/15/12	The oil shows a high Acid Number, indicative of acids in the oil. The acids can either come from oil oxidation or contamination by an acid (like hydrochloric acid resulting from a chlorosilane leak). There is no Silicon detected so we lean towards an advanced degradation stage for the oil. The sample does not show an excessive amount of solids for a bottom drain sample so the system does not appear to be excessively dirty but it is possible that heat transfer surfaces may be coated with insoluble material that accumulated over the years. Please take a sample about 24-48 hrs after the system has ben cleaned, flushed and put back into service in order to get a baseline.

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