

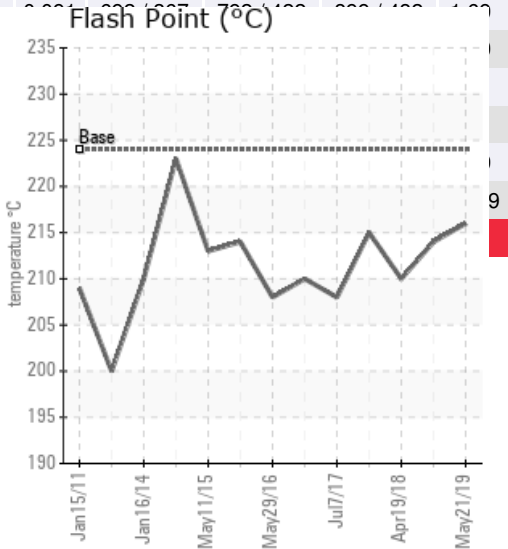
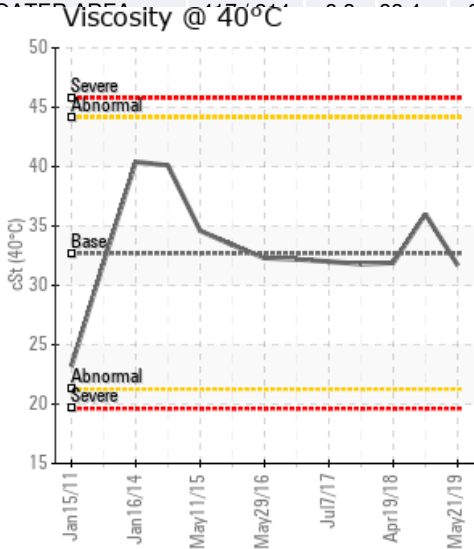
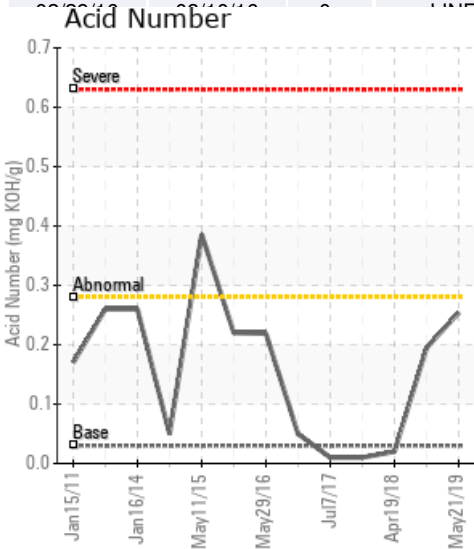
## LINE 2 HOT OIL SYSTEM

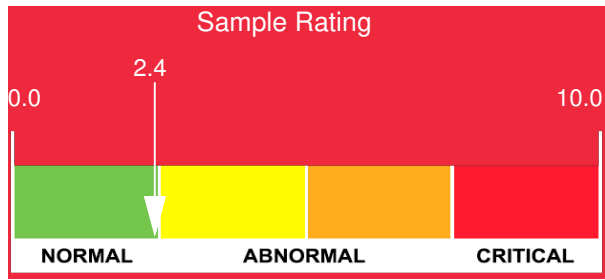
Customer: PTRHTF10059	System Information	Sample Information
CERTAINEED - SAINT GOBAIN 11519 US RT 250 N MILAN, OH 44846 USA Attn: DAVE BLAKELY Tel: (419)541-0843 E-Mail: dave.l.blakely@saint-gobain.com	System Volume: 1265 gal Bulk Operating Temp: 480F / 249C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: FIRST THERMOL	Lab No: 02288395 Analyst: Gaston Arseneault Sample Date: 05/21/19 Received Date: 05/31/19 Completed: 06/03/19

Recommendation: Everything looks good but we are noticing a steady increase in the acid number since last year which may mean the fluid is undergoing oxidation. This will result in a shortened fluid life. Oxidation is when the fluid gets oxidized due to contact with oxygen from air. First, we suggest to check the nitrogen blanket to make sure oxygen is kept out of the expansion tank. Second, if there is oxygen in the expansion tank and the fluid temperature in the expansion tank is hotter than 125F, this means the fluid will oxidize rapidly because the oxidation rate doubles for every 18F increase. Let's discuss what may be happening

### Comments:

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	%
05/21/19	05/31/19	0y		421 / 216	10.3	31.7	0.254	0.013	686 / 363	780 / 416	888 / 476	0.99
10/11/18	10/24/18	0y		417 / 214	14.3	36.0	0.195	0.207	694 / 368	786 / 419	880 / 471	0.00
04/19/18	04/27/18	0y	OFF OF HEADER	410 / 210	6.1	31.9	0.02	0.277	690 / 365	790 / 421	883 / 473	2.28
07/12/17	07/28/17	0y		419 / 215	18.5	31.8	0.01	0.314	697 / 369	794 / 424	896 / 480	1.38
07/07/17	07/28/17	0y		406 / 208	15.1	32.0	0.01	0.289	696 / 369	794 / 423	895 / 479	1.43
02/07/17	02/15/17	0y	SIDE STREAM FLTR PRT	410 / 210	8.7	32.2	0.05	0.145	696 / 369	793 / 423	900 / 482	1.18
05/29/16	06/07/16	0y	SEALNAT USE TANK PMP	406 / 208	13.7	32.3	0.219	0.156	692 / 367	780 / 416	877 / 469	0.13





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	
05/21/19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0
10/11/18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0
04/19/18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0
07/12/17	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	91	0
07/07/17	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	90	0
02/07/17	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0
05/29/16	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	91	0
Elemental analysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]																									
05/11/15	55	0	0	0	0	0	0	0	0	0	1	0	2	0	2	0	2	0	0	4	0	0	0	148	6
02/26/14	103	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	2	0	0	0	14	0	0	162	24
01/16/14	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	153	2
12/11/12	15	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142	1
01/15/11	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	46	1
Baseline Data			0	0						0			0	0					0					270	

Historical Comments	
10/11/18	The Acid Number test jumped to 0.2. While this is still a very low value and the test itself carries a certain uncertainty when measuring low values, the jump from 0.02 to 0.2 is noticeable in that perhaps oxidation has begun. We will monitor this property and if the trend of increasing Acid Number continues we will recommend to take action. Resample in 6 months.
04/19/18	The condition of the oil looks very good. Please continue to sample at the same 8-9 months frequency.
07/12/17	Everything looks excellent, nothing is flagged. Pls resample at next scheduled interval.
07/07/17	Everything looks excellent, nothing is flagged. Pls resample at next scheduled interval.
02/07/17	The age of the fluid is unknown but it showed as 14 years old in 2014. The fluid looks very dark but its condition doesn't look that bad. We do not want to condemn 1200 gals of fluid based on looks only but if problems described last year with deposits in piping in low lying areas then a good system cleaning to restore its overall good condition should be considered.
05/29/16	The fluid looks very dark but its condition is not as bad as in 2014. Solids are not alarmingly high, oxidation is present but not at levels worth flagging or indicative of major problems. It came to our attention however that the system shows deposits in low lying piping and those signs should not be ignored. This oil analysis is just another tool in the toolbox but the challenge is to determine what the inside looks like based on a 1qt sample of hot oil.
02/29/16	Oil is in good condition, no issues at this time. Re-sample at next scheduled interval.

05/11/15



01/16/14

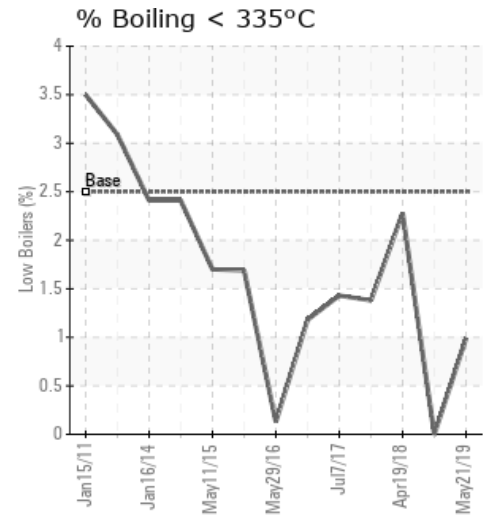
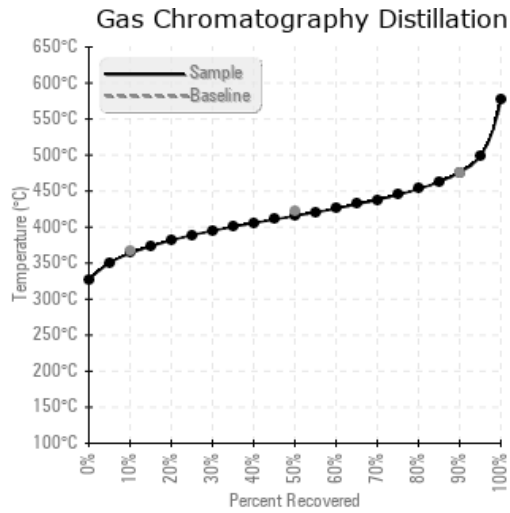
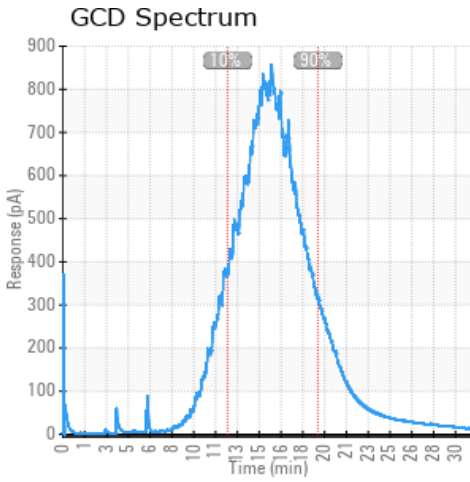
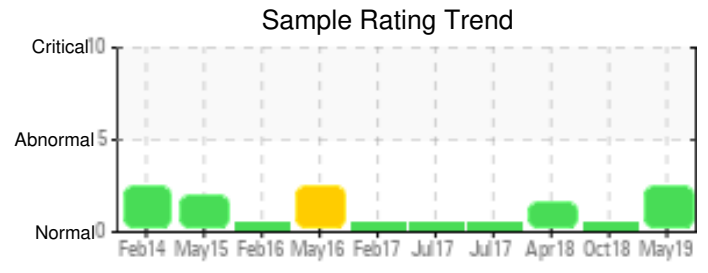
The amount of insoluble solids remains high but the oil appears to be in better condition judging by the lower TAN (oxidation). We wouldn't suggest to invest in filtration if none is present, but if the system is equipped with a filter we'd recommend to pay attention to filtration or try to remove more solids. Other properties look normal. Pentane Insolubles levels are severely high.

12/11/12

For some reason, this system is showing oil degradation by oxidation. It has high solids floating in the oil and both the viscosity and GCD 90% tail end of the distillation curve show heavy molecules in the oil. If indeed this system is 750 gals I would recommend a complete oil replacement including a system cleaning and investigation into why the degradation seems to occur only in this system. Pentane Insolubles levels are severely high.

01/15/11

The TAN is slowly rising but the oil is still in good condition overall. Please rem



This is the first samples we receive under our program so we are building the database here so we can examine trends. The oil looks significantly different than Calflo AF values because there is very little Calflo AF in this fluid, we suspect is mainly what looks like Therminol 55. As the systems are topped-up the numbers will start looking more like Calflo AF. The oil condition is good at this point, no action required. We suggest sampling twice per year, yearly minimum. Thank you for your business.