

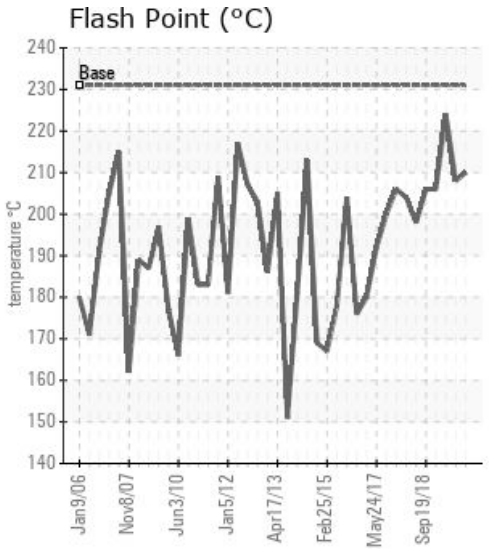
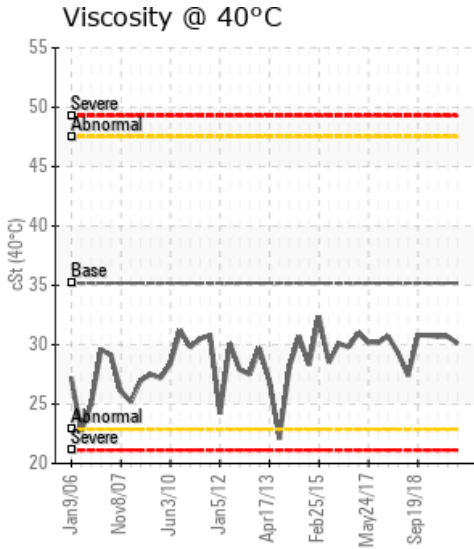
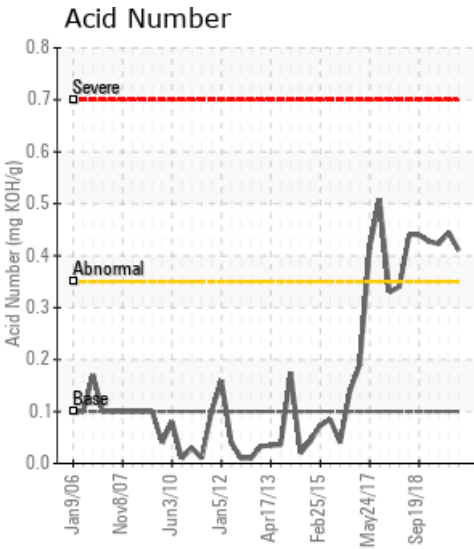
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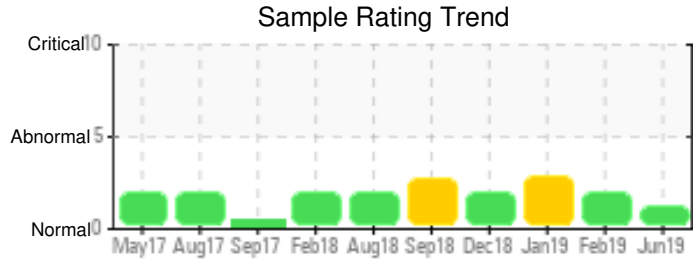
Customer: PTRHTF10036	System Information	Sample Information
CERTAINTEED - SAINT GOBAIN 6400 STEVENSON BLVD FREMONT, CA 94538-2468 USA Attn: Dan Arata Tel: (510)490-0890 E-Mail: dan.d.arata@saint-gobain.com	System Volume: 5000 gal Bulk Operating Temp: 450F / 232C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make: FIRST THERMAL	Lab No: 02293746 Analyst: Steven Slanker Sample Date: 06/12/19 Received Date: 06/26/19 Completed: 07/09/19

Recommendation: The acid number is high. Otherwise the oil is in good condition. Recommend verifying nitrogen blanket is working properly and partial fluid replacement to reduce acid number.

Comments: Acid Number (AN) is abnormally high.

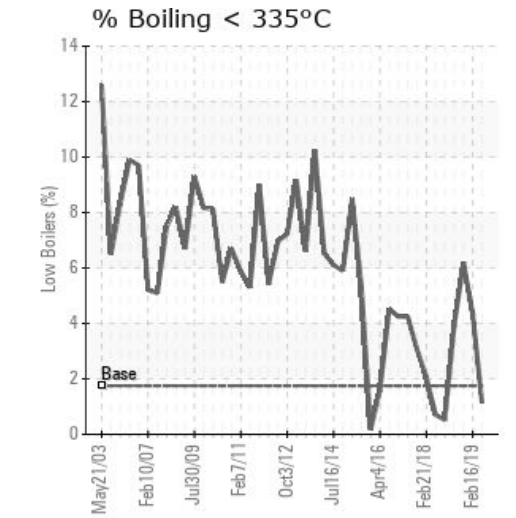
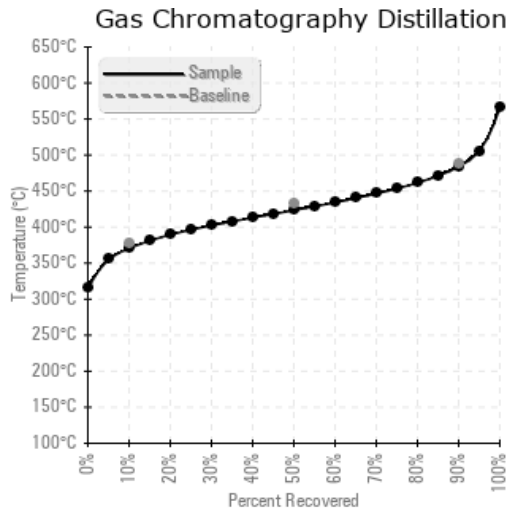
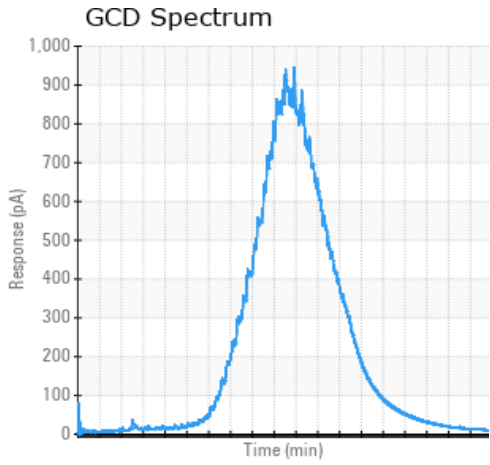
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
06/12/19	06/26/19	7y		410 / 210	13.6	30.1	0.410	0.110	698 / 370	794 / 423	903 / 484	1.14
02/16/19	02/28/19	6y	VALVE ON MAIN LOOP	406 / 208	7.6	30.7	0.445	0.035	674 / 356	779 / 415	890 / 477	4.33
01/22/19	02/01/19	5y		435 / 224	8.8	30.7	0.423	0.052	657 / 347	767 / 408	884 / 473	6.20
12/19/18	01/17/19	0y		403 / 206	5.8	30.8	0.427	0.083	671 / 355	774 / 412	884 / 473	3.91
09/19/18	10/01/18	6y		403 / 206	2.7	30.8	0.44	0.048	700 / 371	790 / 421	878 / 470	0.52
08/22/18	08/31/18	6y	MAIN SUPPLY	388 / 198	9.1	27.4	0.441	0.083	699 / 371	795 / 424	905 / 485	0.70
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75





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
06/12/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	0
02/16/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0
01/22/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0
12/19/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	0
09/19/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129	0
08/22/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	0
Baseline Data			0	0						0			0	0					0				280	

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



Historical Comments	
02/16/19	The Acid Number has been relatively stable over the last 6 months but shows oxidation has occurred. The oil won't degrade rapidly but it's better to adopt a proactive approach. If left to degrade until it fouls the system, it will force a full system cleaning and flushing. If you have a shut-down in the coming months, we would advise to consider replacing a portion (example 30 - 50%) of the fluid with fresh Calflo to maintain healthy oil. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally low.
01/22/19	Recommend venting low boilers off then replacing 50% of the fluid to reduce acid number. Verify that nitrogen is in use. Acid Number (AN) is abnormally high. (GCD) 10% Distillation Point is marginally low. (GCD) 90% Distillation Point is marginally low.
12/19/18	The results are identical to the last sample. The Acid Number remains high at 0.43 so recommendations from the last sample still apply. We suggested to replace a certain percentage of the fluid, like 20% in order to dilute the oxidation products present. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally low.
09/19/18	The Acid Number remains high at 0.44. It was always a bit elevated but it might be best to dilute these degradation products by replacing a part of the fluid with fresh oil, so that this fluid charge can be run for many more years. Replacing 20% will bring down the Acid Number to below 0.4 which is sort of our initial warning limit. Moreover, we suggest to look into the possible causes of the high Acid Number and oil oxidation. Make sure the nitrogen blanket works and that the fluid is not allowed to boil off for days on end because that's when the hot oil gets in contact with air and accelerates its oxidation. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally low.
08/22/18	Flash Point is low and acid number high. Recommend venting to reduce low boilers thereby reducing the low flash point issues. Replace 50% of the fluid to bring the acid number down. Check the pumping system to insure the flow is high enough to minimize thermal cracking in the heater. Thermal cracking generates low boilers and reduces the flash point of the fluid. It also generates high boilers that obstruct downstream piping and elbows. Check the nitrogen blank to insure it is working. By minimizing the presence of oxygen will greatly reduce the oxidation process thereby extending fluid life.

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