

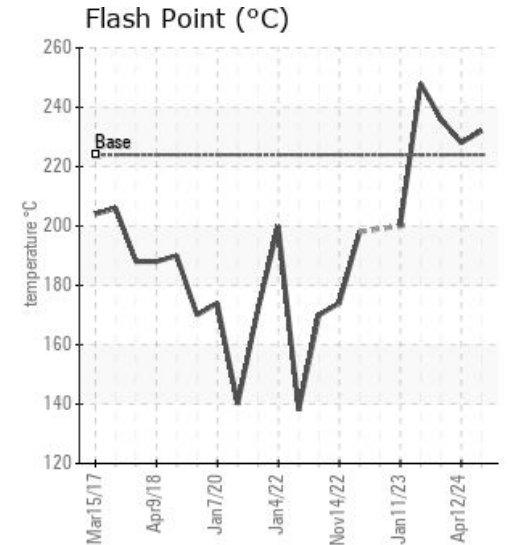
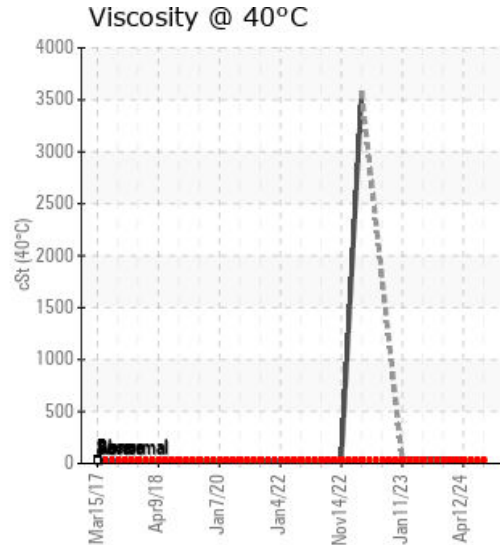
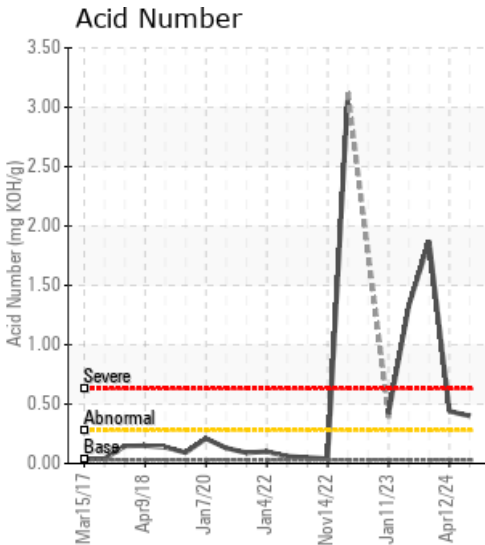
TFS H/O SYSTEM #2

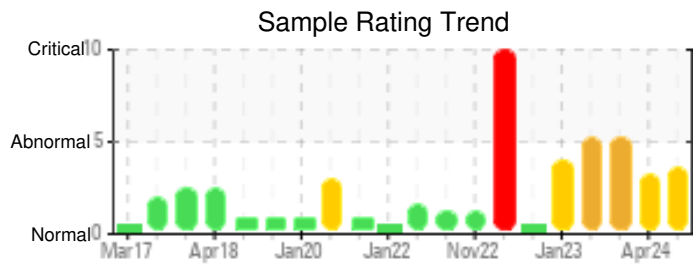
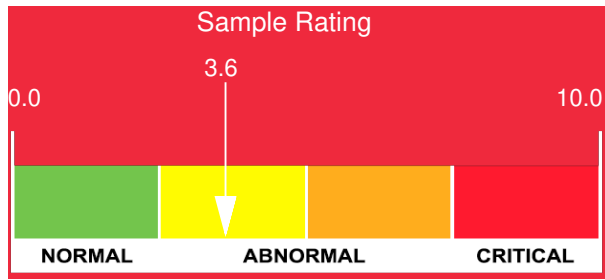
Customer: PTRHTF10176	System Information	Sample Information
CERTAINEED ROOFING 100 CERTAINEED DR JONESBURG, MO 63351 US Attn: Jeff Montgomery Tel: (952)261-9532 E-Mail: jeffrey.d.montgomery@saint-gobain.com	System Volume: 4244 gal Bulk Operating Temp: 525F / 274C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: FSE	Lab No: 02644450 Analyst: Neil Buchanan Sample Date: 06/21/24 Received Date: 06/27/24 Completed: 07/05/24 Neil Buchanan neil.buchanan@HFSinclair.com

Recommendation: Calcium levels remain abnormally high but have decreased from the high. Acid Number is below the condemning limit >1.0. GCD and flash point are good. Iron levels are elevated, and water levels are low at 102 ppm so probably do to work on the system. Fit for further service and resample next interval to monitor.

Comments: Iron ppm levels are abnormal. Calcium ppm levels are severely high. Acid Number (AN) is abnormally high. Visc @ 40°C is marginally low.

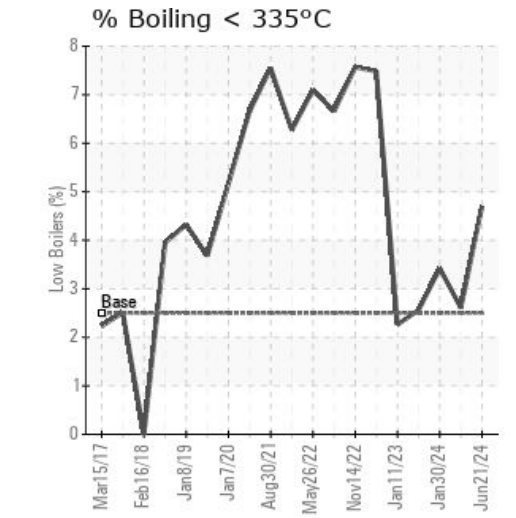
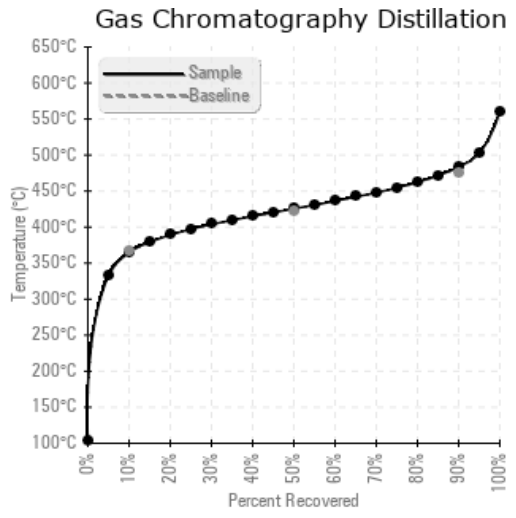
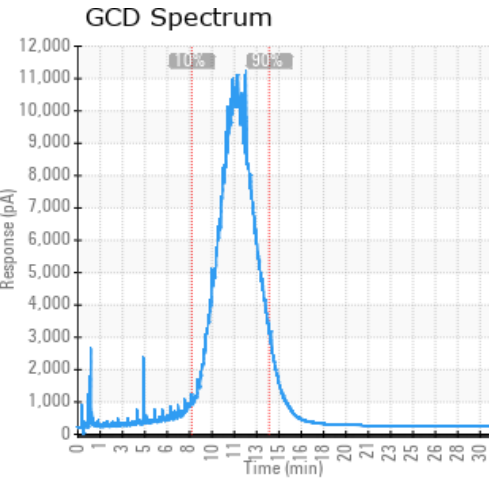
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
06/21/24	06/27/24	0.0m	SIDE STREAM FILTER	450 / 232	102	29.0	0.40	0.095	689 / 365	798 / 426	902 / 484	4.70
04/12/24	04/22/24	0.0m	side stream filter	442 / 228	113	30.9	0.44	0.299	703 / 373	801 / 427	902 / 484	2.61
01/30/24	02/06/24	0.0m	sidestream filter	457 / 236	98	31.5	1.87	0.290	699 / 370	801 / 427	906 / 485	3.42
11/07/23	11/16/23	0.0m	SIDE STREAM FILTER	478 / 248	295.8	33.4	1.33	0.296	706 / 374	803 / 428	906 / 486	2.56
01/11/23	01/24/23	0.0m	sidestream filter	392 / 200	52.7	36.9	0.42	1.05	713 / 379	808 / 431	910 / 488	2.26
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5





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
06/21/24	213	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	3	0	0	0	414	0	205	0
04/12/24	197	0	0	0	0	0	0	0	0	0	1	9	0	0	0	0	2	0	0	0	437	0	218	1
01/30/24	37	0	0	0	0	0	1	0	0	0	3	5	1	0	0	0	0	0	0	0	891	0	183	0
11/07/23	28	0	0	0	0	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	1039	0	187	1
01/11/23	35	0	3	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	83	2
Baseline Data			0	0						0			0	0					0				270	

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



Historical Comments	
04/12/24	Iron levels have increased noticeably (in a dry system) so that may reflect work being done on the system. Calcium levels are still much higher than normal but half of the previous sample. Acid Number is higher than normal at 0.44 but it now well below the condemning limit of >1.0. GCD and insolubles are acceptable. Fluid is fit for further use based on this sample. Resample next interval. Iron ppm levels are abnormal. Calcium ppm levels are severely high. Acid Number (AN) is abnormally high.
01/30/24	Acid Number (AN) continues to increase well above the condemning limit of >1.0. This indicates oxidative degradation of the fluid. Check or install an inert gas blanket over the reservoir. Unknown calcium contamination still exists. A full or partial change of the fluid should be considered. Acid Number (AN) is severely high. Calcium ppm levels are severely high. (GCD) 90% Distillation Point is marginally high.
11/07/23	Large amounts of calcium are showing up at 1039 ppm and it is not part of the fluid formulation. Moisture levels are higher than normal at 295 ppm but still within acceptable range. Acid Number has suddenly increased to above the condemning limit of 1.0 to 1.3. Viscosity and GCD do not show high levels of oxidation. Investigate the source of the high levels of calcium contaminant. Acid Number (AN) is severely high. Calcium ppm levels are severely high. (GCD) 90% Distillation Point is marginally high.
01/11/23	Sample is in reasonable shape given the history except for the high level of pentane insolubles. Continue to monitor and change filters as required. Pentane Insolubles levels are severely high. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally high. Visc @ 40°C is marginally high.

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