

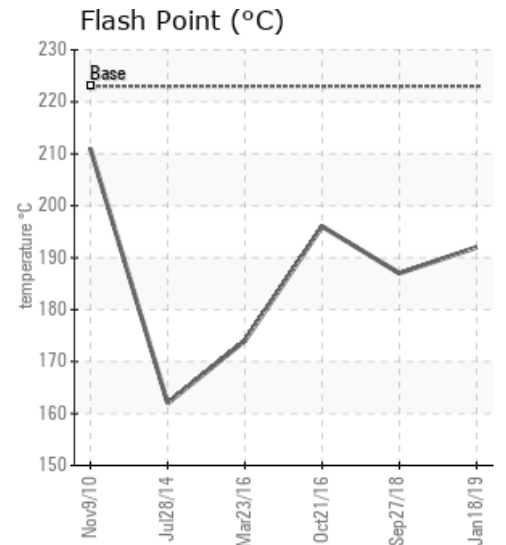
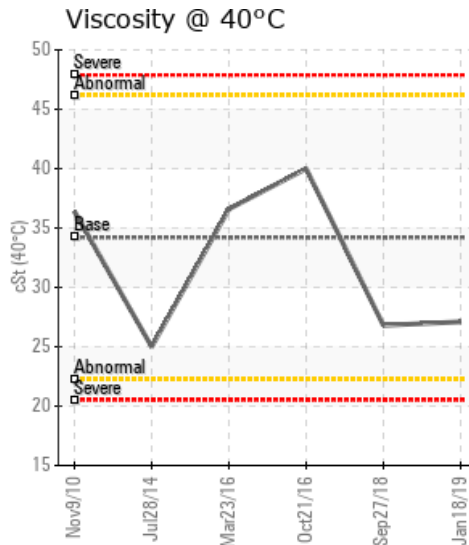
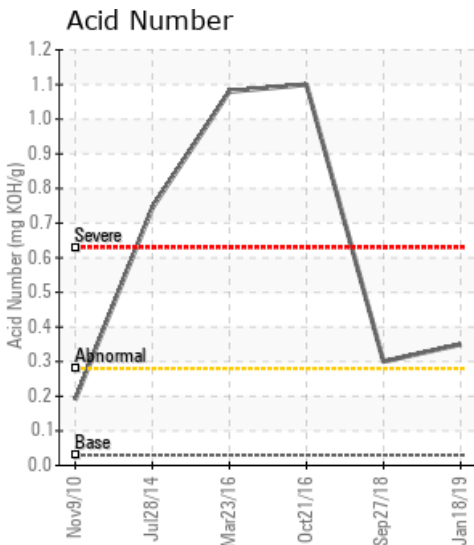
MODEL CEI 2400C

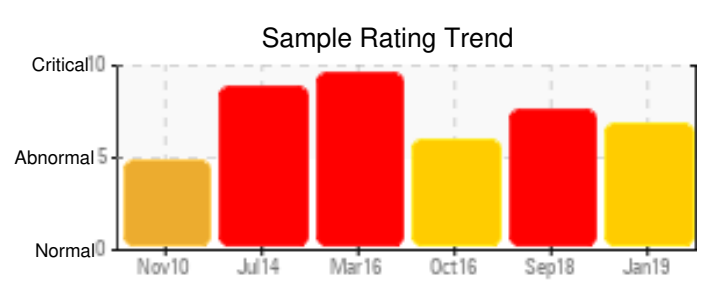
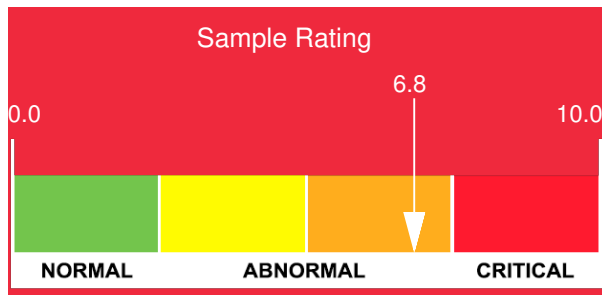
Customer: PTRHTF10051	System Information	Sample Information
SUPERIOR READY MIX 1508 MISSION RD ESCONDIDO, CA 92029 USA Attn: MARK STROMEYER Tel: (760)745-0556 E-Mail: purchasing@superiorrm.com	System Volume: 605 gal Bulk Operating Temp: 375F / 191C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: CEI	Lab No: 02265792 Analyst: Steven Slanker Sample Date: 01/18/19 Received Date: 02/01/19 Completed: 02/15/19

Recommendation: The fluid has been thermally degraded causing a severely low 10% distillation point, high <335°C GC distillation % and unusually high acid number. Check that the heater controller is functioning properly and staying within the thermal conductivity capabilities of the fluid. Recommend venting the system first and subsequently replacing 50% of the fluid.

Comments: (GCD) 10% Distillation Point is severely low. (GCD) % < 335°C is abnormally high. Acid Number (AN) is abnormally high. COC Flash Point is marginally low. (GCD) 90% Distillation Point is marginally low.

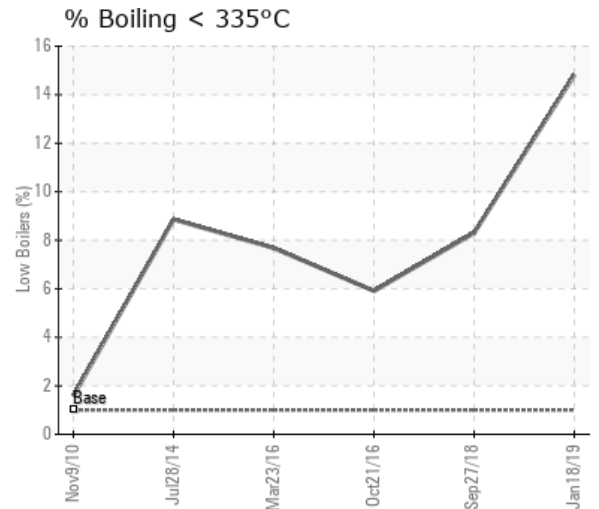
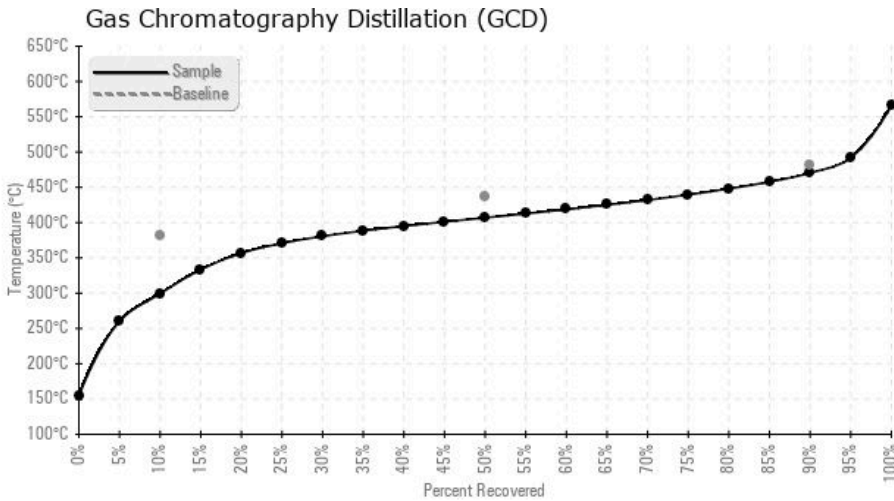
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/18/19	02/01/19	2h		378 / 192	88.8	27.1	0.350	0.237	571 / 299	764 / 407	879 / 471	14.81
09/27/18	10/10/18	0h		369 / 187	130.4	26.8	0.30	1.20	654 / 345	798 / 426	899 / 481	8.30
10/21/16	11/14/16	0h	FILTER	385 / 196	109.6	40.0	1.10	3.34	672 / 356	800 / 427	913 / 489	5.91
03/23/16	04/20/16	0h	AT THE HEATER	345 / 174	59.7	36.6	1.08	1.67	652 / 344	788 / 420	895 / 479	7.68
07/28/14	08/12/14	0h	RETURN FILTER	324 / 162	9.4	25.0	0.744	0.213	643 / 339	788 / 420	898 / 481	8.86
11/09/10	11/11/10	15h	BETWEEN RETURN MANIF	412 / 211	398	36.4	0.19	0.596	705 / 374	802 / 428	898 / 481	1.588
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
01/18/19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
09/27/18	20	0	0	0	6	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	46	6	3	1
10/21/16	11	0	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	168	0	13	0
03/23/16	17	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	2	1396	0	17	0
07/28/14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	25	0
11/09/10	21	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	2	0	101	2
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

09/27/18	The fluid has been contaminated with high levels of calcium and forming insoluble. The elevated acid number indicates early signs of oxidation. The fluid should be filtered, then vent off the low boilers. Subsequently drain and replace 25% of the fluid. Recommend desiccant breathers on all venting and breathers. Pentane Insolubles levels are severely high. Calcium ppm levels are severely high. Acid Number (AN) is abnormally high. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low. COC Flash Point is marginally low.
10/21/16	Sample shows significant oxidation (very high acid number), contamination and severely high insolubles. Because of very small system clearances recommend system clean and flush to maximize reliability and reduce ongoing maintenance costs. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Calcium ppm levels are severely high.
03/23/16	The results shown appear to indicate the possibility of a competitive product remaining in the system. Calcium is significant and should not be in the system. The Acid Number is severely high. The competitive product that was used to clean the system could have caused the lowering of the GCD 10% flash point. We will contact the customer. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Calcium ppm levels are severely high. COC Flash Point is abnormally low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
07/28/14	The sample shows thermal cracking of the oil. The sample might have been drawn without purging fluid from the sample point. The acid # is high which indicates oxidation of the oil. This can be caused by the oil being heated too quickly on start up or the oil being heated rapidly as it leaves the reservoir and is brought back up to working temperature. Before changing the oil out I would suggest taking another sample and purge some oil before filling sample container. Also, you can add some new oil to the reservoir and it will raise the flash point as well as lower the TAN. Acid Number (AN) is severely high. COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high.
11/09/10	The solids content is high which may explain the line plugging you have been experiencing. The phosphorous is not part of Petro-Therm's additive package so it may come from a previous fluid. The Acid Number was getting a bit high and it should be back to fresh oil levels after the clean-up operation