

[LSD: 9-57-6-W6] VOLCANO THERMAL OIL HEATER

Customer: PTRHTF20097
 FOOTHILLS FOREST PRODUCTS
 HWY 40 SOUTH MILLSITE
 GRANDE CACHE, AB T0E 0Y0 CA
 Attn: Ryan McKeand
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 E-Mail: rmckeand@dunkleylumber.com

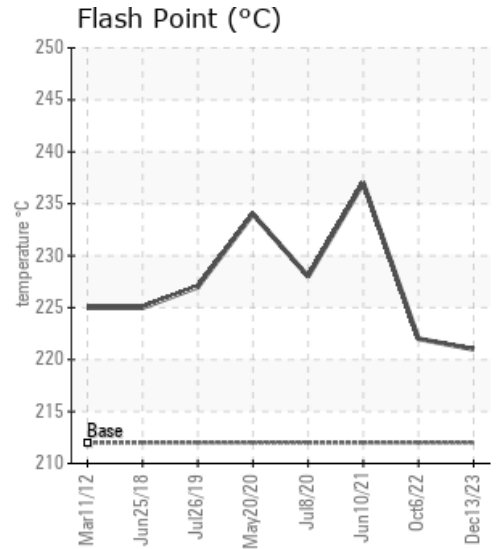
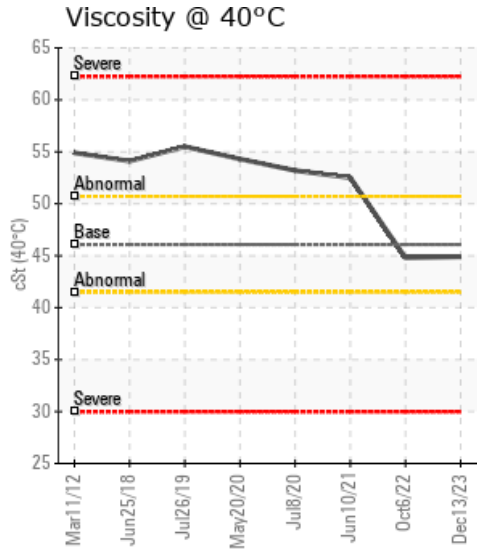
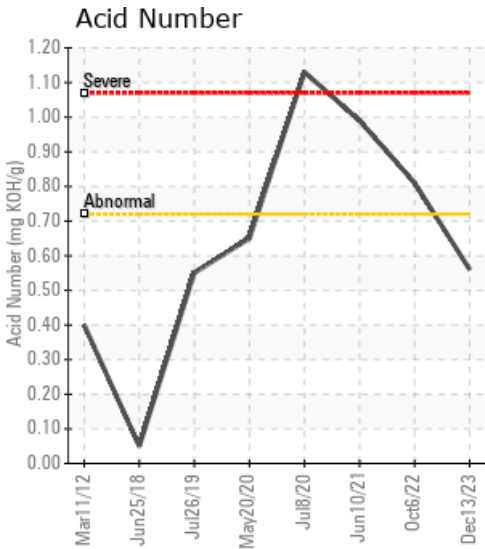
System Information
 System Volume: 27231 ltr
 Bulk Operating Temp: 450F / 232C
 Heating Source:
 Blanket:
 Fluid: ESSO THERMOIL 46
 Make: SALTON/WELLONS

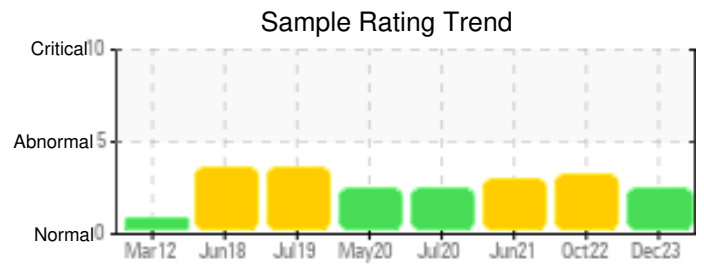
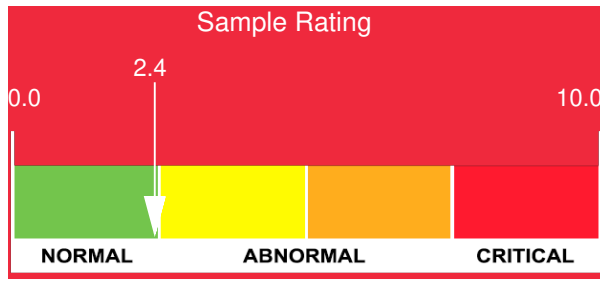
Sample Information
 Lab No: 02603953
 Analyst: Peter Hartevelde
 Sample Date: 12/13/23
 Received Date: 12/18/23
 Completed: 12/20/23
 Peter Hartevelde
 peter.hartevelde@HFSinclair.com

Recommendation: Sweetening has resulted in a decrease of AN from 0.81 to 0.56. This is still elevated but not alarming. The viscosity has remained the same (ISO VG 46) which means the fluid mix contains more Thermoil 46 than Petro-Therm. The 90% GCD temperature is slightly low for Thermoil 46. This is the effect of the added Petro-Therm. Pentane Insoluble (solids) content has remained the same and is above the reportable limit of 0.5%. Filtration and further sweetening with Petro-Therm is recommended. Please re-sample in 12 months and label the sample as Petro-Therm.

Comments: Pentane Insolubles levels are severely high. (GCD) 90% Distillation Point is abnormally low.

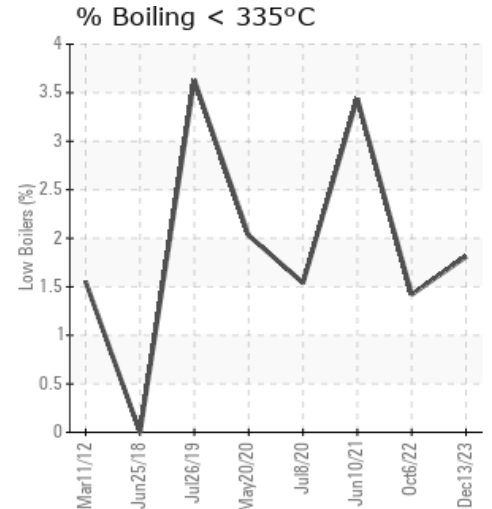
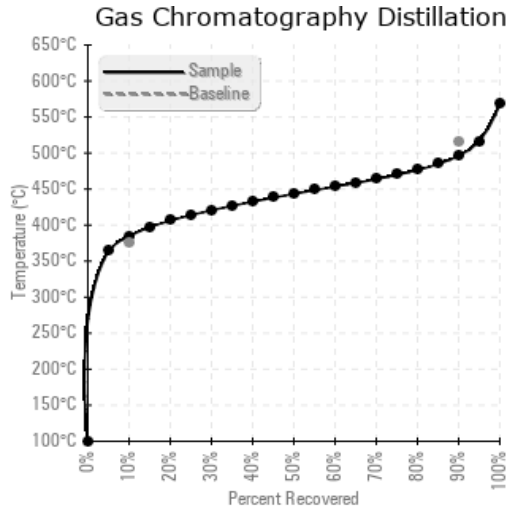
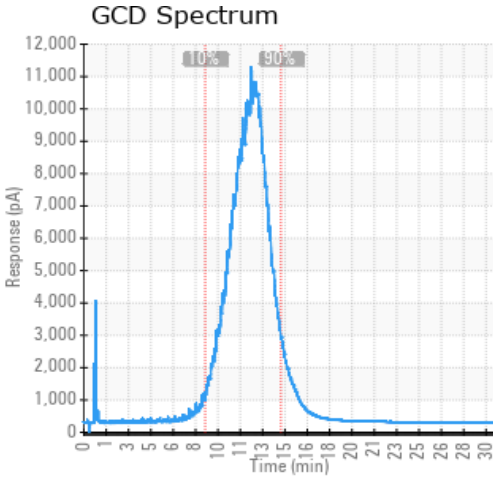
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/13/23	12/18/23	0.0y	heater inlet	430 / 221	44	44.9	0.56	0.624	724 / 384	830 / 443	925 / 496	1.81
10/06/22	10/11/22	14.0y	HEATER INLET	432 / 222	31.6	44.8	0.81	0.688	728 / 387	830 / 443	921 / 494	1.42
06/10/21	06/21/21	6.0y	Heater Inlet	459 / 237	83.7	52.5	0.99	0.413	705 / 374	820 / 438	924 / 495	3.44
07/08/20	07/14/20	12.0y		442 / 228	85.4	53.2	1.13	0.603	738 / 392	845 / 452	934 / 501	1.54
05/20/20	05/28/20	12.0y	HEATER INLET	453 / 234	229.0	54.3	0.65	0.739	730 / 388	844 / 451	933 / 500	2.03
Baseline Data				414 / 212		46.07			709 / 376		961 / 516	





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
12/13/23	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
10/06/22	41	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	3	0	1	2
06/10/21	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
07/08/20	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2
05/20/20	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	2
Baseline Data													0						0				0	

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



Historical Comments

10/06/22	Info from customer: System volume appr. 27 m3. Esso ISO VG 46 sweetened with 7 m3 of Petro-Therm. Viscosity is still ISO VG 46 which means the initial viscosity must have been very high. Since the fill is an appr. 1/4 : 3/4 mix of Petro-Therm and Thermoil 46 data interpretation is difficult due to absence of reference data representative of the mix. Fresh Petro-Therm has a 90% distillation temperature of 475 degrees C. The 90% dist. temp. of the sample is 494 degrees C. This temperature is influenced by the higher viscosity of the Thermoil 46 and oxidation of the fluid which has resulted in the elevated AN. The Fe content of 41 ppm is not high but an indication of the elevated acidity of the fluid which is causing some corrosion. The Pentane Insoluble (solids) content of the fluid has exceeded 0.5% which is the point at which filtration is recommended. The fluid is suitable for further use but further sweetening and filtration are recommended. After sweetening re-sample and label the oil as Petro-Therm. Pentane Insolubles levels are severely high. (GCD) 90% Distillation Point is severely low. Acid Number (AN) is abnormally high.
06/10/21	Based on the recent technical interface meeting, we were informed that 12 drums of fresh Petro-Therm had been filled in the system since Aug 2020. The 9% of the system sweetening helped to reduce the Acid Number and the Solid Contents. The fluid viscosity is also trending down to the normal reading. There is minimum water or dirt contamination. The contaminant of iron element remains consistent in the past 9 years. The current fluid age shall be 13 years old instead of the reported 6 years. In conclusion, the current fluid is suitable for further operation. The 12 drums of fresh Petro-Therm annual top-up definitely helps to bring this large system towards to normal, so please keep doing this good practice. Take one sample in 12 months to monitor the conditions. Solid levels are abnormally high. Acid Number (AN) is abnormally high.
07/08/20	The 6 drums of fresh Petro-Therm sweetening helps to reduce the solid contents. The fluid has low water contaminant, and normal flash point. However, the mixed fluid still has relatively high viscosity and moderate oxidation. Please keep running the fluid and take one sample in 6 months to monitor the conditions. Pentane Insolubles level is high. Acid number is high.
05/20/20	The current fluid has a similar condition as the last sample in July 2019. However, the elevated Acid Number means there are more fluid oxidation in the past 9 months. The water contamination is also a concern. Solid levels are severely high. (GCD) 90% Distillation Point is abnormally low.