

## HOT OIL

**Customer: PTRHTF10123**  
 AKZONOBEL  
 300 SPROWL RD  
 HURON, OH 44839 US  
 Attn: Gregory Eyer  
 Tel: (419)602-5827  
 E-Mail: gregory.eyer@akzonobel.com

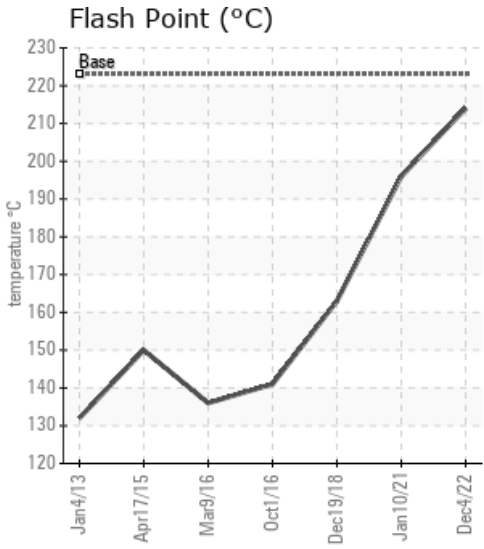
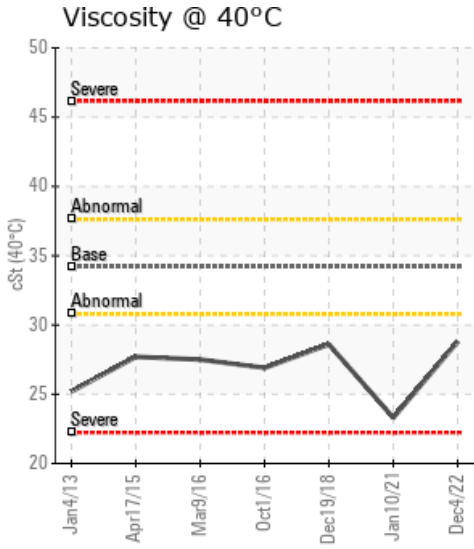
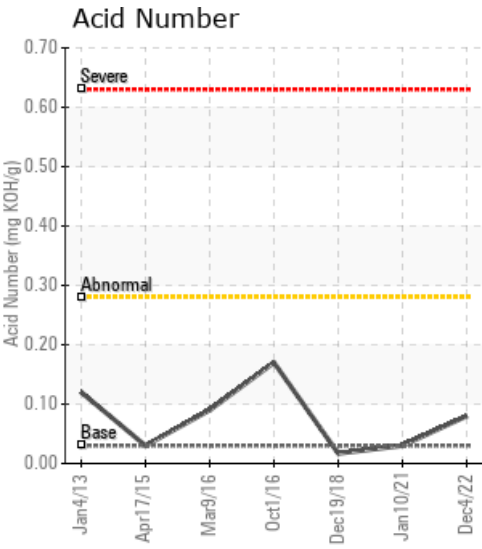
**System Information**  
 System Volume: 1250 gal  
 Bulk Operating Temp: 550F / 288C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA PETRO-THERM  
 Make: VAPOR POWER

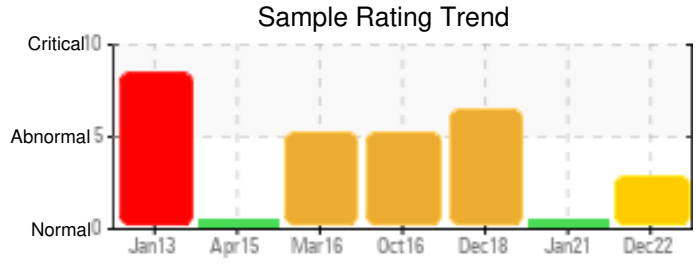
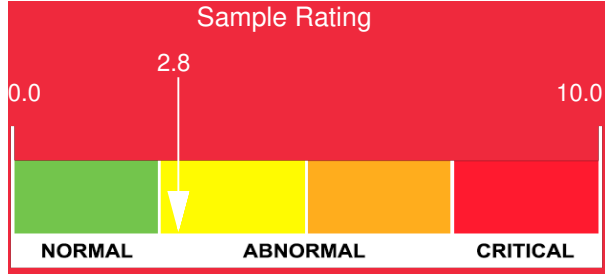
**Sample Information**  
 Lab No: 02533276  
 Analyst: Yvette Trzcinski  
 Sample Date: 12/04/22  
 Received Date: 01/13/23  
 Completed: 01/20/23  
 Yvette Trzcinski  
 yvette.trzcinski@HFSinclair.com

Recommendation: Some thermal degradation/cracking of the fluid that has created some lighter viscosity materials are present in the oil - GCD % of 7.68 at boiling temperatures below 335 C. flash point, acid number and insolubles are all at acceptable levels, Venting the system can help with removing light ends or can sweeten the oil with new heat trasfer fluid. Resample in 9-12 months

Comments: (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.

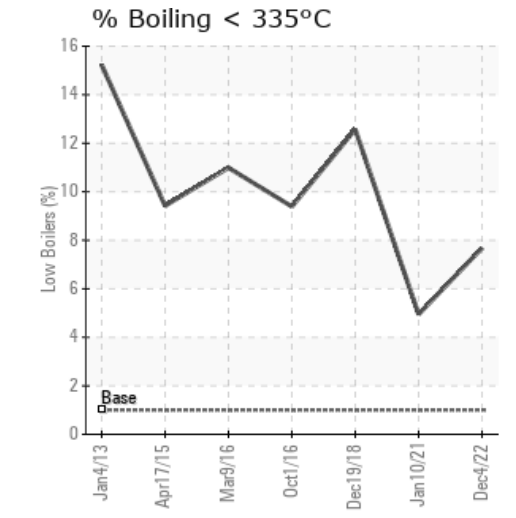
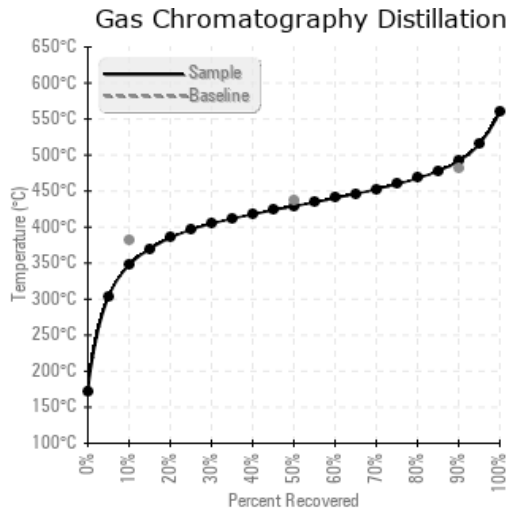
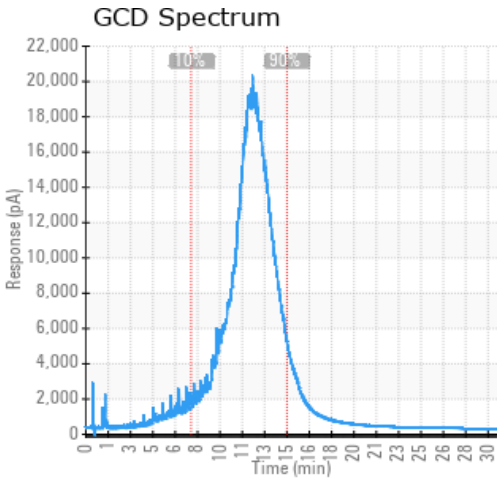
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/04/22	01/13/23	0.0h		417 / 214	17.5	28.8	0.08	0.099	657 / 347	804 / 429	916 / 491	7.68
01/10/21	03/05/21	0.0h		385 / 196	259.5	23.3	0.03	0.125	685 / 363	807 / 430	918 / 492	4.95
12/19/18	01/21/19	2.0h		325 / 163	8.5	28.6	0.017	0.040	603 / 317	763 / 406	879 / 470	12.57
10/01/16	10/11/16	0.0h	INLET TO PUMP	286 / 141	22.0	26.9	0.17	0.094	635 / 335	788 / 420	910 / 488	9.39
03/09/16	04/05/16	0.0h		277 / 136	14.5	27.5	0.090	0.048	631 / 333	785 / 418	920 / 493	10.99
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	
12/04/22	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
01/10/21	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/19/18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
10/01/16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
03/09/16	76	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	
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	
01/10/21	This unit was last sampled in Dec 2018 looks like the unit might have added new oil to the system since the last sample. The oil characteristics all are at acceptable levels for continued service, acid number, GCD distillation, and Insolubles. There is some water in the system 259 ppm but within acceptable limits. Large amounts of water can cause issues with the performance of the system and would be noticeable. Resample in 9 -12 months
12/19/18	It looks like some oil replacement was done since the last sample in 2016 the viscosity has increased about 6% as well as the flash point now at 325 F, though it is still low. There is still thermal cracking happening in the system that is causing thermal degradation of the fluid. I recommend venting the low boilers from the system and then resampling the system to see if venting helped, or if some oil replacement is required
10/01/16	The situation is not as dire as when the first sample was taken 3 years ago but the flash point remains low at 286F. We suggest to vent the low boiling hydrocarbons (present at 9.4%) out of the system via the expansion tank while keeping the nitrogen blanketing on, then replace the losses by adding fresh oil. Lastly, a day after this operation is performed we suggest to take another sample to measure the effectiveness of the operation. This will tell us if the fluid flash point can be restored this way or if a more aggressive approach like 50% or complete replacement will be needed. COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high.
03/09/16	This fluid is experiencing thermal degradation which is causing the flashpoint of the fluid to be come extremely low. Please vent the system of light ends in order to try and increase the flashpoint. Once the system has been vented of the light ends, please re-submit a sample for testing. COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is marginally high. (GCD) 90% Distillation Point is marginally high.

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