

### [4-21-55-23-W5] H-802

**Customer: PTRHTF20089**  
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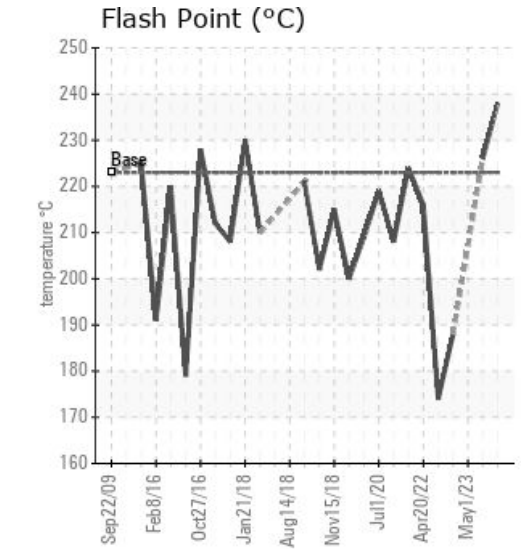
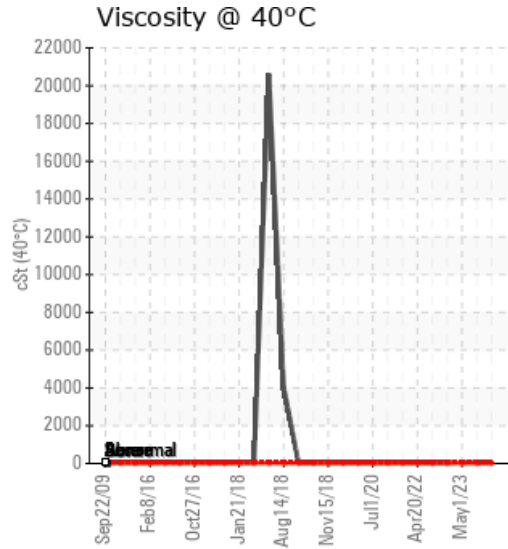
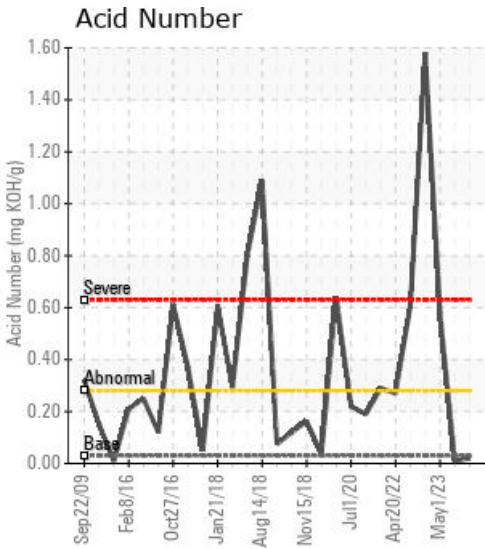
**System Information**  
 System Volume: 25000 ltr  
 Bulk Operating Temp: 338F / 170C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA PETRO-THERM  
 Make: ALCO

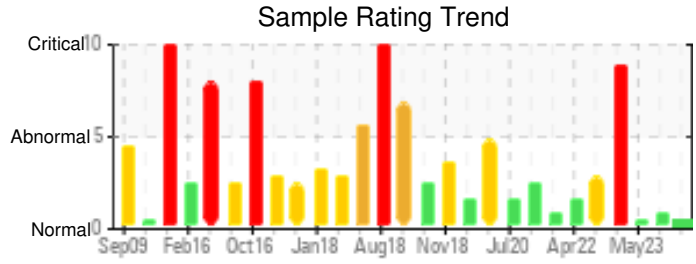
**Sample Information**  
 Lab No: 02629060  
 Analyst: Clinton Buhler  
 Sample Date: 04/10/24  
 Received Date: 04/16/24  
 Completed: 04/22/24  
 Clinton Buhler  
 Clinton.Buhler@HFSinclair.com

Recommendation: Sample results indicate the fluid is in suitable condition for continued service. Please ensure blanket gas remains operational. Please re-sample in 12 months.

Comments:

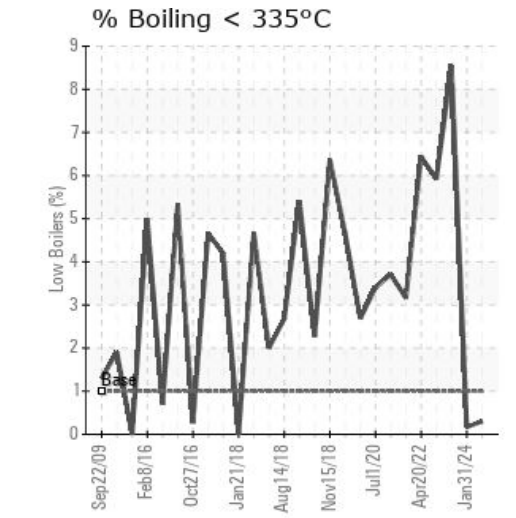
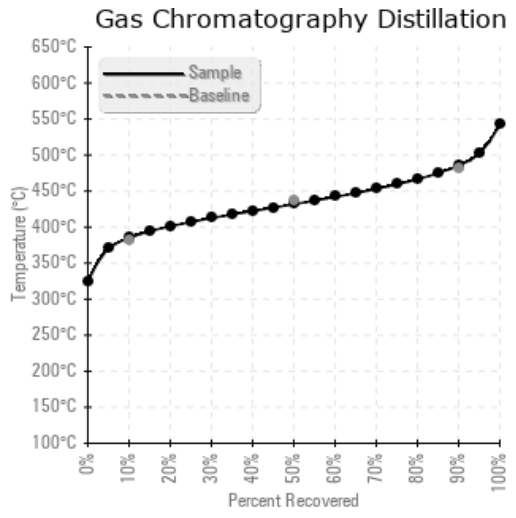
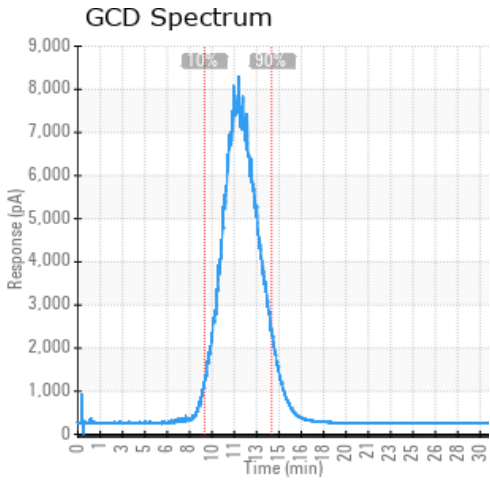
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/10/24	04/16/24	1628.0m		460 / 238	16	34.8	0.02	0.063	724 / 385	809 / 432	906 / 486	0.30
01/31/24	04/16/24	0.0m	new oil-startup samp	439 / 226	54	35.1	0.01	0.040	726 / 385	811 / 433	907 / 486	0.17
05/01/23	05/04/23	0.0m	SOLIDS		2128345		0.58					
04/18/23	04/24/23	0.0m	pump discharge	370 / 188	71.4	28.1	1.58	0.662	649 / 343	797 / 425	884 / 473	8.55
11/07/22	11/11/22	0.0m	pump discharge	345 / 174	37.6	27.4	0.61	0.735	684 / 362	804 / 429	894 / 479	5.92
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
04/10/24	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/31/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
05/01/23	144	0	0	0	0	0	0	0	0	0	1	6	0	0	0	0	1	0	3	0	0	0	0	0
04/18/23	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/07/22	25	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	0	0	1	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	
01/31/24	*new oil after fire tube failure. sample taken at 25C*Sample results indicate the fluid is in very healthy condition post change-out.
05/01/23	This is a baseline read-out on the submitted sample. We recommend an early resample to monitor this condition. Diagnostician's Note: The oil is highly oxi-polymerized, which is a result of extreme oxidation of the oil. The oil is a semi-solid. We could not conduct all tests due to the high amount of water present and the high degree of oxidation present in the sample. We recommend that you remove this fluid from the system (likely with the aid of a flushing solvent), refill, circulate, drain, and fill with fresh oil to attempt to remove solids from the thermal system.(not applicable) There is a high concentration of water present in the fluid. The fluid is no longer serviceable due to the presence of contaminants.
04/18/23	Sample results indicate that both fluid oxidation and likely thermal degradation are ongoing in this system. Oxidation because the fluid's Acid Number has increased to 1.58 (condemning limit is 1) and thermal degradation (or potential mixing with light hydrocarbon) due to reduced 10% GCD temperature, viscosity and flash point and increased low boiling vapor content (8.55%). The elevated solids content of 0.662% can be caused from both forms of degradation. Fluid needs to be replaced after a thorough system clean and flush.
11/07/22	Sample results indicates continued fluid oxidation as Acid Number has increased to 0.61. Fluid viscosity and flash point have both decreased, which may be due to thermal degradation, mixing with a lighter process fluid or elevated blanket gas pressure causing a dilutive effect. Solids content has increased, indicating continued fouling. System will require a cleaning in the future. Regular venting can help reduce the amount of low boiling vapors and help restore fluid flash point and viscosity. Please ensure blanket gas is operational after venting periods.Please re-sample in 6 months Pentane Insolubles levels are severely high. Acid Number (AN) is abnormally high. COC Flash Point is abnormally low. Visc @ 40°C is abnormally low.

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