

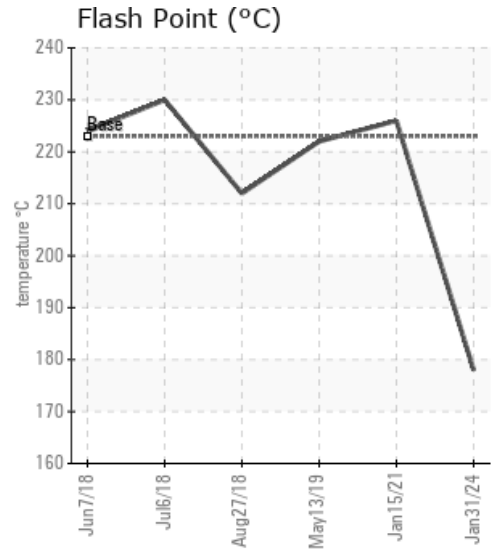
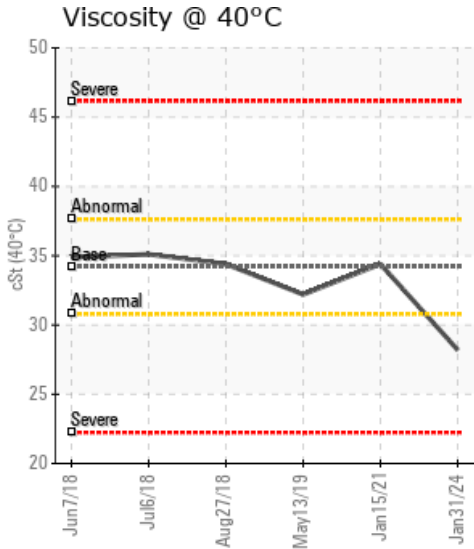
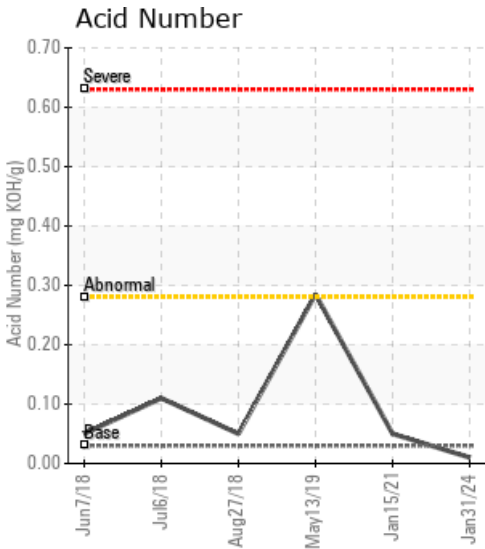
## [CNRL / 13-26-67-5W6] STABILIZER #2

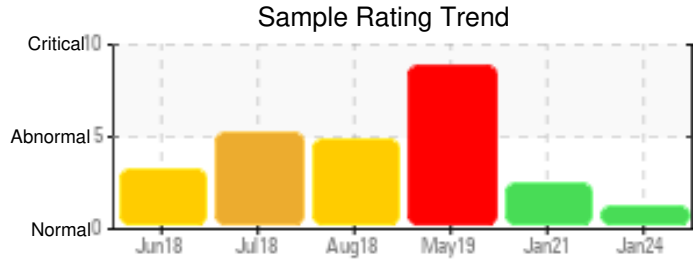
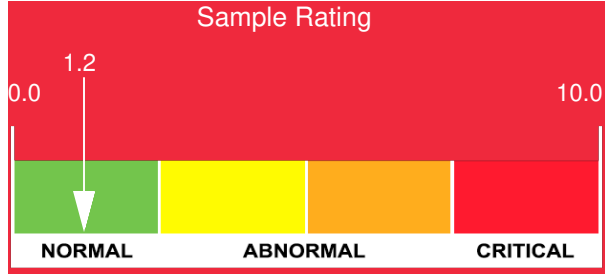
Customer: PTRHTF20197	System Information	Sample Information
CNRL GOLD CREEK 13-26-67-05W6 GRANDE PRAIRIE, AB CA Attn: Joe Beamish Tel: (780)512-7015 E-Mail: joe.beamish@cnrl.com	System Volume: 15000 ltr Bulk Operating Temp: 428F / 220C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: PETRO-TECH	Lab No: 02614844 Analyst: Clinton Buhler Sample Date: 01/31/24 Received Date: 02/09/24 Completed: 02/20/24 Clinton Buhler Clinton.Buhler@HFSinclair.com

Recommendation: Sample results indicate a reduced fluid viscosity which in turn has reduced the fluid's flash point (178C). Typical causes of this in heat transfer systems include too-high blanket gas pressure in the expansion tank, thermal degradation or contamination with lighter process fluids such as condensate. Please confirm if it is possible that process fluids may have mixed with the heat transfer fluid. To help restore fluid properties, it is recommended to perform regular venting of the expansion tank to reduce the low boiler vapor content (currently at 3.45%). After thorough venting and elimination of potential leaks, please re-sample in 3 months. Try to sample system from a hot, turbulent zone such as pump discharge.

Comments: COC Flash Point is abnormally low. Visc @ 40°C is abnormally low.

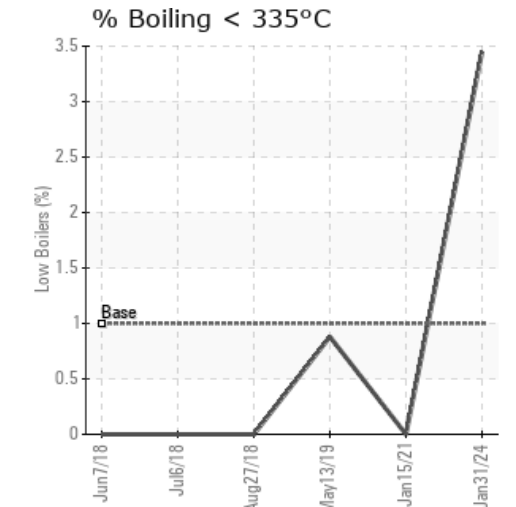
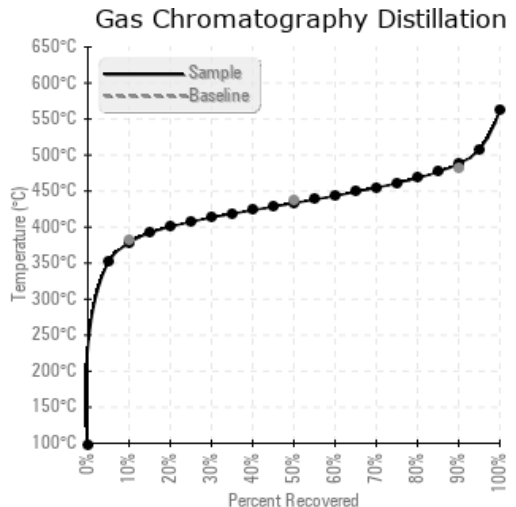
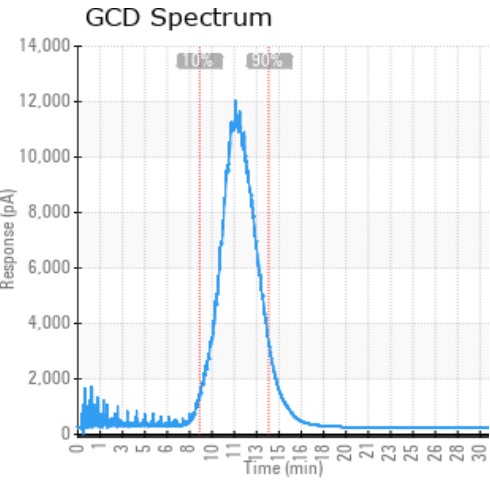
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/31/24	02/09/24	4.0y		352 / 178	105	28.2	0.01	0.044	713 / 378	812 / 433	910 / 488	3.45
01/15/21	01/28/21	15.0y	Heater Inlet	439 / 226	551.1	34.4	0.05	0.075	732 / 389	816 / 436	911 / 488	0.00
05/13/19	05/21/19	166.0y	150FT DOWNSTREAM	432 / 222	14959.5	32.2	0.285	0.303	719 / 382	813 / 434	930 / 499	0.88
08/27/18	08/30/18	1.0y	DISCHARGE OF PUMP	414 / 212	2156.2	34.4	0.05	0.492	727 / 386	816 / 435	919 / 493	0.00
07/06/18	07/10/18	3.0y	DISCHARGE CIRC PUMPS	446 / 230	2726.5	35.1	0.11	0.116	704 / 373	779 / 415	860 / 460	0.00
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
01/31/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/15/21	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	0
05/13/19	0	0	0	0	0	0	0	0	0	0	0	25	1	0	0	0	0	0	0	0	2	0	0	0
08/27/18	6	0	0	0	0	0	0	0	0	0	0	19	2	0	0	0	0	0	0	1	5	0	2	0
07/06/18	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	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	
01/15/21	Sample results indicate that the fluid is in suitable condition for continued service. Water levels have greatly reduced since previous analysis as has Acid Number likely indicating fluid replacement since last sample. Water levels currently at 551 ppm. Consider further venting of steam vapor to further reduce the level of water in the system. This will help pro-long fluid and system life. Please re-sample once water has been vented from system in 6 months. Please ensure sample is taken from a hot, turbulent zone such as at the pump discharge, and only after a thorough purge of the valve and piping.
05/13/19	It is understood that there was a reboiler bundle failure, and the sample results indicate this as evidenced by excess amounts of water as well as the element sodium. The excess water can be a safety risk in the event of boil over. Acid Number has increased which can also be related to the water contamination. Increased acidity can lead to corrosion of metal surfaces. Water needs to be removed from system before heater is brought back to normal operating temperatures. Upon initial start-up, system needs to be safely vented to remove water via steam. Do not allow system to exceed 105°C during the venting of the steam. Vent system until steam has subsided while taking all necessary safety precautions. During venting, blanket gas cannot be active as this will impeded the steam from exiting the system. If blanket gas is required for proper pump head pressure, investigate other means of water removal. For proper pump head pressure, investigate other means of water removal. Please re-sample once water has been vented from system. Please ensure sample is taken from a hot, turbulent zone such as at the pump discharge, and only after a thorough purge of the valve and piping. Water contamination levels are severely high. Water contamination levels are severely high. ppm Water contamination levels are severely high. Acid Number (AN) is abnormally high. Sodium ppm levels are abnormally high. (GCD) 90% Distillation Point is abnormally high.
08/27/18	Sample results indicate that there is excessive water in the system. It is understood that appropriate steps were taken to draw a representative sample (at pump discharge). 2,156ppm Water poses a safety risk of fluid boil over when the boiling point of the water is reached and also can contribute to oxidation of the fluid and corrosion if left in service. Water needs to be removed from system before heater is brought back to normal operating temperatures. Upon initial start-up, system needs to be safely vented to remove water via steam. Do not allow system to exceed 105°C during the venting of the steam. Vent system until steam has subsided while taking all necessary safety precautions. During venting, blanket gas cannot be active as this will impeded the steam from exiting the system. If blanket gas is required for proper pump head pressure, investigate other means of water removal. Pentane insoluble (solids) level is also abnormally high. It is understood that this fluid was replaced. Please investigate possible sources of continued water contamination. Please call Petro-Canada Technical Services for further support as required. Please re-sample once water has been removed. Please ensure a thorough purge of sample point before filling sample container. Water contamination levels are severely high. Water contamination levels are severely high. ppm Water contamination levels are severely high. Pentane Insolubles levels are abnormally high. (GCD) 90% Distillation Point is marginally high.
07/06/18	Sample results indicate that there is excessive water in the system. Fluid lab re-tested water content and confirmed that there is 2,726 ppm water. This is nearly 1,000 ppm more water than initial sample drawn June 7, 2018. It is understood that appropriate steps were taken to draw a representative sample on July 6, 2018 (at pump discharge). 2,726ppm Water poses a safety risk of fluid boil over when the boiling point of the water is reached and also can contribute to oxidation of the fluid and corrosion if left in service. Water needs to be removed from system before heater is brought back to normal operating temperatures. While system is down, this would be a good opportunity to drain any free water from low lying spots in the heat transfer system. Upon initial start-up, system needs to be safely vented to remove water via steam. Do not allow system to exceed 105°C during the venting of the steam. Vent system until steam has subsided while taking all necessary safety precautions. During venting, blanket gas cannot be active as this will impeded the steam from exiting the system. If blanket gas is required for proper pump head pressure, investigate other means of water removal. Please re-sample once system is safely back on-line under normal conditions (after water has been removed). Please call Petro-Canada Technical Services for further support as required. Water contamination levels are severely high. Water contamination levels are severely high. ppm Water contamination levels are severely high.

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