

### [7-18-40-09w5] H-633

**Customer: PTRHTF20154**  
 CANADIAN NATURAL RESOURCES (CNRL)  
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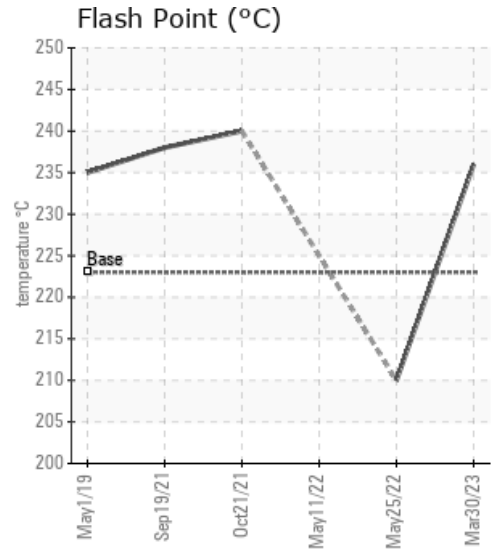
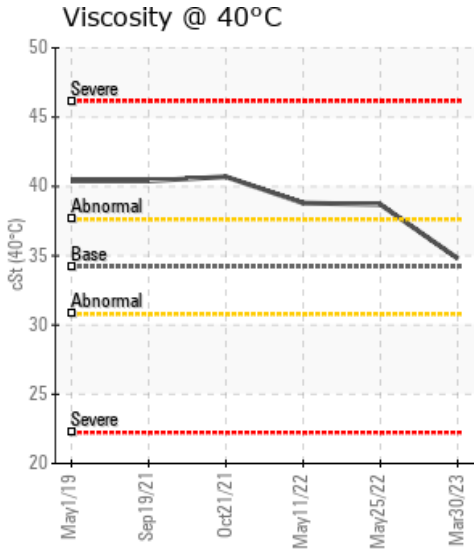
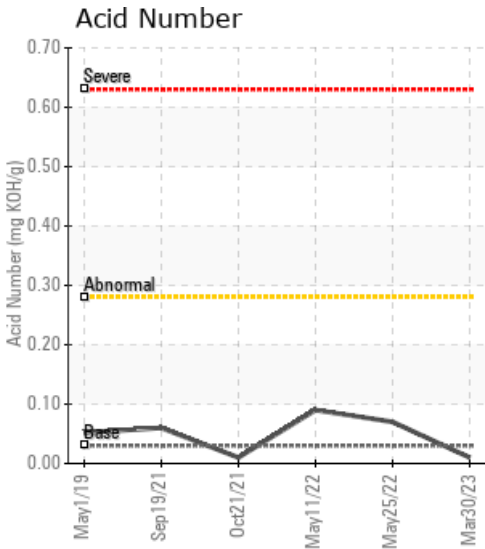
**System Information**  
 System Volume: 5000 ltr  
 Bulk Operating Temp: 352F / 178C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA PETRO-THERM  
 Make: PROPAK SYSTEMS

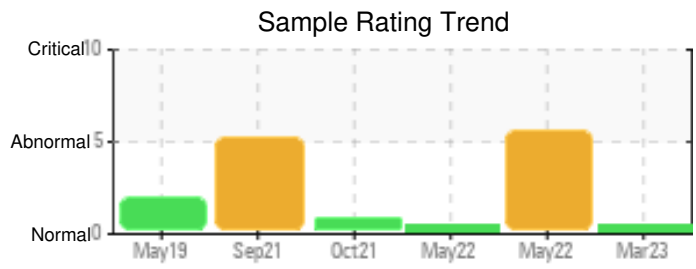
**Sample Information**  
 Lab No: 02549149  
 Analyst: Lyle Dach  
 Sample Date: 03/30/23  
 Received Date: 03/31/23  
 Completed: 04/11/23  
 Lyle Dach  
 lyle.dach@HFSinclair.com

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Fluid looks to be new but fluid age is not indicated. Sulfur content is higher than expected, is there a way for sulfur contamination to enter the fluid? Resample in 12 months.

Comments:

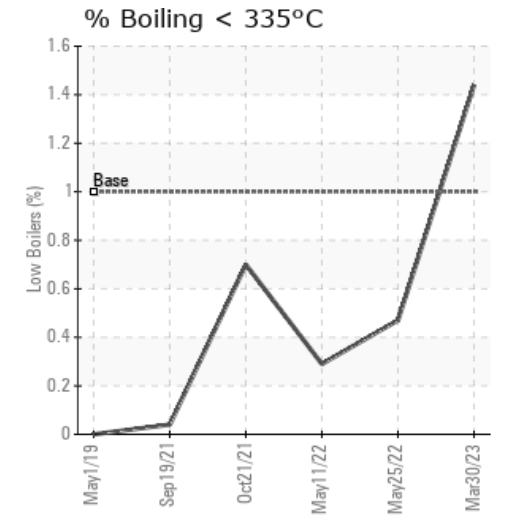
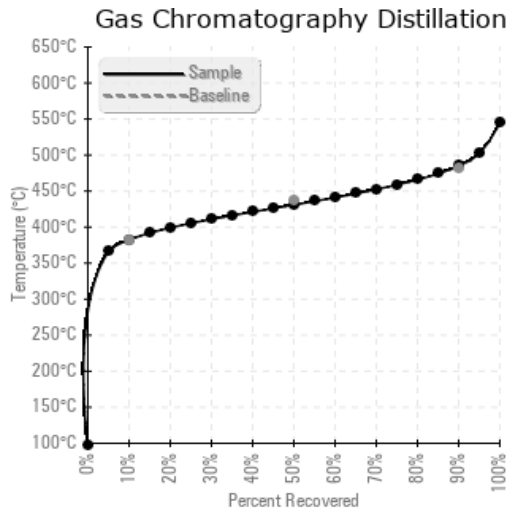
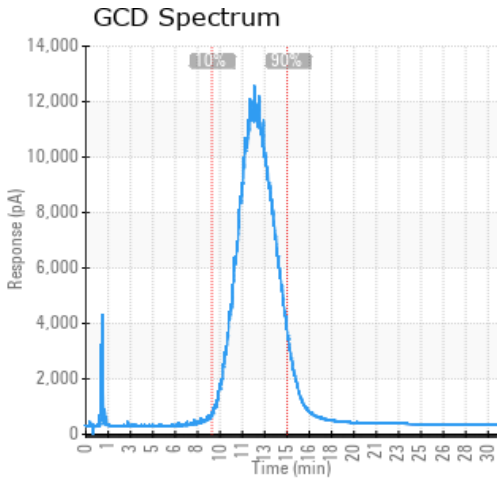
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
03/30/23	03/31/23	0.0y	return line to bath	457 / 236	16.8	34.8	0.01	0.033	720 / 382	808 / 431	905 / 485	1.44
05/25/22	05/31/22	0.0y	drain plug and bttm	410 / 210	8241.7	38.7	0.07	0.609	730 / 388	819 / 437	927 / 497	0.47
05/11/22	05/11/22	0.0y	bath drain plug		2062.5	38.8	0.09	0.111	731 / 388	820 / 438	931 / 500	0.29
10/21/21	11/01/21	0.0y	BATH DRAIN PLUG	464 / 240	23.6	40.7	0.01	0.044	729 / 387	820 / 438	935 / 502	0.70
09/19/21	10/08/21	10.0y	de-eth line heater	460 / 238	3412.3	40.4	0.06	0.170	730 / 388	821 / 438	936 / 502	0.04
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
03/30/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/25/22	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0
05/11/22	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0
10/21/21	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
09/19/21	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	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	
05/25/22	Very high water content from the failed fire tube, fluid condition other than water looks to be acceptable for continued use. Water should be boiled off while venting steam to help avoid unwanted boil overs to reduce corrosion risk. Resample after water is boiled off. Water contamination levels are severely high. Water contamination levels are severely high.. ppm Water contamination levels are severely high. Pentane Insolubles levels are severely high. (GCD) 90% Distillation Point is abnormally high.
05/11/22	Sample is showing very high water again. When samples are being collected the sample line needs to be purged for several seconds minimum, longer time maybe necessary if there is a long sample line or if the sample point is at the very bottom of the vessel. The collected fluid should be at system operating temperature. Please resample to confirm the fluid condition.*** NOTE: The sample contained too much water to perform COC Flash Point *** ppm Water contamination levels are severely high. Water contamination levels are severely high. (GCD) 90% Distillation Point is abnormally high.
10/21/21	Sample results indicate that the fluid is in suitable condition for continued service. Metals, contamination and water are all very low. Viscosity and flashpoint are in spec and acid # and pentane insolubles are low. GCD 90% distillation point is marginally high but is trending down slightly. Resample in 6 months. (GCD) 90% Distillation Point is abnormally high.
09/19/21	Water very high - resample to confirm water content in system. If water content is correct filter or centrifuge system to remove water. Water contamination levels are severely high. ppm Water contamination levels are severely high. (GCD) 90% Distillation Point is severely high.

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