

[14-36-57-23W5] H7006

Customer: PTRHTF20276
 CANADIAN NATURAL RESOURCES (CNRL)
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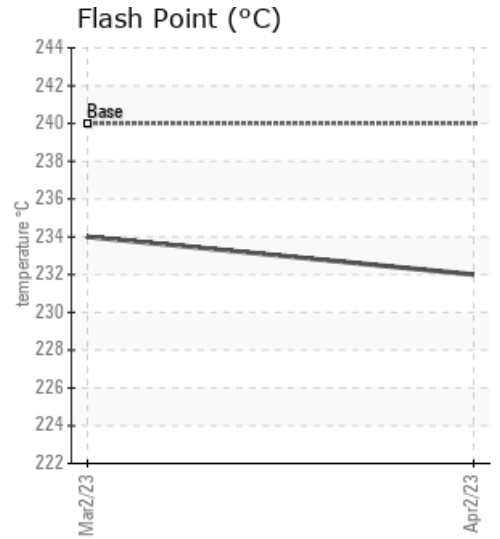
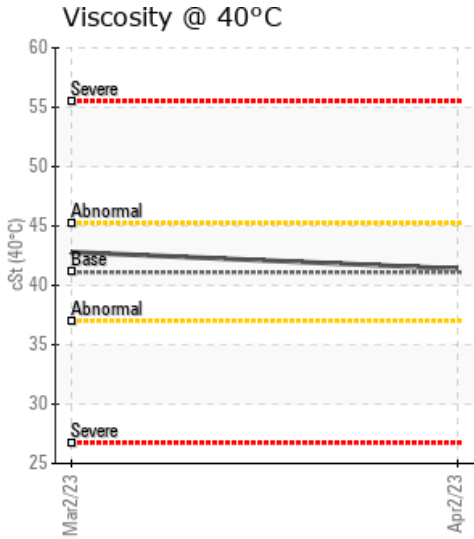
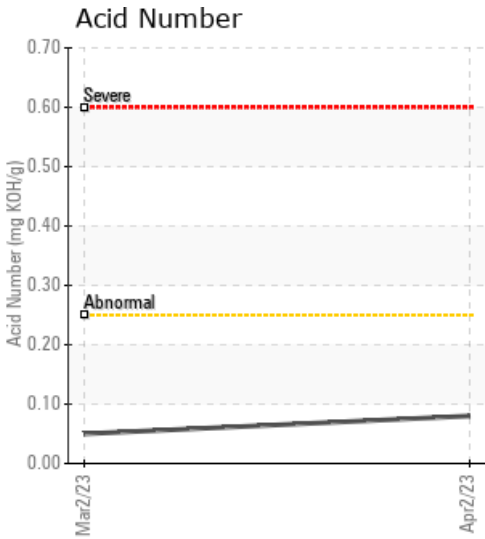
System Information
 System Volume: 9000 ltr
 Bulk Operating Temp: 437F / 225C
 Heating Source:
 Blanket:
 Fluid: CHEVRON HEAT TRANSFER OIL 46
 Make: TDE THERMODESIGN

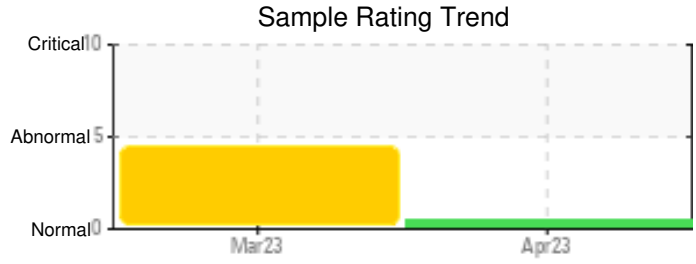
Sample Information
 Lab No: 02550216
 Analyst: Clinton Buhler
 Sample Date: 04/02/23
 Received Date: 04/06/23
 Completed: 04/12/23
 Clinton Buhler
 Clinton.Buhler@HFSinclair.com

Recommendation: Sample results have much improved from the sample taken a month ago: Water levels are much lower and in a healthy range. With the reduction in water there has also been a reduction in Na and K. Fluid is in suitable condition for continued service. Re-sample after 12 months of further run time.

Comments:

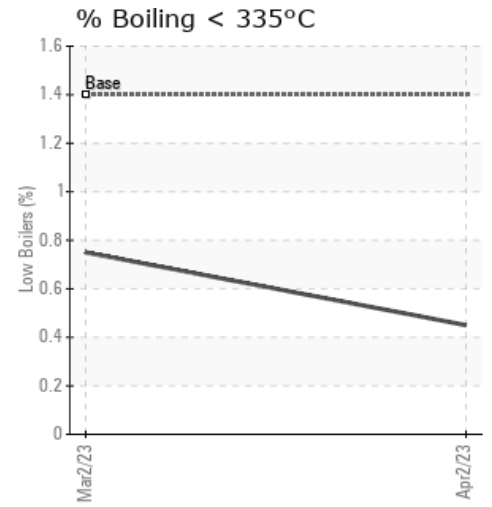
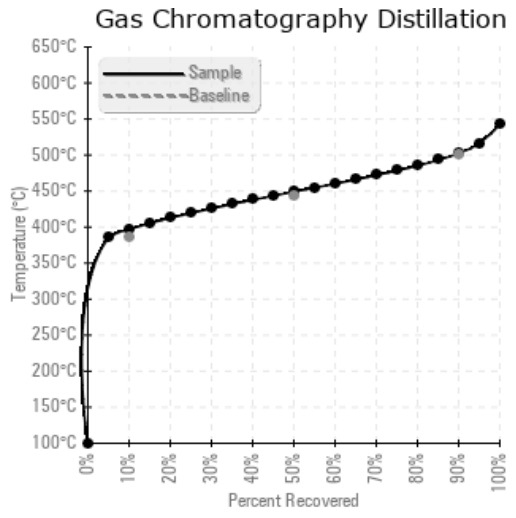
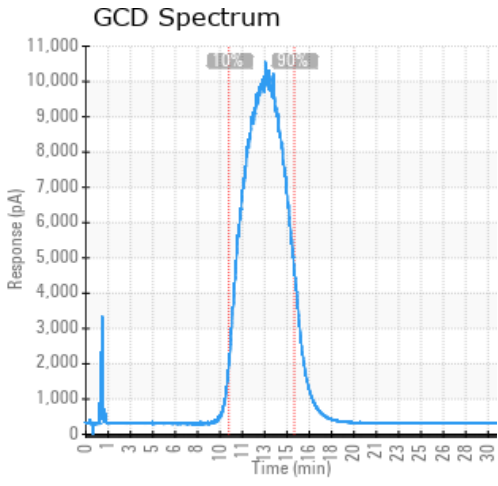
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/02/23	04/06/23	0.0y		450 / 232	113.4	41.4	0.08	0.059	746 / 397	840 / 449	937 / 503	0.45
03/02/23	03/06/23	8.0y	downstream of pump	453 / 234	2301.1	42.8	0.05	0.291	744 / 396	841 / 449	937 / 503	0.75
Baseline Data				464 / 240		41.1			727 / 386	828 / 442	932 / 500	1.4





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
04/02/23	2	0	0	0	0	0	0	0	0	0	0	2	12	0	0	0	0	0	2	0	0	0	2	0
03/02/23	16	0	0	0	0	0	0	0	0	0	0	7	34	0	0	0	0	0	9	0	1	0	13	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	
03/02/23	Sample results show small amounts of Na, P and B which may represent cross contamination with a glycol based fluid. Excessive amounts of water are present (2301 ppm). Low points need to be drained of any potential water and it is advised to vent water vapor through the expansion IF safe to do so. Fluid properties are otherwise in reasonable condition. Ensure water is prevented from entering the system. Water contamination levels are severely high. Water contamination levels are severely high. ppm Water contamination levels are severely high. Potassium ppm levels are abnormally high.

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