

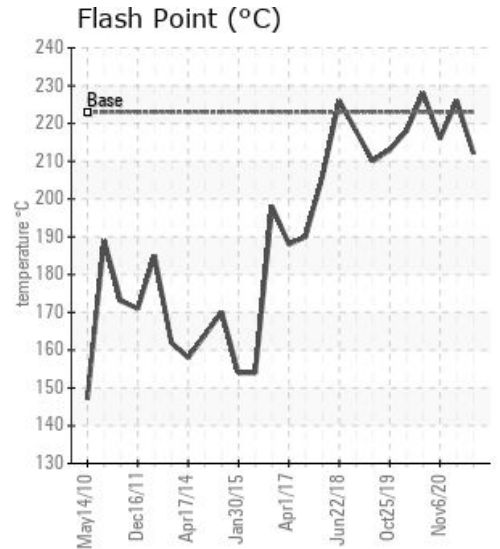
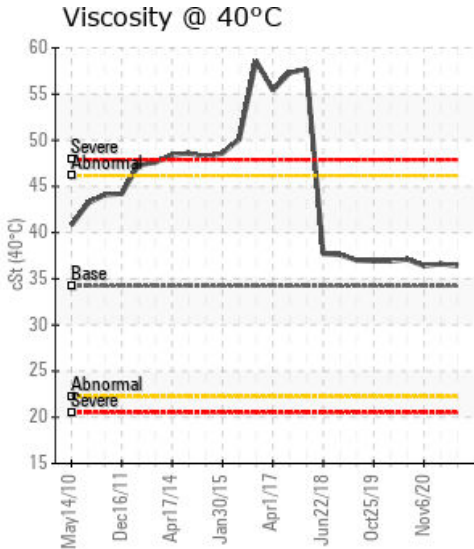
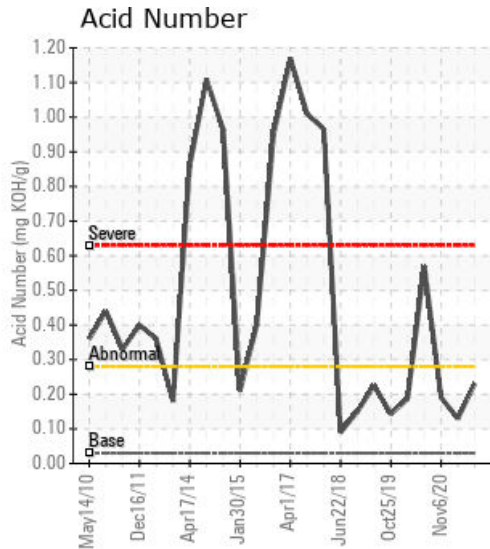
## ENERGY PLANT HOT OIL

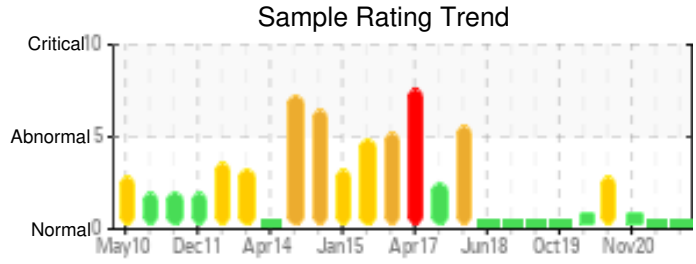
Customer: PTRHTF20043	System Information	Sample Information
WEST FRASER LVI PO BOX 1737 ROCKY MT HOUSE, AB T4T 1B3 Canada Attn: Renny Ceccato Tel: E-Mail: renny.ceccato@westfraser.com	System Volume: 38000 ltr Bulk Operating Temp: 500F / 260C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: WELLONS	Lab No: 02460933 Analyst: Yutong Gao Sample Date: 11/28/21 Received Date: 12/08/21 Completed: 12/09/21 Yutong Gao yutong.gao@hollyfrontier.com

Recommendation: The current fluid has normal viscosity, distillation point and flash point. There is minimum oil oxidation and very low water content. It is suitable for further operation. Please take one sample in 12 months to monitor the conditions.

Comments:

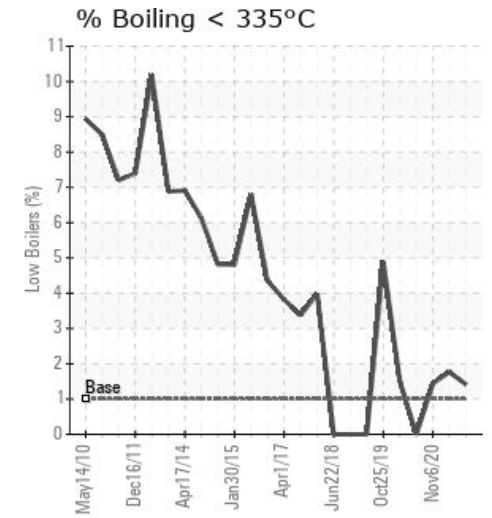
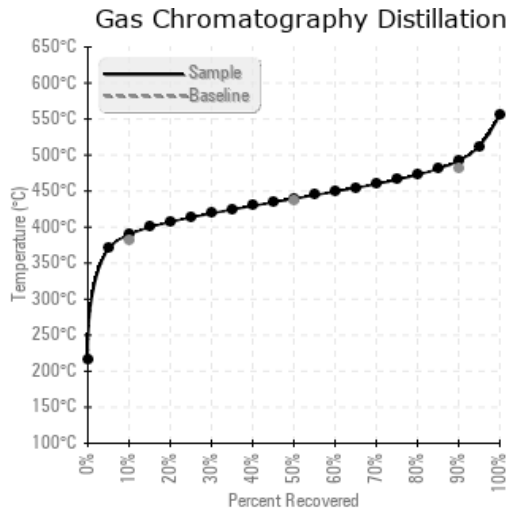
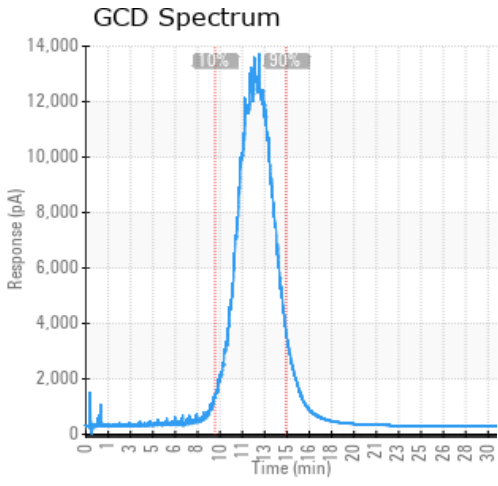
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/28/21	12/08/21	84.0m	HOT OIL PUMP	414 / 212	25.5	36.4	0.23	0.153	733 / 390	823 / 439	918 / 492	1.41
05/20/21	06/11/21	0.0m		439 / 226	68.0	36.6	0.13	0.089	720 / 382	806 / 430	915 / 491	1.77
11/06/20	11/17/20	30.0m	HOT OIL PUMP	421 / 216	59.3	36.4	0.19	0.119	734 / 390	824 / 440	919 / 493	1.44
01/31/20	02/07/20	21.0m	HOT OIL PUMP	442 / 228	58.5	37.1	0.570	0.177	712 / 378	792 / 422	882 / 472	0.00
11/22/19	12/09/19	19.0m	HOT PUMP	424 / 218	52.3	36.9	0.187	0.152	721 / 383	817 / 436	922 / 495	1.50
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
11/28/21	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0
05/20/21	2	0	0	0	0	0	1	0	0	0	0	8	0	0	0	0	0	0	0	0	1	0	0	0
11/06/20	2	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	1	0	0	0
01/31/20	2	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	2	0	0	0
11/22/19	3	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	3	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

05/20/21	The current fluid has normal viscosity, low acid number and low solid contents. There are correct distillation points and minimum third party contaminants. Please continue to run this fluid, and take one sample in 12 months to monitor the conditions.
11/06/20	(GCD) 90% Distillation Point is marginally high. All other results are within normal guidelines. Resample next sample period and continue to monitor the system. (GCD) 90% Distillation Point is marginally high.
01/31/20	It appears that the oil has experienced a sudden increase in Acid Number. The acid number is a measure of the acidic compounds in the oil & increases in the acid number could be due to the formation of oxidation by products in the oil. This value will increase exponentially once the process begins. Tendencies are for sludge and deposits to increase and corrosion to occur if the fluid. Since the Acid Number has increased a great deal in 2 months, and there is no substantial increase in the Pentane insolubles, could this sample have been taken from a port where these by products are allowed to collect? Resample to determine if the result is accurate. Acid Number (AN) is abnormally high.
11/22/19	The GCD 90% results are slightly elevated, which could indicate high boilers are present that are normally associated with carbonaceous deposits in the system that can foul heat exchanger surfaces or plug small lines. All other results appear normal. Resample at the next interval to monitor (GCD) 90% Distillation Point is marginally high.

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