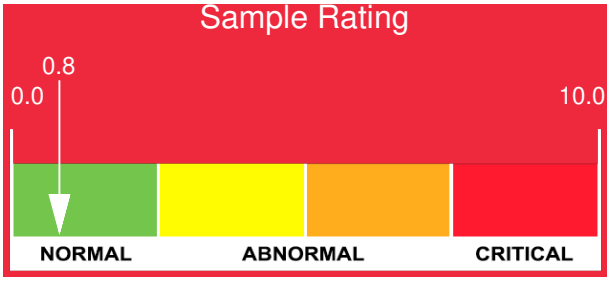
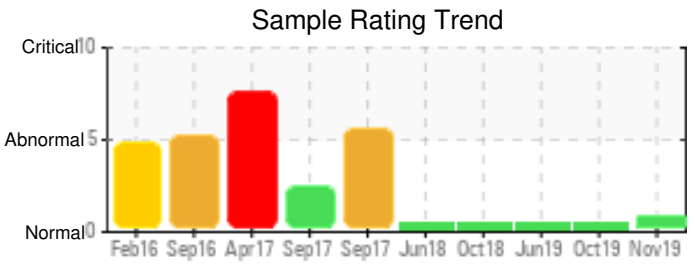




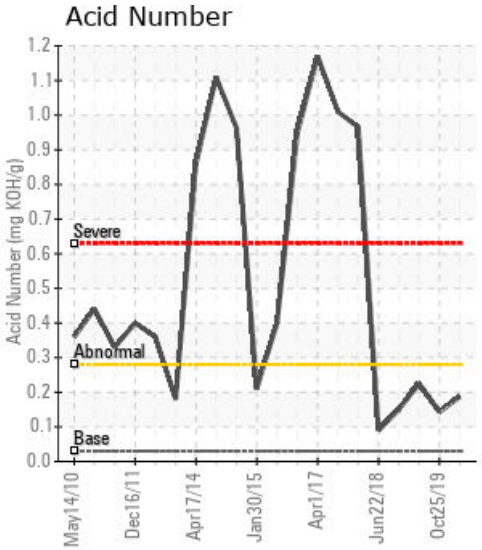
ENERGY PLANT HOT OIL

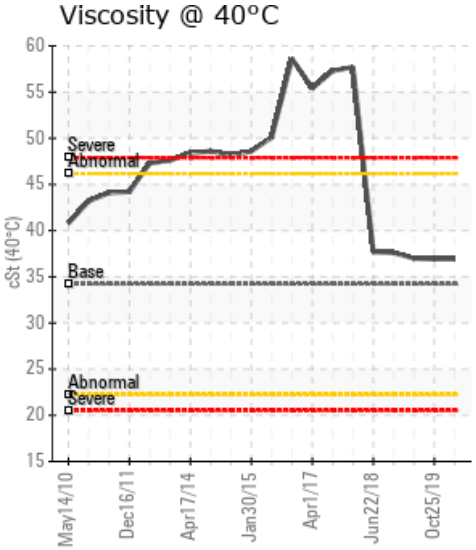
Customer: PTRHTF20043	System Information	Sample Information
WEST FRASER LVI PO BOX 1737 ROCKY MT HOUSE, AB T4T 1B3 Canada Attn: Renny Ceccato Tel: E-Mail: renny.ceccato@westfraser.com	System Volume: 38000 ltr Bulk Operating Temp: 500F / 260C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: WELLONS	Lab No: 02325827 Analyst: Gordon Susinski Sample Date: 11/22/19 Received Date: 12/09/19 Completed: 12/12/19

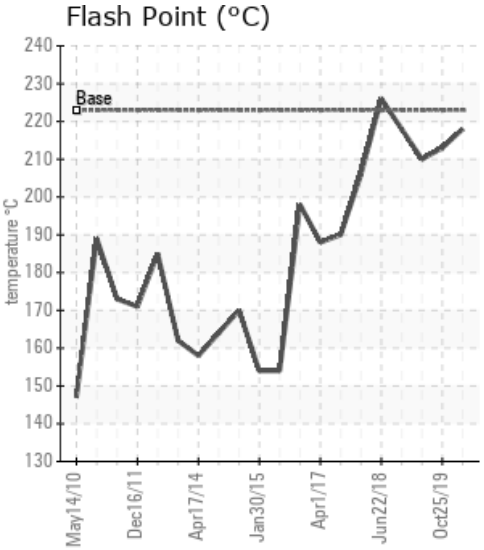
Recommendation: The GCD 90% results are slightly elevated, which could indicate high boilers are present that are normally associated with carbonaceous deposits in the system that can foul heat exchanger surfaces or plug small lines. All other results appear normal. Resample at the next interval to monitor

Comments: (GCD) 90% Distillation Point is marginally high.

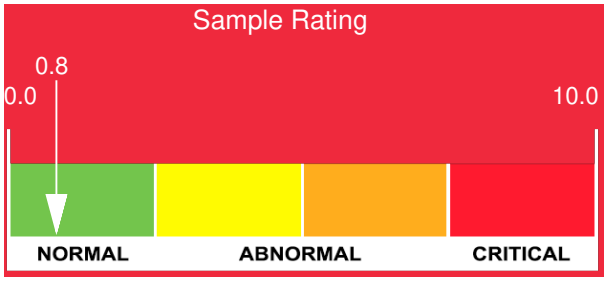
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/22/19	12/09/19	19m	HOT PUMP	424 / 218	52.3	36.9	0.187	0.152	721 / 383	817 / 436	922 / 495	1.50
10/25/19	11/07/19	1m	PUMP	415 / 213	71.9	36.9	0.143	0.141	684 / 362	792 / 422	896 / 480	4.89
06/07/19	06/17/19	1m	HOT OIL PUMP	410 / 210	73.9	37.0	0.225	0.076	734 / 390	821 / 438	915 / 491	0.00
10/26/18	11/08/18	0m		424 / 218	151.4	37.6	0.150	0.364	728 / 387	810 / 432	902 / 483	0.00
06/22/18	07/04/18	0m	PRIMARY PUMP	439 / 226	159.0	37.7	0.09	0.259	715 / 379	794 / 423	899 / 482	0.00
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

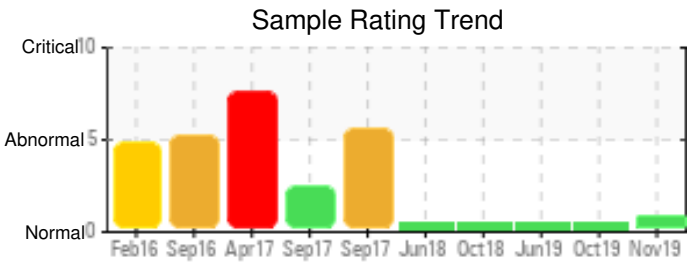






PETRO-CANADA LUBRICANTS

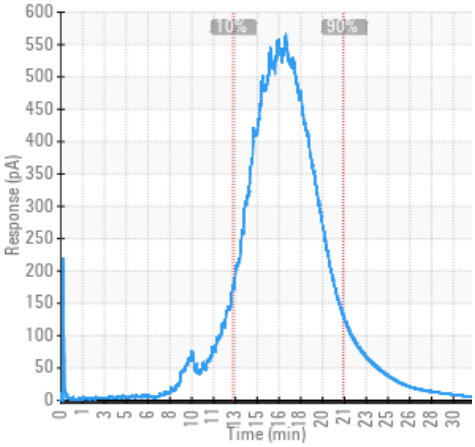




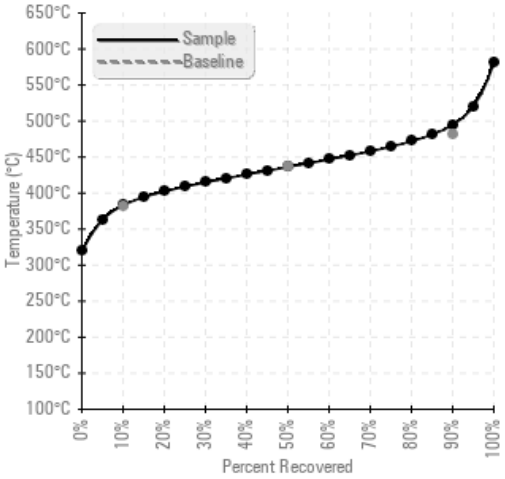
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/22/19	3	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	3	0	0	0
10/25/19	2	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	4	0	0	0
06/07/19	4	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	9	0	1	0
10/26/18	8	0	0	0	0	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	24	0	1	0
06/22/18	6	0	0	0	0	0	0	0	0	0	0	10	2	0	0	0	0	0	0	0	35	0	2	2
Baseline Data			0	0						0			0	0					0				0	

Elemental anaysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]

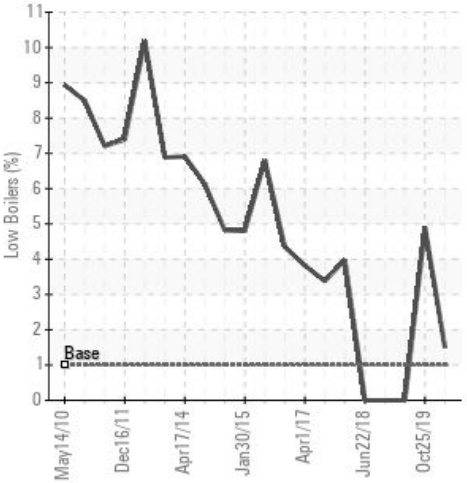
GCD Spectrum



Gas Chromatography Distillation



% Boiling < 335°C



Historical Comments

10/25/19	Despite the results being within normal guidelines, note the increase in the GCD %<335C from 0% to 4.89% This coupled with a reduced Initial Boiling Point (IBP) from 344C to 203C may suggest that the sample may be contaminated with a lighter hydrocarbon, or that the oil may be thermally degraded. We suggest taking another sample taking care to observe proper sampling practices to confirm the sample results.
06/07/19	Results are normal
10/26/18	Results are normal. Resample at the next interval and continue to monitor the system.
06/22/18	Calcium levels are higher than expected. Typical sources of this element are other 1.) heat transfer products and 2.) outside contamination. Resample, taking care to obtain a representative sample of the system. Calcium ppm levels are abnormally high.