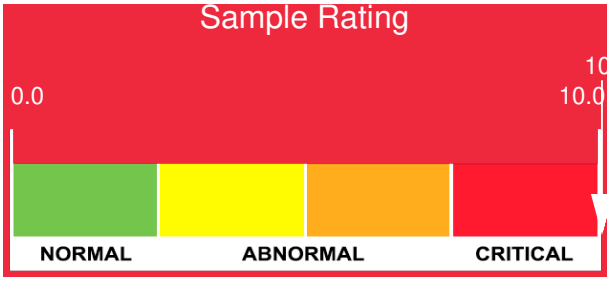
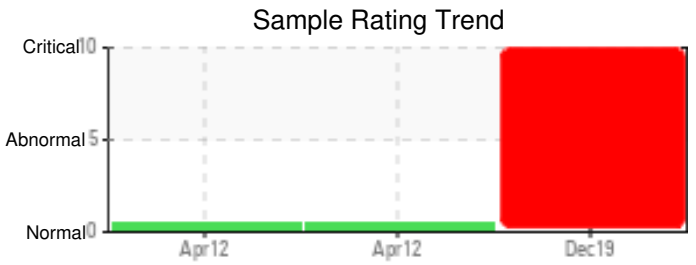




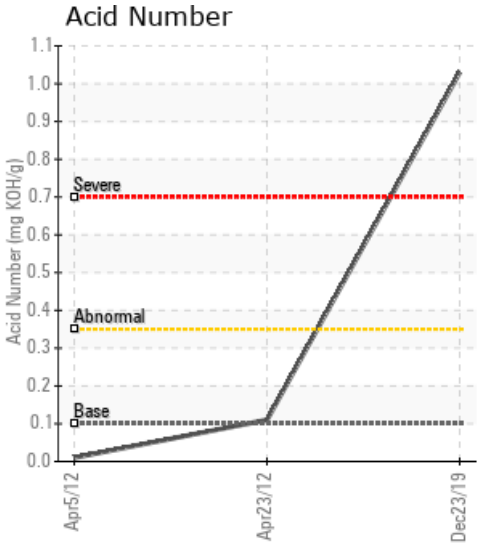
TANK 5 MANGANESE TANK

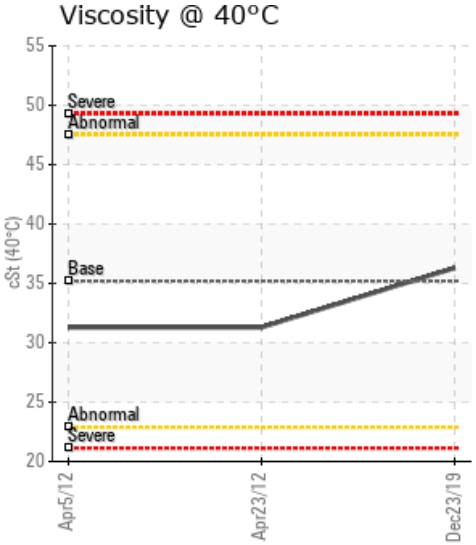
Customer: PTRHTF20100	System Information	Sample Information
HUNTING ENERGY SERVICES CANADA 5550 SKYLNE WAY CALGARY, AB T2E 7Z7 CANADA Attn: LEE BROWN Tel: (403)519-4105 E-Mail: lee.brown@hunting-intl.com	System Volume: 1600 ltr Bulk Operating Temp: 235F / 113C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO HTF Make:	Lab No: 02328878 Analyst: Kevin McDermott Sample Date: 12/23/19 Received Date: 12/24/19 Completed: 01/06/20

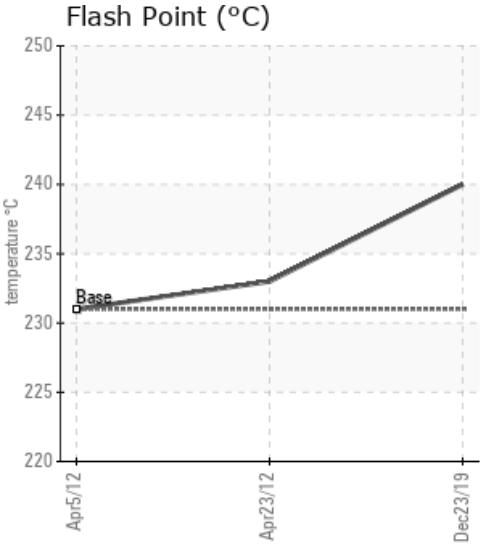
Recommendation: The acid number is severely high which normally is a symptom of oxidation, however unusual levels of Potassium, Magnesium, Calcium, Zinc, Nickel suggest contamination which could also be the reason for the high acid number. Some discussion is needed to understand the reason for the high AN.

Comments:

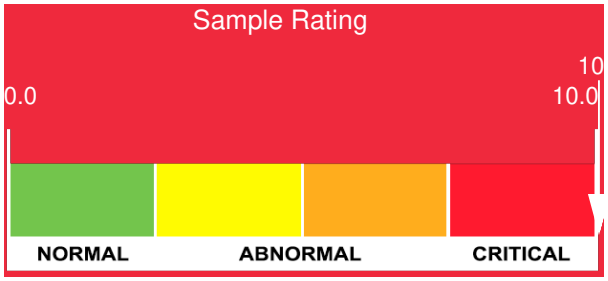
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/23/19	12/24/19	0h		464 / 240	97.3	36.3	1.03	0.211	730 / 388	822 / 439	930 / 499	0.00
04/23/12	04/24/12			451 / 233	36	31.3	0.11	0.027	709 / 376	805 / 429	913 / 489	2.86
04/05/12	04/09/12	1h		448 / 231	58	31.3	0.01	0.065	713 / 379	805 / 429	906 / 485	2.38
Baseline Data				448 / 231		35.20	.1		712 / 378	810 / 432	910 / 488	1.75

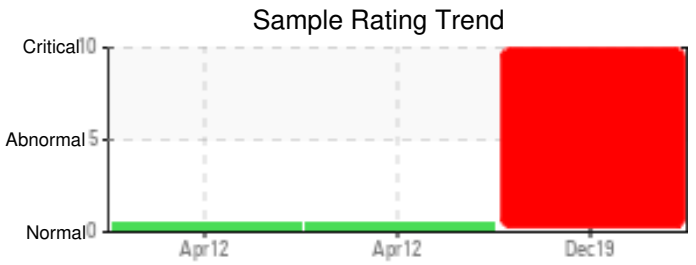






PETRO-CANADA LUBRICANTS

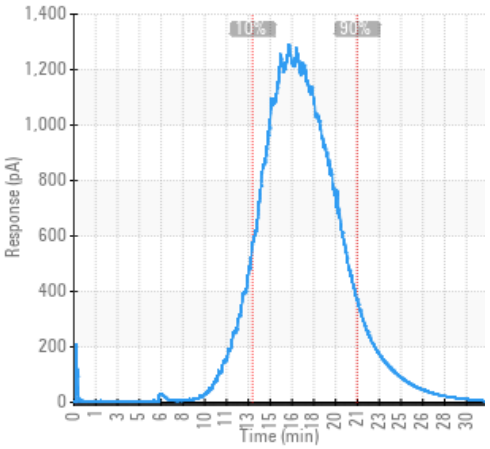




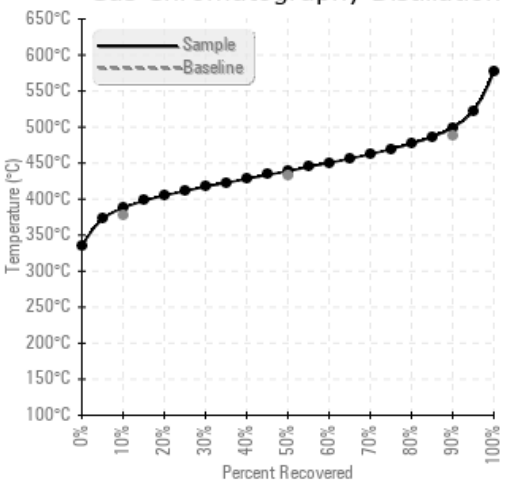
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
12/23/19	4	0	16	0	0	0	0	0	0	0	7	8	46	0	0	0	6	0	0	21	26	0	405	75
04/23/12	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	2	0	0	0	211	3
04/05/12	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	201	4
Baseline Data			0	0						0			0	0					0				280	

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

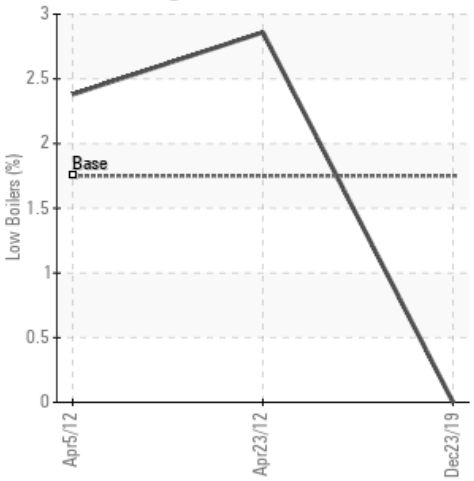
GCD Spectrum



Gas Chromatography Distillation



% Boiling < 335°C



Historical Comments

04/23/12	GCD results are in. The results look very similar to the last sample. The Open Cup flast pt is unchanged. The Closed Cup flash pt first dropped to 63C. We asked for a retest and obtained 104C, proving how sensitive and poorly reproducible this test is. Other properties measured look like the last sample and it looks like the fresh oil. The GCD results do not show low viscosity and low boiling point hydrocarbons because the fluid starts boiling at or a few degrees higher than fresh Calflo HTF. We suggest to monitor the oil quarterly to avoid surprises like Tank 4, we want to trend its degradation so you can perform a less costly change-out at the right time. We also asked a technician to drop a few drops of sample onto a hot plate and report any smell. They reported Calflo HTF was virtually odorless whereas the Tk 5 sample has a distinct odor, without describing exactly. From what we gathered, the smell problem started after the incident where the content of Tk 5 overflowed in the open hot oil system. The odor problem is slowly going away but remains an issue upon start-up. The fresh oil from the drum(s) is on-specification and Tk 4 has not had odor problems in 3 yrs with the same fluid. Therefore we conclude that the odor problem of Tank 5 is due to some chemical(s) formed as a result of the overflow that releases a strong odor when heated. This chemical is likely oil-insoluble or perhaps organic in nature because it is not detected in normal oil analysis.
04/05/12	This 1 month old sample is a baseline sample. Everything looks good as it should. We suggest to re-sample at 6 months oil time