

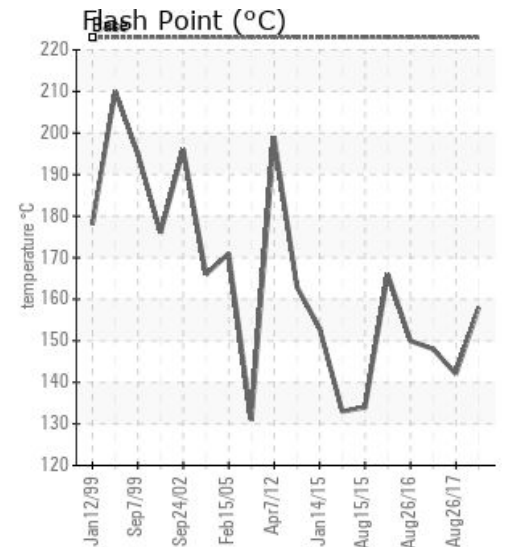
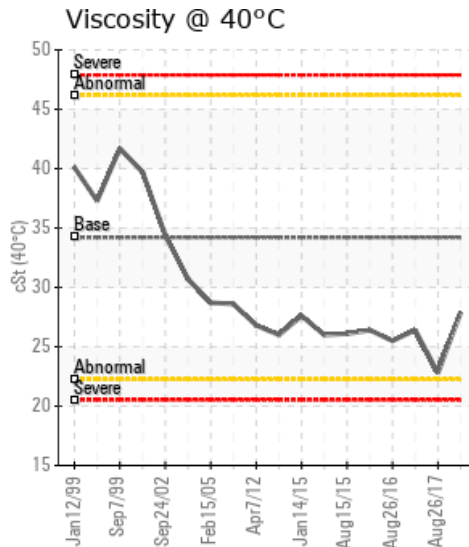
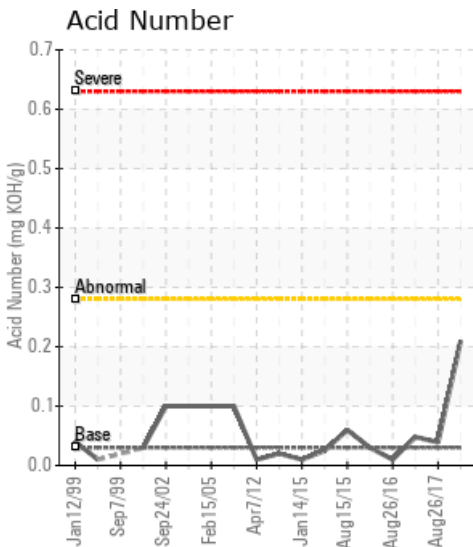
LINE 2

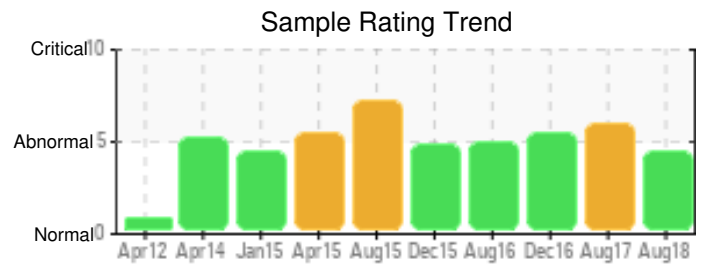
Customer: PTRHTF20031	System Information	Sample Information
MCCAIN FOODS PORTAGE PO BOX 220 1 McCain Avenue PORTAGE LA PRARIE, MB R1N 3B5 Canada Attn: Mark Nelissen Tel: x:	System Volume: 62000 ltr Bulk Operating Temp: 540F / 282C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: VOLCANO	Lab No: 02233911 Analyst: Yutong Gao Sample Date: 08/12/18 Received Date: 08/15/18 Completed: 08/29/18 To discuss this report contact Yutong Gao at (403)873-1876

Recommendation: The current fluid has improved flash point, viscosity, and the distillation points. However, the fluid still has high content of the low boiler due to the thermal cracking at the 285 C bulk working temperature. Please continue to conduct the routine system venting and take one sample in 6 months to monitor the conditions.

Comments: COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.

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	%
08/12/18	08/15/18	9y	#1 SECONDARY PUMP	316 / 158	26.4	27.9	0.21	0.016	655 / 346	792 / 422	900 / 482	7.85
08/26/17	09/01/17	8y	1 SCND PMP TOP SUCTN	288 / 142	1.2	22.8	0.039	0.027	624 / 329	789 / 421	905 / 485	10.37
12/29/16	01/06/17	8y	#3 PRIMARY PUMP SCTN	298 / 148	8.7	26.4	0.048	0.034	627 / 331	800 / 427	921 / 494	10.09
08/26/16	08/31/16	7y	#2 2NDRY PMP SUCTION	302 / 150	14.7	25.5	0.01	0.064	633 / 334	793 / 423	911 / 488	9.65
12/28/15	01/06/16	5y	SUC #1 2NDARY PUMP	331 / 166	1.1	26.4	0.03	0.059	623 / 328	788 / 420	890 / 477	10.38
08/15/15	09/01/15	6y	3 PRIMARY PUMP	273 / 134	717.8	26.1	0.06	0.037	608 / 320	790 / 421	899 / 482	11.47
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

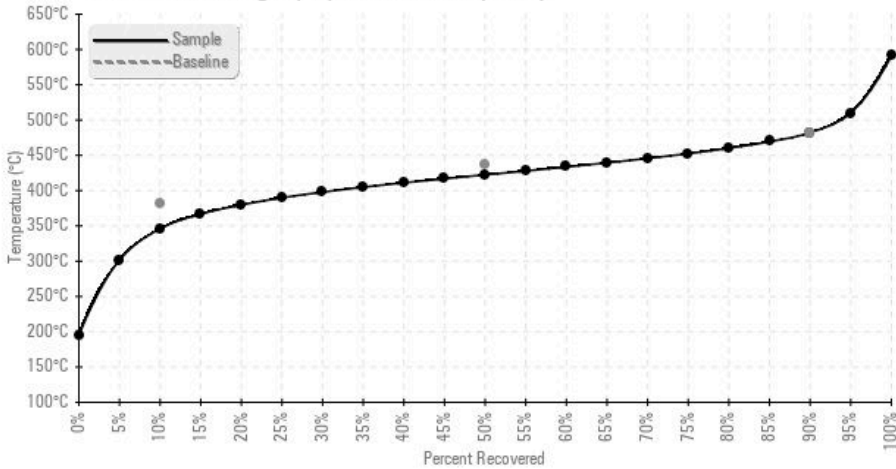




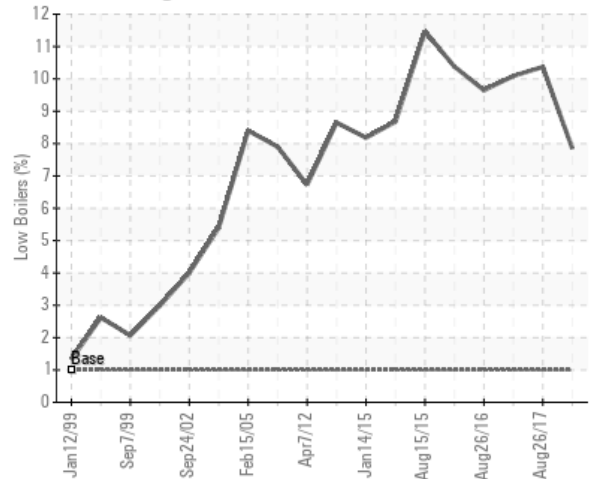
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc	
08/12/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
08/26/17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/29/16	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/26/16	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
12/28/15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/15/15	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	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%]

Gas Chromatography Distillation (GCD)



% Boiling < 335°C



Historical Comments

08/26/17	(GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. The current fluid has a reduced viscosity and reduced flash point by comparing with the sample in late Dec 2016 due to the severe thermal cracking at extremely high bulk working temperature. The effective system venting need to be done as soon as possible so that the light oil vapor can be released from the system. Please verify the AIT test results to make sure the AIT temperature is still above 300C. Please take one sample in 6 months to monitor the conditions.
12/29/16	The fluid has a similar condition to the result in Summer 2016. There is still a quite high portion of the light oil in the system. Please continue to do the effective system venting to release the vapor. Also, please verify the AIT temperature and make sure it is still above your operation temperature. Please take one sample in 6 months to monitor the conditions.
08/26/16	COC Flash Point is severely low. (GCD) 10% Distillation Point is abnormally low. (GCD) % < 335°C is high. The current fluid is partially thermally cracked, the low and light boiler reduce the fluid flash point and viscosity. Please conduct a longer and more frequent venting process as soon as possible. AIT test is recommended at the moment to confirm the automatic ignition temperature. Please take one sample in 6 months to monitor the conditions.
12/28/15	The current fluid is good for future use. However, (GCD) 10% Distillation Point is severely low. COC Flash Point is abnormally low. (GCD) % < 335°C is high. They all indicate the fluid thermal cracking from the constant ~285C high operation temperature. Like what has discussed in the past, please find an effective way to vent the low boiler (light end fluid) out of the system as a routine maintenance practice. The system venting frequency and duration shall be increased, please take one sample in 6 months to monitor the conditions.
08/15/15	The low viscosity, low flash point and high reading of GCD%<335C all indicate the fluid are experiencing severe thermal cracking. The light end of oil continues to accumulate in the system. The effective and more frequent venting process needs to be conducted as soon as possible to release the light boilers. Ideally, the 5% (light oil) of fluid should be released in the next 3-4months and ~15 drums of the fresh fluid need to be topped up to compensate the fluid vapor loss. If possible, please arrange a AIT test to verify the autoignition temperature for the safety concerns. Please take one sample in 4 months to verify the effectiveness of the venting. Water contamination levels are abnormally high. ppm Water contamination levels are abnormally high. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high.

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