

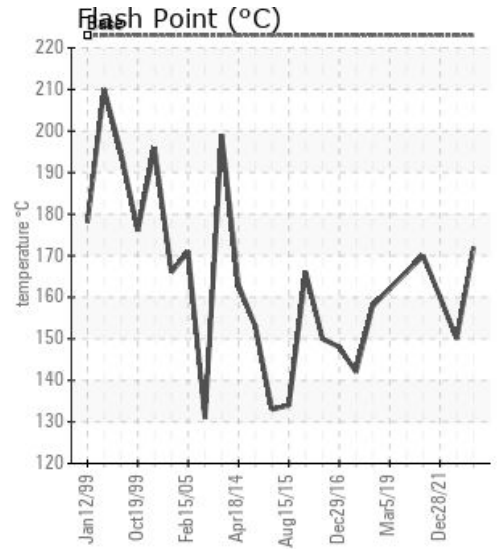
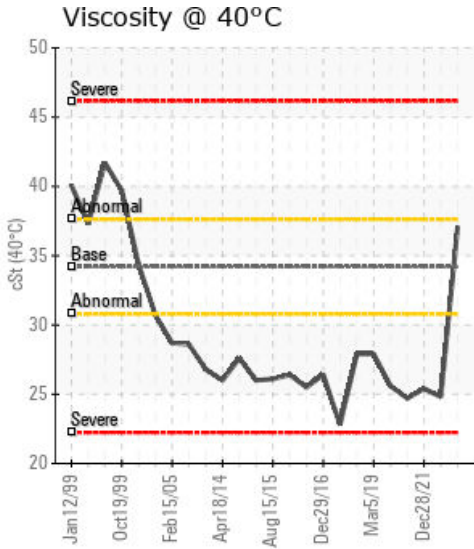
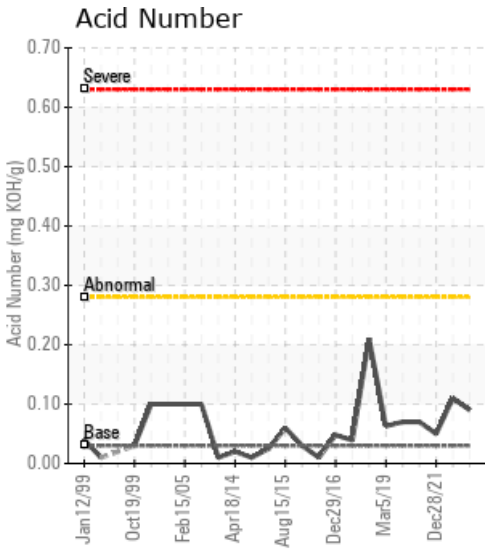
LINE 2

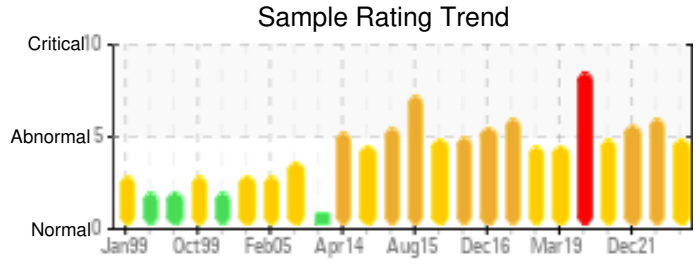
Customer: PTRHTF20031	System Information	Sample Information
MCCAIN FOODS PORTAGE PO BOX 220 1 McCain Avenue PORTAGE LA PRARIE, MB R1N 3B5 Canada Attn: Nick Kelly Tel:	System Volume: 62000 ltr Bulk Operating Temp: 540F / 282C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: VOLCANO	Lab No: 02533601 Analyst: Nick Finelli Sample Date: 12/24/22 Received Date: 01/16/23 Completed: 03/06/23 Nick Finelli nick.finelli@hfsinclair.com

Recommendation: Fluid viscosity has increased and Flash point is low. This in combination with a low 10% GCD temperature and high % boil-off below 335 degrees C indicate thermal degradation. It is recommended to vent low boiler vapors to atmosphere on a regular basis to restore the Flash Point to an acceptable level. Some information is questionable as discussed on phone, we will try to correct it during March 7th visit.

Comments:

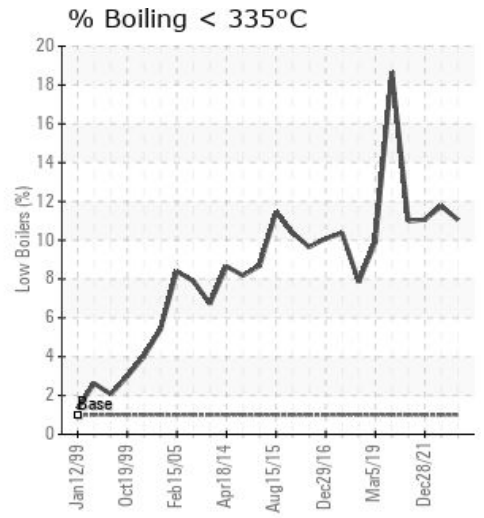
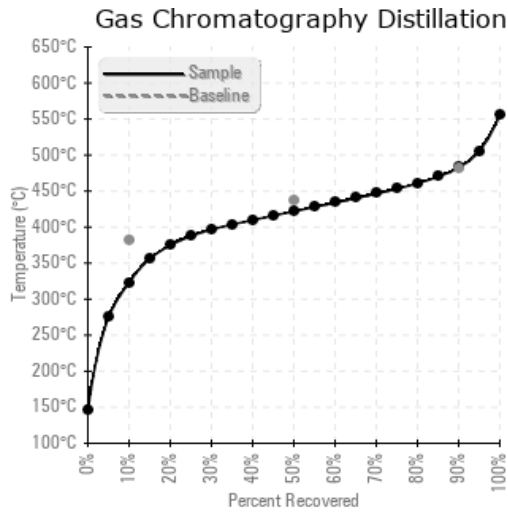
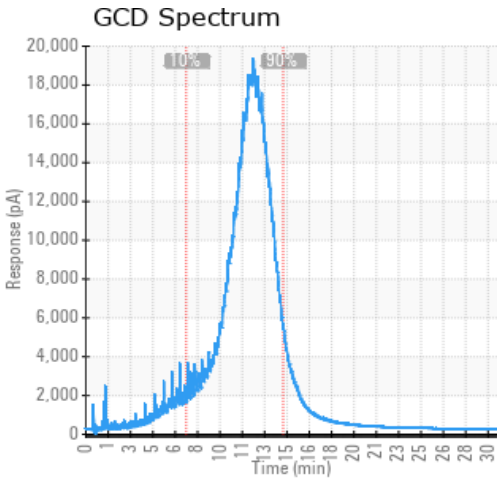
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/24/22	01/16/23	13.5y		342 / 172	4.9	37.1	0.09	0.080	613 / 323	791 / 422	900 / 482	11.05
10/20/22	11/10/22	26.0y	circuit pump 1	302 / 150	17.1	24.8	0.11	0.148	608 / 320	788 / 420	899 / 482	11.76
12/28/21	02/04/22	6.0y	#3 toh drop leg	320 / 160	11.1	25.4	0.05	0.031	617 / 325	789 / 420	901 / 483	11.06
08/08/21	08/12/21	5.0y		338 / 170	27.8	24.7	0.07	0.091	616 / 325	791 / 422	904 / 485	10.98
07/30/19	08/06/19	10.0y	2ND PUMP	331 / 166	8.2	25.6	0.070	0.051	530 / 276	755 / 402	868 / 465	18.68
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
12/24/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/20/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/28/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/08/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07/30/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	
10/20/22	Fluid viscosity is low and Flash point is very low. This in combination with a low 10% GCD temperature and high % boil-off below 335 degrees C indicate thermal degradation. It is recommended to vent low boiler vapors to atmosphere on a regular basis to restore the Flash Point to an acceptable level. Pentane Insolubles (solids) have increased 4x. At the moment the solids content is still acceptable but the rate of increase is a concern. Please re-sample in 3 months after venting as advised. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high. Visc @ 40°C is abnormally low.
12/28/21	Thermal degradation of the fluid has resulted in viscosity, Flash Point and 10% GCD temperature becoming low. Another indication of thermal degradation is an elevated low boiler vapor content. (GCD% <335C = 11.06%). Please vent off low boiler vapor to atmosphere as part of regular fluid maintenance. Re-sample in 3 months to see the effect of venting. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is marginally high.
08/08/21	The fluid is in a reasonable condition and suitable for further use but shows signs of thermal degradation. Indications of this are low viscosity, Flash Point and 10% GCD temperature. As a result of this the low boiler vapor content (GCD% <335C.) is high with 11%. It is recommended to vent off the low boiler vapors on a regular basis as part of fluid maintenance. Please do this weekly for a period of 3 months and after that submit another sample. (GCD) 10% Distillation Point is severely low. COC Flash Point is abnormally low. (GCD) % < 335°C is marginally high.
07/30/19	The current fluid has reduced viscosity and flash point due to the severe thermal cracking, which is reflected by the extremely high reading of 18.68% GCD<335C. Please schedule a long and effective system venting to release the low boiler. Please send one sample to a lab to confirm the AIT (Auto Ignition Temperature). If the system venting cannot be conducted, please drain 5000L fluid and top up the fresh PetroTherm to restore the fluid physical properties. (GCD) % < 335°C is severely high. (GCD) 10% Distillation Point is severely low. COC Flash Point is abnormally low.

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