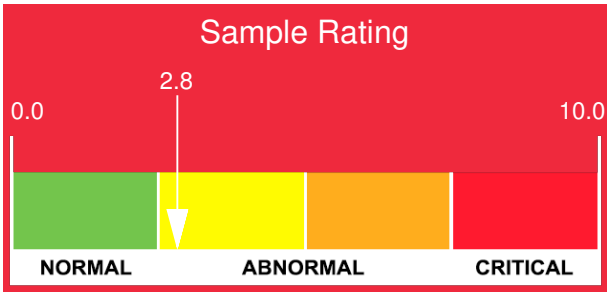
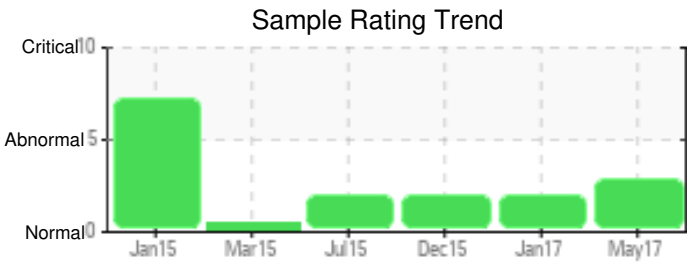




#1 COOKER (I-852-1-0140)

Customer: PTRHTF10156

INGREDION
1515 SOUTH DROVER ST
INDIANAPOLIS, IN 46221 USA
Attn: Devin Wentz
Tel: (317)441-0448
E-Mail: devin.wentz@ingredion.com

System Information

System Volume: 200 gal
Bulk Operating Temp: 400F / 204C
Heating Source:
Blanket:
Fluid: PETRO CANADA PURITY FG HEAT TRANSFER FLUID
Make: HEAT EXCHANGE/TRAN

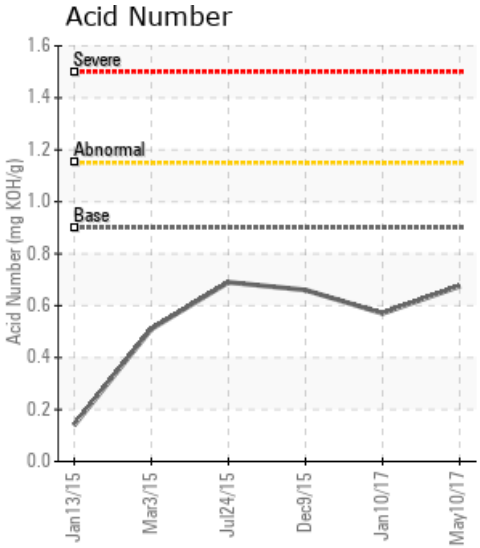
Sample Information

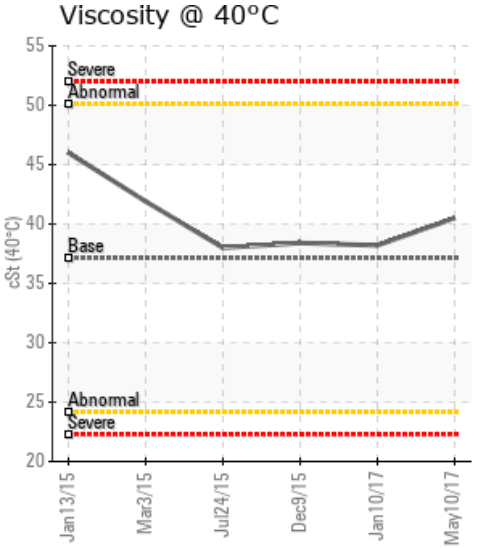
Lab No: 02145884
Analyst: Yvette Trzcinski
Sample Date: 05/10/17
Received Date: 05/16/17
Completed: 05/19/17
To discuss this report contact Yvette Trzcinski at (262)933-0718

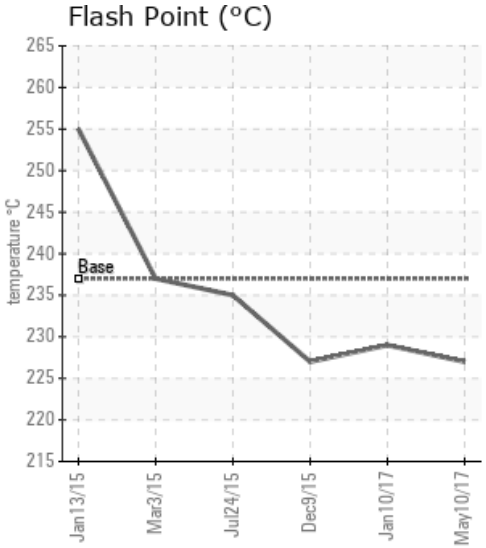
Recommendation: This system has seen little to no addition judging by the results, therefore the condition appears to be similar to the last sample. No action deemed necessary at this time, just re-sample in 6 months for normal monitoring.

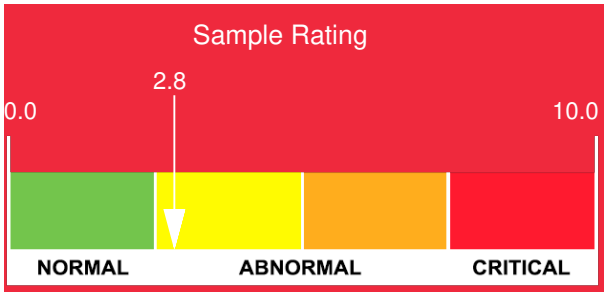
Comments: (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.

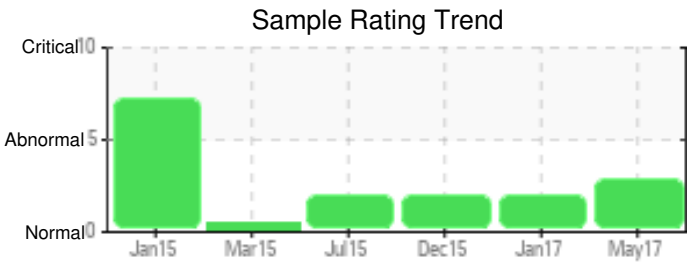
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/10/17	05/16/17	6m	DRAIN PORT	441 / 227	31.8	40.5	0.675	0.045	735 / 391	844 / 451	992 / 533	0.46
01/10/17	01/23/17	9m		444 / 229	14.2	38.2	0.57	0.063	735 / 391	839 / 448	983 / 528	0.24
12/09/15	04/19/16	6m	HOT OIL HEAT EXCHNGR	441 / 227	207.5	38.4	0.66	0.259	779 / 415	848 / 453	942 / 505	0.00
07/24/15	08/06/15	0m	PAST THE STRAINER	455 / 235	6.0	38.0	0.69	0.102	734 / 390	839 / 448	984 / 529	0.19
03/03/15	03/12/15	1m	1 D.T.C	459 / 237	17.1	41.9	0.51	0.139	748 / 398	883 / 473	1008 / 542	0.22
01/13/15	01/30/15	0m	AT PUMP	491 / 255	141.1	46.0	0.14	0.244	821 / 439	933 / 501	1048 / 564	0.00
Baseline Data				459 / 237		37.12	0.90		721 / 383	807 / 431	892 / 478	1.5





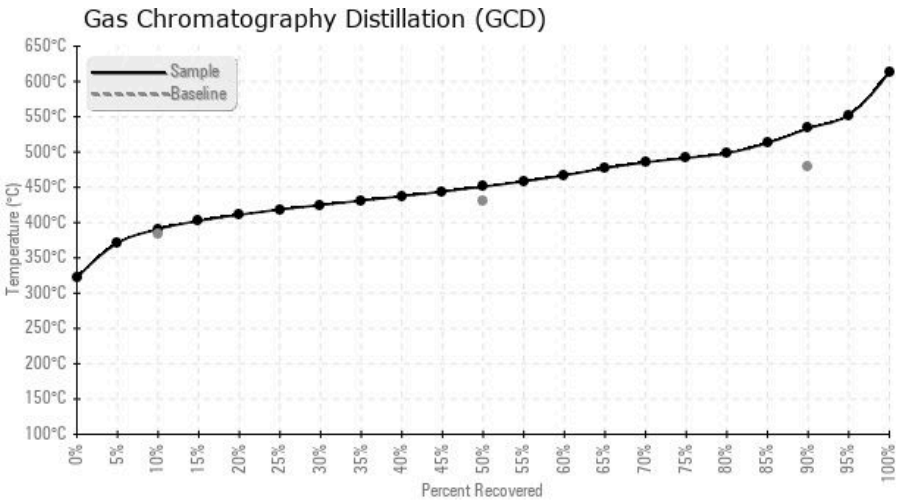


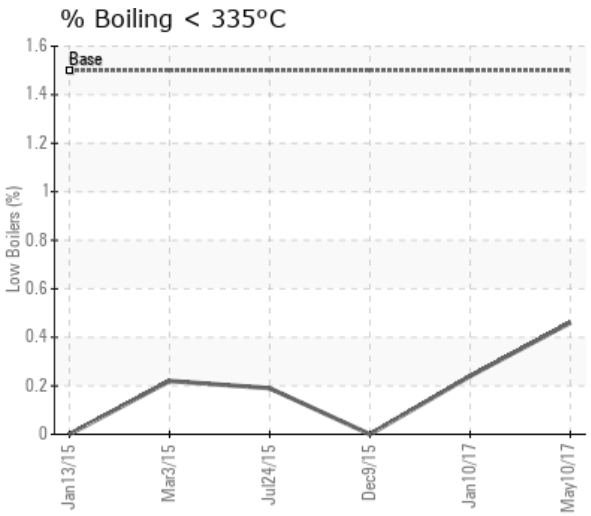




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
05/10/17	18	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	150	0
01/10/17	27	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	146	1
12/09/15	40	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	160	1
07/24/15	27	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	170	1
03/03/15	46	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	115	1
01/13/15	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	24	1
Baseline Data			0	0						0			0	0					0				230	

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





Historical Comments

01/10/17	This system has seen little to no addition judging by the results, therefore the condition appears to be similar to the last sample. No action deemed necessary at this time, just re-sample in 6 months for normal monitoring. (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.
12/09/15	The sample is dated Dec 9 2015, so a fresh sample would provide more insight into the current fluid condition. The amount of Purity FG HTF has increased to >50% in this system. We notice a bit more solids and moisture in this sample, which may be caused by the way the sample was taken. Sampling should include letting a good amount of oil flow through the sampling valve before collecting the sample, so we get a representative sample of what is flowing in the pipes. Please keep monitoring every 6 months considering how critical these cookers are. (GCD) 10% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.
07/24/15	There is a steady change in properties to show the increasing amount of Purity FG HTF in the system (estimated at 65%). The overall condition of the fluid appears to be good based on the results with metals, water and insoluble solids at low levels. Please re-sample at next scheduled interval. (GCD) 90% Distillation Point is severely high.
03/03/15	The system had a significant addition of Purity FG HTF to where FG HTF is about 40% of the system now. The viscosity and boiling properties are shifting towards Purity FG HTF. Nothing alarming to report at this time. we suggest to sample every 3-4 momths to monitor the fluid condition. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. Visc @ 40°C is abnormally high.
01/13/15	The sample shows some red flags and I suspect it's because the current oil looks different than Purity FG HTF. The software is trying to compare the results against fresh Purity FG HTF data. Based on the low phosphorous amount of 24 ppm, it appears there is little Purity FG HTF in this system (~10%). The GCD distillation data confirms the mixture heavily composed of Interlube fluid. This system has very dark oil and considering solids are collected in the strainer on a regular basis now, we suggest to take action and replace the fluid charge (GCD) 10% Distillation Point is severely high. (GCD) 50% Distillation Point is severely high. (GCD) 90% Distillation Point is severely high. COC Flash Point is abnormally high. Visc @ 40°C is abnormally high.