

## RETURN CARGILL MEAT THAILAND

Customer: PTRHTF60010	System Information	Sample Information
SYNLUBE INTERNATIONAL CO LTD 76/1 MOO.7 THACHIN MUANG SAMUTSAKHON, 74000 THAILAND Attn: CHERNPORN CHOBKUI Tel: 034421290 E-Mail: chernporn@synlube.co.th	System Volume: 20910 ltr Bulk Operating Temp: 554F / 290C Heating Source: Blanket: Fluid: PETRO CANADA PURITY FG HEAT TRANSFER FLUID Make: WANSON	Lab No: 02283129 Analyst: Yutong Gao Sample Date: 04/26/19 Received Date: 05/03/19 Completed: 05/22/19

Recommendation: The current fluid has very low flash point and low viscosity at 40C because of the severe thermal cracking. The low boiler needs to be released by effective system venting. However the fluid distillation points are still adequate. Please confirm if the representative sample was taken at the plant? The sample needs to be taken at the sample place after the oil is well circulated. Please take one more sample and send to Focuslab and just do the viscosity and flash point tests to confirm. If the results are still low, please drain half of the system and fill the new fluid. If the system is dirty, please arrange the system cleaning and flushing.

Comments: COC Flash Point is severely low. (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	%
04/26/19	05/03/19	36m		288 / 142	8.0	25.8	0.240	0.049	664 / 351	798 / 426	895 / 479	7.38
02/01/19	02/08/19	0m		356 / 180	16.7	25.6	0.201	0.018	636 / 335	776 / 413	872 / 467	9.43
11/17/18	11/27/18	31m		286 / 141	10.9	24.3	0.13	0.022	603 / 317	731 / 388	823 / 439	14.48
08/25/18	09/05/18	28m	RETURN	354 / 179	7.2	28.0	0.10	0.022	674 / 356	800 / 427	897 / 481	6.22
05/23/18	06/12/18	25m	SUPPLY/RETURN	370 / 188	8.5	27.0	0.12	0.043	684 / 362	805 / 429	901 / 483	5.45
02/04/18	02/26/18	22m		327 / 164	0.00	27.7	0.274	0.022	685 / 363	787 / 419	868 / 464	3.98
11/01/17	11/14/17	19m		313 / 156	9.8	26.5	0.14	0.028	670 / 354	779 / 415	869 / 465	5.10
10/13/17	10/24/17	19m	RETURN	298 / 148	11.5	27.0	0.252	0.028	675 / 357	803 / 429	900 / 482	6.31
08/10/17	08/22/17	17m		309 / 154	49.9	22.3	0.19	0.038	689 / 365	807 / 431	900 / 482	4.95
04/21/17	05/01/17	12m		309 / 154	20.4	28.9	0.317	0.054	683 / 362	804 / 429	900 / 482	5.22
03/26/17	04/03/17	12m		331 / 166	13.2	28.7	0.17	0.029	681 / 361	802 / 428	901 / 483	5.45
11/22/16	12/02/16	7m		324 / 162	9.7	29.2	0.26	0.040	692 / 367	808 / 431	907 / 486	4.25
10/31/16	11/14/16	6m		327 / 164	30.2	29.3	0.27	0.068	695 / 368	809 / 432	902 / 483	4.14
07/07/16	07/13/16	3m		381 / 194	12.1	26.9	0.32	0.112	705 / 374	807 / 430	897 / 481	2.50
04/22/16	04/27/16	7m	RETURN	374 / 190	34.1	32.8	0.41	0.042	707 / 375	808 / 431	899 / 482	2.60
04/13/16	04/27/16	7m	RETURN	259 / 126	18.4	25.5	0.20	0.037	658 / 348	799 / 426	898 / 481	7.77
04/01/16	04/04/16	35m	RETURN	280 / 138	23.3	26.6	0.259	0.017	653 / 345	797 / 425	902 / 484	8.07
01/27/16	02/02/16	33m	RETURN	313 / 156	0.0	26.8	0.271	0.085	682 / 361	802 / 428	899 / 482	4.95
01/12/16	01/19/16	33m	RETURN	313 / 156	20.8	27.3	0.299	0.040	670 / 355	802 / 428	905 / 485	6.68
09/06/15	09/10/15	29m	RETURN	352 / 178	7.3	26.9	0.278	0.048	674 / 356	805 / 429	905 / 485	6.38
06/20/15	06/26/15	26m	RETURN	309 / 154	10.9	28.0	0.30	0.104	684 / 362	808 / 431	928 / 498	5.44
04/22/15	05/01/15	24m		327 / 164	21.9	28.6	0.21	0.037	695 / 368	800 / 427	901 / 483	2.78
02/15/15	02/20/15	22m	RETURN	320 / 160	20.0	28.1	0.24	0.044	680 / 360	786 / 419	894 / 479	4.12
01/31/15	02/06/15	21m	RETURN	320 / 160	13.3	27.4	0.23	0.060	679 / 360	811 / 433	909 / 487	6.11







RETURN



























0m

RETURN





























































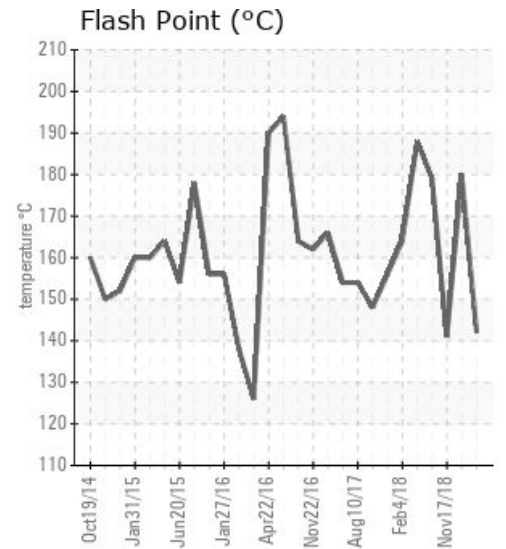
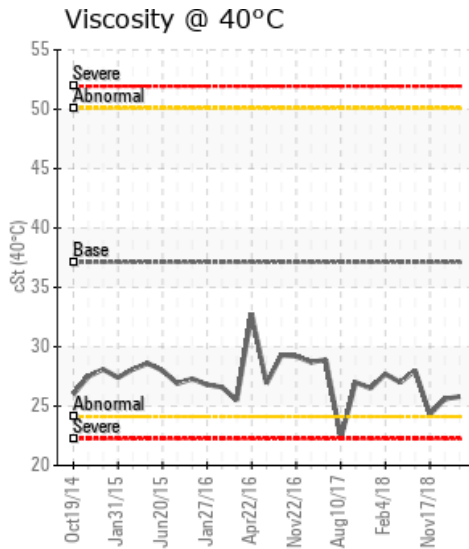
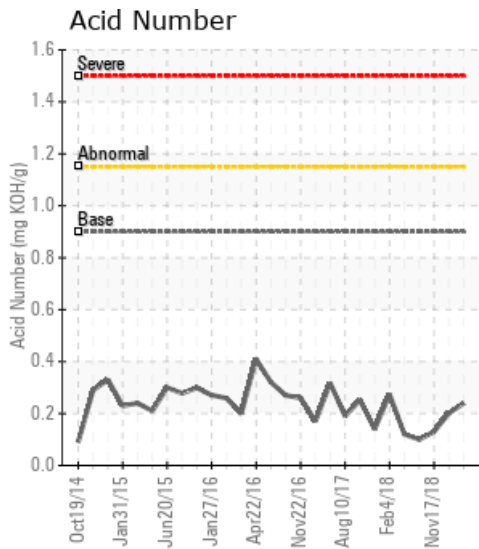
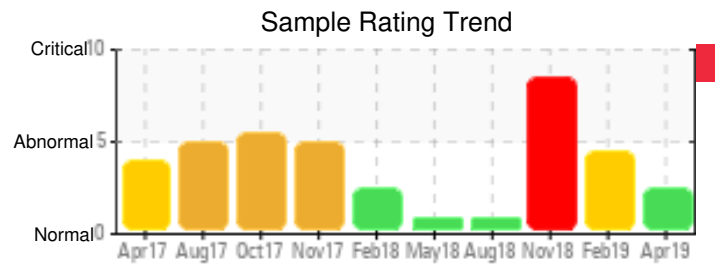


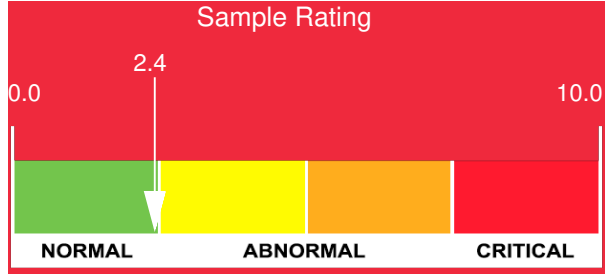












Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc	
04/26/19	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	
02/01/19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1
11/17/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3
08/25/18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
05/23/18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
02/04/18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
11/01/17	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
Elemental analysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]																									
08/10/17	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	10	0	
04/21/17	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
03/26/17	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
11/22/16	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
10/31/16	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0
07/07/16	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0
04/22/16	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0
04/13/16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	7	0
04/01/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
01/27/16	17	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0

Historical Comments

02/01/19	The current fluid has acceptable viscosity, flash point and the distillation points. The water and solid content are all very low. As a routine, please conduct the system venting in a regular base. Take one sample in 6 months to monitor the conditions.	19	0
11/17/18	The current fluid has low viscosity, low flash point due to the severe thermal cracking at high bulk working temperature. Please conduct the effective system venting to release the low boiler. The acid number and solid content are all very low indicating minimum oxidation and minimum system deposit. Please take one sample in 4 months to monitor the conditions. (GCD) 10% Distillation Point is severely low. (GCD) 90% Distillation Point is severely low. COC Flash Point is severely low. (GCD) %335°C is abnormally high. (GCD) 50% Distillation Point is abnormally low.	37	0
08/25/18	The current fluid conditions are very similar to the last sample in May. There are minimum third party contaminations such as water or dirty. The acid number and solid contents are very low, meaning minimum oxidation. The flash point is considered low due to thermal cracking at ~290C bulk working temperature. Please continue to do the system venting as a routine maintenance schedule. Please take one sample in 6 months to monitor the conditions. COC Flash Point is abnormally low.	35	0
05/23/18	The currently fluid has experienced severe thermal cracking at the extremely high bulk working temperature. However, the fluid flash point is higher than the previous three used oil samples, so the overall fluid conditions are improving. Please continue to do the effective system venting and take one sample in 6 months to monitor the conditions. COC Flash Point is abnormally low.	62	2
02/04/18	The current fluid has normal distillation points, the acid number and solid contents are all very low. However, the flash point is still much lower than the fresh fluid due to the thermal cracking at the extremely high bulk working temperature. Please do a long and effective system venting and take one sample in 6 months to monitor the conditions. COC Flash Point is severely low.	0	0
11/01/17	The current fluid has very low acid number, normal distillation point, and minimum water and solid particles. However, the viscosity and flash point are still much lower than the fresh fluid due to the thermal cracking at 290C bulk temperature. The flash point is higher than the last sample on Oct 13th, so please continue to do the effective system venting, and take one sample in 4 months to verify the conditions.	230	0
10/13/17	The current fluid has adequate distillation points, viscosity, Tan or solids reading in general. However, the flash point is very low because of the presence of the low boiler/lighter oil. The fluid was partially thermal cracked by the high working temperature. Please do a longer system venting as soon as possible. The AIT test is recommended to double check the auto-ignition temperature. If the venting cannot be conducted efficiently, a partial oil change can be an option. Please take one sample in 3 months to monitor the conditions. COC Flash Point is severely low.		

08/10/17



03/26/17

The current fluid has correct viscosity, TAN and distillation points. The solid level is acceptable. The flash point is still lower than the new fluid which is resulted from the thermal cracking at the high bulk temperature. Please continue to perform the system venting and take one sample in 4~6 months to monitor the conditions. COC Flash Point is severely low.

11/22/16

The fluid viscosity and flash point are all much lower than the fresh fluid. However, they are very similar to the samples taken on Nov 2016 and Oct 2016. The GCD, TAN, solid and water content are all normal. Please keep on doing the system venting as much as possible. Take one sample in 6 months to monitor the conditions.

10/31/16

The test results are the same as the last sample on Oct 31 2016. The fluid has normal viscosity, GCD distillation points, TAN and the solid contents. However, the flash point starts to drop after half year operation. Most likely, a portion of the fluid has been thermally cracked at 290C bulk temperature, and the system venting is not enough. Please confirm if the system has been modified for the easy venting process? The venting frequency and duration need to be increased. Please take a sample in 4 months to monitor the conditions.



07/07/16

The fluid has normal viscosity, GCD distillation points, TAN and the solid contents. However, the flash point starts to drop after half year operation. Most likely, a portion of the fluid has been thermally cracked at 290C bulk temperature, and the system venting is not enough. Please confirm if the system has been modified for the easy venting process? The venting frequency and duration need to be increased. Please take a sample in 4 months to monitor the conditions.

04/22/16

The current oil has almost identical normal flash point and distillation points as three months ago. However, the lower viscosity is unexplainable. The oil is suitable for further use. Please take one sample in 6 months.

04/13/16

The fluid has adequate viscosity, distillation points, solid and TAN. COC Flash Point is a little low, but it is normal, assuming some old fluid mixing with the fresh fluid. Please keep working on the venting process on the regular base. Take one sample in 6 months to monitor the conditions.

04/01/16

COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low. Believe that this oil sample was taken before the oil change or just for the experimental study purpose. Again the old fluid need to be changed, and the venting process need to be improved.

01/27/16

Looks like the current fluid has been severely thermal cracked, so it is not suitable for the further use. Please conduct the effective system venting as soon as possible, otherwise, please do a partial oil change (i.e. 30%) or a complete oil change. According to the current information, the system modification to improve the low boiler venting effectiveness will be the key to support the future fluid longevity. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.

01/12/16

COC Flash Point is severely low. All of the other fluid properties are OK at the moment. The low boiler/light oil is generated by the extremely high working temperature, which causes the low flash point. Please continue the automatic and manual system venting to bleed out the low boilers. If the venting process is not effective, please consider the 30% of the partial oil change.

09/06/15

COC Flash Point is severely low. All of the other fluid properties are normal. The low boiler/light oil is generated by the extremely high working temperature, which causes the low flash point. Please continue the automatic and manual system venting to bleed out the low boilers. Please take one sample in 6 months to monitor the conditions.

06/20/15

The TAN and solid level are all normal. The low flash point and the low GCD@10C is because of the thermal cracking with the high operation temperature. However, the flash point has improved a little. Please continue to do the current venting practice. Take a sample in 6 months to monitor the conditions. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low. COC Flash Point is marginally low.



04/22/15

All of the parameters are good enough, except the low flash point. The thermal cracking produced the low boiler and resulted in the low flash point. Based on the previous normal AIT test result, we have learned we still could run the current fluid even though the flash point is abnormally low. Please continue to conduct the system venting process on a regular base and record the oil top up volume as well. Take one sample in 4 months to monitor the conditions. COC Flash Point is abnormally low.

02/15/15

The current sample analysis results are almost identical to the last two samples. All of the parameters are good enough, except the low flash point. Since we have done the AIT test not too long ago, and the AIT result was good. I just recommend continuing to run the fluid and conduct the current vening practice, and take one sample in 2 months to monitor the conditions. Please provide me what system modification has been done by the installer during the turnaround? Thanks!  
COC Flash Point is abnormally low.

01/31/15

The current fluid has adequate viscosity, GCD distillation point, and TAN, however, the flash point is still low as the previous two samples. Please continue the venting process, and take one sample in 2 months. In the meanwhile, please help to get the heater heat flux (kW/m<sup>2</sup> or Btu/hr. ft<sup>2</sup>) and the fluid flow rate (feet/second) from the end customer the system installer. COC Flash Point is abnormally low.

12/06/14

This sample has very similar reading as the supply line, which has adequate viscosity, TAN and the distillation points. The water and solid contents are all normal. However, the flash point is still abnormally low. Please continue to do the same venting process as per discussed before. Please double check if there is any possibility for the frying cooking oil to leak into the heat transfer fluid system? Take one sample in 2 months to monitor the conditions. COC Flash Point is abnormally low. (GCD) 10% Distillation Point is marginally low.

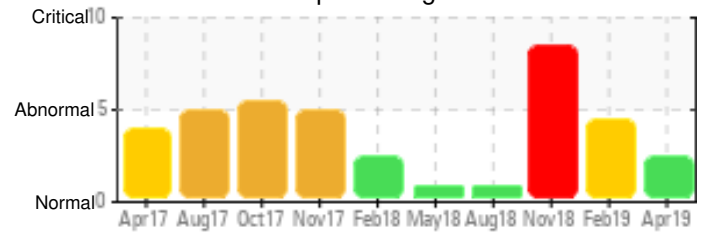
11/23/14

The tests show the current fluid has adequate reading on the GCD distillation, viscosity and TAN. However, the sample contains 0.2% (2000ppm) free water, which I don't believe it is true for the whole system. Most likely the sample is not a representative sample. Please make sure to drain/flush the sampling line longer (i.e. 6 liters) before taking the samples. COC Flash Point is abnormally low.

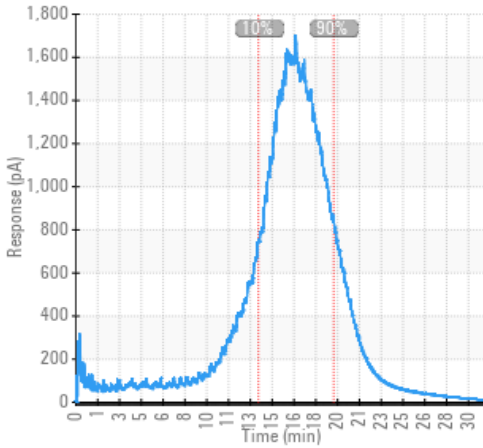
10/19/14

The current fluid has normal viscosity, TAN and GCD distillation points. It is sui the left bottom corner, resulting in the low flash point. Please keep doing the ef one sample in two months to monitor the conditions. COC Flash Point is abno

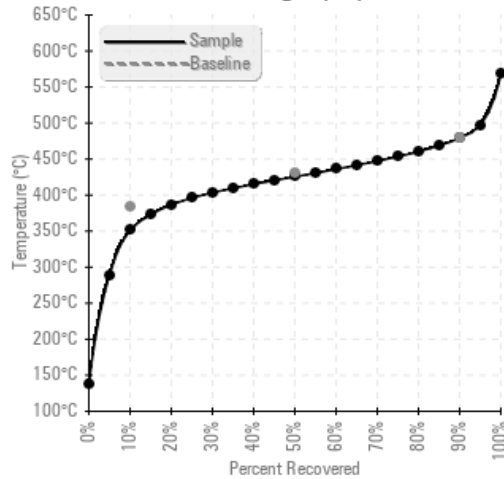
### Sample Rating Trend



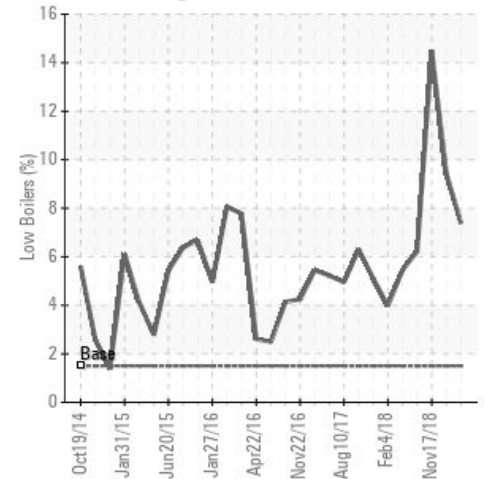
### GCD Spectrum



### Gas Chromatography Distillation



### % Boiling < 335°C



Some of the fluid has been thermally cracked due to the high working temperature. Need to confirm if Cargill is still doing the same venting process (100-200L/month oil top up as the plan discussed 4 months ago)? There is no reason to see the low flash point and low viscosity grade if the same venting process is in place. We will re-test the flash point and viscosity if there is enough left over fluid. COC Flash Point is abnormally low. Viscosity is abnormally low.