

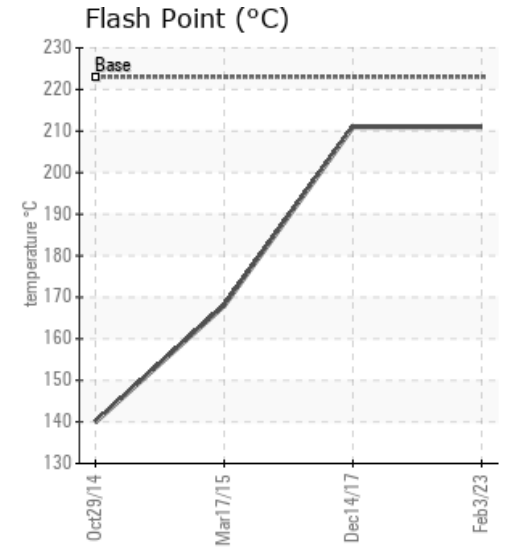
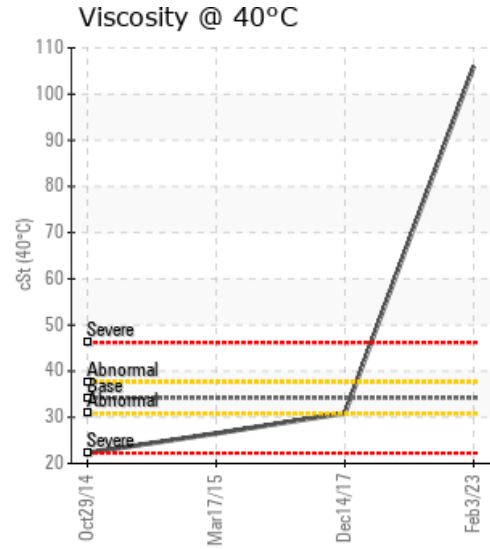
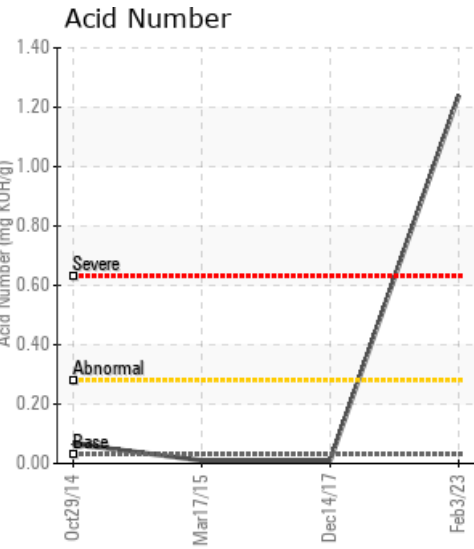
[PROGRESS ENERGY / LSD#B-88-I/94-B-1] 049 HEAT MEDIUM

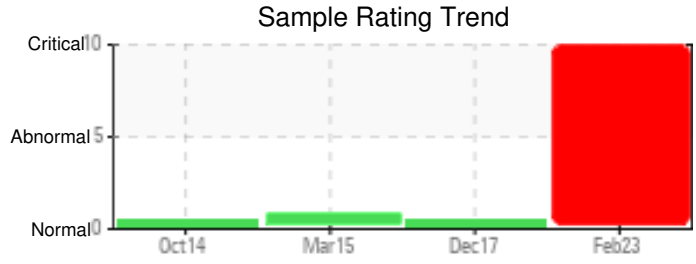
Customer: PTRHTF20039	System Information	Sample Information
BRENNTAG CANADA INC 3124-54TH AVENUE SE CALGARY, AB T2C 0A8 Canada Attn: Matthew Kryska Tel: E-Mail: mkryska@brenntag.ca	System Volume: 2000 ltr Bulk Operating Temp: 392F / 200C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: ZIRCO	Lab No: 02546133 Analyst: Clinton Buhler Sample Date: 02/03/23 Received Date: 03/17/23 Completed: 03/23/23 Clinton Buhler Clinton.Buhler@HFSinclair.com

Recommendation: If this fluid sample is representative of system condition, the system requires a cleaning, flush and re-fill with fresh heat transfer fluid due to severe oxidative degradation: Acid Number is at 1.24 and fluid viscosity has increased from 30.9 to 106 cSt. Solids content has increased to 2.55%, indicating system fouling. Please contact Petro-Canada Lubricants Tech Services for further details.

Comments: Iron ppm levels are severe. PQ levels are severe. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is severely high.

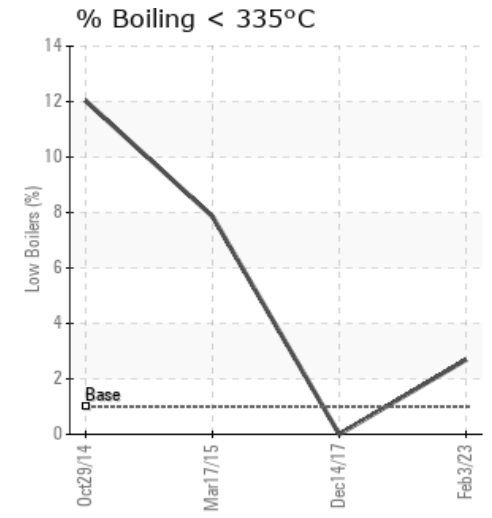
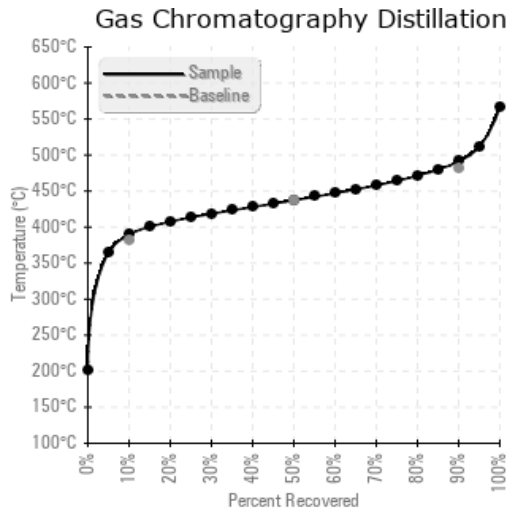
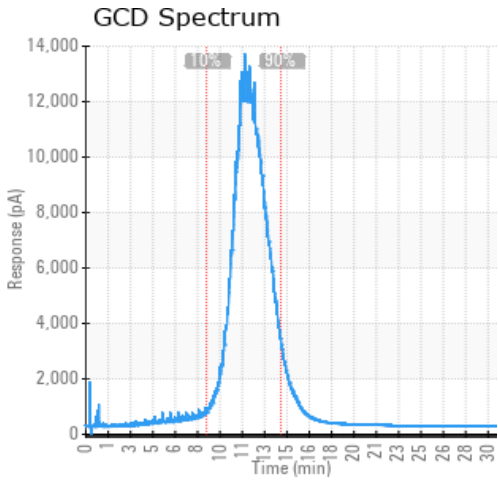
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
02/03/23	03/17/23	84.0m	sight glass	412 / 211	68.8	106	1.24	2.55	734 / 390	819 / 437	916 / 491	2.69
12/14/17	01/02/18	1.5m		412 / 211	9.5	30.9	0.01	0.085	731 / 388	796 / 424	892 / 478	0.00
03/17/15	04/15/15	34.0m	SIGHT GLASS DRAIN	334 / 168	95.1	26.5	0.01	0.008	659 / 349	782 / 417	885 / 474	7.86
10/29/14	11/11/14	0.0m	LOW LEVEL BLEED	284 / 140	7.4	22.3	0.066	0.064	575 / 302	788 / 420	904 / 484	12.03
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
02/03/23	582	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	9	0	0	0	0	0	0	0
12/14/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/17/15	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
10/29/14	0	0	0	0	0	0	2	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

12/14/17	Please ensure complete sample registration card is filled out including unit ID, heater manufacture and model. Sample results indicate that the heat transfer fluid is suitable for continued service. Continue to monitor system operation. Re-sample in 12 months.
03/17/15	Oil Flash Point is moderately low however this sample is much better then the previous sample. GCD @ 10% has also improved from last sample. Resample in 6 months. COC Flash Point is abnormally low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
10/29/14	Viscosity has come up from 18.8 cSt to 22.3 cSt and Flash has come up from 122 deg C to 140 deg C however is still very low. Resample in 3 months and if the opportunity comes up, top up system with fresh oil. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high.

Petro-Canada makes no representation or warranty of any kind, either express or implied, as to the accuracy or completeness of the analysis and assumes no responsibility and shall have no liability whatsoever with respect to such analysis, or a party's use of it. Petro-Canada is a division of HollyFrontier Corporation.