

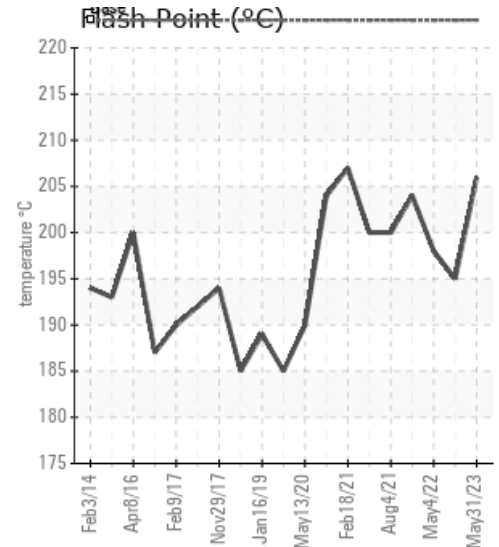
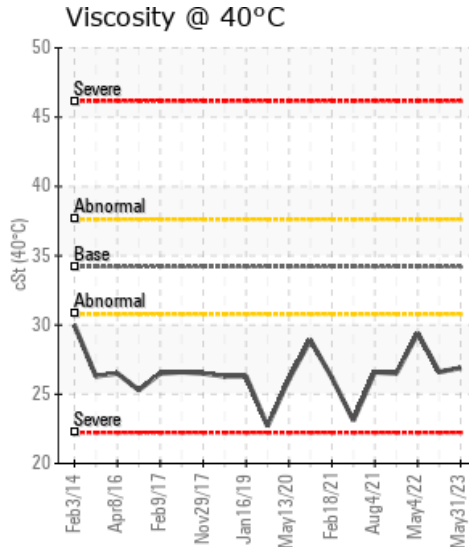
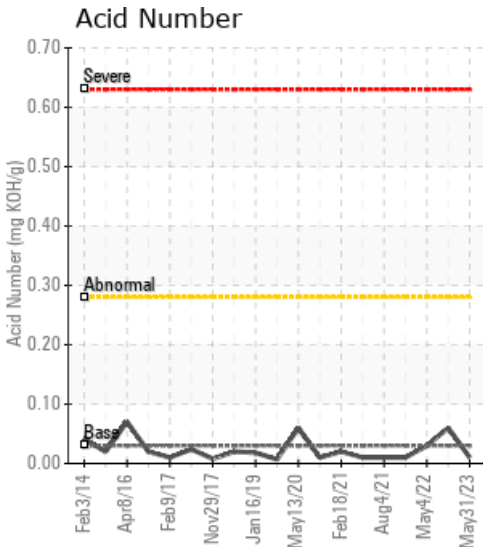
PM #1 STACK HOT OIL SYSTEM

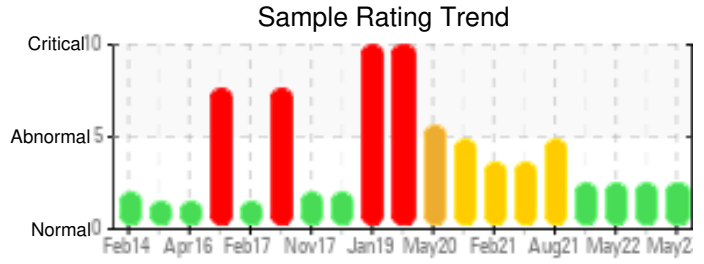
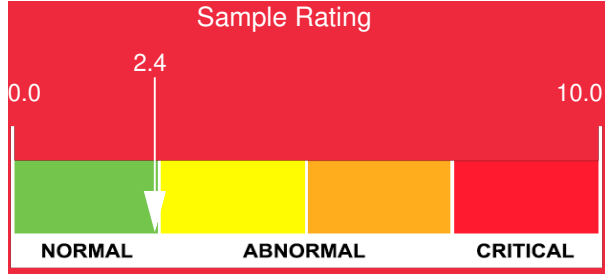
Customer: PTRHTF30073	System Information	Sample Information
IRVING PAPER LTD 435 BAYSIDE DRIVE SAINT JOHN, NB E2L 4K9 CA Attn: Anthony Bass Tel: (506)650-8435 E-Mail: bass.anthony@irvingpaper.com	System Volume: 3500 ltr Bulk Operating Temp: 536F / 280C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: METSO	Lab No: 02562410 Analyst: Luc Leblanc Sample Date: 05/31/23 Received Date: 06/06/23 Completed: 06/09/23 Luc Leblanc luc.leblanc@HFSinclair.com

Recommendation: The overall condition remains good. Pentane insolubles have risen (0.15%), but remain below our limit. We will monitor the rising tendency with the next sample. If it does not improve, we will recommend a filtration service. Continue to indicate on the sample label whenever there is a mixture of fluids, sweetening, venting of light ends, or other notable maintenance events.

Comments: The fluid contains no wear/corrosion metals, and very little water. Flash point is relatively stable, though it is still below our fresh Petro-Therm value. The low (GCD) distillation points across the curve continue to be low. However, they are likely attributed to the blend of different fluids. The Acid Number is low @0.01 and remains stable through the years.

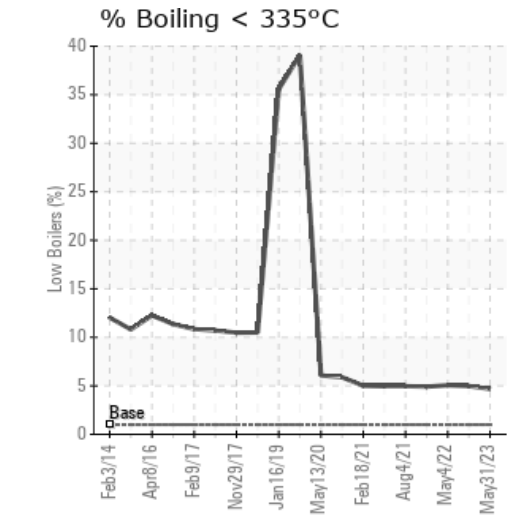
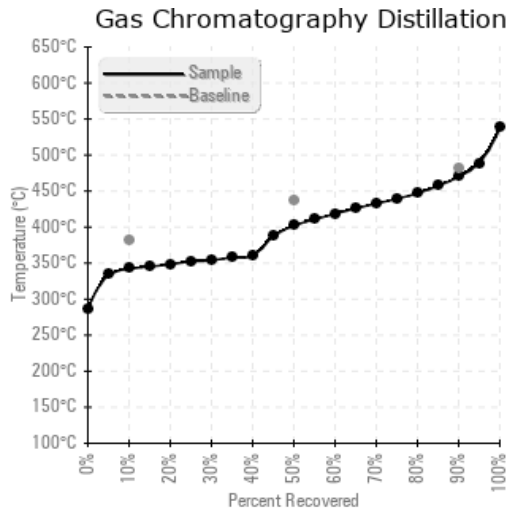
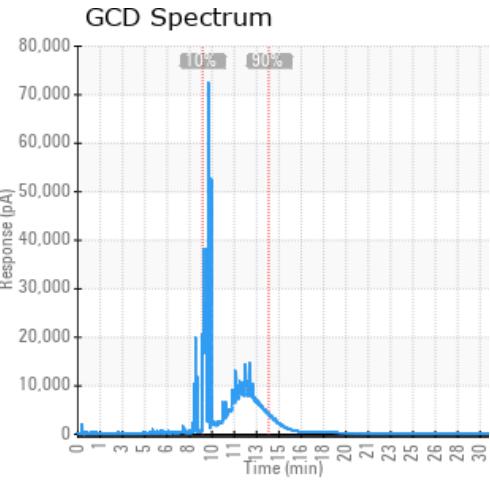
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/31/23	06/06/23	10.0y	MANIFOLD	403 / 206	4.4	26.9	0.01	0.154	648 / 342	756 / 402	878 / 470	4.68
10/19/22	10/26/22	10.0y	system manifold	383 / 195	26.0	26.6	0.06	0.022	648 / 342	748 / 398	875 / 468	4.97
05/04/22	05/13/22	9.0y	manifold from system	388 / 198	21.7	29.4	0.03	0.016	645 / 341	751 / 399	879 / 470	5.06
09/15/21	09/24/21	8.0y		399 / 204	22.7	26.5	0.01	0.032	648 / 342	736 / 391	873 / 467	4.91
08/04/21	08/10/21	8.0y	system was sweetened	392 / 200	65.3	26.6	0.01	0.026	647 / 342	721 / 383	863 / 462	4.96
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
05/31/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/19/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/04/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
09/15/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/04/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	
10/19/22	No immediate action is needed. Resample at your regular interval, keeping an eye on the evolution of flash point, GCD curve, and TAN. Continue to indicate whenever there is a mixture of fluids, sweetening, venting of light ends, or other notable maintenance events. Elemental analysis of wear and rust particles is excellent. Both pentane insolubles (0.022%) and water concentrations are very low, and doing well. (GCD) 10% and 50% Distillation Points are stable, but below target. The flash point is slightly reduced again (195°C) compared to the previous sample. These trends, along with the slightly elevated GCD 4.97% <335°C have been observed with high nitrogen blanket pressures, or mixtures with other fluids. The Acid Number of 0.06 is excellent, well below the warning threshold.
05/04/22	The fluid is in great condition overall. Exact maintenance practices (fluid top ups, venting) are unknown. Consult with your Petro-Canada representative should you have questions. Continue monitoring results for flash point and GCD distillation curve in the next sample. Elemental analysis of wear and rust particles is excellent. Both pentane insolubles and water concentrations are very low. (GCD) 10% Distillation Point is abnormally low, but stable. The flash point is slightly reduced (198°C). These trends, along with the slightly elevated GCD 5.06% <335°C can be attributed to high nitrogen blanket pressures. The Acid Number of 0.03 is well below the warning threshold.
09/15/21	Recommendation: No Iron Presence. Sulphur content still present at 288 ppm. COC Flash point at 204°C is always correct. Pentane Insoluble is to 0.032 and stay under the limit of 0.30. Viscosity is abnormal if the Petro-Therm is the product used, viscosity is for fresh oil 35.8 cSt @ 40C and we have 26.5 cSt @ 40C. If the product are a mix of product it's ok. GCD Distillation Point at 10% is abnormally low 342.1/382 = +10% difference. GCD Distillation Point at 50% is abnormally low 391.1/436 = +10%. GCD Distillation point is marginal low 467.1/482 = +3% difference. The Heat Transfer Fluid GCD graphics is heavily cracked (low boiler presence level is high, High boilers are present). I recommend cleaning and flushing of the heat transfer system and replacing the fluid with fresh Petro-Therm or Callo AF. (GCD) 50% Distillation Point is abnormally low. (GCD) 90% Distillation Point is marginally low. (GCD) 10% Distillation Point is marginally low.
08/04/21	Recommendation: No Iron Presence. Sulphur content still present at 226 ppm. COC Flash point at 200°C is OK. Pentane Insoluble are under the limit of 0.30. GCD Distillation Point at 10% is abnormally low 341.9/382 = +10% difference. GCD Distillation Point at 50% are severely low 382.8/436 = +12%. GCD Distillation point are abnormally low 462.6/482 = +4% difference. Heat transfer fluid viscosity is ISO VG 22, it should be an ISO VG 32. According to WearCheck there is approximately 25% of the previous oil in the heat transfer system. The Heat Transfer Fluid is heavily cracked (low boiler presence level is high, High boilers are present) the viscosity of the HTF is lower than it should be. I recommend cleaning and flushing of the heat transfer system and replacing the fluid with fresh Petro-Therm. (GCD) 50% Distillation Point is severely low. (GCD) 90% Distillation Point is severely low. (GCD) 10% Distillation Point is abnormally low.

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