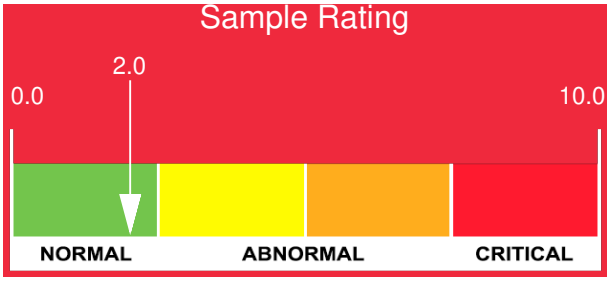
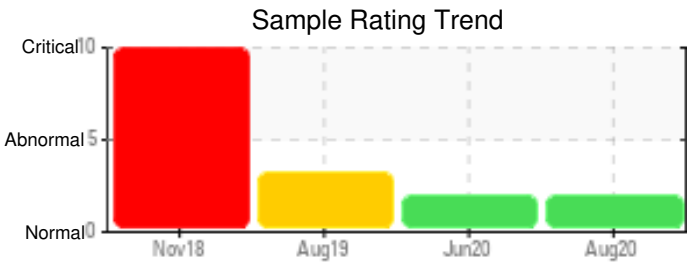




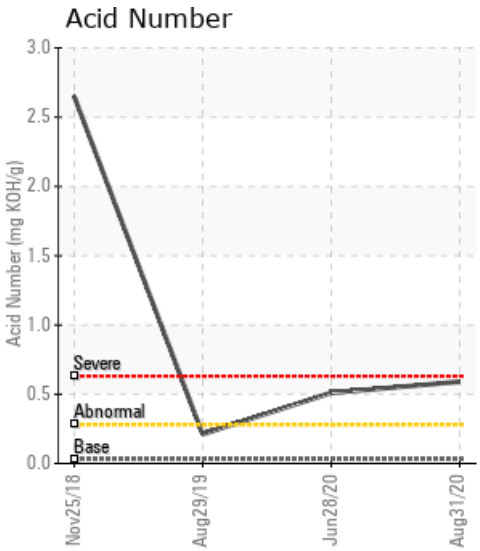
[Orlen Upstream Canada / 16-7-63-5W6] STABILIZER REBOILER 1350

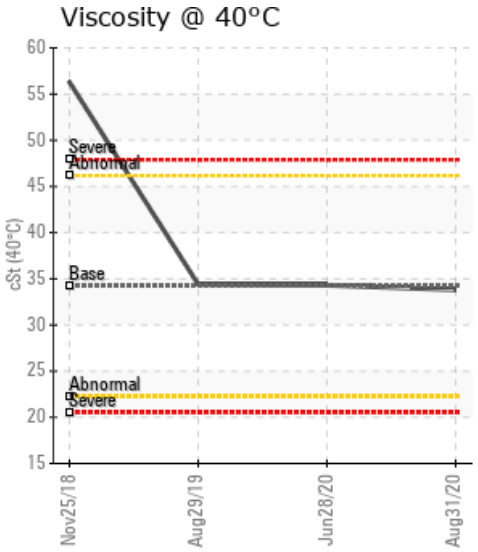
Customer: PTRHTF20175	System Information	Sample Information
QUADRA CHEMICALS 7802 98 STREET CLAIRMONT, AB T0H 0W0 Canada Attn: Quadra Samples Tel: E-Mail: quadra_samples@quadra.ca	System Volume: 20000 ltr Bulk Operating Temp: 365F / 185C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02374472 Analyst: Clinton Buhler Sample Date: 08/31/20 Received Date: 09/08/20 Completed: 09/09/20 Clinton Buhler Clinton.Buhler@PetroCanadaLSP.com

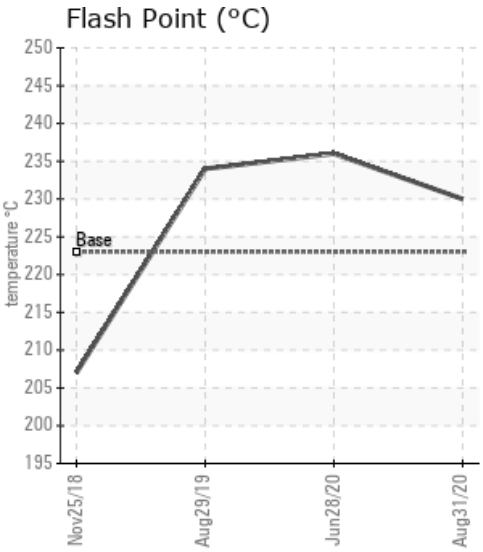
Recommendation: Sample results indicate that the fluid is suitable for continued service; results are very similar to the previous sample taken 2 months prior.Acid number and 90% distillation temperature are indicative of oxidation degradation. Please ensure blanket gas is operational to keep oxygen from contacting the fluid. Please ensure sample point is purged thoroughly before taking sample (referring to increased Solids content).Please re-sample in 6 months once system and blanket gas is back in operation.

Comments:

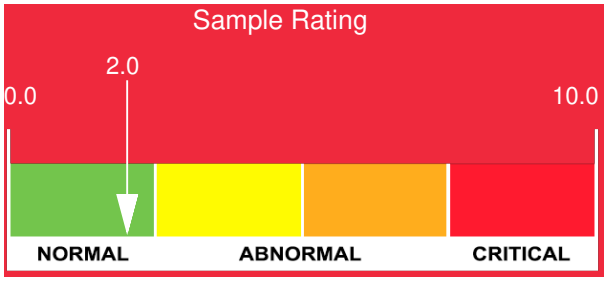
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
08/31/20	09/08/20	24m	BULK FLUID	446 / 230	85.8	33.8	0.59	0.362	734 / 390	821 / 438	921 / 494	1.35
06/28/20	07/13/20	24m		457 / 236	289.7	34.3	0.51	0.194	733 / 390	820 / 438	920 / 493	1.42
08/29/19	08/30/19	10m	SIGHTGLASS	453 / 234	352.3	34.4	0.211	0.202	734 / 390	818 / 437	919 / 493	0.00
11/25/18	12/14/18	3m		405 / 207	404.6	56.3	2.65	1.72	730 / 388	817 / 436	920 / 494	0.42
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

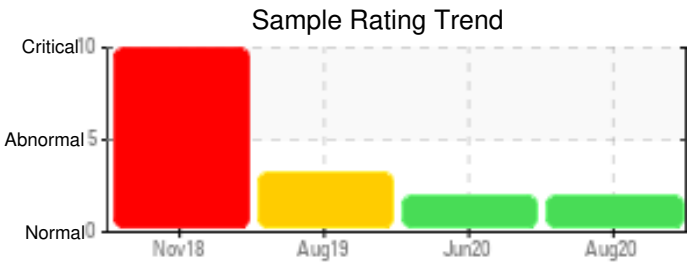






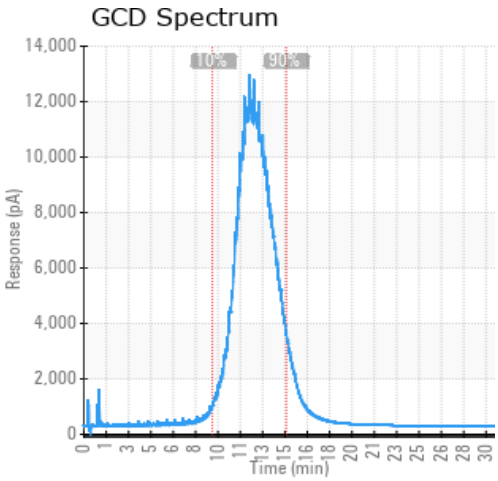
PETRO-CANADA LUBRICANTS

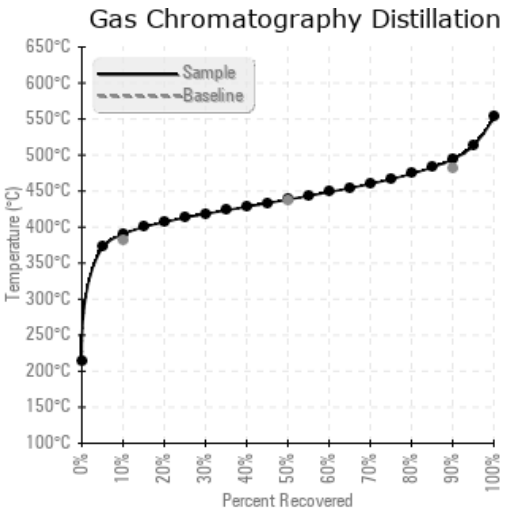


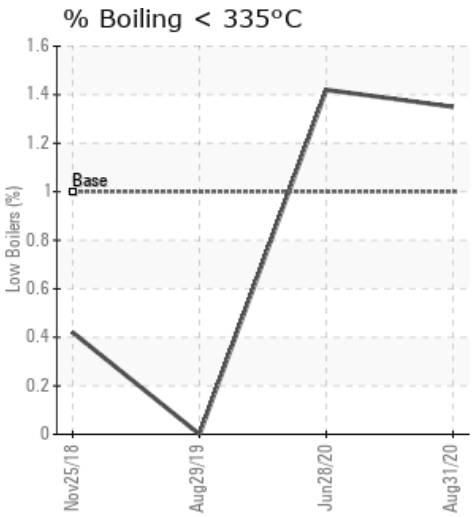


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
08/31/20	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/28/20	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/29/19	5	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/18	1090	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	24	24
Baseline Data			0	0						0			0	0					0				0	

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







Historical Comments

06/28/20	The fluid is in a reasonable condition and suitable for further use. AN and 90% GCD temperature are slightly high. This indicates fluid degradation by oxidation. Please ensure the blanket gas system is in good working order. Re-sample in 6 months. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is marginally high.
08/29/19	Sample results indicate that the heat transfer fluid is suitable for continued service.Water contamination is present. Please safely vent water vapors from expansion tank and drain any free water from low points of the heater.Please re-sample in 6 months. Please ensure sample is drawn from the most representative zone. Thoroughly purge sample valve and piping prior to obtaining sample. ppm Water contamination levels are marginally high. Water contamination levels are marginally high. (GCD) 90% Distillation Point is marginally high.
11/25/18	Orlen has reported that gurgling sounds from the system can be heard at times. The system is a non-circulated system with a fire tube inside the heater vessel. Above the fire tube is a process fluid coil installed. Gurgling sounds are usually associated with high water content in the heat medium fluid. The water content of the fluid is moderately high (404 ppm.) but this is not necessarily accurate as it is difficult to draw a sample that is representative for the system fill from a non-circulated system. The Petro-Therm heat medium fluid shows signs of degradation by oxidation. For a fluid with only 3 months of service life the following parameters are high and indicative of oxidation:Acid Number, Viscosity, Pentane Insolubles (solids content) and 90% GCD temperature. The high AN in combination with 1090 ppm of Fe indicates the fluid has become acidic and corrosion is taking place. Based on these analysis results it is recommended to replace the fluid. However since the sample may not be representative for the system fill, another sample will be taken to base the decision on. As discussed please flush at least 20 ltr of Petro-Therm through the sample line before taking the sample. The sampled fluid has to be hot. System ID will be corrected to show 1350 instead of 1340.Iron ppm levels are severe. Pentane Insolubles levels are severely high. Water contamination levels are marginally high. ppm Water contamination levels are marginally high. Acid Number (AN) is severely high. Visc @ 40°C is severely high. (GCD) 90% Distillation Point is marginally high.