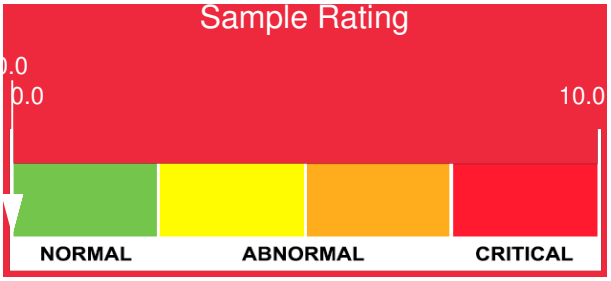
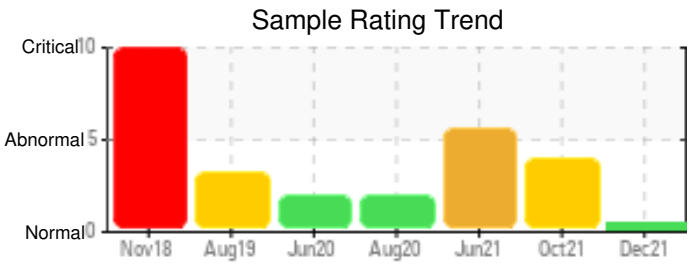




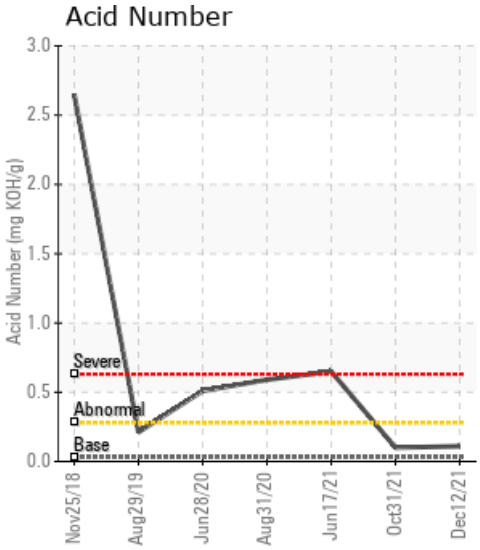
[Orlen Upstream Canada / 16-7-63-5W6] STABILIZER REBOILER 1350

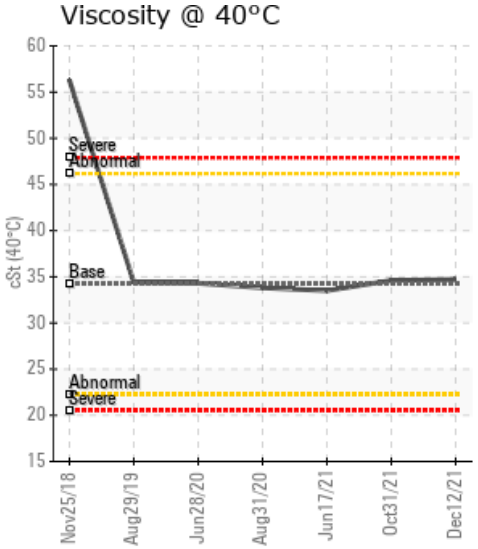
Customer: PTRHTF20262	System Information	Sample Information
Orlen upstream Canada Ltd. 850 2 St. SW Calgary, AB T2P 0R8 Canada Attn: Colin Pashley Tel: E-Mail: Colin.Pashley@orlenupstream.ca	System Volume: 20000 ltr Bulk Operating Temp: 365F / 185C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02463119 Analyst: Clinton Buhler Sample Date: 12/12/21 Received Date: 12/20/21 Completed: 01/04/22 Clinton Buhler Clinton.Buhler@hollyfrontier.com

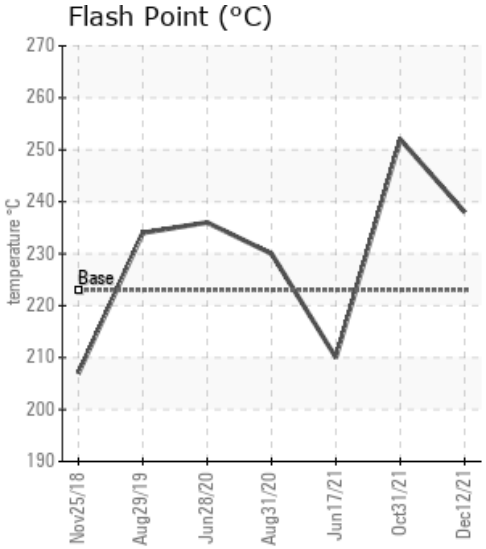
Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. The re-sample shows a great improvement in water content which likely indicates the previous sample was compromised.Please re-sample in 12 months.

Comments:

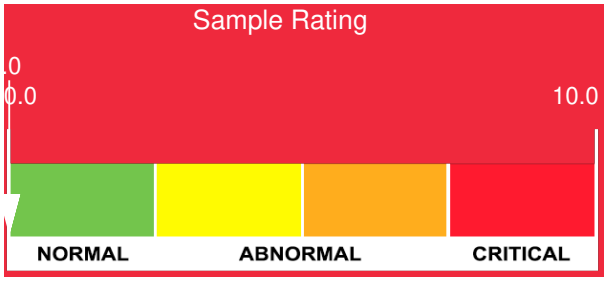
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/12/21	12/20/21	4.0m		460 / 238	73.7	34.7	0.11	0.086	730 / 388	814 / 435	913 / 489	0.48
10/31/21	11/26/21	2.0m	site glass on 1350	486 / 252	4437.6	34.6	0.10	0.128	732 / 389	815 / 435	913 / 489	0.48
06/17/21	06/28/21	36.0m	Sight glass	410 / 210	193.1	33.5	0.65	0.843	703 / 373	795 / 424	925 / 496	3.44
08/31/20	09/08/20	24.0m	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	24.0m		457 / 236	289.7	34.3	0.51	0.194	733 / 390	820 / 438	920 / 493	1.42
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

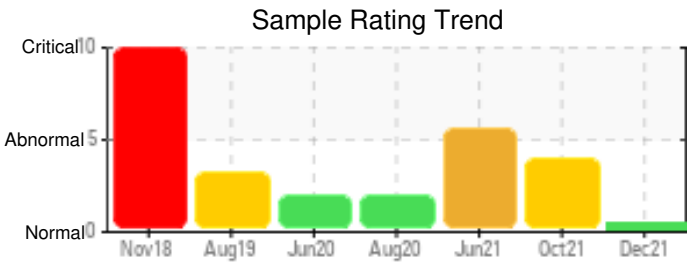






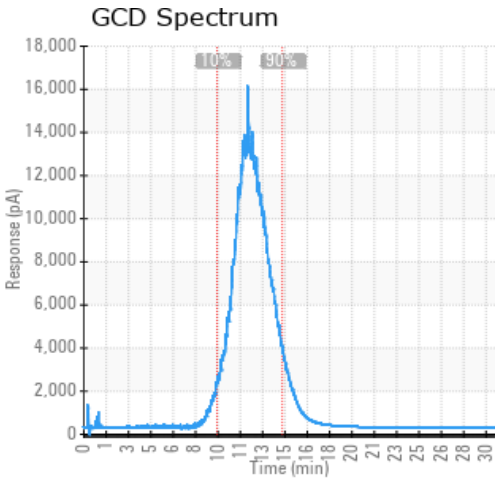
PETRO-CANADA LUBRICANTS

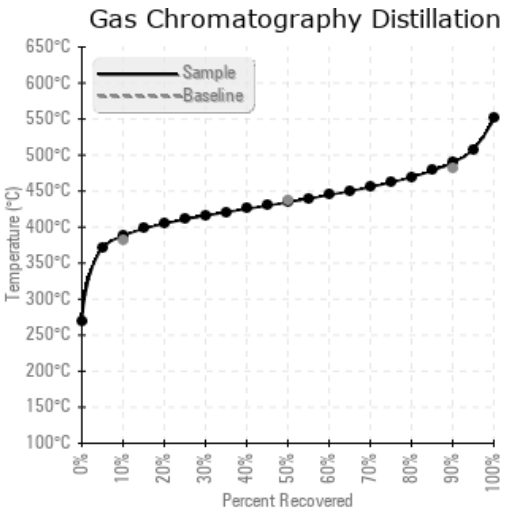


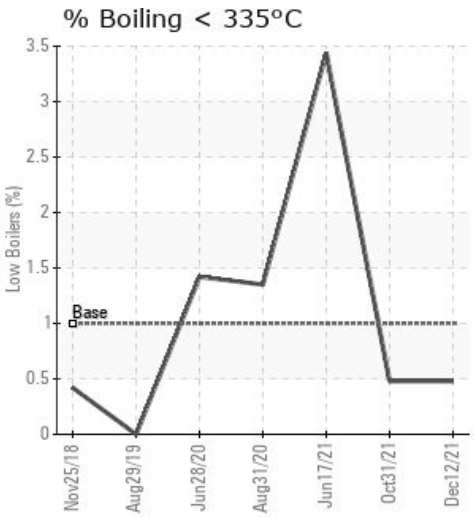


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
12/12/21	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
10/31/21	11	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	2	0	0	0
06/17/21	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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
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

10/31/21	Sample results indicate that the fluid is in suitable condition for continued service. Please note excess water content. It is understood that there are not circulation pumps in this system and that the sample was drawn from the site glass. This is not an ideal sample point as it can collect water and sediment from the system. If it is possible, please vent off any steam that may be present in the expansion tank. After venting, please re-sample system from a hot, representative zone, but only after a very thorough purge of the sample valve and related piping to ensure a representative result. Water contamination levels are severely high. ppm Water contamination levels are severely high.
06/17/21	Analysis results indicate that there are likely two forms of fluid degradation ongoing: Increased fluid Acid Number (0.65) and higher 90% GCD temperature support oxidative degradation while reduced flash point and increased low boiling content (3.44%) may be associated to thermal degradation. Both of these can contribute to the fluid's increasing solids content (0.843%). The warning limit for solids is 0.5%. It is advised to filter the solids from the system.Regarding the fluid's Acid Number, it is advised to begin sweetening of systems when Acid Number reaches 0.4. This helps to buy time before the system will require a full fluid replacement and cleaning. Please ensure system blanket gas is operational to reduce further oxidation.Please re-sample system in 6 months and ensure sample is drawn after pump discharge (Not from the site glass) after thoroughly purging the sample valve and piping. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high.
08/31/20	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.
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.