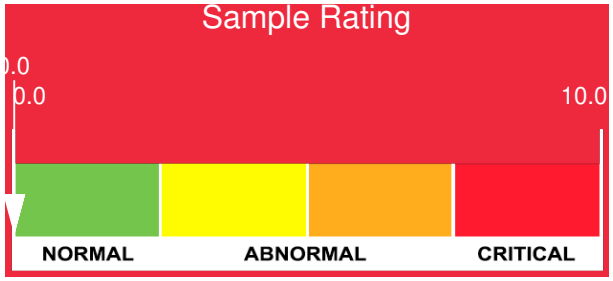
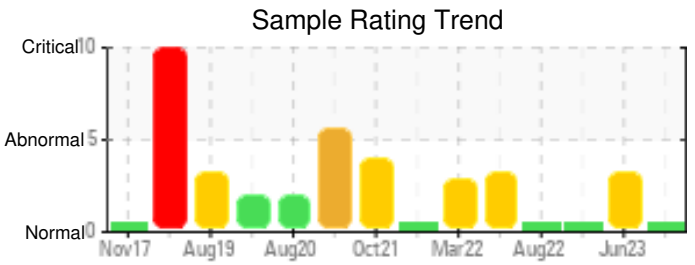




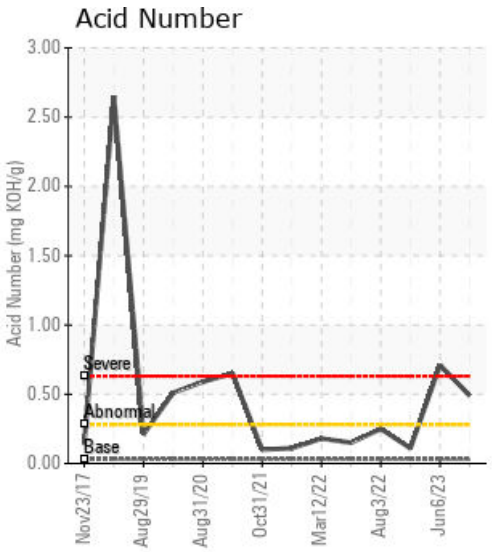
[Orlen Upstream Canada / 16-7-63-5W6] STABILIZER REBOILER 1350

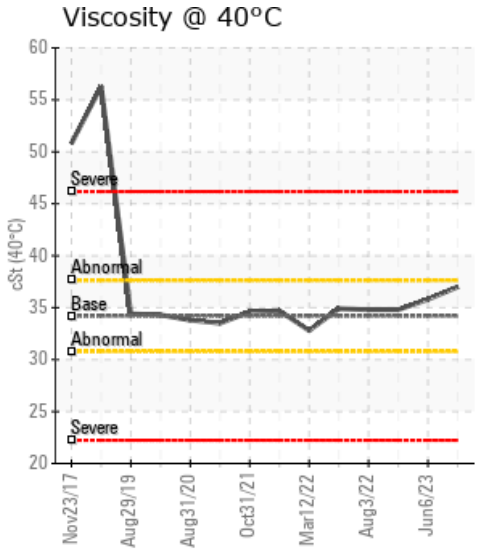
Customer: PTRHTF20262	System Information	Sample Information
Orlen upstream Canada Ltd. 850 2 St. SW Calgary, AB T2P 0R8 CA Attn: Bret Elchyson Tel: E-Mail: Bret.Elchyson@orlenupstream.ca	System Volume: 20000 ltr Bulk Operating Temp: 365F / 185C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: RUSHTON	Lab No: 02600269 Analyst: Clinton Buhler Sample Date: 11/10/23 Received Date: 12/01/23 Completed: 12/05/23 Clinton Buhler Clinton.Buhler@HFSinclair.com

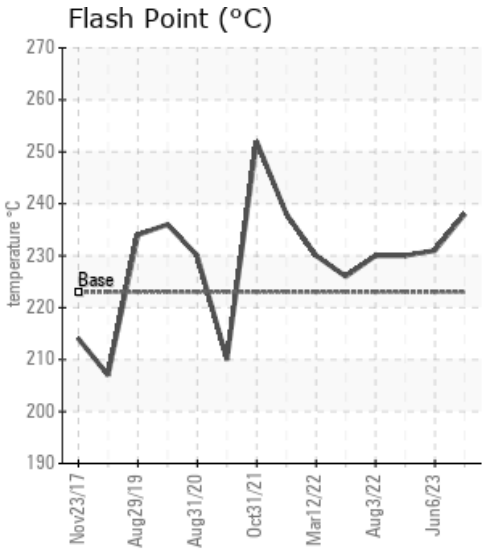
Recommendation: Sample results indicate the fluid is in suitable condition for continued service. Acid Number remains somewhat elevated at 0.49 and likely is indicative of fluid oxidation. This has also increased the fluid viscosity to 37 cSt; previous sample was 35.8 cSt @40°C. It is important to ensure that blanket gas is operational in the expansion tank to prevent outside air from interacting with the fluid. Given the higher Acid Number, please re-sample in 4-6 months and ensure blanket gas is operational.

Comments:

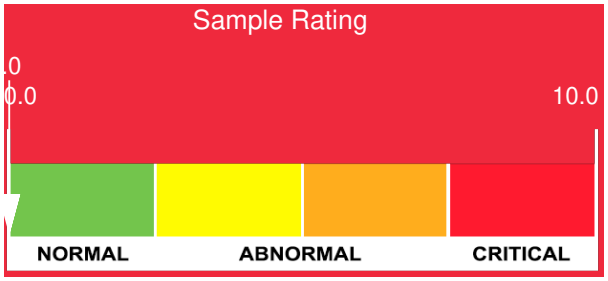
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/10/23	12/01/23	0.0m		460 / 238	10	37.0	0.49	0.228	724 / 384	815 / 435	918 / 492	2.30
06/06/23	06/27/23	0.0m	1350 heater	448 / 231	67.9	35.8	0.71	0.346	728 / 387	815 / 435	914 / 490	1.09
12/01/22	12/16/22	6.0m	off circulation pump	446 / 230	19.9	34.8	0.11	0.147	731 / 388	816 / 436	916 / 491	1.20
08/03/22	08/23/22	0.0m	OFF CIRC PUMP	446 / 230	68.6	34.8	0.25	0.102	731 / 388	815 / 435	913 / 489	0.54
06/08/22	06/24/22	0.0m	off circ pump disch	439 / 226	1029.9	34.9	0.15	0.098	731 / 388	815 / 435	913 / 489	0.55
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

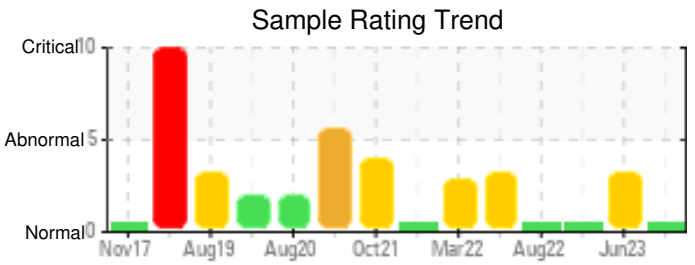






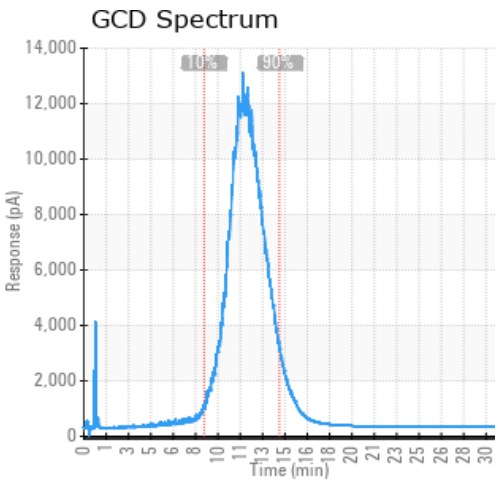
PETRO-CANADA LUBRICANTS

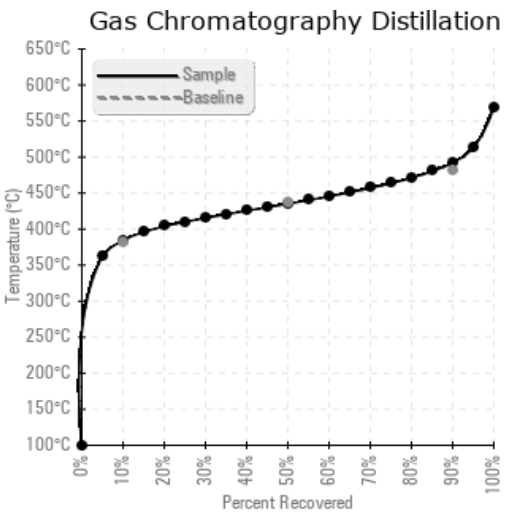


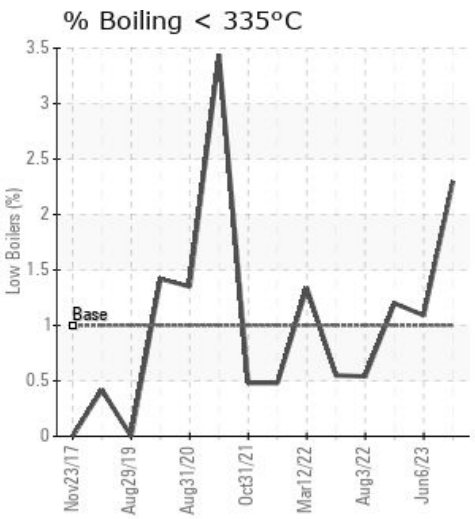


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/10/23	23	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
06/06/23	14	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1
12/01/22	2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
08/03/22	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
06/08/22	5	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	2	0	1	1
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

06/06/23	Sample results indicate the fluid is in suitable condition for continued service. It is understood that there have been observations of sludge building up at the bottom of the stabilizer near the burner tubes; the increase in solids content to 0.346% correlates to this. This could be associated with thermal degradation of the fluid, yet the analysis results do not readily suggest this. Not to say that thermal degradation is not occurring, but the rate of fluid oxidation is more obvious and can be masking signs of thermal cracking. Oxidation is related to the elevated Acid Number and small increase in fluid viscosity. It is important to ensure that blanket gas is operational in the expansion tank to prevent outside air from interacting with the fluid. Given the higher Acid Number, please re-sample in 3 months and ensure blanket gas is operational. Acid Number (AN) is severely high.
12/01/22	Sample results indicate the fluid is in suitable condition for continued service. Please re-sample in 6 months.
08/03/22	Sample results indicate the fluid is in suitable condition for continued service. Water content has greatly improved, moving down to 68 ppm from 1029 ppm.Please re-sample in 6 months.
06/08/22	Water content has increased to 1029 ppm. Steam needs to be vented from the system's expansion tank to removed this excess water.Otherwise, sample results indicate the fluid is in suitable condition for continued service.Please actively vent system to remove water vapor and then ensure that blanket gas is operational after venting periods. Inspect heater for source of water ingress.Please re-sample in 6 months and only after thorough venting of system.