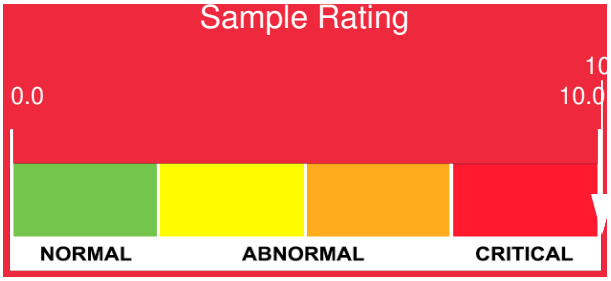
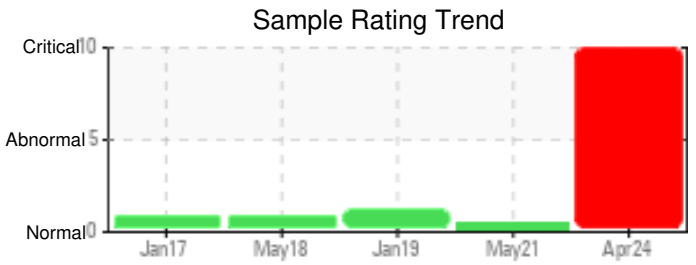




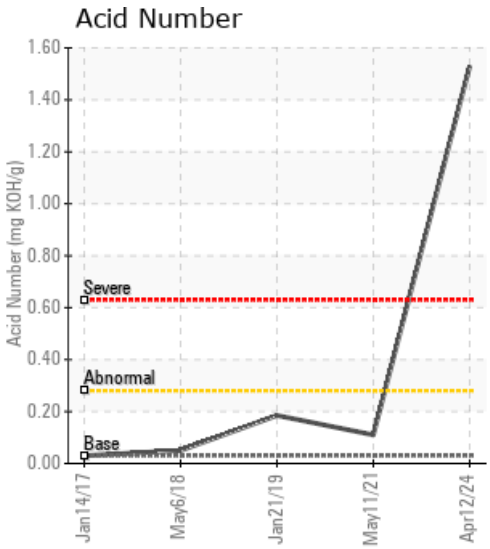
[C-39-D/94-H-3] H-6300

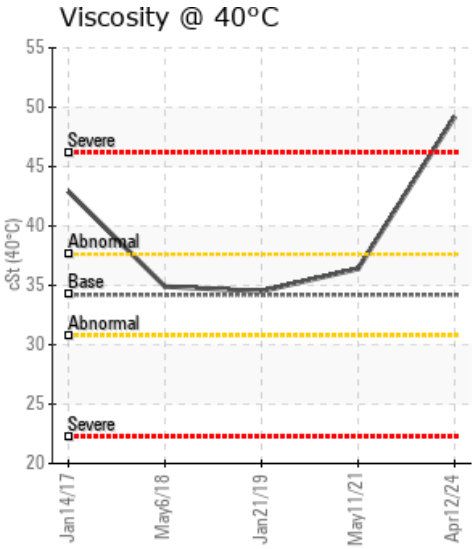
Customer: PTRHTF60077	System Information	Sample Information
Canadian Natural Resources (CNRL) C-39-D/94-H-3 Fort St. John, BC V1J 4H9 CA Attn: Jesse Dyer Tel: (250)262-1778 E-Mail: jesse.dyer@cnrl.com	System Volume: 14000 ltr Bulk Operating Temp: 518F / 270C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: ALCO	Lab No: 02630814 Analyst: Clinton Buhler Sample Date: 04/12/24 Received Date: 04/22/24 Completed: 04/26/24 Clinton Buhler Clinton.Buhler@HFSinclair.com

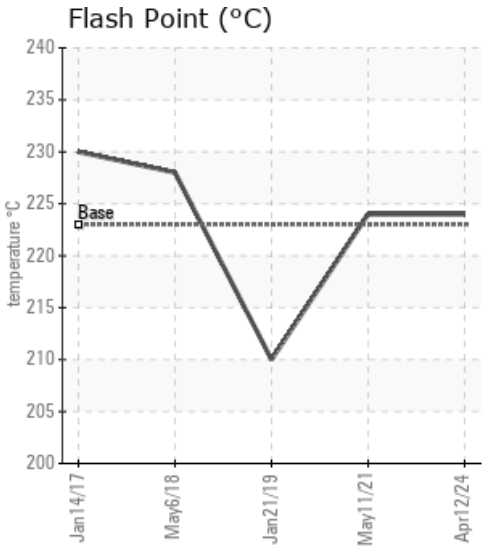
Recommendation: Sample results indicate that the fluid is severely degraded and that system fouling is ongoing. Oxidation appears to be the primary form of degradation based on the Acid Number of 1.53 (condemnable at 1) and the increased fluid viscosity corresponds with this. Iron content has increased dramatically to 428 ppm which likely is associated with system corrosion. Solids content has jumped to 0.969% which is likely due to degradation based deposits but the iron content in the fluid also contributes to this. System requires fluid replacement preceded by a system clean and flush. Please contact Lance Guest (account manager) and Clinton Buhler (tech services) to discuss the use of Calflo Cleaning and Calflo Flushing fluid to restore the system cleanliness. Considering how severe the fluid condition appears, it is advise to re-sample to confirm, but to make sure the sample is taken from a turbulent zone (pump discharge). If this sample was taken from a turbulent area, and not a dead leg, it should be representative.

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. (GCD) 90% Distillation Point is abnormally high.

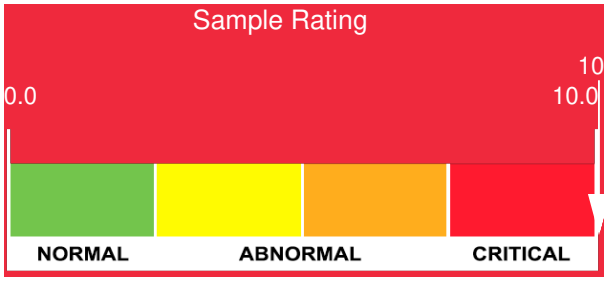
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/12/24	04/22/24	8.0y		435 / 224	54	49.2	1.53	0.969	725 / 385	817 / 436	928 / 498	1.20
05/11/21	05/26/21	7.0y	Reboiler	435 / 224	17.2	36.4	0.11	0.148	704 / 374	797 / 425	911 / 488	2.02
01/21/19	02/01/19	4.0y		410 / 210	92.4	34.5	0.185	0.055	673 / 356	780 / 416	892 / 478	5.16
05/06/18	05/07/18	13000.0y		442 / 228	18.4	34.9	0.05	0.043	708 / 376	814 / 434	918 / 492	2.82
01/14/17	02/13/17	4.0y	SIGHT GLASS	446 / 230	13.5	42.9	0.03	0.062	727 / 386	813 / 434	907 / 486	0.15
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

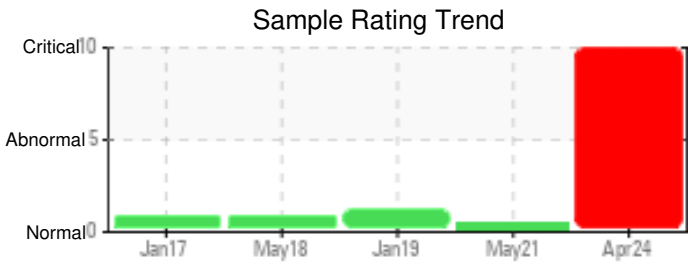






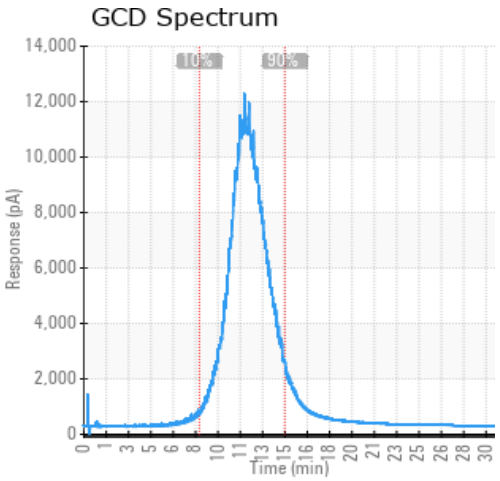
PETRO-CANADA LUBRICANTS

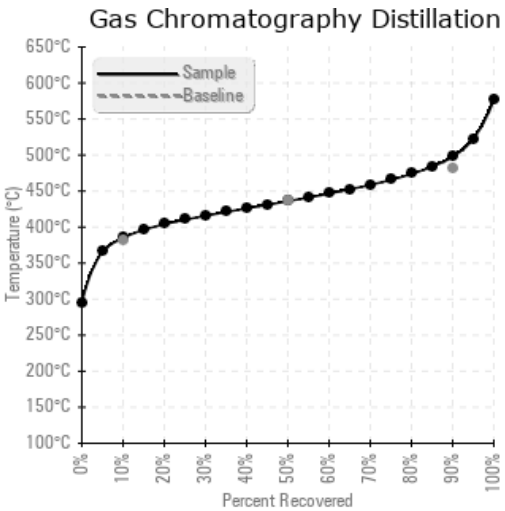


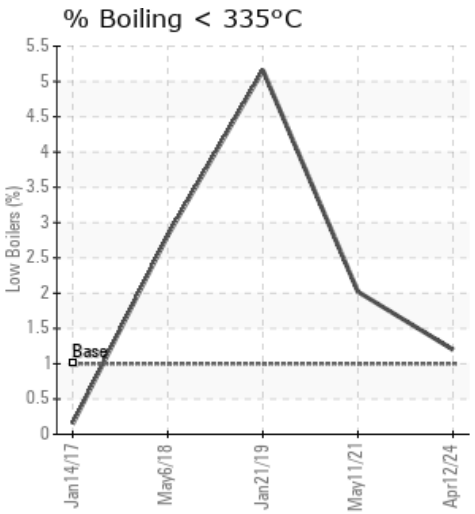


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
04/12/24	428	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
05/11/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/21/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/06/18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/14/17	0	0	0	0	0	0	0	0	0	0	0	0	1	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

05/11/21	Sample results indicate that the fluid is in suitable condition for continued service.Please re-sample in 12 months
01/21/19	Sample results indicate that the fluid is suitable for continued service.increased % boil-off now at 5.15. This likely indicates thermal degradation or could be related to high blanket gas pressure.Vent expansion tank to remove low boiling vapors from system. If blanket gas is required for proper circulation pump suction head, venting may have to be performed during an outage.Re-sample in 12 months after thorough venting of expansion tank.
05/06/18	Sample results indicate that fluid is suitable for continued service.Please note the % boil-off below 335C: 2.82%. This can be an indication of thermal degradation while slightly increased 90% distillation value of 492C can be an indication of oxidation.As part of a robust thermal fluid maintenance program, perform regular venting of expansion tank to release the low boiling vapors. Ensure expansion tank blanket gas is operational after venting and set between 2-3 psi.Re-sample in 12 months. (GCD) 90% Distillation Point is marginally high.
01/14/17	(GCD) 90% Distillation Point is marginally low. TAN, Flashpoint and Viscosity all are within limits. Continue to operate and resample in 6 months. (GCD) 90% Distillation Point is marginally low.

