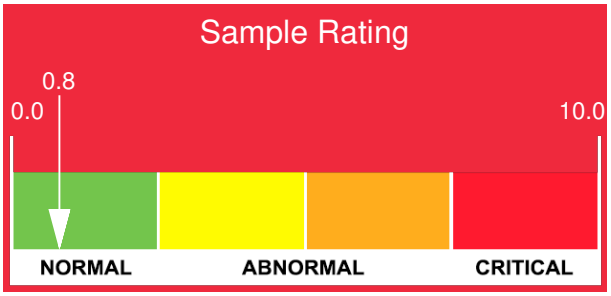
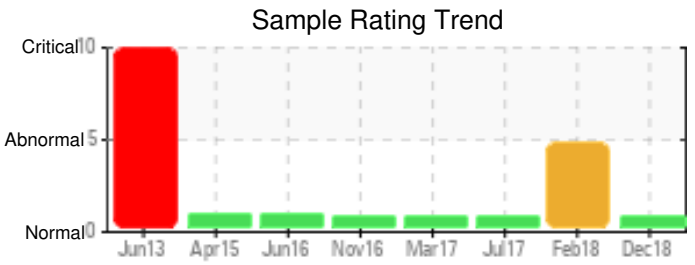




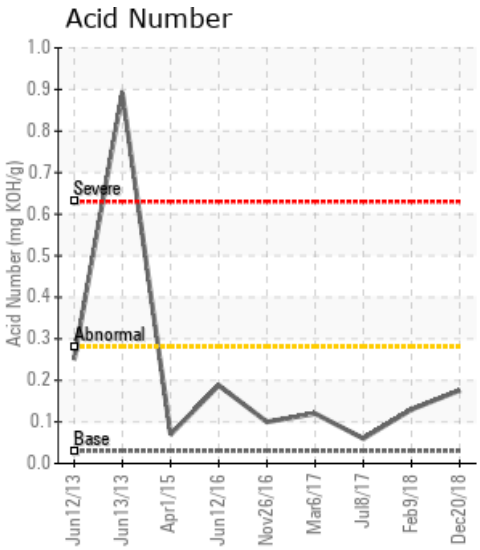
[JUPITER, KAKWA / 1-35-60-5-W6] H-751

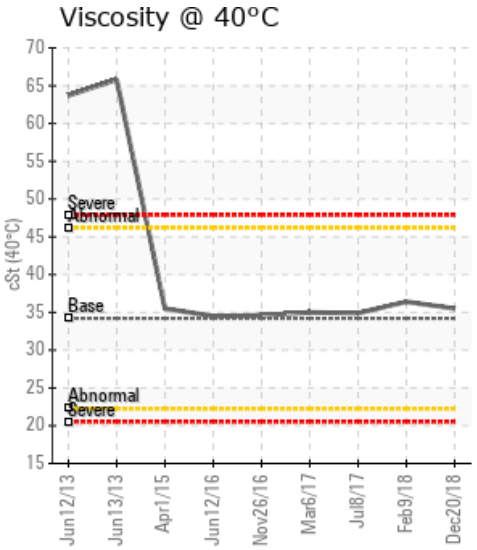
Customer: PTRHTF20175	System Information	Sample Information
QUADRA CHEMICALS 7802 98 STREET CLAIRMONT, AB T0H 0W0 Canada Attn: Quadra Samples Tel: E-Mail: quadra_samples@quadra.ca	System Volume: 52000 gal Bulk Operating Temp: 347F / 175C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make:	Lab No: 02263393 Analyst: Clinton Buhler Sample Date: 12/20/18 Received Date: 01/21/19 Completed: 01/25/19

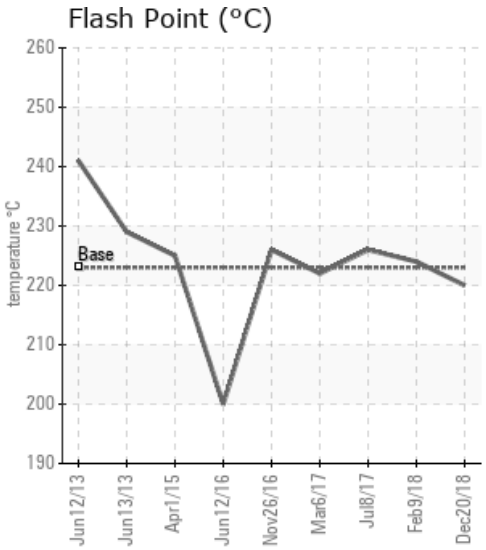
Recommendation: Sample results indicate that the fluid is suitable for continued service. % boil-off has increased since last sample which can indicate some thermal degradation. Regular venting of low boiling vapors from the expansion tank is recommended. Solids continues to be present. Please ensure blanket gas is operational. Please re-sample in 6 months

Comments:

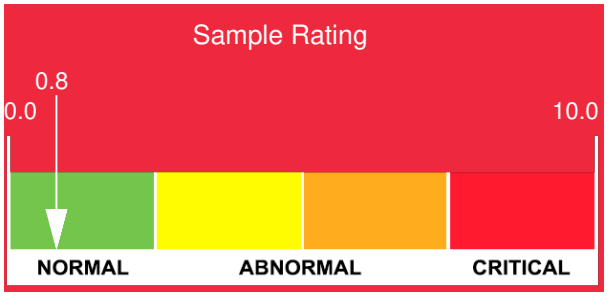
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
12/20/18	01/21/19	54m	DISCHARGE	428 / 220	145.1	35.5	0.176	0.433	692 / 367	789 / 420	883 / 473	1.81
02/09/18	02/20/18	54m		435 / 224	479.3	36.4	0.13	0.532	745 / 396	820 / 438	909 / 487	0.00
07/08/17	07/28/17	48m		439 / 226	255.1	34.9	0.06	0.359	719 / 382	816 / 436	920 / 494	0.90
03/06/17	03/14/17	36m		432 / 222	322.6	35.0	0.12	0.359	711 / 377	811 / 433	920 / 493	1.35
11/28/16	12/15/16	0m	N2 LINE						476 / 246	780 / 416	971 / 522	20.79
11/27/16	12/15/16	0m	N2 LINE						559 / 293	740 / 394	1004 / 540	22.49
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

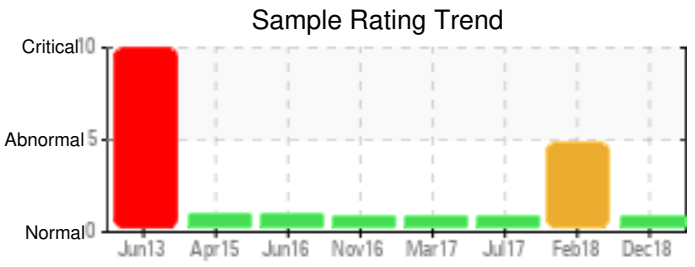






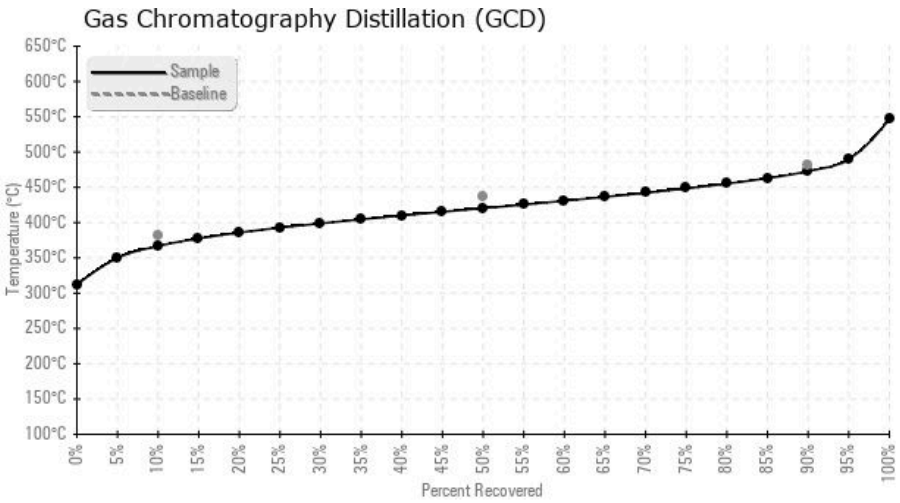
PETRO-CANADA LUBRICANTS

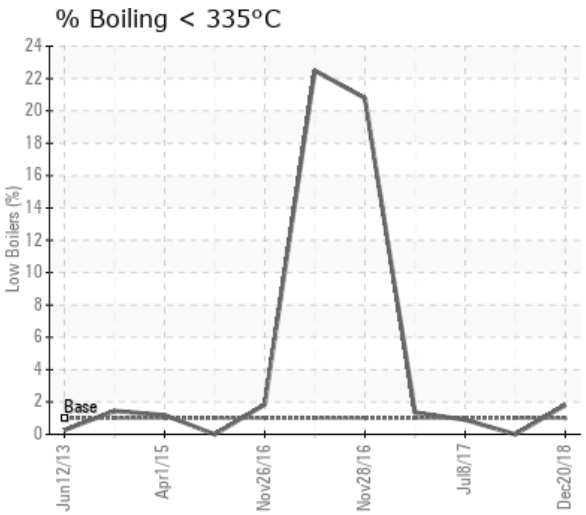




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
12/20/18	73	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	1	0	0	0
02/09/18	186	0	0	0	0	0	0	0	0	0	3	4	0	0	0	0	4	0	0	0	6	0	1	0
07/08/17	75	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	0	0	0	0	0	0	0
03/06/17	96	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	0	0	0	2	0	0	0
11/28/16																								
11/27/16																								
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

02/09/18	Sample results indicate that the fluid itself is suitable for continued service.However, Iron, pentane insolubles and water levels may indicate that there is corrosion ongoing or that possibly the sample was drawn from a dead leg that may not have been purged thoroughly. Consider investigating source of Iron and Water in system.Please ensure future samples are drawn from a hot, turbulent zone that is representative of system condition, and not from still, low lying zones with little fluid movement. Please ensure sample card is completely filled out with machine # and time on fluid.Re-sample in 6 months.Iron ppm levels are marginal. Pentane Insolubles levels are abnormally high. ppm Water contamination levels are marginally high. Water contamination levels are marginally high.
07/08/17	90% GCD slightly elevated from new spec yet unchanged from previous sample. Elevated 90% GCD can indicate Oxidation of the fluid, however Acid Number is low which is ideal and Pentane Insolubles (solids) remains unchanged from last sample. Fluid is suitable for continued use. Please re-sample in 12 months.
03/06/17	The 90% GCD temperature is slightly high. This is an indication of oxidation of the fluid. Please make sure the blanket gas system works properly. The fluid is in good condition and suitable for further use. Please re-sample in 12 months. (GCD) 90% Distillation Point is marginally high.
11/28/16	This is a baseline read-out on the submitted sample.{not applicable} {not applicable} (GCD) % < 335°C is severely high. (GCD) 90% Distillation Point is severely high. (GCD) 10% Distillation Point is severely low. The sample contained >20% of a volatile hydrocarbon product (suspect pentane).
11/27/16	This is a baseline read-out on the submitted sample.{not applicable} {not applicable} (GCD) % < 335°C is severely high. (GCD) 90% Distillation Point is severely high. (GCD) 10% Distillation Point is severely low. The sample contained >20% of a volatile hydrocarbon product (suspect pentane).