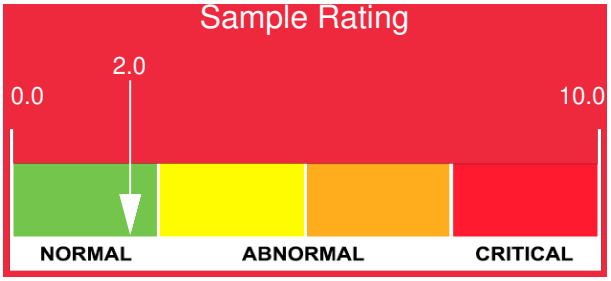
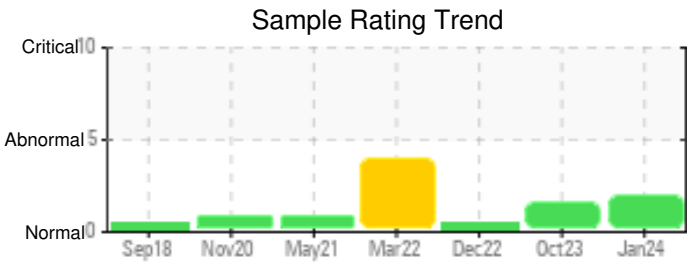




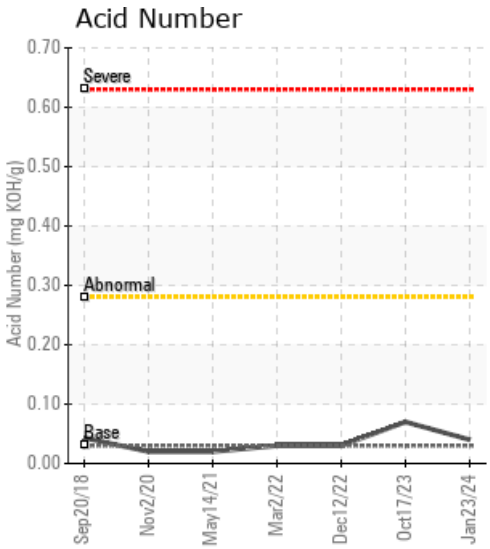
5-02-76-12W6

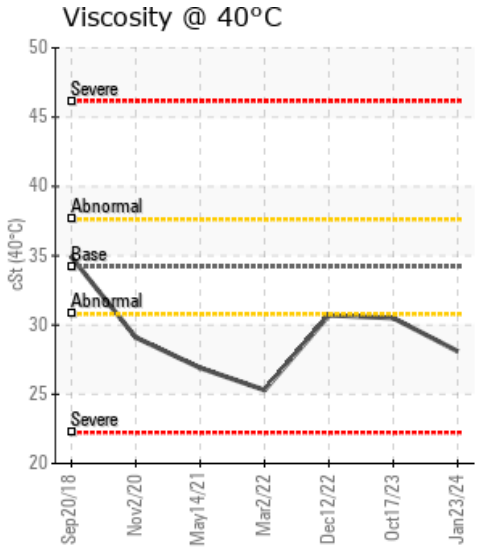
Customer: PTRHTF20204	System Information	Sample Information
ADVANTAGE OIL AND GAS 05-02-76-12W6M HYTHE, AB CA Attn: Lorne Kingdon Tel: (780)552-3083 E-Mail: lkingdon@advantageog.com	System Volume: 110000 ltr Bulk Operating Temp: 410F / 210C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: PETROTECH	Lab No: 02613278 Analyst: Clinton Buhler Sample Date: 01/23/24 Received Date: 02/02/24 Completed: 02/08/24 Clinton Buhler Clinton.Buhler@HFSinclair.com

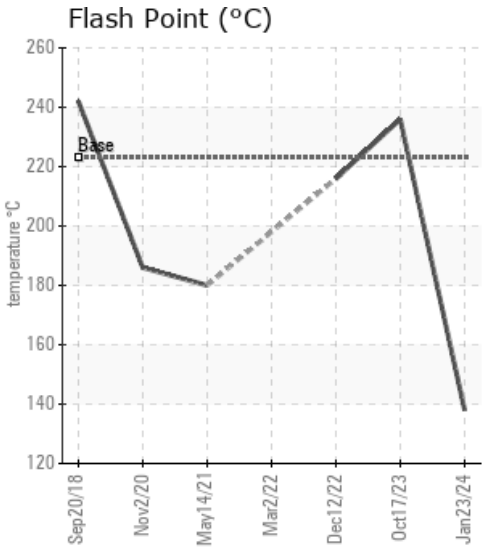
Recommendation: Sample results indicate a quick reduction in the fluid's flashpoint and viscosity since the last sample taken in October; low boiler vapor content has increased to 4.59%. Potential causes are contamination with lighter process fluids or from high blanket gas pressure in the expansion tank. We understand that blanket gas is ~230 kpa; this may be required for NPSH pump requirements but it has a negative impact on these fluid properties. If possible, reduce blanket gas pressure to <10 psi. Please vent expansion tank thoroughly before re-sampling in 3 months time.

Comments: COC Flash Point is severely low. Visc @ 40°C is abnormally low.

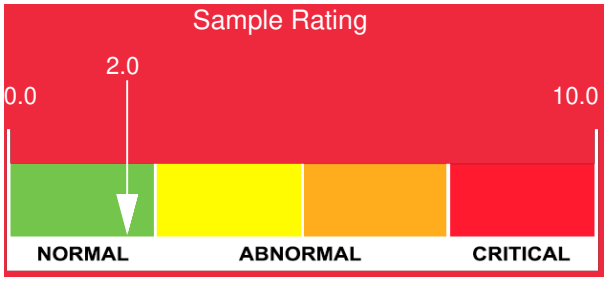
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/23/24	02/02/24	0.0y		280 / 138	60	28.1	0.04	0.076	706 / 374	811 / 433	911 / 488	4.59
10/17/23	10/27/23	0.0y		457 / 236	971.3	30.5	0.07	0.046	717 / 381	812 / 434	911 / 488	2.76
12/12/22	12/19/22	4.0y	Downstream Pumps	421 / 216	215.5	30.7	0.03	0.023	721 / 383	816 / 436	915 / 491	2.58
03/02/22	03/15/22	48.0y	Heat Medium Exp Tank		654.3	25.3	0.03	0.028	698 / 370	809 / 432	910 / 488	5.18
05/14/21	05/31/21	0.0y	Level column	356 / 180	134.3	26.9	0.02	0.372	685 / 363	794 / 423	904 / 484	6.13
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

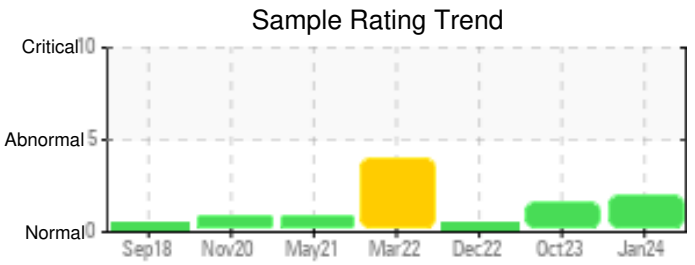






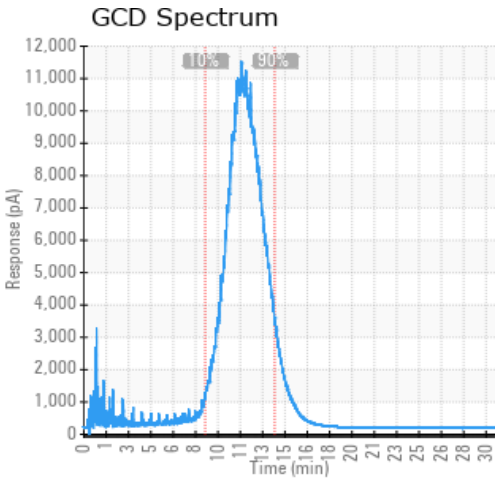
PETRO-CANADA LUBRICANTS

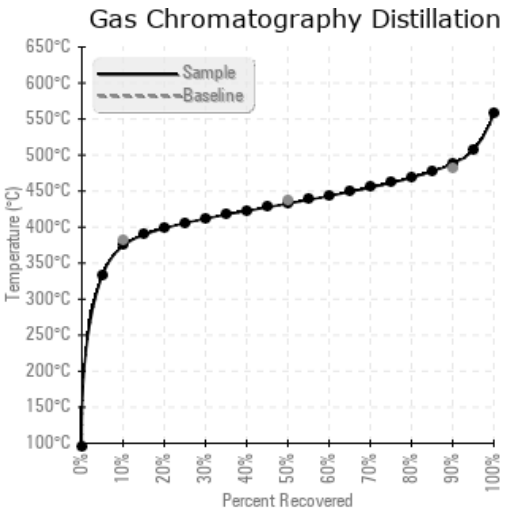


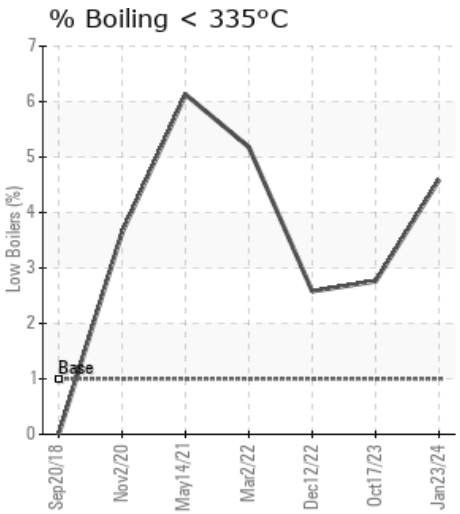


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
01/23/24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
10/17/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
12/12/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/02/22	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
05/14/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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

10/17/23	Sample results indicate the fluid is in suitable condition for continued service. Water content is at 971 ppm which is high for a heat transfer system, indicating potential contamination or possibly from sampling the fluid from a dead leg or low point that may have collected water (site-glass). If safe to do so, please vent expansion tank of any water vapor followed by ensuring blanket gas is operational in the expansion tank. Please re-sample in 6 months, but please try to sample from a hot, turbulent zone after a thorough flush of the sample valve and piping.
12/12/22	Sample results indicate an improvement from the sample earlier this year and shows the fluid is in suitable condition for continued service. Please re-sample in 12 months
03/02/22	Fluid sample is contaminated with water (>10% free water, 654 ppm dissolved). If this is not a known issue and the system is not knocking or boiling over, this is likely a non-representative sample drawn from the expansion tank.Please note, the sample point needs to be hot and turbulent; Pump discharge is the ideal location for this.Please drain off free water from the expansion tank and vent any water vapor; take measures to prevent water ingress and ensure blanket gas is operational when not venting. Venting will also be beneficial to reducing low boiler vapor content currently at 5.18%. Re-sample in 3 months after water has been drained and vented and please sample from pump discharge. Water contamination levels are abnormally high. Water contamination levels are abnormally high.. ppm Water contamination levels are abnormally high.
05/14/21	Sample results indicate that the fluid is suitable for continued service. Flash point and fluid viscosity continue to be reduced and increasing low boiling vapor content suggest that there is thermal degradation or mixture with process fluid ongoing. It is advised to regularly vent off low boiling vapors from the expansion tank to help bring these parameters back in line. Solids content also has increased which may be an indication of solids formed from thermal cracking. However, with the sample being drawn from the level column, this may be questionable. Please sample from the hottest, most turbulent zone, preceded by a thorough purge of the sample valve, so we are confident in the sample being representative. Please re-sample in 6 months, after thorough venting.