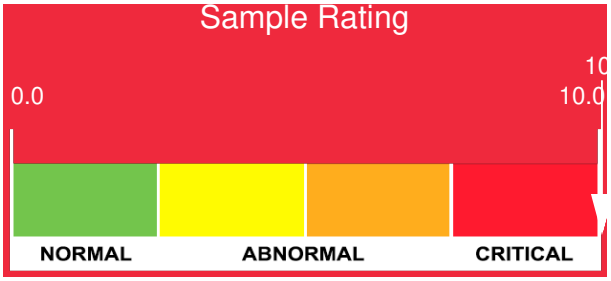
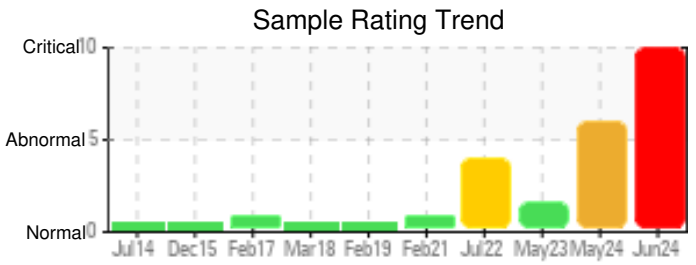




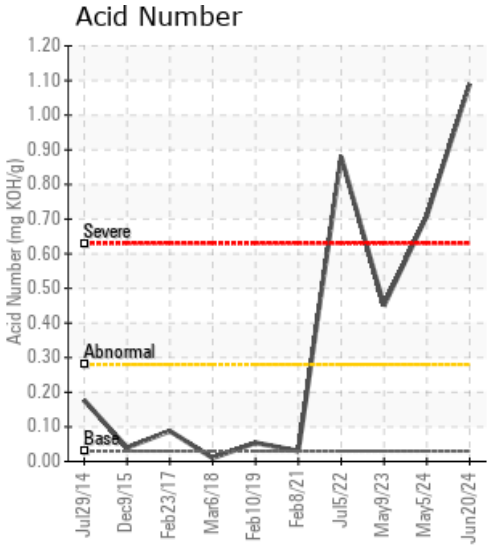
[15-12-50-21W5] TOURMALINE BANSHEE H6600-1

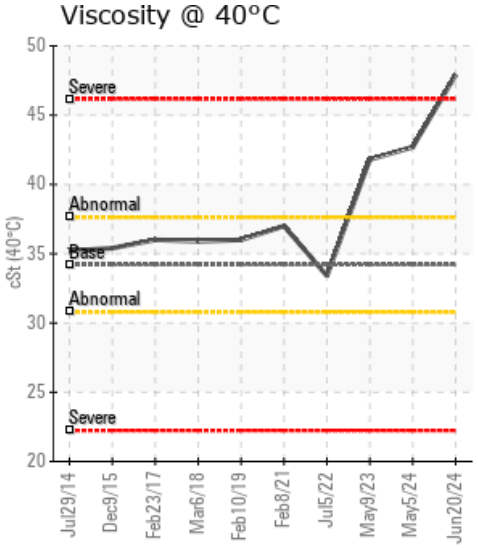
Customer: PTRHTF60079	System Information	Sample Information
Tourmaline 15-12-50-21W5 Edson, AB T7E 1R8 CA Attn: Justin Thebeau Tel: E-Mail: justin.thebeau@tourmalineoil.com	System Volume: 20000 ltr Bulk Operating Temp: 482F / 250C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: RUSHTON	Lab No: 02646499 Analyst: Clinton Buhler Sample Date: 06/20/24 Received Date: 07/08/24 Completed: 07/18/24 Clinton Buhler Clinton.Buhler@HFSinclair.com

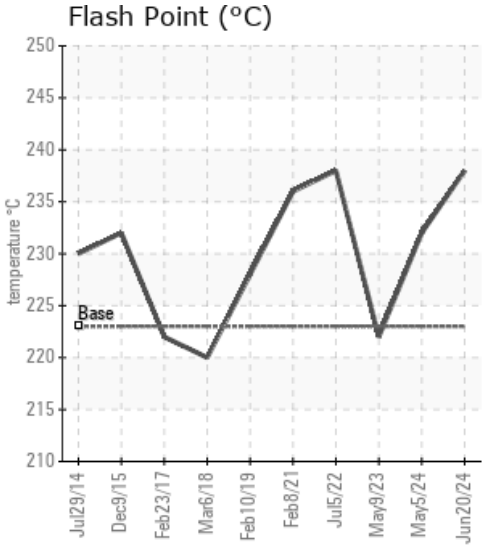
Recommendation: Sample results indicate an abrupt increase in iron content- please ensure this sample was drawn from a hot, turbulent zone (pump discharge) as the change from 8 ppm to 168 ppm was unexpected over the course of ~45 days.Acid Number has increased to 1.09 and fluid viscosity has also risen to nearly 48 cSt. Solids content up to 1%. Results suggest the need for fluid replacement with system cleaning and flushing.

Comments: PQ levels are severe. Iron ppm levels are abnormal. 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	%
06/20/24	07/08/24	5.0y		460 / 238	171	47.9	1.09	1.04	694 / 368	790 / 421	929 / 499	4.36
05/05/24	05/29/24	8.0y	return line	450 / 232	61	42.7	0.71	0.904	716 / 380	814 / 434	919 / 493	2.16
05/09/23	05/23/23	0.0y		432 / 222	23.3	41.8	0.45	0.040	708 / 376	791 / 422	916 / 491	2.03
07/05/22	07/19/22	0.0y	discharge	460 / 238	37.0	33.4	0.88	0.212	730 / 388	815 / 435	921 / 494	0.88
02/08/21	03/02/21	8.0y		457 / 236	8.2	37.0	0.03	0.128	734 / 390	817 / 436	924 / 495	0.00
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00







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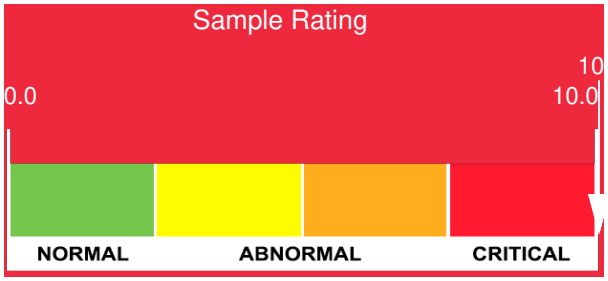
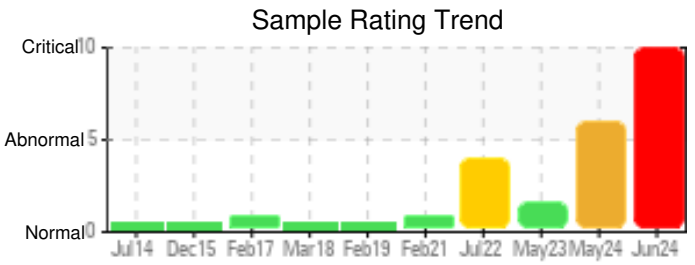
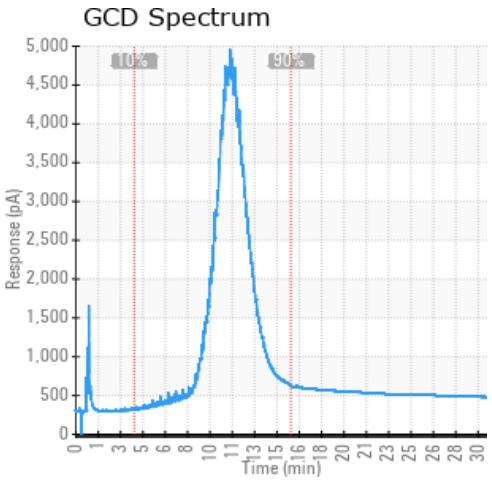
PETRO-CANADA LUBRICANTS

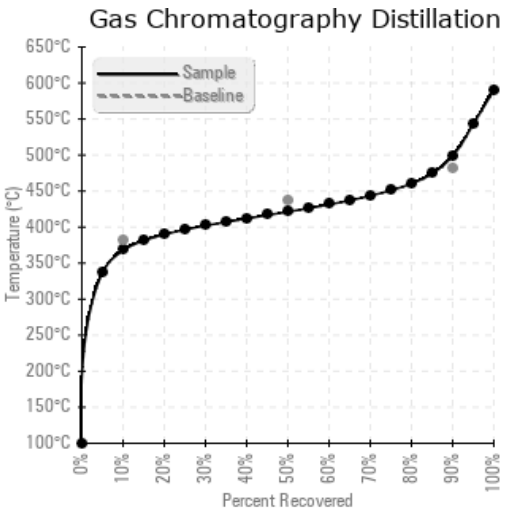


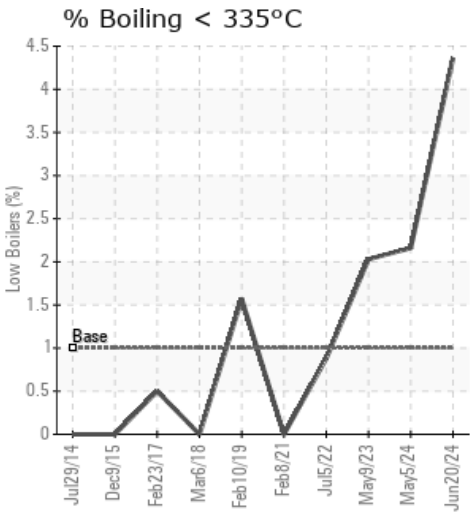


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
06/20/24	168	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
05/05/24	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05/09/23	22	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07/05/22	29	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/08/21	3	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

05/05/24	Sample results indicate the fluid remains in a degraded state. Acid Number is at 0.71 and solids content has increased to 0.904% (limit is 0.5%) which indicates system fouling. Plans should be made to clean system and replace fluid. Sweetening of the system is recommended if the system cannot be shutdown for a full replacement in the near future. Resample within 6 months. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high. (GCD) 90% Distillation Point is marginally high.
05/09/23	Fluids acid number did decline but is still beyond our recommended limit for a large system. Iron levels did also drop slightly. Viscosity is beyond fluid specifications. Ensure blanket gas is functioning properly. Sample collection point shows pump discharge, ensure the sample line is purged properly prior to collecting samples. Resample in 6 months to confirm fluids condition. If sample results indicate high acid number consider blending new fluid to help reduce acid levels. Acid Number (AN) is abnormally high. Visc @ 40°C is abnormally high.
07/05/22	Fluid is in reasonable condition but acid number has climbed beyond recommended levels, iron and pentane insolubles have also climbed slightly. Resample to confirm current analysis in a month or two. Please follow a sampling procedure and purge the sample line adequately to ensure the sample is representative of the whole system. If the acid number comes back at high levels a second time blending of fresh oil could help or a fluid change may be needed to reduce the risk of system damage from acidic fluid. Our recommendation is to start sweetening large systems with an acid number of 0.3-04, condemning limit is >1.0. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high.
02/08/21	Fluid remains in excellent condition. Continue to submit samples annually to proactively monitor fluid condition.

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