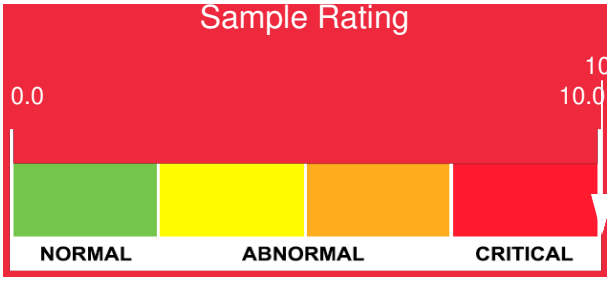
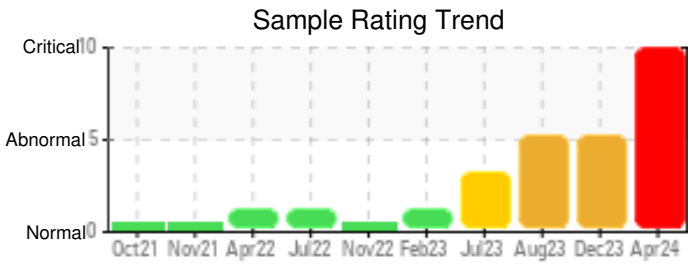




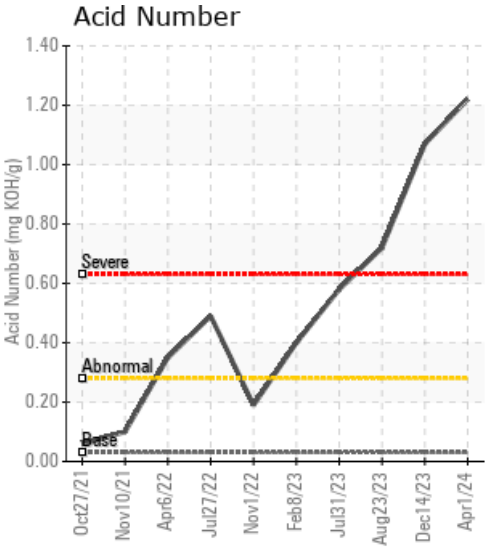
[VESTA SYLVAN LAKE] 6-20-37-1-W5 HEAT MEDIUM #2

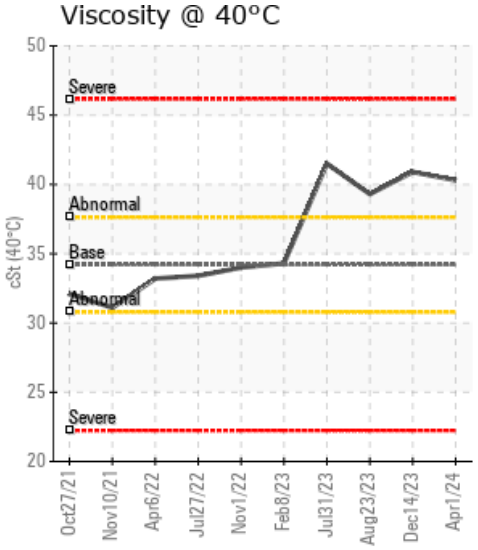
Customer: PTRHTF20261	System Information	Sample Information
VESTA ENERGY 6-20-37-1 W/5 SYLVON LAKE, AB CA Attn: JASON COFFIN Tel: (403)318-1291 E-Mail: jcoffin@vestaenergy.com	System Volume: 13000 ltr Bulk Operating Temp: 329F / 165C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: ASPIRE MANUFACTURING	Lab No: 02627138 Analyst: Yutong Gao Sample Date: 04/01/24 Received Date: 04/05/24 Completed: 04/12/24 Yutong Gao yutong.gao@HFSinclair.com

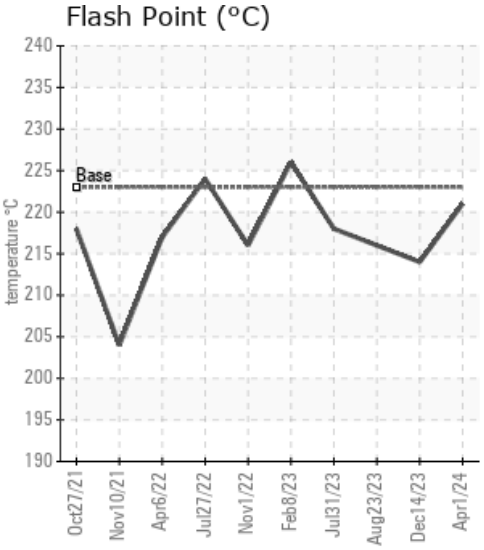
Recommendation: Based on the test results, the fluid conditions are getting worse. There are severe fluid oxidation, and solid particle level is extremely high. The iron content is abnormally high, which is related to the metal corrosion due to higher acid concentration in the fluid. The fluid is not suitable for use, and need a complete cleaning/flushing/Fluid Changing. Or at least the 1/3 changes to gain the time. As mentioned in the past, this system need modification to add the gas blanket (the same as System 1) and reduce the expansion tank temperature down from 100C to 60C or lower. Also a second circulation pump needs to be installed, just in case the primary fluid circulation pump has a problem. Jason, I will send you an email shortly to discuss further.

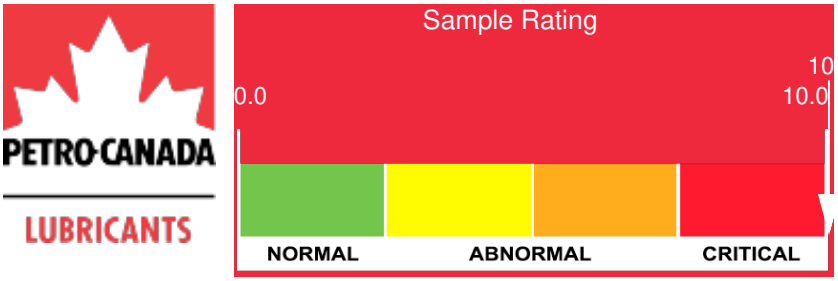
Comments: PQ levels are severe. Iron ppm levels are abnormal. Solid Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high.

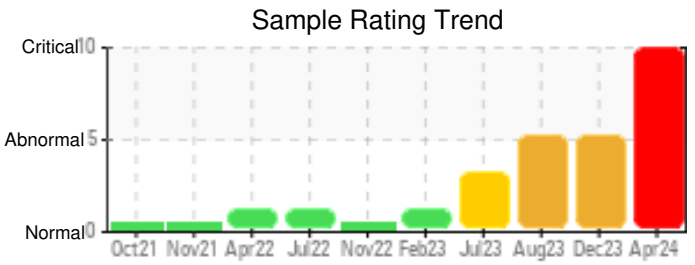
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
04/01/24	04/05/24	2.0m		430 / 221	147	40.3	1.22	1.93	710 / 377	803 / 428	903 / 484	2.72
12/14/23	12/15/23	0.0m		417 / 214	116	40.9	1.07	1.60	719 / 381	811 / 433	911 / 488	1.91
08/23/23	08/25/23	0.0m	DE ETH TOWER	421 / 216	72.7	39.3	0.72	1.14	722 / 383	811 / 433	909 / 487	1.33
07/31/23	08/02/23	12.0m		424 / 218	148.1	41.5	0.58	2.03	721 / 383	812 / 433	909 / 487	1.63
02/08/23	02/09/23	9.0m		439 / 226	34.1	34.3	0.40	0.381	729 / 387	813 / 434	910 / 488	1.03
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00





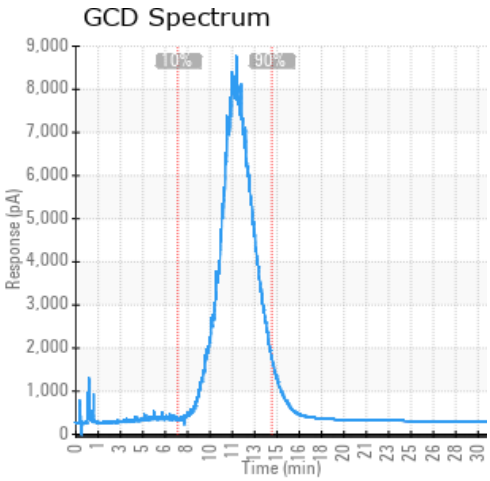


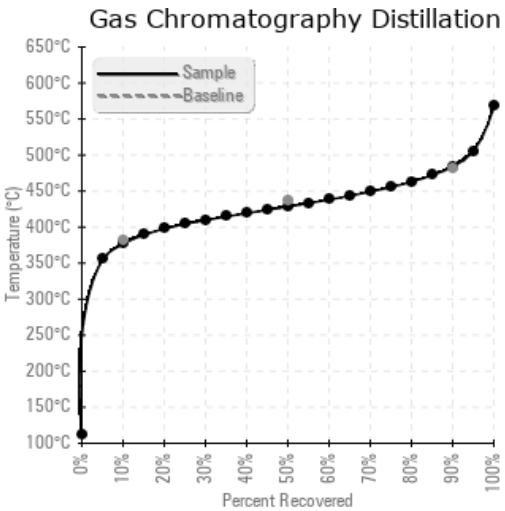


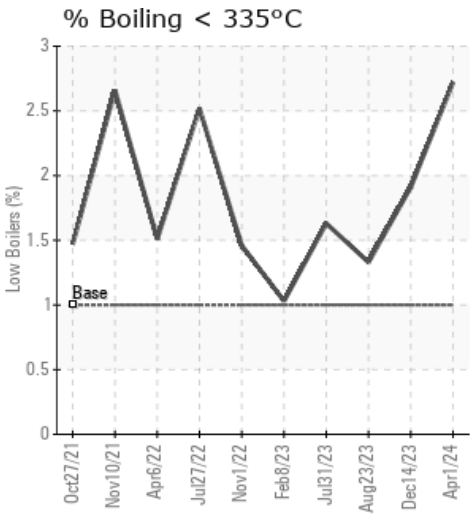


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
04/01/24	219	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	0	0	0	0	0
12/14/23	126	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/23/23	53	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07/31/23	73	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
02/08/23	12	0	0	0	0	0	1	0	0	0	1	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

12/14/23	The fluid has elevated Acid Number and Solid Contents, meaning the oil oxidation has been accelerated in the past 5 months. As discussed in the past, please consider implementing the following improvements ASAP: 1. Reduce the expansion tank temperature from the current 100C to 60C or lower. 2. Add a blanket in the expansion tank to isolate the hot fluid. The blanket can be the same as the Medium #1. 3. Please consider installing a second circulation pump, just incase the current pump has a premature failure.Iron level is increasing over the time, which is not typically from a wear and tear. Most likely, the iron is a third party contamination. Please trouble-shoot the source of the iron (i.e. the pipe corrosion, or third fluid contamination, etc.) Solid levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high.
08/23/23	This is the second sample in 30 days after instructing a good sampling port flushing, so that I think it is a representative sample. The elevated oil viscosity, acid number and solid contents are all the results of the fluid oxidation and degradation. Please add gas/nitrogen blanket in the expansion tank, also keep the expansion tank fluid temperature =< 50C. System filtration needs to be arranged. Yutong will follow up with Jason. Solid levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is abnormally high.
07/31/23	The sample has adequate distillation points comparing with the fresh fluid. However, the solid content has been elevated substantially only after 5 months operation since the last sample in Feb 2023. The viscosity and acid number test results are also higher than the previous samples. Referring to the system design parameters, please double check the fluid flow rate and expansion tank typical temperature. If they are all adequate enough, then please re-sample ASAP before taking any additional actions. Please use the same sample port, flush the port by 50 liters fluid, then take a representative sample. Yutong will contact Jason along with the Petro-Canada Lubricants local distributor to follow up the details. An increase in the iron level is noted. Solid levels are severely high. Acid Number (AN) is abnormally high. Visc @ 40°C is abnormally high.
02/08/23	The current fluid has correct viscosity and decent distillation points. There is minimum water / dirt contaminations. The overall solid content is low. The acid number is elevated from last sample result, however, it is similar to the two samples in Apr/Jul 2022. Please continue to run this fluid and take one sample in Sept 2023 to monitor the conditions. To better understand the variation of the AN, please confirm if there was a high volume fluid top-up between Jul and Nov, 2022. Also please make sure to take samples from the same port and the sampling port shall be well flushed.

