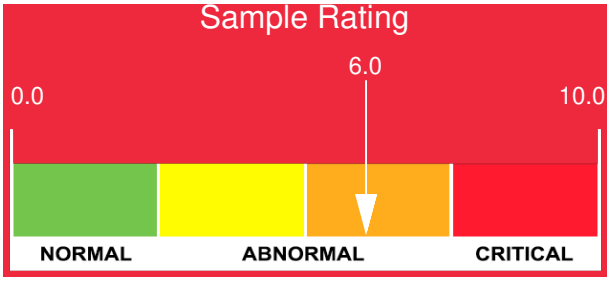
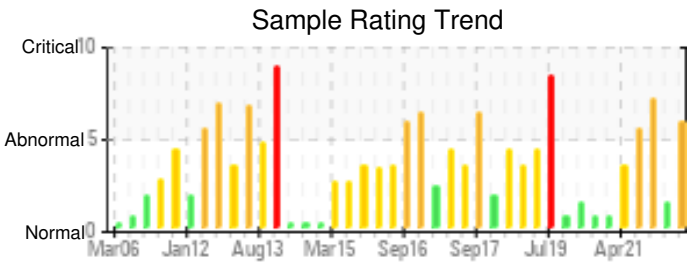




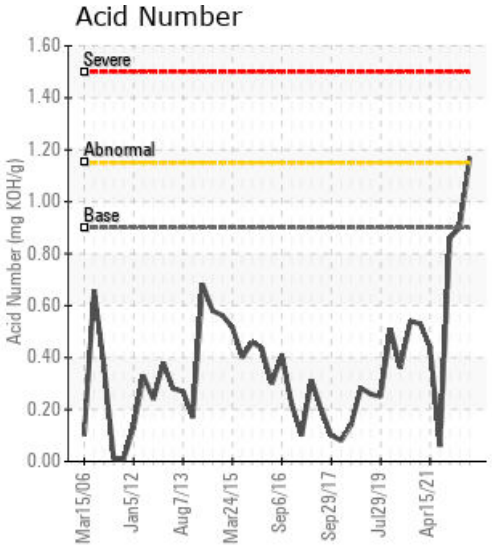
[VIT E 116] EAST

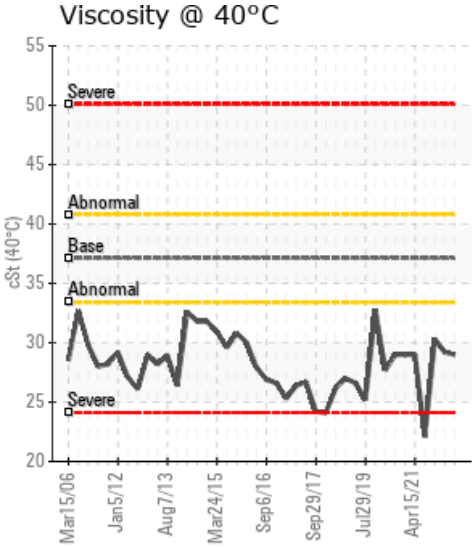
Customer: PTRHTF10004	System Information	Sample Information
ADM VITAMIN E PLANT 3700 EAST DIVISION STREET DECATUR, IL 62526 US Attn: Rick Cluck Tel: (217)451-7770 E-Mail: ricky.cluck@adm.com	System Volume: 2200 gal Bulk Operating Temp: 550F / 288C Heating Source: Blanket: Fluid: PETRO CANADA PURITY FG HEAT TRANSFER FLUID Make: AMERICAN HEATING	Lab No: 02635435 Analyst: Joe Goecke Sample Date: 05/06/24 Received Date: 05/14/24 Completed: 05/17/24 Joe Goecke Joe.goecke@HFSinclair.com

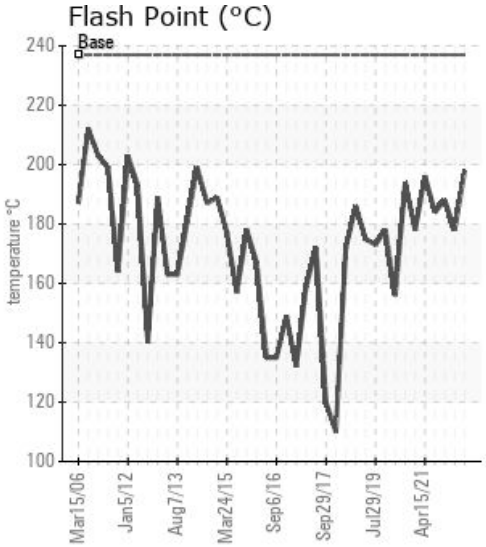
Recommendation: This system appears to have a critical component issue as seen in the high iron wear readings. The lack of routine samples makes it impossible to determine a true trend with this system. There was a period of a year and a half without a sample and this one is almost 1 year again. Much of the oil chemistry is within normal parameters, Viscosity, Flash Point, Light Ends are all ok to continue but the very high iron wear with PQ index signals an issue with pump or some other ferrous component wear. The acid number over 1 is high as well and could be adding to the metal wear. I suggest an inspection of this system components and piping to confirm no catastrophic wear is occurring. I also suggest sending in another sample to confirm these results. If they are confirmed a system change should be scheduled and detailed equipment inspection.

Comments: PQ levels are abnormal. Iron ppm levels are abnormal. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally low. Acid Number (AN) is marginally high. COC Flash Point is marginally low.

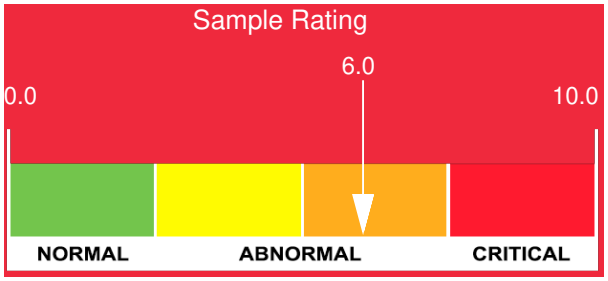
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
05/06/24	05/14/24	0.0m		388 / 198	23	29.0	1.17	0.074	670 / 355	809 / 432	924 / 495	6.85
06/05/23	06/20/23	0.0m		352 / 178	38.9	29.2	0.90	0.057	681 / 361	813 / 434	923 / 495	5.44
01/26/23	02/06/23	0.0m		370 / 188	54.1	30.3	0.86	0.139	692 / 367	813 / 434	923 / 495	4.12
07/23/21	08/04/21	0.0m		363 / 184	9.5	22.1	0.06	0.038	607 / 319	794 / 423	901 / 483	11.10
04/15/21	04/28/21	0.0m	Recirc pump	385 / 196	25.4	29.0	0.44	0.051	664 / 351	787 / 420	901 / 483	7.62
Baseline Data				459 / 237		37.12	0.90		721 / 383	807 / 431	892 / 478	1.5

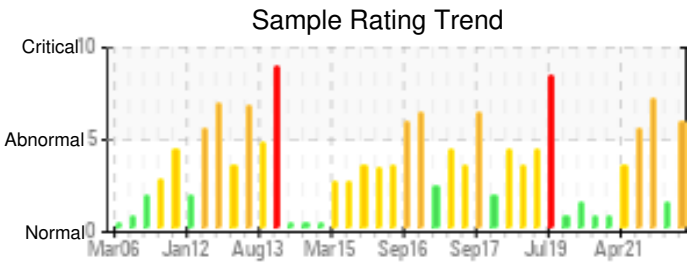






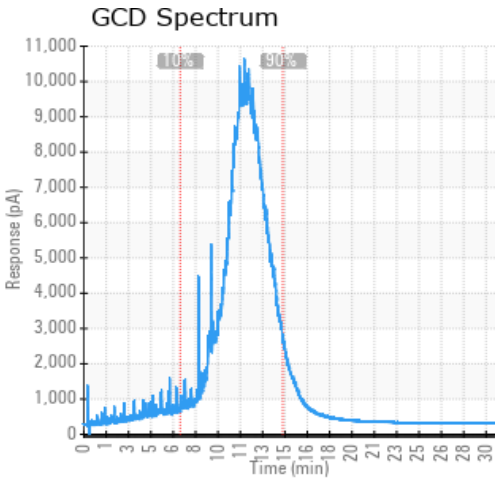
PETRO-CANADA LUBRICANTS

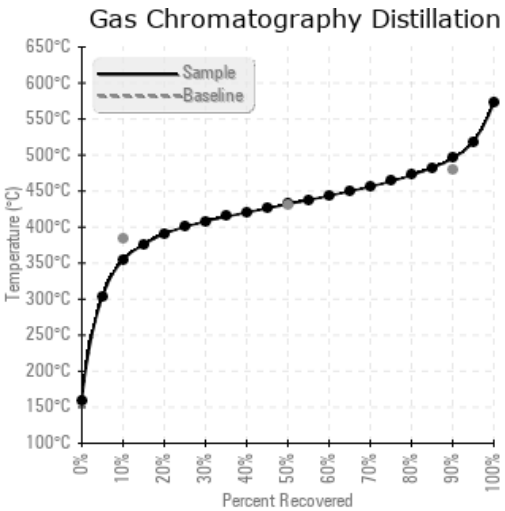


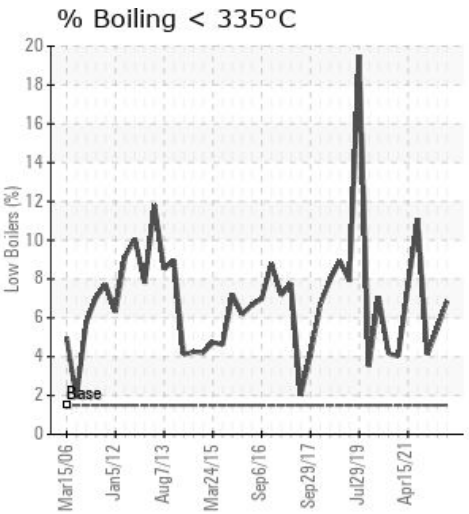


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
05/06/24	215	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	2	0	0	0	0	0	57	0
06/05/23	199	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	2	0	0	0	0	0	47	0
01/26/23	221	0	0	0	0	0	11	0	0	0	0	6	0	0	0	0	2	0	0	0	0	0	48	0
07/23/21	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
04/15/21	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0
Baseline Data			0	0						0			0	0				0	0				230	

Elemental anaysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]







Historical Comments

06/05/23	The viscosity, Acid number, and GCD < 335 C (low Boilers) are continuing to decrease which is a sign the oil is continuing to degrade which is causing the flash point to continue to drop - requires additional monitoring of the fluid and potential change out of the system
01/26/23	Sample has a large amount of ferrous material in the sample. Iron wear metals are high inspect the pump. Viscosity and acid number are at acceptable levels. Do see some fluid degradation lowering flash point and GCD Distillation at 90%. if a filtration unit designed for Heat Transfer systems is available recommend filtering the oil. Resample in 3 months.PQ levels are severe. Iron ppm levels are abnormal. Tin ppm levels are marginal. (GCD) 90% Distillation Point is abnormally high. COC Flash Point is abnormally low.
07/23/21	The viscosity has dropped by 24% as the GCD < 335 C is increasing gone from 8% to 11% it is reaching the critical limit of 15%. The GCD 10% temperature has also dropped by over 32 degrees there is degradation in the system which is continuing and continuing to lower the flash point. The system will need to be scheduled for an oil change out by the end of summer (GCD) 10% Distillation Point is severely low. Visc @ 40°C is severely low. COC Flash Point is abnormally low. (GCD) % < 335°C is marginally high.
04/15/21	GCD < 335C is increasing and GCD 10% is decreasing - this points to the development of low boiling components in the heat transfer fluid a sign the fluid is degrading - flash point is low - continue running and we will need to review next oil sample - looks like the oil will continue to degrade and possible oil replacement by the end of summer