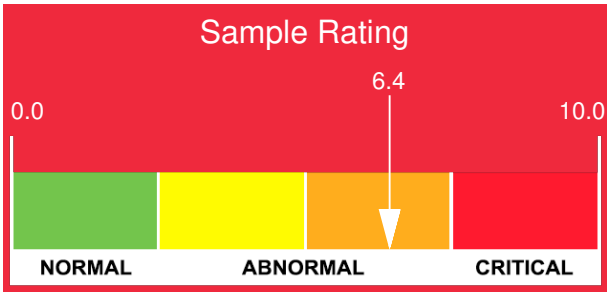
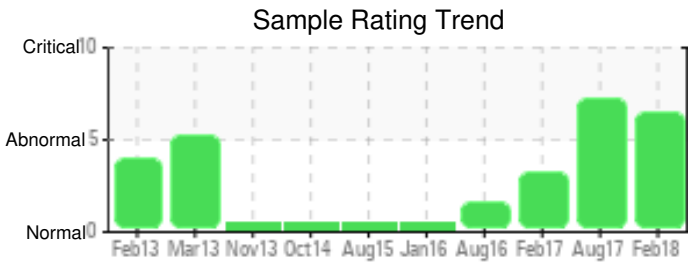




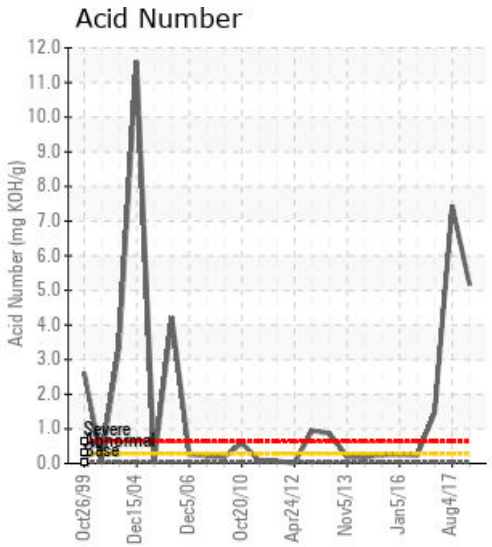
COMPOUNDING PRODEX

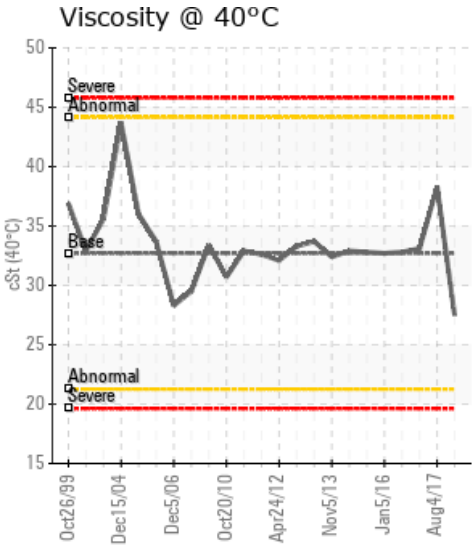
Customer: PTRHTF20087	System Information	Sample Information
Celanese Eva Performance Poly 4405-101 AVE. P.O. 428 EDMONTON, AB T5J 2K1 Canada Attn: Erik Halyk Tel: (780)468-0723 E-Mail: erik.halyk@celanese.com	System Volume: 0 ltr Bulk Operating Temp: Not Specified Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make: N/A	Lab No: 02200899 Analyst: Gordon Susinski Sample Date: 02/21/18 Received Date: 02/27/18 Completed: 03/01/18 To discuss this report contact Gordon Susinski at (587)582-4118

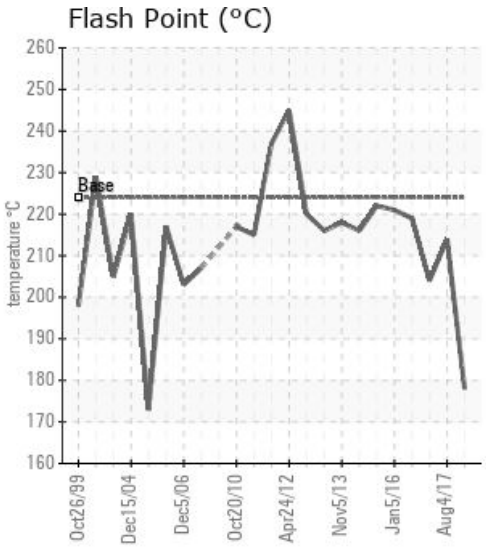
Recommendation: Based on the analysis results, it appears that the oil may have experienced one or both of the following deteriorating conditions. 1.) System wear, 2.) Heat transfer fluid oxidation, & 3.) Thermal degradation. This may be due in part to the length of service on the oil (# of years indicated is not clear or consistent from sample to sample)Note the sample rating index continues to increase. The acid number increase is a measure of the acidic compounds in the oil. Increases in the acid number are likely due to the formation of oxidation by products in the oil. This value will increase exponentially once the process begins. Tendencies are for sludge and deposits to increase and corrosion to occur if the fluid continues to be utilized beyond its limits. The flash point level is below normal. The flash point Is the lowest temperature at which the fluids vapor will momentarily ignite when contacted by an ignition source. Reduction is typically associated with thermal degradation of the heat transfer oil or possibly contamination. The Pentane Insolubles are abnormally high. This analysis is used for the determination of contaminants in used heat transfer oils, is to determine the amount of insoluble materials such as oxidation by products, dirt, carbonaceous material, and system wear components. These contaminants as a group are called pentane insolubles.Although, the test result is within acceptable guidelines, and reduced from the previous sample, please note the wear element iron (Fe) Iron typically comes from the system components and may indicate system wear. Also note the element copper. The copper level has risen significantly in this last sample. Please determine the source of the copper in your system and determine the severity of the wear. Sources of copper can be from heat exchangers (if so equipped) and possibly aftermarket ant seize compounds or pump components. Although it is still within normal guidelines, the viscosity level has dropped. Viscosity Is the fluids ability to resist flow. A decrease in viscosity may be due to a lower viscosity oil being added, indicates that low boilers are present as a result of thermal degradation. Although still within normal ranges, the IBP remains low. A low initial boiling point indicates that low boilers are present. This result can be corroborated by a lower flash point. This result can lead to pump cavitation.

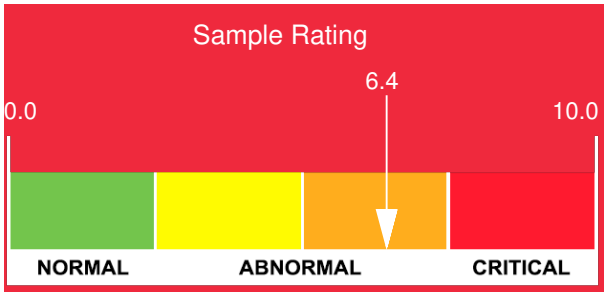
Comments: Copper ppm levels are abnormal. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. COC Flash Point is abnormally low.

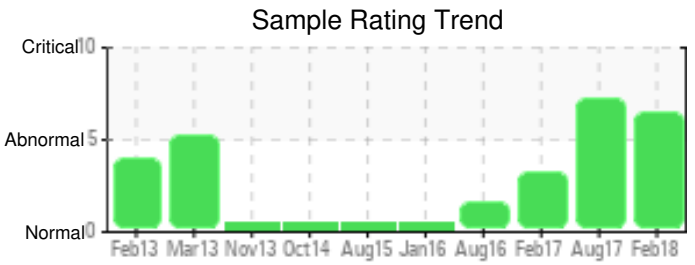
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
02/21/18	02/27/18	1y		352 / 178	131.6	27.5	5.16	0.980	672 / 356	778 / 414	870 / 466	4.61
08/04/17	08/11/17	6y	RESERVOIR	417 / 214	371.5	38.3	7.43	0.223	729 / 387	813 / 434	911 / 488	1.21
02/07/17	02/09/17	6y	RESERVOIR	399 / 204	62.3	33.1	1.47	0.029	701 / 372	799 / 426	899 / 481	1.30
08/04/16	08/05/16	0y	EXPANSION TANK	426 / 219	0.00	32.8	0.232	0.031	719 / 382	809 / 432	901 / 483	0.35
01/05/16	01/06/16	0y	TANK/DREW @ CELANESE	430 / 221	0.00	32.7	0.26	0.007	692 / 367	790 / 421	881 / 472	1.77
08/12/15	08/14/15	0y	TANK	432 / 222	7.2	32.8	0.25	0.038	701 / 372	801 / 427	900 / 482	0.81
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5





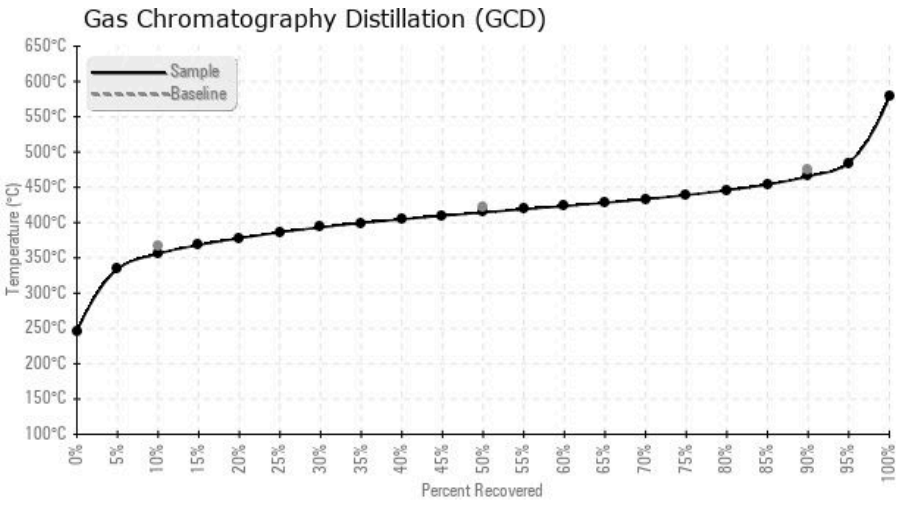


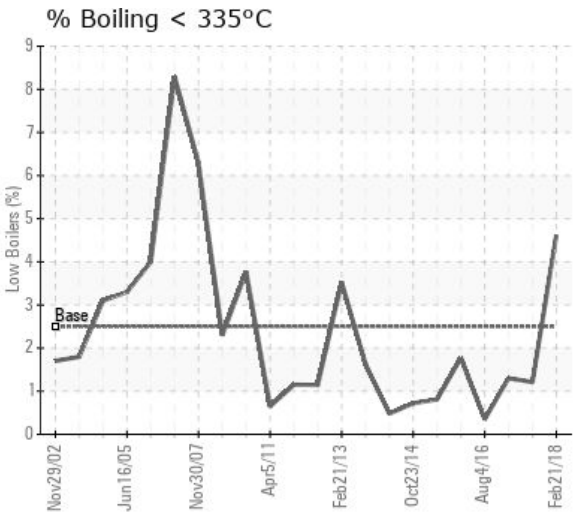




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
02/21/18	177	0	0	0	23	2	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	240	32
08/04/17	294	0	0	0	9	1	0	0	0	0	4	0	1	0	0	0	1	0	1	0	0	0	265	18
02/07/17	3	0	0	0	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	262	1
08/04/16	0	0	0	0	3	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	277	1
01/05/16	0	0	0	0	0	0	1	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	274	0
08/12/15	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	270	0
Baseline Data			0	0						0			0	0					0				270	

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





Historical Comments

08/04/17	Based on the analysis results, it appears that the oil may have experienced oxidation of the system as well as contamination by water and wear metals - most notably iron. The acid number is a measure of the acidic compounds in the oil. Increases in the acid number are likely due to the formation of oxidation by products in the oil. This value will increase exponentially once the process begins. Tendencies are for sludge and deposits to increase and corrosion to occur if the fluid continues to be utilized beyond its limits. A higher than normal initial boiling point indicates that lower components in the oil have been boiled off. An final boiling point of 90% GCD result indicates that high boilers are present and are normally associated with carbonaceous deposits in the system that can foul heat exchanger surfaces or plug small lines. The iron level has had a significant increase (also not increase in copper, although, the test result is within acceptable guidelines), please note the wear element iron (Fe). Iron typically comes from the system components. The amount of water present in the product by Karl Fischer reagent and coulometric method. An elevated water content in conjunction with increasing iron, by lead to system corrosion. High water content can lead to safety concerns with hot oil gargling and splashing out of the expansion tank. Water content can contribute to the formation of fluid oxidation and the formation of acids. High water content can also be attributed to a dirt sampling port. Oxidation is a reaction of hydrocarbons in the oil with oxygen from air, forming various species including weak organic acids. Oxidation is accelerated by contaminants such as wear debris, dust, water, metals, and high temperatures. Changes in the fluid will be seen as discoloration, increased viscosity, formation of varnish, increase in acidity and finally the formation of heavy insoluble compounds. We recommend resampling as soon as possible, making sure that proper sampling procedures are followed. Iron ppm levels are abnormal. Water contamination levels are marginally high. ppm Water contamination levels are marginally high. Acid Number (AN) is severely high. (GCD) 10% Distillation Point is marginally high. (GCD) 90% Distillation Point is marginally high.
02/07/17	The TAN result is well above normal limits. Due to the date of the sample, we request that you resample the system at your earliest convenience. Acid Number (AN) is severely high.
08/04/16	Results are normal
01/05/16	Results appear normal. Resample at the next interval.
08/12/15	Oil is in good condition, please re-sample at next maintenance interval.I agree with the laboratories interpretation.