

## EDSON FOREST PRODUCTS

**Customer: PTRHTF20090**

Edson Forest Products (Div. of West...  
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**System Information**

System Volume: 60000 ltr  
Bulk Operating Temp: 495F / 257C  
Heating Source:  
Blanket:  
Fluid: PETRO CANADA PETRO-THERM  
Make: WELLONS

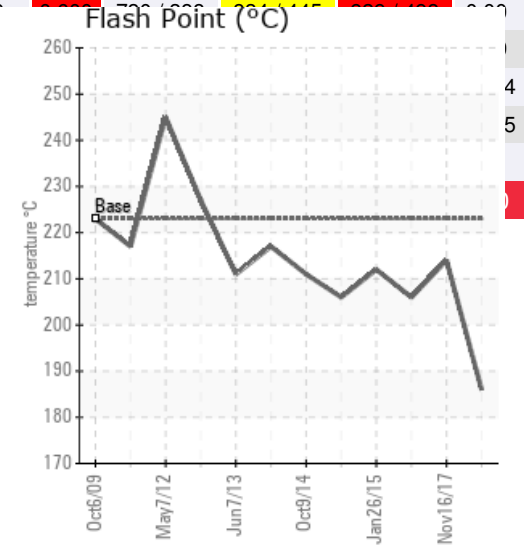
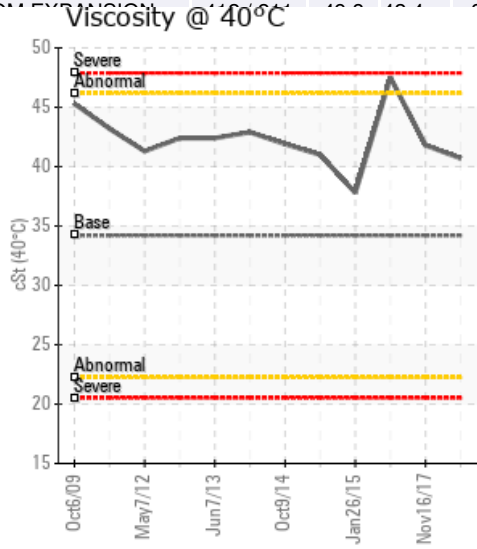
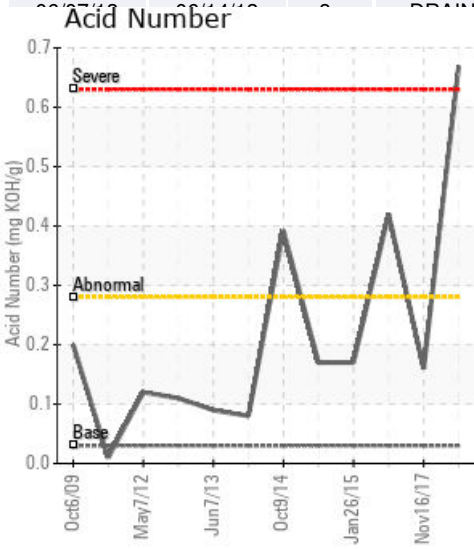
**Sample Information**

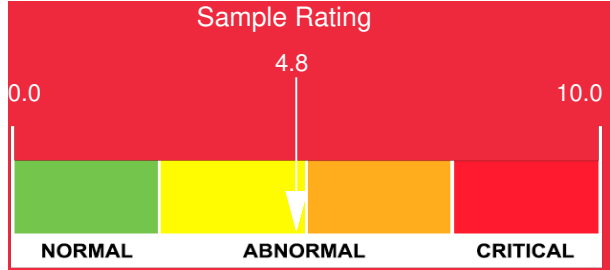
Lab No: 02287580  
Analyst: Gordon Susinski  
Sample Date: 05/23/19  
Received Date: 05/28/19  
Completed: 05/31/19

Recommendation: Depending on the actual oil service, (oil service dropped from 15 years to 13 years?) the acid number has dramatically increased, and 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. This current level may be an indicator that the oil may have reached the end of its useful life. 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.

Comments: Acid Number (AN) is severely high. (GCD) 90% Distillation Point 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	%
05/23/19	05/28/19	13y		367 / 186	47.5	40.7	0.669	0.280	722 / 383	826 / 441	924 / 496	0.81
11/16/17	11/23/17	15y		417 / 214	8.1	41.8	0.16	0.192	715 / 380	802 / 428	905 / 485	0.00
08/10/16	08/16/16	12y	KILNS 1-4 STRAINER	403 / 206	138.4	47.5	0.42	2.11	724 / 385	834 / 445	929 / 499	1.52
01/26/15	02/03/15	10y	KILNS 5-6	414 / 212	39.8	37.8	0.17	0.305	729 / 387	837 / 447	924 / 496	0.49
01/25/15	02/03/15	10y	KILNS 1-4	403 / 206	69.5	41.0	0.17	0.303	730 / 388	831 / 444	917 / 492	0.00
10/09/14	10/23/14	9y	DRAIN	412 / 211	46.4	41.9	0.392	0.317	717 / 381	823 / 440	930 / 499	0.89
06/08/13	06/14/13	8y	KILNS 5/6	423 / 217	39.6	42.9	0.08	0.450	722 / 383	828 / 442	923 / 495	1.07





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
05/23/19	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
11/16/17	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/10/16	96	0	0	1	0	0	0	0	0	0	3	3	0	0	0	0	2	0	0	0	2	0	2	2
01/26/15	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01/25/15	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/09/14	20	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06/08/13	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Elemental analysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]																								
05/16/13	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
05/07/12	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
08/17/11	8	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	2	3
10/06/09	30	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Baseline Data			0	0						0			0	0					0				0	

### Historical Comments

11/16/17	Results are normal
08/10/16	Service on the oil appears to be 12 years. Iron level has increased significantly. Typical sources are from the system tubing or possibly pumps. Acid number increase is likely due to the formation of oxidation by products. Oxidation is a chemical reaction between oxygen and the components of the oil whereby the hydrocarbon in the oil turns into weak carboxylic acids and other carbon-oxygen containing species. The higher the temperature, the worse the oxidation becomes and it will feed off of itself becoming exponentially worse over time when the additives are depleted. In a closed heat transfer system, the most probable place for fluid oxidation to occur is in the expansion tank (without an inert gas blanket). In an open system, the fluid oxidizes rapidly at its operating temperature. Different oils vary considerably in their resistance to oxidation largely due to the base oil used and the antioxidant additives used in the oil. Viscosity increase in a heat transfer system is normally attributed to the oxidation process and supports the findings in the AN increase. The oxidation process increases the size of the molecules and thus increases the oils viscosity. Pentane Insolubles analysis is for the determination of contaminants in used heat transfer oils and is used 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. In light of the age of the in service oil (12 years) & increasing evidence of formation of oxidation by products and insoluble material, it may be time to begin to schedule oil change and cleaning of the system. Continue to monitor the system and resample as required. Iron ppm levels are noted. Pentane Insolubles levels are severely high. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally high. Visc @ 40°C is abnormally high.
01/26/15	The fluid is in good condition and suitable for further use. Please re-sample in 6 months. (GCD) 90% Distillation Point is marginally high.
01/25/15	Fluid is in good condition and suitable for further use. Please re-sample in 6 months.
10/09/14	We are a bit concerned with the sudden rise in Total Acid Number since it's an indirect measure of oil oxidation (degradation). We suggest to investigate any changes in expansion tank temperature, or any condition that promote contact of warm oil with air. We recommend to step up the sampling from once per year to every 4 months to monitor this rise in Acid Number. Acid Number (AN) is abnormally high. (GCD) 90% Distillation Point is abnormally high.
06/08/13	This sample is nearly identical to lab# 01844067. We should continue to monitor the system through annual sampling. Pentane Insolubles levels are abnormally high. (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.
06/07/13	The overall oil condition is acceptable for further use. There appears to be an increase in the insoluble solids and a high GCD @90%, which can indicate that the oil is showing sign of oxidations. We recommend to continue monitoring the system through annual sampling. Pentane Insolubles levels are severely high. (GCD) 90% Distillation Point is severely high. (GCD) 50% Distillation Point is marginally high.

05/16/13

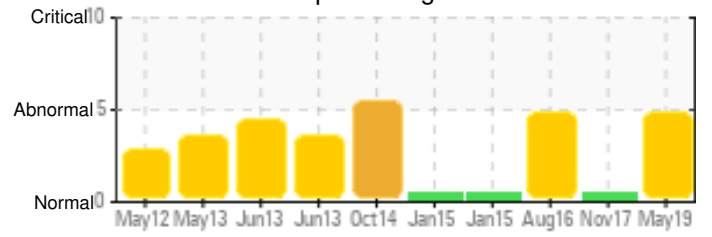


08/17/11

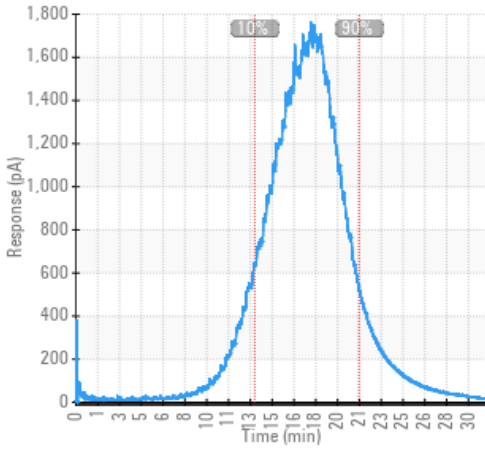
This sample looks very good considering it comes from the bottom of the expansion tank. The oil properties are drifting towards the properties of today's Petro-Therm. Everything looks good. Please keep re-sampling every 9-12 months.

10/06/09

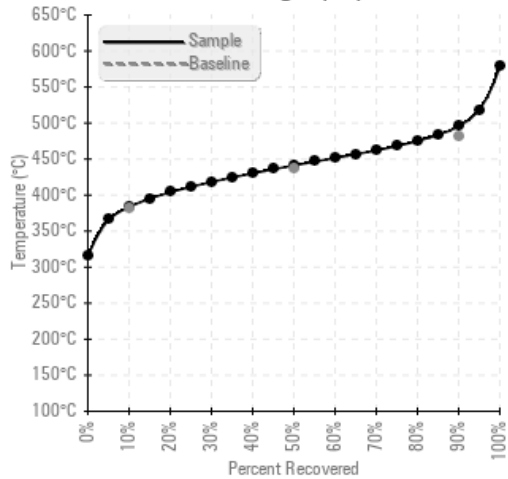
### Sample Rating Trend



### GCD Spectrum



### Gas Chromatography Distillation



### % Boiling < 335°C

