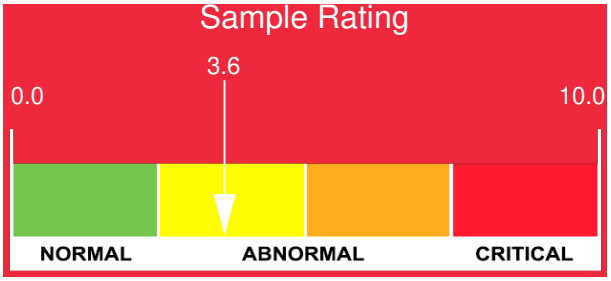
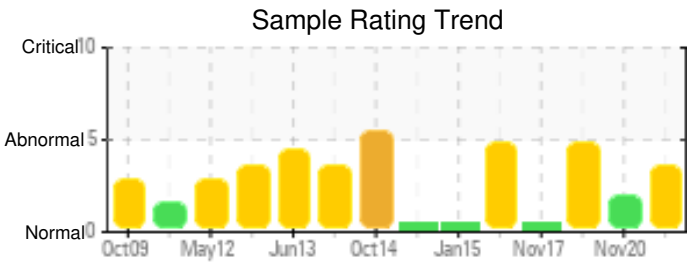


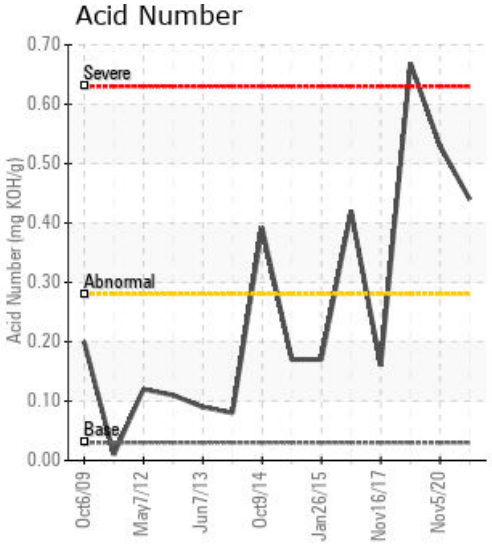

# [SW 10-53-18W5] EDSON FOREST PRODUCTS

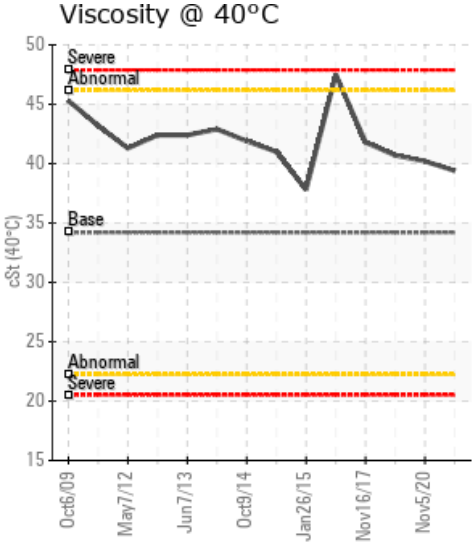
| Customer: PTRHTF20090 | System Information | Sample Information |
|---|---|---|
| Edson Forest Products (Div. of West...<br>P.O. BOX 6810<br>Edson, AB T7E 1V2 Canada<br>Attn: Roxane Parker<br>Tel: (780)723-3977<br>E-Mail: roxane.parker@westfraser.com | System Volume: 60000 ltr<br>Bulk Operating Temp: 495F / 257C<br>Heating Source:<br>Blanket:<br>Fluid: PETRO CANADA PETRO-THERM<br>Make: WELLONS | Lab No: 02445350<br>Analyst: Yutong Gao<br>Sample Date: 09/14/21<br>Received Date: 09/21/21<br>Completed: 10/04/21<br>Yutong Gao<br>yutong.gao@hollyfrontier.com |

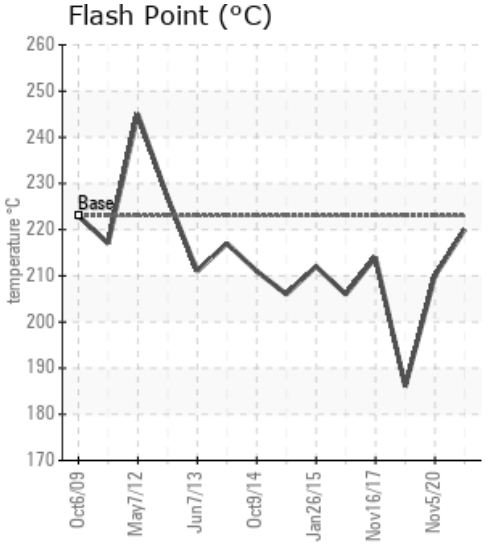
Recommendation: The current fluid has very similar viscosity, flash point and distillation points as the last sample. There is a mild fluid oxidation. It is good to see that Acid Number (AN) has been reduced over the last two years, but the solid content has been increased a lot. The water contamination is minimal. Overall, the fluid is suitable for further operation. Please take one sample in 12 months to monitor the conditions.

Comments: (GCD) 90% Distillation Point is marginally 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 | % |
| 09/14/21 | 09/21/21 | 16.0y | Primary oil pump #1 | 428 / 220 | 49.5 | 39.4 | 0.44 | 0.713 | 726 / 385 | 826 / 441 | 920 / 493 | 1.77 |
| 11/05/20 | 11/12/20 | 15.0y | #1 Primary Pump | 410 / 210 | 26.0 | 40.2 | 0.53 | 0.197 | 723 / 384 | 825 / 441 | 921 / 494 | 2.26 |
| 05/23/19 | 05/28/19 | 13.0y | | 367 / 186 | 47.5 | 40.7 | 0.669 | 0.280 | 722 / 383 | 826 / 441 | 924 / 496 | 0.81 |
| 11/16/17 | 11/23/17 | 15.0y | | 417 / 214 | 8.1 | 41.8 | 0.16 | 0.192 | 715 / 380 | 802 / 428 | 905 / 485 | 0.00 |
| 08/10/16 | 08/16/16 | 12.0y | KILNS 1-4 STRAINER | 403 / 206 | 138.4 | 47.5 | 0.42 | 2.11 | 724 / 385 | 834 / 445 | 929 / 499 | 1.52 |
| | | | | | | | | | | | | |
| Baseline Data | | | | 433 / 223 | | 34.2 | 0.03 | | 720 / 382 | 817 / 436 | 900 / 482 | 1.00 |

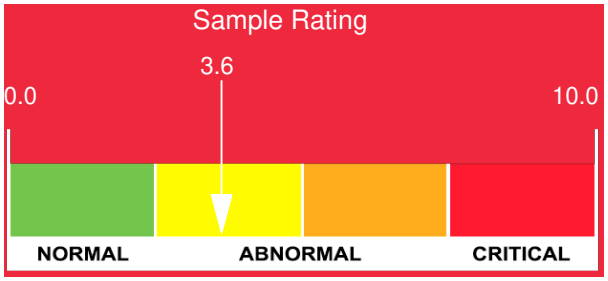


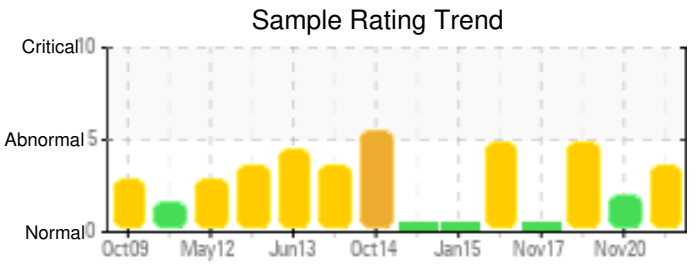



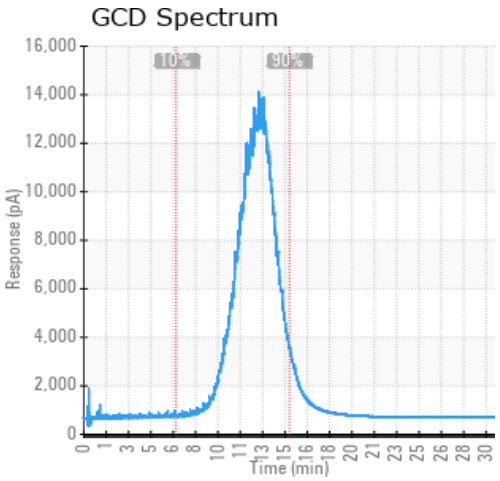
PETRO-CANADA LUBRICANTS

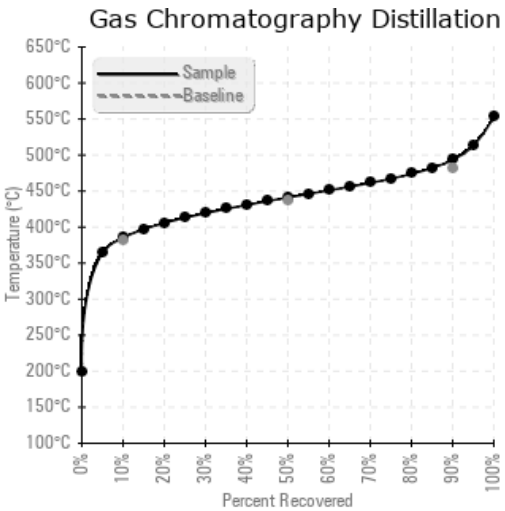


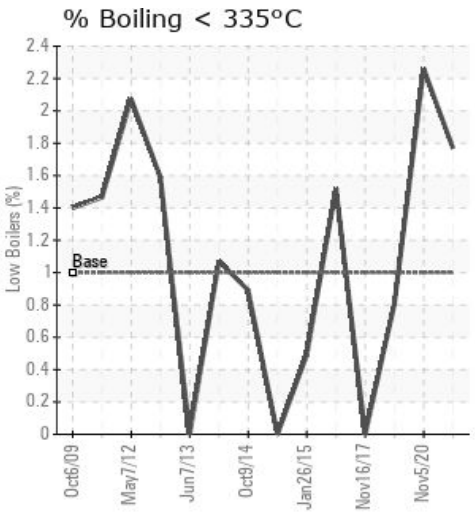




| Sample Date | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09/14/21 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11/05/20 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 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 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 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

| | |
|---|---|
| 11/05/20 | The fluid has normal flash point, and minimum water contamination. The solid content is also normal. The elevated TAN and oil viscosity indicate there are moderate oil oxidation or the wrong oil contamination. The high fluid viscosity will reduce the overall heat transfer efficiency. The 15 years old oil fluid is still suitable for further operation. Please take one sample in 12 months to monitor the conditions. |
| 05/23/19 | 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. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high. COC Flash Point is marginally low. |
| 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 and 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. |
| | |