

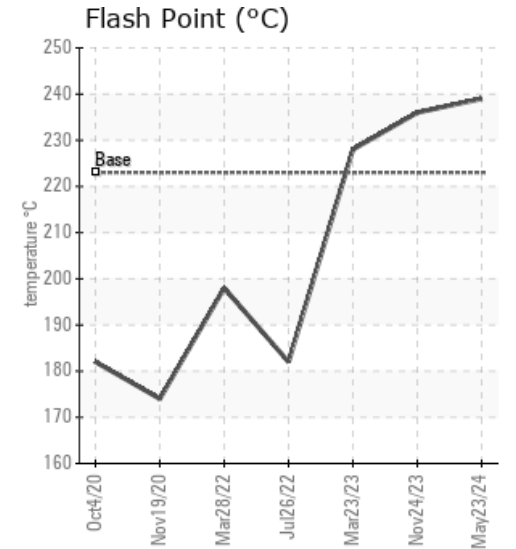
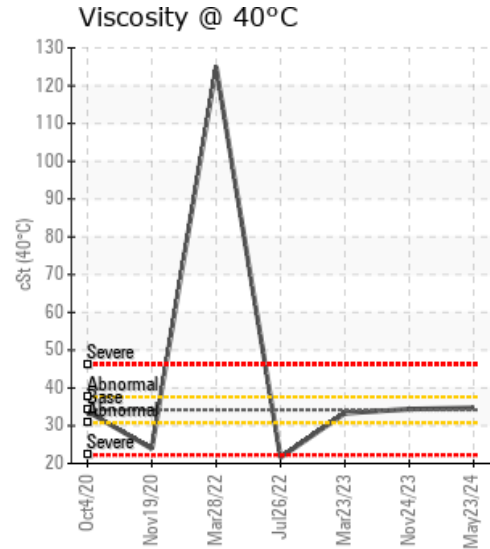
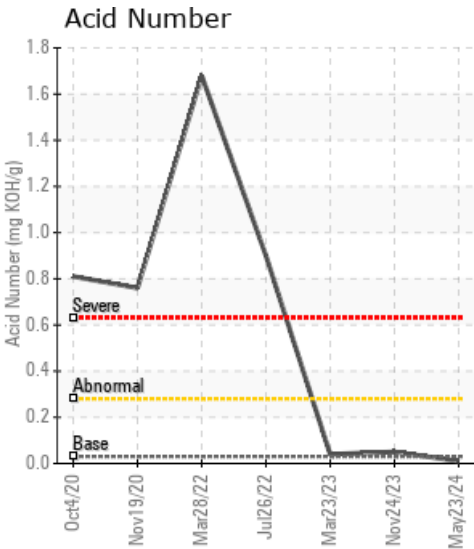
## [5-11-29-4W5] ORLEN UPSTREAM

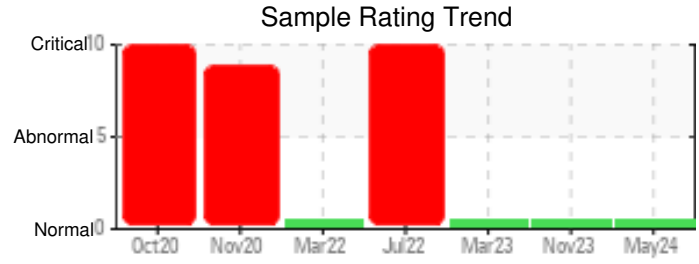
| Customer: PTRHTF20262   | System Information   | Sample Information   |
|---|--|--|
| Orlen upstream Canada Ltd.<br>850 2 St. SW<br>Calgary, AB T2P 0R8 CA<br>Attn: Ian Stewart<br>Tel:<br>E-Mail: ian.stewart@orlenupstream.ca | System Volume: 2700 ltr<br>Bulk Operating Temp: 356F / 180C<br>Heating Source:<br>Blanket:<br>Fluid: PETRO CANADA PETRO-THERM<br>Make: PROPACK | Lab No: 02640370<br>Analyst: Lyle Dach<br>Sample Date: 05/23/24<br>Received Date: 06/06/24<br>Completed: 06/13/24<br>Lyle Dach<br>lyle.dach@HFSinclair.com |

Recommendation: Sample results indicate that the fluid is in suitable condition for continued service. Resample in 12 months.

Comments:

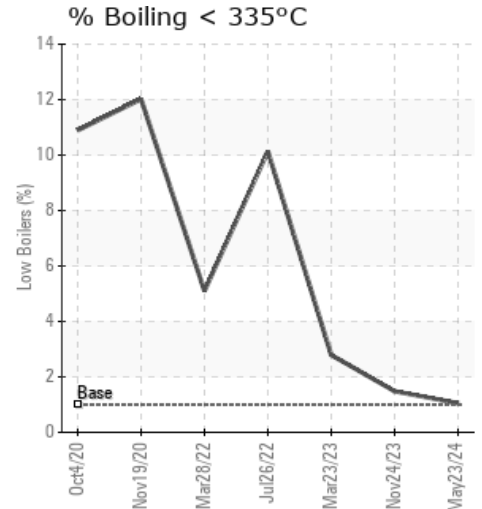
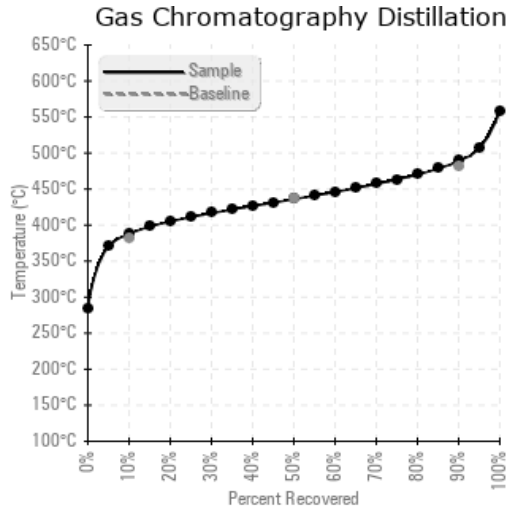
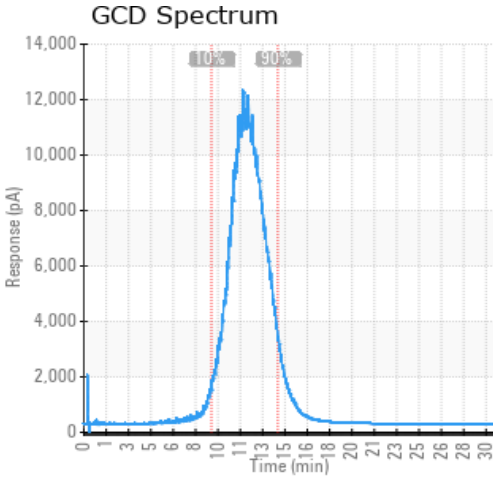
| Sample Date   | Received Date | Fluid Age | Sample Location  | Flash Point (COC) | Water (KF) | Viscosity (40°C) | Acid Number | Solids | GCD 10%   | GCD 50%   | GCD 90%   | GCD % < 335°C |
|---------------|---------------|-----------|------------------|-------------------|------------|------------------|-------------|--------|-----------|-----------|-----------|---------------|
|               | mm/dd/yy      |           |                  | °F/°C             | ppm        | cSt              | mg/KOH/g    | %wt    | °F/°C     | °F/°C     | °F/°C     | %             |
| 05/23/24      | 06/06/24      | 6.0m      | PUMP INLET       | 462 / 239         | 0          | 34.7             | 0.01        | 0.215  | 730 / 388 | 817 / 436 | 912 / 489 | 1.05          |
| 11/24/23      | 11/29/23      | 0.0m      |                  | 457 / 236         | 10         | 34.4             | 0.05        | 0.045  | 726 / 386 | 814 / 435 | 913 / 489 | 1.48          |
| 03/23/23      | 03/30/23      | 12.0m     | BOILER SITE TUBE | 442 / 228         | 64.3       | 33.3             | 0.04        | 0.117  | 721 / 383 | 814 / 435 | 910 / 488 | 2.79          |
| 07/26/22      | 08/09/22      | 4.0m      |                  | 360 / 182         | 32.0       | 21.6             | 0.90        | 0.617  | 623 / 328 | 798 / 426 | 897 / 481 | 10.14         |
| 03/28/22      | 04/13/22      | 10.0m     | sight glass      | 388 / 198         | 233.5      | 125              | 1.68        | 3.65   | 690 / 365 | 808 / 431 | 908 / 487 | 5.10          |
| 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 |
|---------------|------|----------|--------|----------|--------|------|-----|---------|--------|----------|---------|--------|-----------|----------|------------|----------|-----------|---------|-------|-----------|---------|--------|------------|------|
| 05/23/24      | 0    | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 11/24/23      | 0    | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 03/23/23      | 0    | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 07/26/22      | 18   | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 03/28/22      | 538  | 0        | 0      | 8        | 0      | 0    | 1   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 5         | 0       | 1     | 0         | 0       | 0      | 0          | 0    |
| Baseline Data |      |          | 0      | 0        |        |      |     |         |        | 0        |         |        | 0         | 0        |            |          |           |         | 0     |           |         |        | 0          |      |

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



| Historical Comments |   |
|---------------------|---|
| 11/24/23            | Sample results indicate that the fluid is in suitable condition for continued service. Resample in 12 months.   |
| 03/23/23            | Sample results indicate that the fluid is in suitable condition for continued service. Resample in 12 months.   |
| 07/26/22            | Fluid has continued to degrade, acid number, viscosity, flash point, GCD % <335, GCD 10% and pentane insolubles are all at alarm levels. Fluid is in poor condition due to both oxidation and thermal degradation. Fluid looks to have an ingress of lighter hydro carbons which is bringing the viscosity and flash point down and effected the GCD. The lighter ends could be vented off but the fluids acidity and pentane insolubles are still at high levels and iron is climbing slightly. Full or partial fluid change out should be considered, as well as cleaning of system internals. Consult PC Technical Services for remediation / degradation prevention strategies. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 10% Distillation Point is severely low. Visc @ 40°C is severely low. (GCD) % < 335°C is marginally high. COC Flash Point is marginally low. |
| 03/28/22            | The fluid is showing significant degradation, the fluid should be resampled to confirm the condition as it has deteriorated from the last sample. The viscosity is very high and not proportional to the rest of the sample. Please investigate the system for other sample locations that could give a better representative of the whole system. Site glasses are not ideal but bottom drains are generally worse. With systems that do not have pumps it is best to purge the fluid until hot oil has been flowing for several seconds to try and get a good representative sample. Iron ppm levels are severe. PQ levels are severe. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. Visc @ 40°C is severely high.  |

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