

### [3-18-80-17W6M] HEAT MEDIUM #1

**Customer: PTRHTF20156**  
 TOURMALINE OIL  
 9920 98a Ave  
 FORT ST. JOHN, BC V1J 1S2 Canada  
 Attn: Brandon Braun  
 Tel: (250)262-5420  
 E-Mail:  
 Brandon.braun@tourmalineoil.com

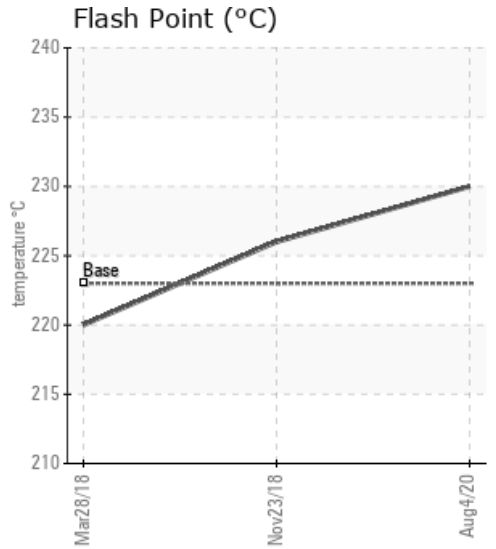
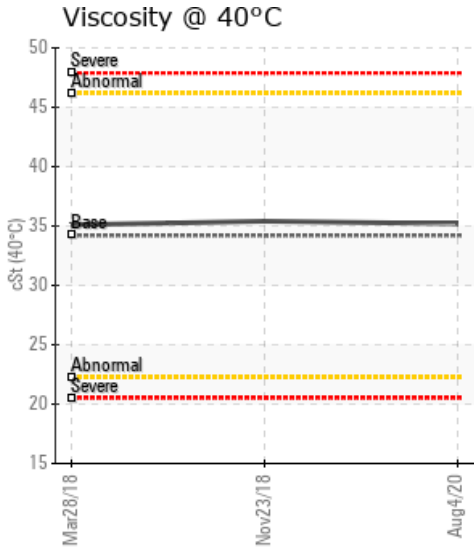
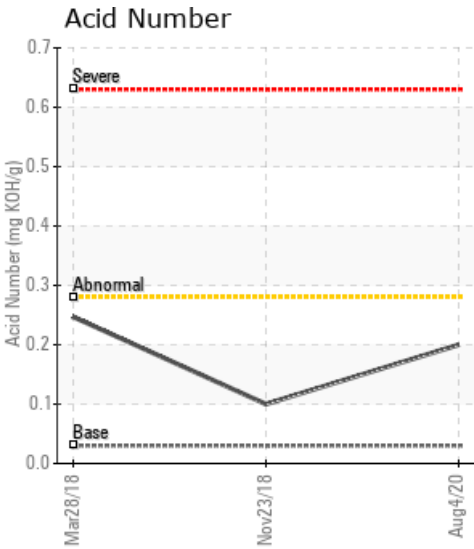
**System Information**  
 System Volume: 15000 ltr  
 Bulk Operating Temp: 392F / 200C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA PETRO-THERM  
 Make:

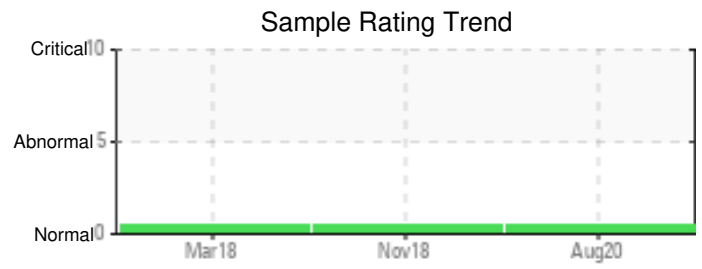
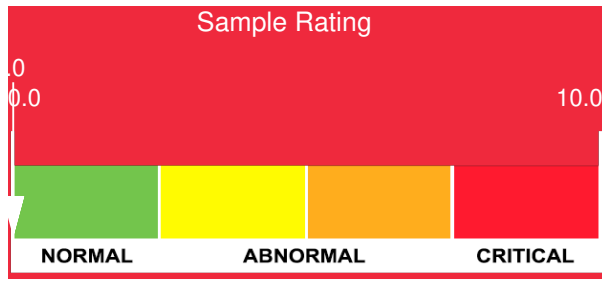
**Sample Information**  
 Lab No: 02369119  
 Analyst: Clinton Buhler  
 Sample Date: 08/04/20  
 Received Date: 08/07/20  
 Completed: 08/10/20  
 Clinton Buhler  
 Clinton.Buhler@PetroCanadaLSP.com

Recommendation: Sample results indicate that the heat transfer fluid is suitable for continued service. Please re-sample in 12 months

Comments:

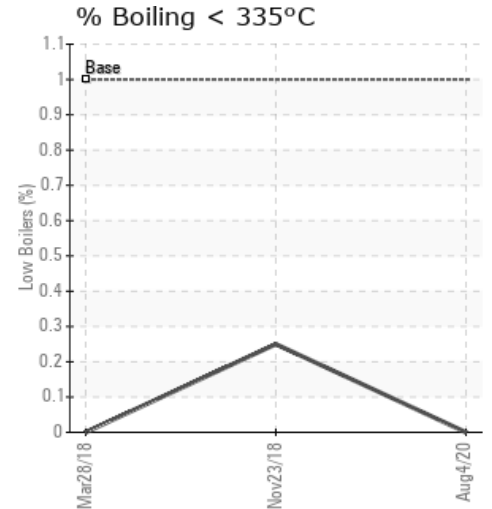
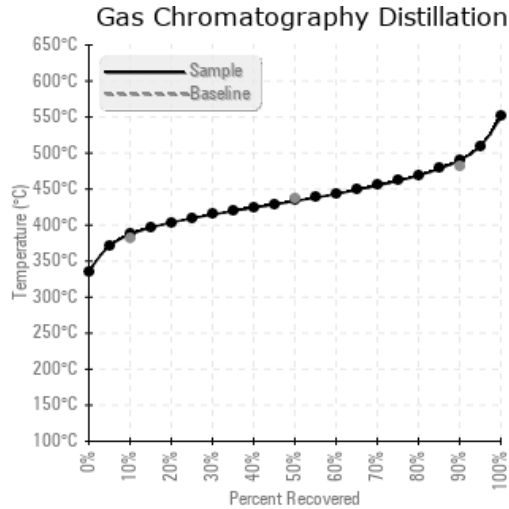
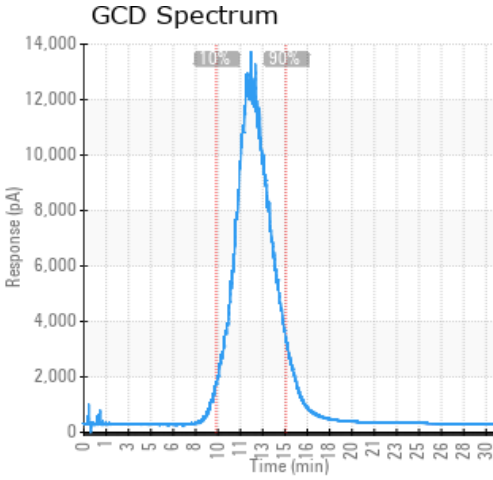
| Sample Date          | Received Date | Fluid Age | Sample Location | Flash Point (COC) | Water (KF) | Viscosity (40°C) | Acid Number | Solids | GCD 10%          | GCD 50%          | GCD 90%          | GCD % < 335°C |
|----------------------|---------------|-----------|-----------------|-------------------|------------|------------------|-------------|--------|------------------|------------------|------------------|---------------|
|                      | mm/dd/yy      |           |                 | °F/°C             | ppm        | cSt              | mg/KOH/g    | %wt    | °F/°C            | °F/°C            | °F/°C            | %             |
| 08/04/20             | 08/07/20      | 36m       | SURGE DRUM      | 446 / 230         | 176.8      | 35.2             | 0.20        | 0.062  | 728 / 387        | 812 / 433        | 914 / 490        | 0.00          |
| 11/23/18             | 12/18/18      | 0m        |                 | 439 / 226         | 131.0      | 35.4             | 0.10        | 0.197  | 722 / 383        | 808 / 431        | 913 / 490        | 0.25          |
| 03/28/18             | 04/06/18      | 18m       |                 | 428 / 220         | 67.9       | 35.1             | 0.247       | 0.045  | 723 / 384        | 798 / 425        | 894 / 479        | 0.00          |
| <b>Baseline Data</b> |               |           |                 | <b>433 / 223</b>  |            | <b>34.2</b>      | <b>0.03</b> |        | <b>720 / 382</b> | <b>817 / 436</b> | <b>900 / 482</b> | <b>1.00</b>   |





| 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 |
|---------------|------|----------|--------|----------|--------|------|-----|---------|--------|----------|---------|--------|-----------|----------|------------|----------|-----------|---------|-------|-----------|---------|--------|------------|------|
| 08/04/20      | 33   | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 11/23/18      | 50   | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 0         | 0       | 0      | 0          | 0    |
| 03/28/18      | 10   | 0        | 0      | 0        | 0      | 0    | 0   | 0       | 0      | 0        | 0       | 0      | 0         | 0        | 0          | 0        | 0         | 0       | 0     | 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 |   |
|---------------------|---|
| 11/23/18            | The fluid is in good condition and suitable for further use. Fe and solids (PI) content have increased slightly. These have to be monitored via future samples. Please re-sample in 6 months. (list oil service life on analysis request form)  |
| 03/28/18            | Sample results indicate that the thermal fluid is suitable for continued service. Please note that Acid Number of 0.247 and Iron content (possibly from corrosion) can be an early indication of oxidation. Please ensure that blanket gas is properly applied to the expansion tank. Re-sample in 6 months and please ensure sample is drawn off of pump discharge and that a thorough purge precedes the drawing of the sample. |
|                     |   |
|                     |   |

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