

MORA HE

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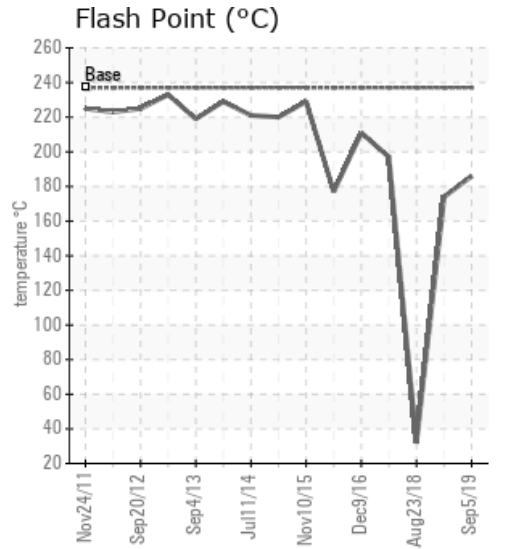
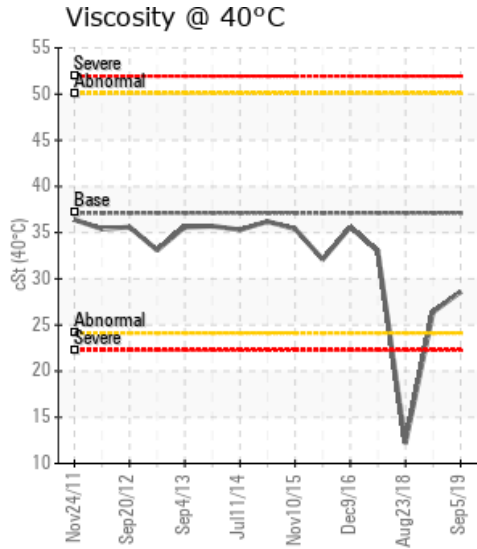
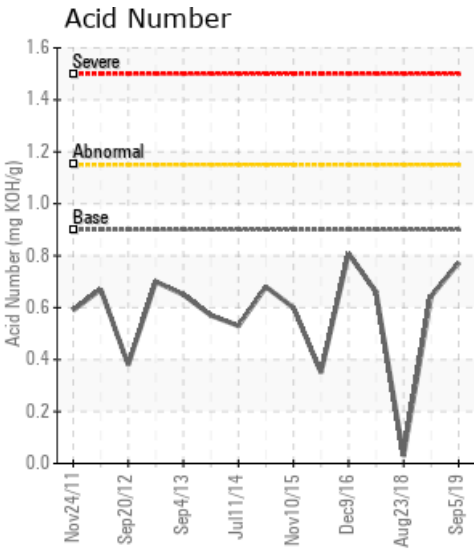
System Information
 System Volume: 800 ltr
 Bulk Operating Temp: 300F / 149C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PURITY FG HEAT TRANSFER FLUID
 Make:

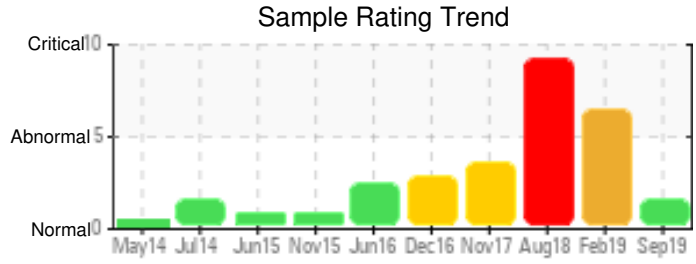
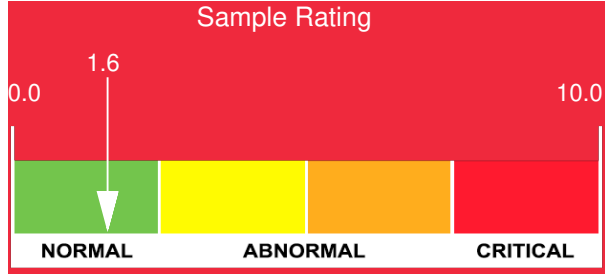
Sample Information
 Lab No: 02307722
 Analyst: Philip Riley
 Sample Date: 09/05/19
 Received Date: 09/11/19
 Completed: 09/15/19

Recommendation: Marginally low on COC Flash Pt, bu tmay be carryover from previous oil charge. Short sampling frequencies evident and recommend sample again on the current short frequency to monitor oil condition

Comments: COC Flash Point is abnormally low. (GCD) 90% Distillation Point is marginally high.

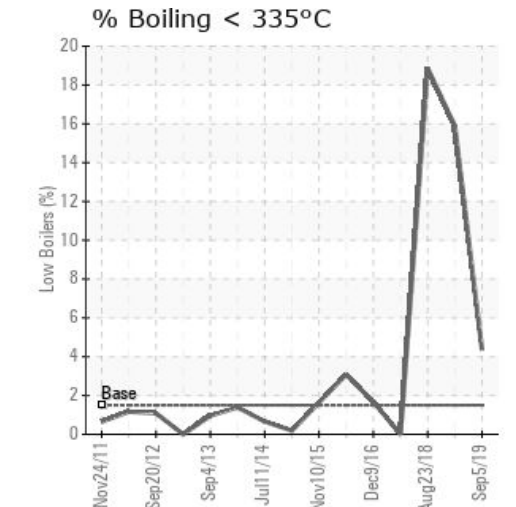
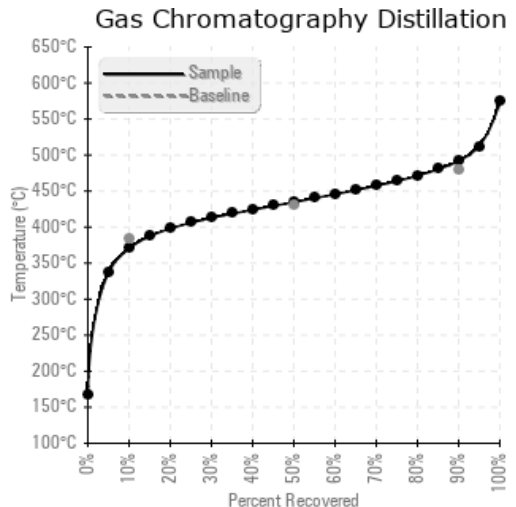
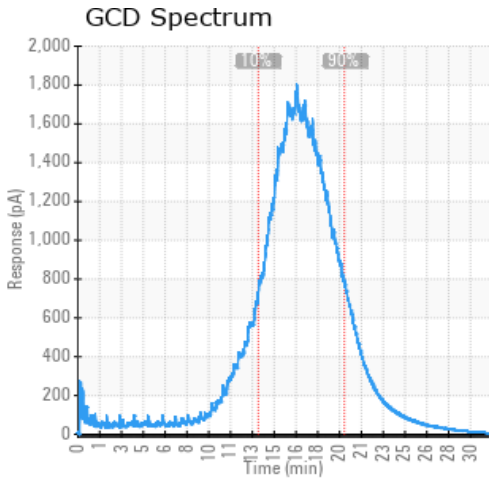
| Sample Date | Received Date | Fluid Age | Sample Location | Flash Point (COC) | Water (KF) | Viscosity (40°C) | Acid Number | Solids | GCD 10% | GCD 50% | GCD 90% | GCD % < 335°C |
|---------------|---------------|-----------|-----------------|-------------------|------------|------------------|-------------|--------|-----------|-----------|-----------|---------------|
| | mm/dd/yy | | | °F/°C | ppm | cSt | mg/KOH/g | %wt | °F/°C | °F/°C | °F/°C | % |
| 09/05/19 | 09/11/19 | 9m | | 367 / 186 | 26.5 | 28.6 | 0.773 | 0.084 | 699 / 370 | 814 / 435 | 917 / 492 | 4.37 |
| 02/21/19 | 02/26/19 | 3m | | 345 / 174 | 11.2 | 26.4 | 0.644 | 0.121 | 484 / 251 | 781 / 416 | 909 / 487 | 15.89 |
| 08/23/18 | 08/28/18 | 7m | | 90 / 32 | 51.9 | 12.2 | 0.03 | 0.094 | 486 / 252 | 768 / 409 | 864 / 462 | 18.86 |
| 11/24/17 | 11/29/17 | 7m | | 387 / 197 | 30.7 | 33.0 | 0.660 | 0.211 | 732 / 389 | 813 / 434 | 895 / 479 | 0.00 |
| 12/09/16 | 12/16/16 | 6m | | 412 / 211 | 15.3 | 35.6 | 0.808 | 0.065 | 721 / 383 | 822 / 439 | 946 / 508 | 1.67 |
| 06/21/16 | 06/27/16 | 5m | | 351 / 177 | 101.5 | 32.1 | 0.35 | 0.098 | 676 / 358 | 774 / 412 | 870 / 466 | 3.08 |
| Baseline Data | | | | 459 / 237 | | 37.12 | 0.90 | | 721 / 383 | 807 / 431 | 892 / 478 | 1.5 |





| 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 |
|---------------|------|----------|--------|----------|--------|------|-----|---------|--------|----------|---------|--------|-----------|----------|------------|----------|-----------|---------|-------|-----------|---------|--------|------------|------|
| 09/05/19 | 86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 157 | 6 |
| 02/21/19 | 222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 170 | 12 |
| 08/23/18 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 6 |
| 11/24/17 | 271 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 137 | 13 |
| 12/09/16 | 139 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 9 |
| 06/21/16 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 4 |
| Baseline Data | | | 0 | 0 | | | | | | 0 | | | 0 | 0 | | | | | 0 | | | | 230 | |

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



| Historical Comments | |
|---------------------|--|
| 02/21/19 | This follows the critical sample recently which I am aware was addressed. The flash point is very low, the GC shows evidence of light ends and cracking. If the fluid cannot be recovered safely I would recommend a change, including a clean and flush with appropriate products. Iron ppm levels are abnormal. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. (GCD) % < 335°C is abnormally high. |
| 08/23/18 | *** NOTE: This sample represents a severe fire hazard. Please notify the customer urgently! ***Product must be changed immediately. Although we believe the system is not in use currently, the oil must be changed ahead of re-start. The flash point is dangerously low and as such presents a serious hazard. (GCD) % < 335°C is severely high. (GCD) 10% Distillation Point is severely low. COC Flash Point is severely low. Visc @ 40°C is severely low. (GCD) 90% Distillation Point is abnormally low. |
| 11/24/17 | Flash point slightly low and build up of iron particles showing high wear. Within condemnation limits on both parts but the fluid has significantly deteriorated since last sample. Similar degradation will require oil change in 12 months time unless filtration is used to try and reduce particles and wear, it may extend fluid life beyond the next 12 months PQ levels are abnormal. Iron ppm levels are abnormal. COC Flash Point is marginally low. |
| 12/09/16 | Higher than expected levels of Iron reported. Try to detect where the Iron is originating from as this will cause the oil to deteriorate. Oil appears to be acceptable for further use at this time. Suggest sample at next scheduled maintenance interval. Iron ppm levels are abnormal. (GCD) 90% Distillation Point is severely high. |
| 06/21/16 | COC Flash Point tested twice: 177°C and 178°C. There are some low boilers present - remove low boilers if possible. Oil is fit for further service. Suggest sample at next scheduled maintenance interval. COC Flash Point is severely low. (GCD) 90% Distillation Point is marginally low. |

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