

FAENADORA SAN VICENTE

Customer: PTRHTF60022
 TECNILUB LTD
 ALCALDE PEDRO ALARCON 726
 SAN MIGUEL
 SANTIAGO, 8900110 Chile
 Attn: Andres Hermosilla
 Tel: 1(562)273-1300
 E-Mail: andres@TECNILUB.CL

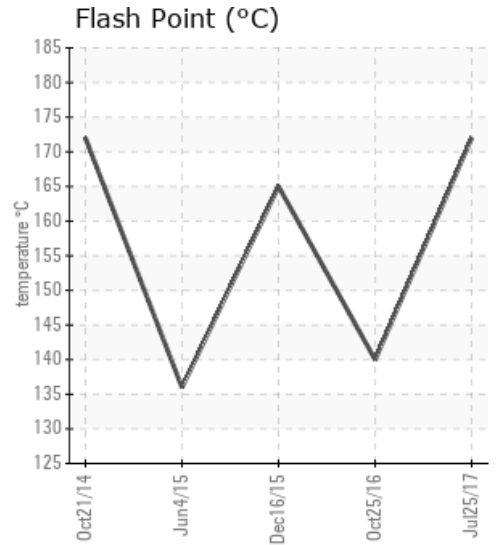
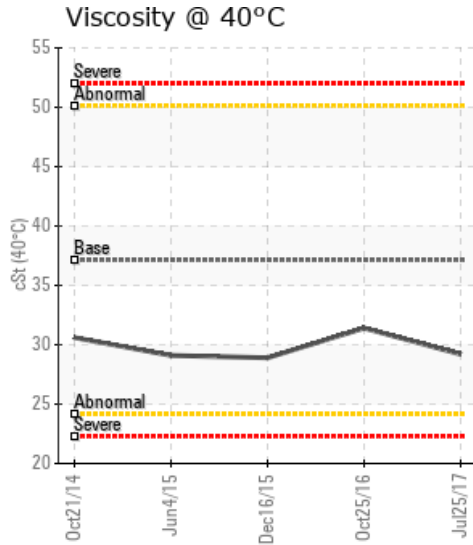
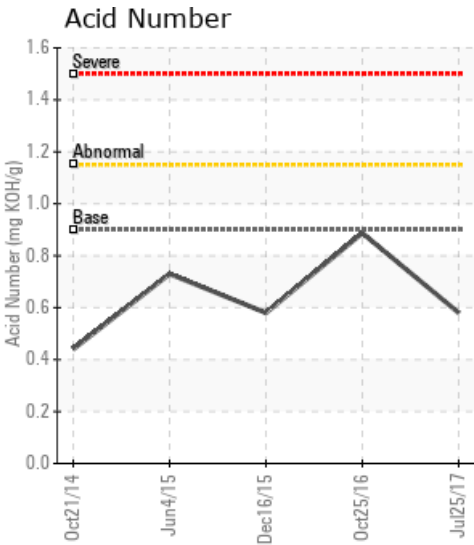
System Information
 System Volume: 5740 ltr
 Bulk Operating Temp: 608F / 320C
 Heating Source:
 Blanket:
 Fluid: PETRO CANADA PURITY FG HEAT TRANSFER FLUID
 Make: MAXTEC

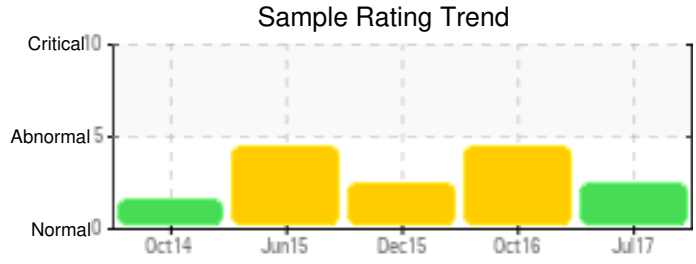
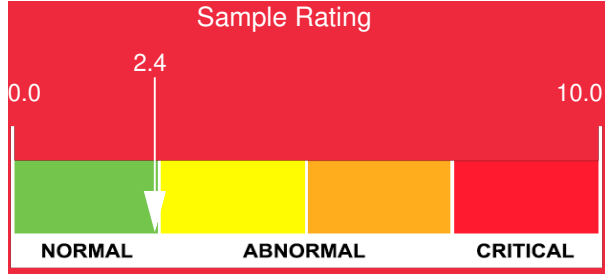
Sample Information
 Lab No: 02162596
 Analyst: Peter Hartevelde
 Sample Date: 07/25/17
 Received Date: 08/10/17
 Completed: 08/16/17
 Peter Hartevelde
 peter.hartevelde@petrocanadalsp.com

Recommendation: The fluid is in good condition and suitable for further use. It shows signs of an acceptable rate of thermal degradation considering fluid service life and operating temperature. Indications of thermal degradation are the low Flash Point in combination with slightly elevated % boil-off <335C. It is recommended to vent-off low boiler vapors to atmosphere to bring the Flash Point back to a more acceptable level. If natural gas is used as blanket gas the above can be the result of using natural gas. (N2 blanket gas will not have this effect)The fluid shows an increasing trend of Pentane Insoluble (solids) content. At this level (0.3%) this is no problem. (0.5% is the warning limit.) Please check efficiency of fluid filtration. If the system is not equipped with filters please look into ways of future fluid filtration. Please re-sample in 12 months.

Comments: COC Flash Point is severely 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	%
07/25/17	08/10/17	80500h	LLAVE DE MUESTRA	342 / 172	217.0	29.2	0.58	0.322	735 / 390	817 / 436	906 / 486	2.19
10/25/16	11/08/16	74800h	LLAVE DE MUESTRA	284 / 140	267.2	31.4	0.887	0.282	658 / 348	807 / 431	905 / 485	7.76
12/16/15	01/08/16	40856h	VALVULA DESCARGA	329 / 165	13.4	28.9	0.58	0.017	656 / 347	801 / 427	897 / 481	7.95
06/04/15	06/15/15	37400h	TAP SAMPLE	277 / 136	44.9	29.1	0.73	0.216	672 / 356	810 / 432	907 / 486	6.57
10/21/14	11/12/14	32000h	LLAVE DE MUESTRA	342 / 172	19.7	30.6	0.44	0.207	676 / 358	803 / 428	898 / 481	6.05
Baseline Data				459 / 237		37.12	0.90		721 / 383	807 / 431	892 / 478	1.5

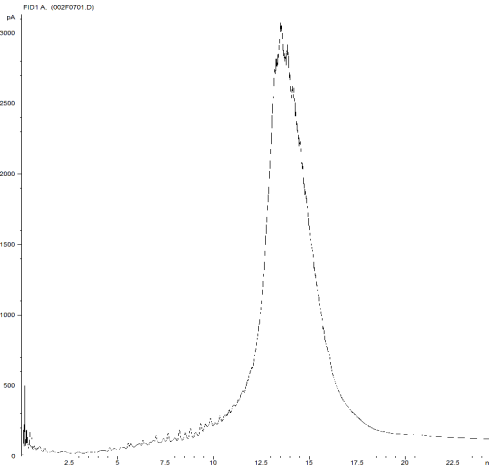




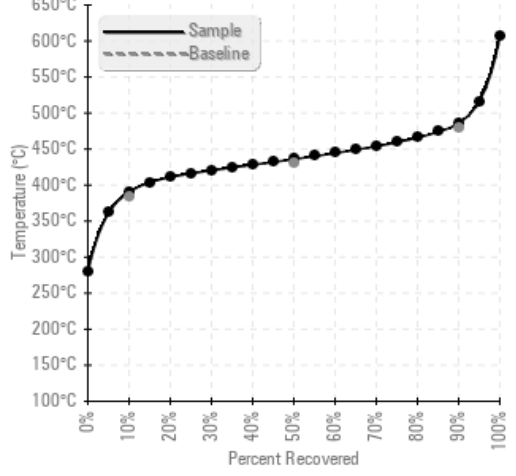
Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc	
07/25/17	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	
10/25/16	9	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	14	0
12/16/15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
06/04/15	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	15	0
10/21/14	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	19	0	
Baseline Data			0	0						0		0	0						0					230	

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

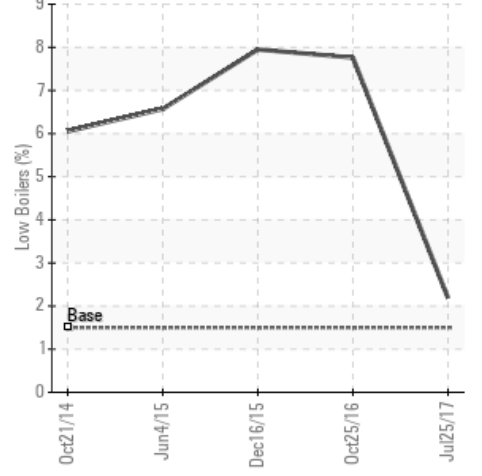
GCD Spectrum



Gas Chromatography Distillation



% Boiling < 335°C



Historical Comments	
10/25/16	Recommendation: COC Flash point is abnormally low. Presence of low boilers in the oil are confirmed by GCD 10% at 347.9°C. We recommend to follow the venting procedure through the expansion tank. All other parameters are normal. Oil can stay in service after venting of low boilers. We recommend a new sample in 6 months. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
12/16/15	The amount of low boilers is at a significant level, characterizing the level of thermal degradation or possible dilution with a lighter oil (if applicable). COC Flash Point is MARGINALLY LOW; Simulated distillation 10% boiling point is significantly low. Viscosity is SIGNIFICANTLY LOW; The oil condition remains the same, even though it appears fresh oil was added. We recommend to perform the venting procedure through the expansion tank to vent the low boilers out of the system to restore the fluid properties and the safe operation of this system. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
06/04/15	Presence of low boilers are confirmed by COC Flash Point lower than normal. Also, GCD < 335°C is marginally high and GCD 10% Distillation Point is marginally low. We recommend that customer follow the venting procedure through the expansion tank. Customer should review the heating profile if system is shut down and re-started on a regular basis. Too much energy while firing up the system can crack the molecules and generate low boilers. All other parameters are normal. Heat transfer fluid can stay in service until next sample. We recommend a new sample in 9-12 months. COC Flash Point is severely low. (GCD) % < 335°C is marginally high. (GCD) 10% Distillation Point is marginally low.
10/21/14	COC Flash point is marginally low and GCD 10% distillation point is also marginally low. This could indicate presence of low boilers in the oil. It is recommended to follow the venting procedure through the expansion tank. All other parameter are normal. Oil can stay in service until next sampling in 6 months. COC Flash Point is marginally low. (GCD) 10% Distillation Point is marginally low.

Petro-Canada makes no representation or warranty of any kind, either express or implied, as to the accuracy or completeness of the analysis and assumes no responsibility and shall have no liability whatsoever with respect to such analysis, or a party's use of it. Petro-Canada is a division of HollyFrontier Corporation.