

### [LSD-3-36-65-6W6 Bilbo] H801

**Customer: PTRHTF20245**  
 NUVISTA ENERGY LTD  
 RR 93  
 WEMBLY, AB T8W 0H6 Canada  
 Attn: Eldon Weaver  
 Tel: (780)831-5603  
 E-Mail: eweaver@nvaenergy.com

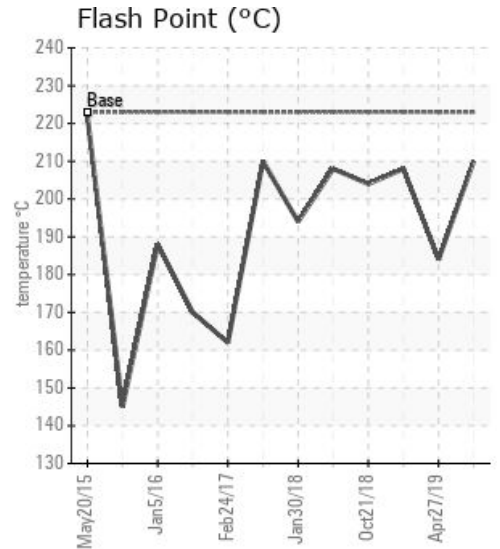
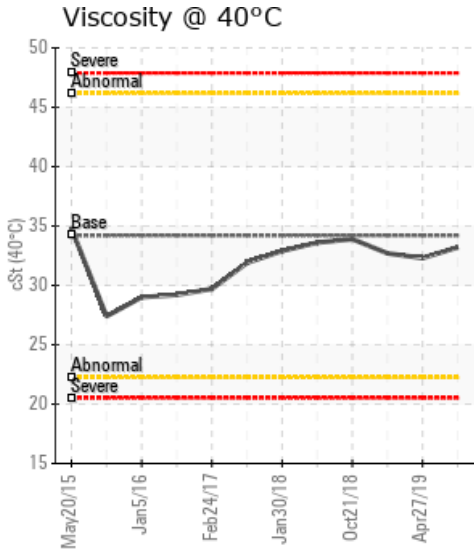
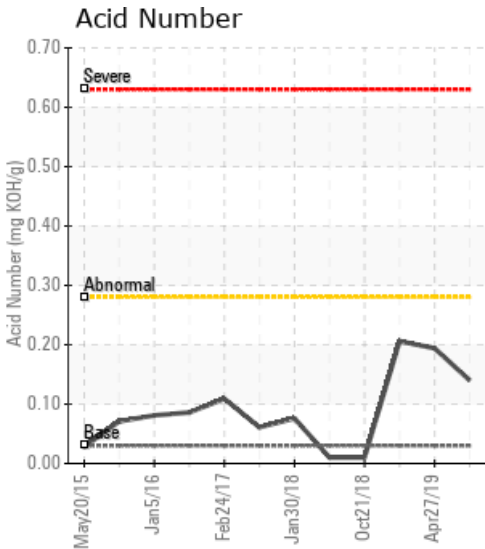
**System Information**  
 System Volume: 40000 gal  
 Bulk Operating Temp: 446F / 230C  
 Heating Source:  
 Blanket:  
 Fluid: PETRO CANADA PETRO-THERM  
 Make: ALCOE

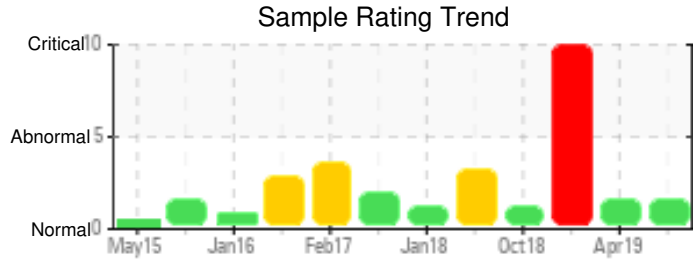
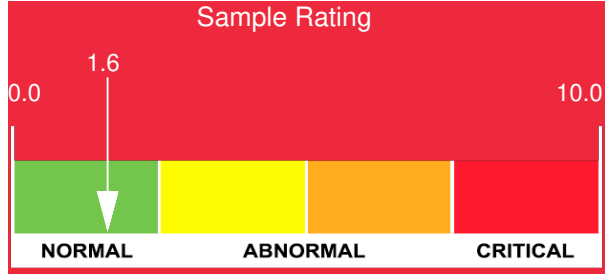
**Sample Information**  
 Lab No: 02397476  
 Analyst: Clinton Buhler  
 Sample Date: 10/10/20  
 Received Date: 01/14/21  
 Completed: 01/18/21  
 Clinton Buhler  
 Clinton.Buhler@PetroCanadaLSP.com

Recommendation: Fluid analysis results would appear to indicate that the heating fluid is in suitable condition for continued service. Remnants of sodium, potassium and calcium remain from previous contamination. Solids content up from last sample. Please ensure that sample valve and related tubing or piping is thoroughly purged prior to obtaining sample. Please re-sample in 6 months to monitor solids content.

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

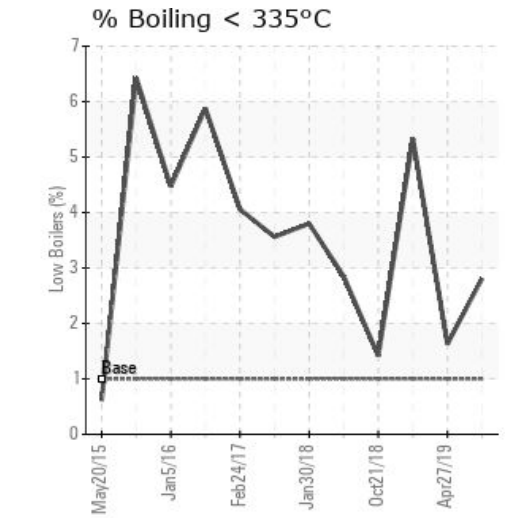
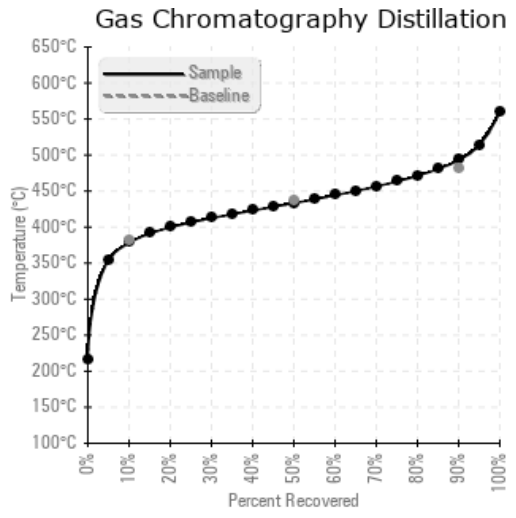
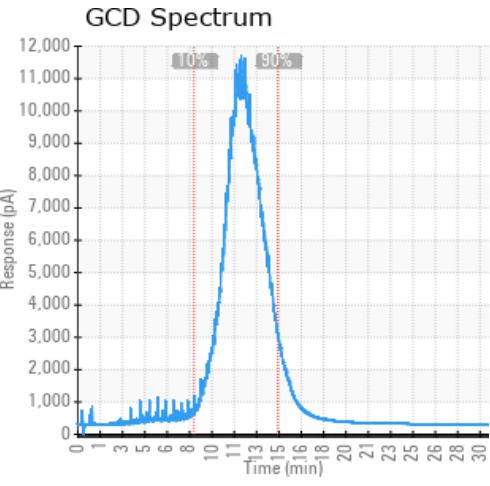
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
10/10/20	01/14/21	7y	PUMP OUTLET	410 / 210	5.8	33.2	0.14	0.503	713 / 378	812 / 433	919 / 493	2.81
04/27/19	05/09/19	5y		363 / 184	13.5	32.3	0.194	0.077	723 / 384	820 / 438	928 / 498	1.63
01/22/19	02/04/19	0y	BOTTOM OF VESSEL	406 / 208	5425.7	32.7	0.206	0.465	676 / 358	786 / 419	899 / 481	5.33
10/21/18	11/05/18	5y		399 / 204	137.8	33.9	0.01	0.289	713 / 379	809 / 432	914 / 490	1.42
04/14/18	04/24/18	0y		406 / 208	19.5	33.6	0.01	0.283	713 / 379	821 / 438	951 / 511	2.85
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
10/10/20	11	0	0	0	0	0	0	0	0	0	0	7	18	0	0	0	0	0	0	4	6	0	0	0
04/27/19	11	0	0	0	0	0	0	0	0	0	0	7	20	0	0	0	0	0	0	1	5	0	0	0
01/22/19	198	0	0	0	0	0	0	0	0	0	3	68	144	0	0	0	3	0	0	5	34	0	1	1
10/21/18	10	0	0	0	0	0	1	0	0	0	0	9	28	0	0	0	0	0	0	1	4	0	0	0
04/14/18	14	0	0	0	0	0	0	0	0	0	1	12	30	0	0	0	0	0	0	0	4	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	
04/27/19	Sample results are much improved compared to the previous analysis and indicate the fluid is suitable for continued service. This may indicate that the previous sample was drawn from a low spot in the system with little turbulence and the sampling piping and valves may not have been purged thoroughly. Continue periodic venting of expansion tank as part of good maintenance practices and ensure blanket gas in the expansion tank is operational except for while venting. Please re-sample in 6 months (GCD) 90% Distillation Point is abnormally high. COC Flash Point is marginally low.
01/22/19	Sample results are of concern. Iron has increased to 198ppm from 10. This, along with significant increase in Acid Number may indicate ongoing corrosion. Sodium, Potassium and Calcium have all increased along with an alarming increase in water- water at 5,425 ppm. This is a risk for fluid boil-over. Water needs to be removed from system. Venting, if safe to do so will help remove excess water. This water content may have also influenced the increase in % boil-off, now at 5.33. The excess water contamination likely has contributed to the increased AN and Iron levels. Please safely remove water from system and re-sample once venting is completed. Please ensure that sample port is near pump discharge and that a very thorough purge of the valve and related piping occurs before collecting the sample in the sample container. Please include time on oil with next sample
10/21/18	Sample results indicate that the fluid is suitable for continued service. Please note Potassium which is a contaminant in this case, however it remains fairly steady over multiple samples so ongoing contamination doesn't seem to be occurring. Please re-sample in 12 months Potassium ppm levels are abnormally high.
04/14/18	Sample results indicate that the thermal fluid is suitable for continued service. increased 90% distillation point can be an indication of fluid oxidation. Ensure blanket gas is operational. (GCD) % < 335°C value of 2.85% indicates thermal degradation of the fluid. Pentane Insolubles has increased supporting that thermal degradation has been ongoing. Please perform regular venting of thermal expansion tank to release low boiling vapors. Note that Potassium and Sodium are contaminants. Investigate source. It is understood that this sample was drawn after a re-boiler failure. Please call Petro-Canada Lubricants Technical Services to discuss next re-sample interval. Potassium ppm levels are abnormally high. (GCD) 90% Distillation Point is severely high.

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.