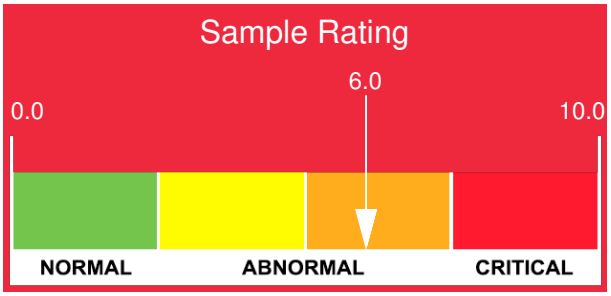
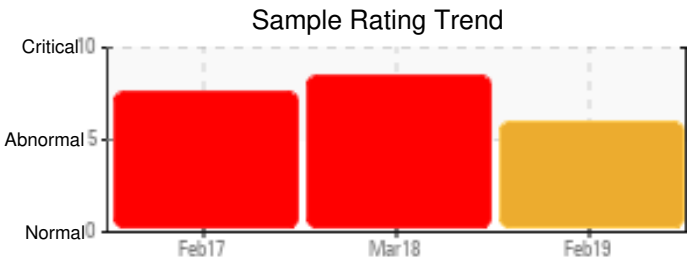




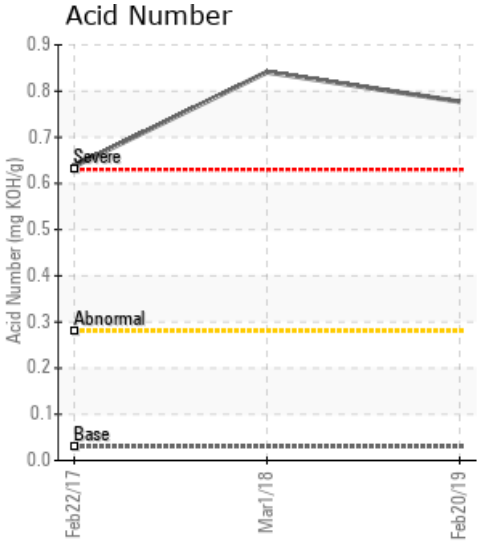
[AB 2 HOT OIL OUTLET] MAIN SYSTEM

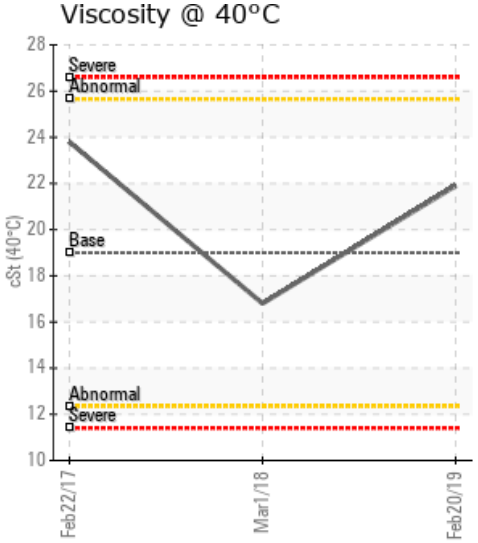
Customer: PTRHTF10183	System Information	Sample Information
Bitumar USA Inc 6000 Pennington Avenue Baltimore, MD 21226 USA Attn: Jason Rodriguez Tel: (410)454-8192 E-Mail: jason.rodriguez@bitumar.com	System Volume: 17000 gal Bulk Operating Temp: 450F / 232C Heating Source: Blanket: Fluid: MONSANTO THERMINOL 55 Make: AMERICAN HEATING	Lab No: 02269989 Analyst: Gaston Arseneault Sample Date: 02/20/19 Received Date: 02/26/19 Completed: 03/01/19

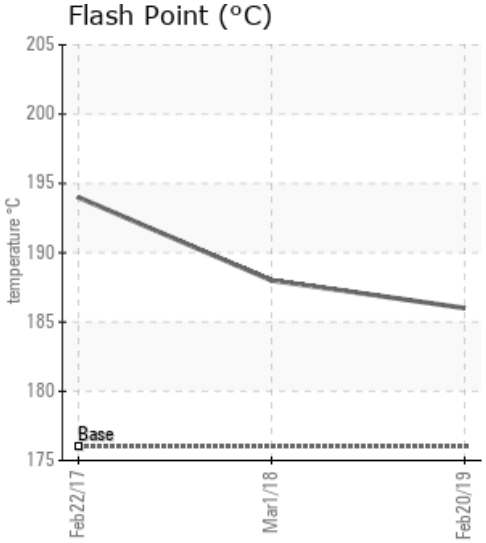
Recommendation: The properties like insoluble solids, iron and water contamination seem to be getting better which indicates significant addition of fresh Therminol 55 to the system. However, the problem identified 2 years ago of fluid degradation by oxidation remains judging by the Acid Number which stubbornly stays high through the additions of oil. An Acid Number this high for a system this size means the oil has generated a lot of oxidation products. They are what thickens the oil, accumulates in the bottom of the expansion tank and elbows and reduces the effective diameter of the piping to carry the hot oil. Our Petro-Therm is significantly less expensive so a lot more fresh oil could be added for the same cost vs Therminol 55, thus making a stronger impact in reducing the oxidation level (and acid level) of the oil. This would help maintain the integrity of the piping and maintain better flow.

Comments: Pentane Insolubles levels are abnormally high. Acid Number (AN) is severely high. (GCD) % < 335°C is marginally high.

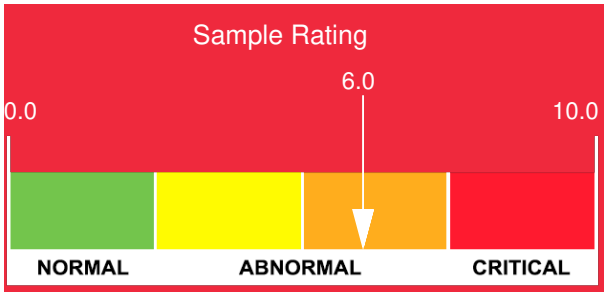
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
02/20/19	02/26/19	0y	HOT OIL HEATER	367 / 186	21.2	21.9	0.777	0.545	631 / 333	703 / 373	804 / 429	10.73
03/01/18	03/07/18	6y		370 / 188	45.8	16.8	0.841	0.673	648 / 342	717 / 381	854 / 457	5.35
02/22/17	03/03/17	5y		381 / 194	117.6	23.8	0.637	0.827	650 / 343	725 / 385	818 / 437	5.51
Baseline Data				349 / 176		19.0	0.03		655 / 346		790 / 421	3.40

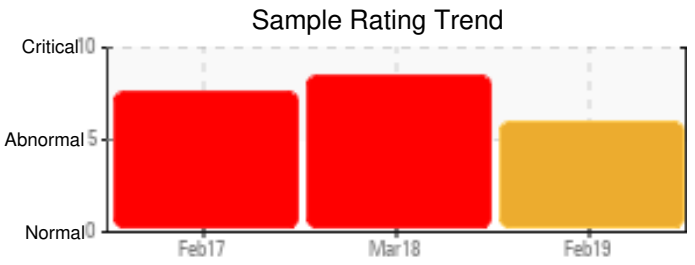






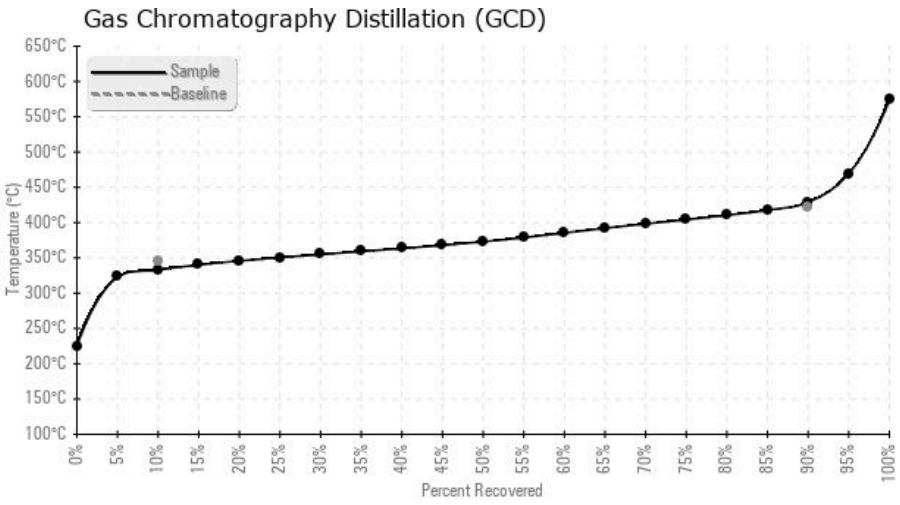
PETRO-CANADA LUBRICANTS

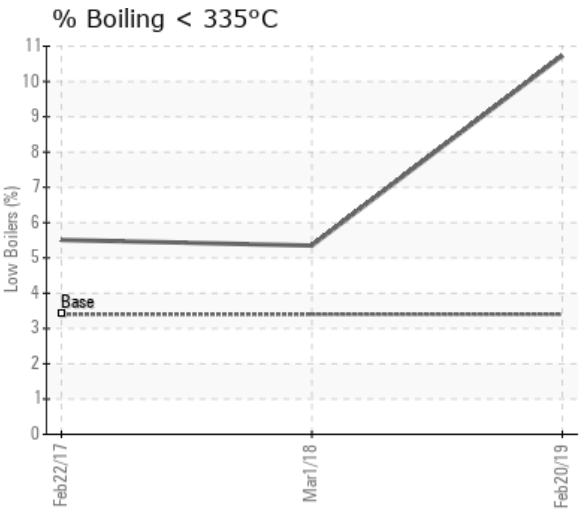




Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
02/20/19	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
03/01/18	67	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
02/22/17	139	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	2	0	0	0	1	0	0	1
Baseline Data			0	0						0			0	0					0				0	

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





Historical Comments

03/01/18	Based on the drop in Iron - 139 down to 67, Viscosity - 23.8 down to 16.8 and Solids - .827 down to .673 fresh fluid was most likely added to the system. Although we have seen the drop in these important key factors, we still see an increase in the (AN) Acid Number from .637 up to .841. By replacing 1/3 of the fluid, or approximately 6,000 to 8,000 gallons, the (AN) Acid Number could be reduced to as low as .65, which is an improvement but not optimal. New (fresh) fluid has an (AN) Acid Number of 0. Acid Number is a key component in reporting HTF condition. If the Acid Numbers are too high, (sweetening) or adding fresh new fluid may help extend the life of the fluid and lower the Acid Number, but in most cases is a temporary fix. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is severely high.
02/22/17	Results indicate a 25% increase in viscosity from 19 cSt to 23.8 cSt which will effect the efficiency of the heat transfer fluid. Vanadium is 0.00, but the results show higher solids and Pentane Insolubles at .827 Acid Number (AN) is high at .637. For small systems we would tolerate a higher Acid Number, but for a larger system we would recommend 1/3 to 1/2 of the fluid be changed out with Petro-Therm to bring the Acid Number down. The Acid Number (AN) is a measurement of the acid in the oil, which is a key component for causing the oil to degrade rapidly. This can not be filtered out, but will need to be replaced. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is abnormally high.