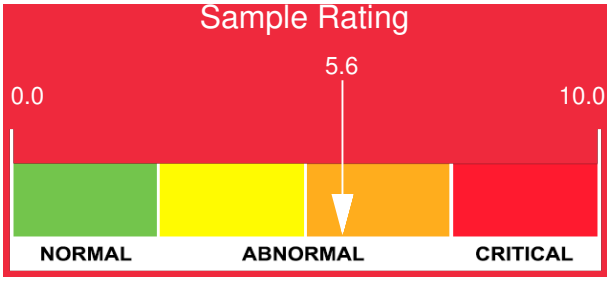
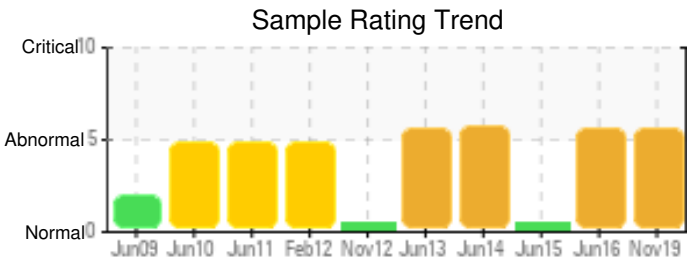




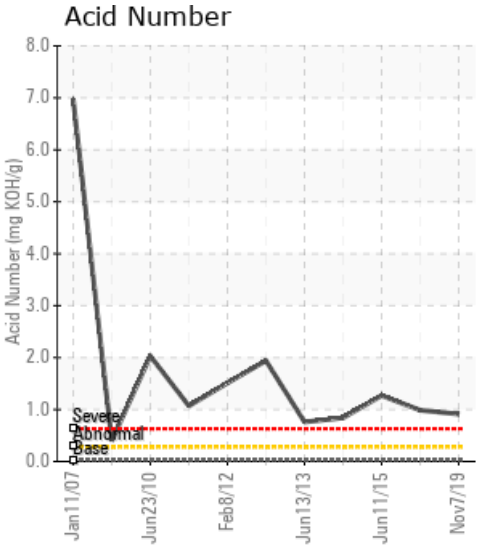
HEAT TRANSFER SYSTEM

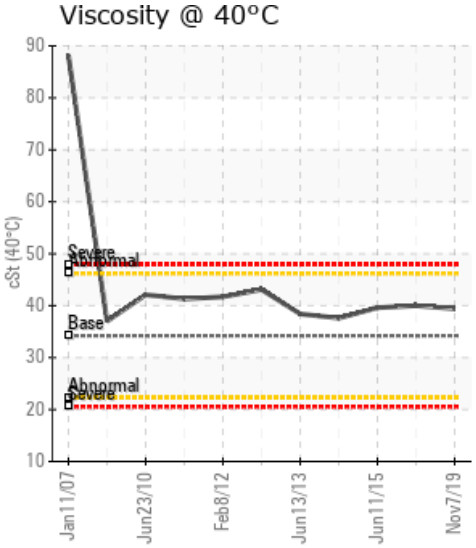
Customer: PTRHTF10025	System Information	Sample Information
LAKESIDE INDUSTRIES 8705 N.E. 117TH AVENUE VANCOUVER, WA 98662 USA Attn: Chris Merringer Tel: (360)903-3695 E-Mail: chris.merringer@lakesideindustries.com	System Volume: 450 gal Bulk Operating Temp: 330F / 166C Heating Source: Blanket: Fluid: PETRO CANADA PETRO-THERM Make: HEATEC	Lab No: 02329288 Analyst: Ron LeBlanc Sample Date: 11/07/19 Received Date: 12/30/19 Completed: 01/08/20

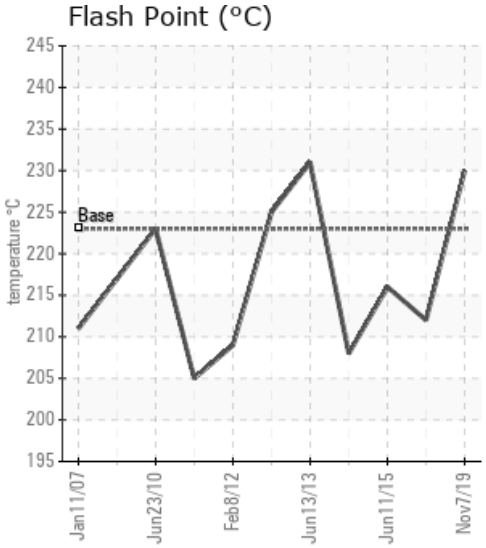
Recommendation: Iron has elevated significantly indicating a circulation pump issue. The Acid Number is elevated which indicates the fluid has been stressed. Pentane insoluble could indicate contamination causing the iron to elevate from abrasive wear in the circulating pump. .

Comments: Iron ppm levels are abnormal. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high.

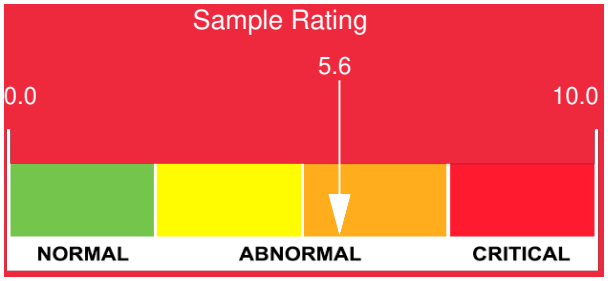
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
11/07/19	12/30/19	0y	VALVE	446 / 230	48.6	39.4	0.912	2.12	692 / 367	789 / 421	898 / 481	1.62
06/24/16	07/11/16	9y	RETURN LINE	414 / 212	21.2	40.0	0.987	1.55	713 / 378	811 / 433	927 / 497	0.91
06/11/15	07/02/15	9y	RETURN LINE	421 / 216	62.3	39.6	1.27	1.49	712 / 378	814 / 434	937 / 503	1.39
06/13/14	07/09/14	7y	RETURN LN B4 FILTER	406 / 208	53.5	37.6	0.84	0.598	694 / 368	789 / 420	912 / 489	2.37
06/13/13	07/08/13	6y	RETURN LINE B4 FLTR	448 / 231	47.4	38.4	0.760	1.60	715 / 380	810 / 432	911 / 489	0.94
Baseline Data				433 / 223		34.2	0.03		720 / 382	817 / 436	900 / 482	1.00

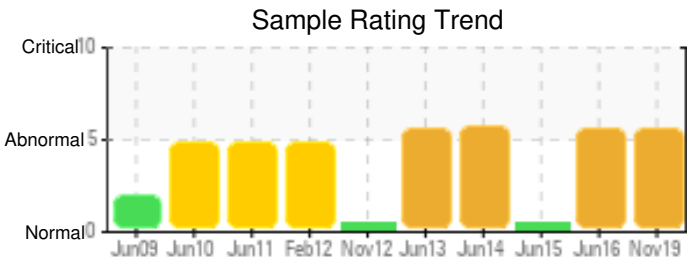






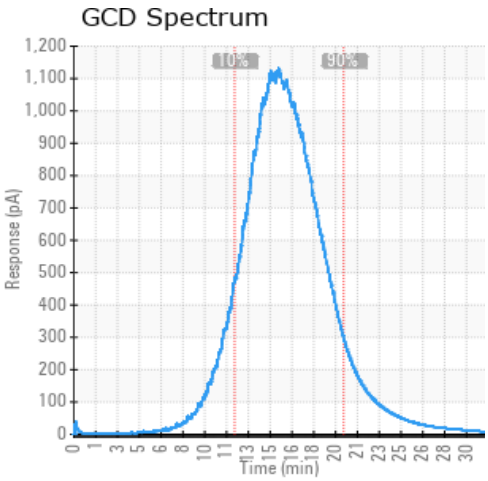
PETRO-CANADA LUBRICANTS

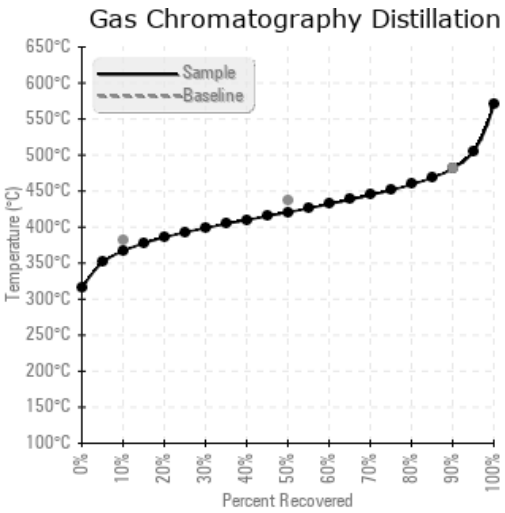


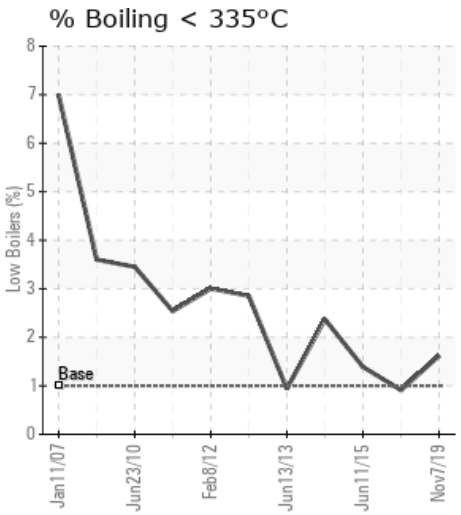


Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
11/07/19	234	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0
06/24/16	27	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
06/11/15	23	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
06/13/14	8	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
06/13/13	41	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
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

06/24/16	Pentane is high. TAN has dropped slightly from previous sample. Resample in 2 months. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high.
06/11/15	Acid Number (AN) is severely high. (GCD) 90% Distillation Point is severely high. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is severely high.
06/13/14	The oil condition deteriorated slightly since the last sample. The Acid Number is higher and considered elevated, which shows degradation by oxidation. The high solids content and high GCD 90% confirm the presence of heavy oxidation products. Things can be donw now like a sweetening (partial fluid replacement) to help delay an expensive system cleaning & flushing. But running on this fluid in this condition for months and years will eventually cause issues with flow, unecessary heat needed to do the same job (i.e. loss of heat transfer performance) and productivity. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high.
06/13/13	The oil is showing signs of improvement, probably due to a fluid top-up. The Acid number has decreased from 1.94 in Nov 2012 to 0.76, but we would still consider it high. High acid problems appear to date back to 2007. Acids form as a result of oxidation and their presence can be corrosive to the system over time. If this sample is representative of what is in the system, we recommend a partial fluid change-out help bring that acid number down. Pentane Insolubles levels are severely high. Acid Number (AN) is severely high. (GCD) 90% Distillation Point is marginally high.

