LIEBHERR
CONSTRUCTION EQUIPMENT

[[579372]] LIEBHERR HS895HD 188227 - Diesel Engine

Sample No: LH0277699

Oil Type: PETRO CANADA SUPREME 5W30

HIGGS & HIGGS
RR # 4
ST THOMAS, ON
CA N5P 3S8
Contact: Bernie Higgs

T: (519)631-4095
F: (519)631-2745

SAMPLE INFORMATION

Sample Number		**LH0277699**	LH0234997	LH0077144	LH0075061
Sample Date		**13 Oct 2023**	29 Nov 2022	20 Nov 2013	09 Sep 2013
Machine Hours		**25204**	23243	4741	4153
Oil Hours		**0**	0	0	0
Oil Changed		**N/A**	Changed	Changed	Changed
Sample Status		**ABNORMAL**	NORMAL	NORMAL	ABNORMAL

OIL CONDITION

Visc @ 40°C	cSt	**---**	---	---	106
Visc @ 100°C	cSt	**16.6**	13.4	11.9	14.7
Viscosity Index (VI)	Scale	**---**	---	---	143
Oxidation (PA)	%	**119**	47	60	63

CONTAMINATION

Water	%	**NEG**	NEG	NEG	NEG
Soot %	%	**1.5**	0.8	1.6	1.8
Nitration (PA)	%	**118**	63	63	56
Sulfation (PA)	%	**81**	55	68	66
Glycol	%	**NEG**	NEG	NEG	NEG
Fuel	%	**<1.0**	<1.0	<1.0	<1.0
Silicon	ppm	**5**	15	3	2
Sodium	ppm	**7**	6	4	6
Potassium	ppm	**8**	<1	<1	2

WEAR METALS

Iron	ppm	**72**	26	18	13
Copper	ppm	**181**	4	6	18
Lead	ppm	**7**	2	<1	1
Tin	ppm	**2**	<1	<1	<1
Aluminum	ppm	**3**	3	3	2
Chromium	ppm	**3**	1	<1	<1
Molybdenum	ppm	**83**	22	5	1
Nickel	ppm	**2**	<1	<1	<1
Titanium	ppm	**0**	<1	0	<1
Silver	ppm	**<1**	0	0	<1
Manganese	ppm	**<1**	<1	<1	0
Vanadium	ppm	**0**	0	0	0

ADDITIVES

Calcium	ppm	**1446**	2035	2239	2398
Magnesium	ppm	**1283**	318	95	34
Zinc	ppm	**1585**	1095	1179	1414
Phosphorus	ppm	**1210**	1020	968	997
Barium	ppm	**1**	0	0	<1
Boron	ppm	**11**	4	3	3

Diagnosis

Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition.Copper ppm levels are noted. In the absence of other significant wear metals, suspect copper due to sources other than wear (i.e. cooling core). All other component wear rates are normal. Elevated aluminum (Al) and/or lead (Pb) and potassium (K) levels in your metals analysis are likely a result of solder flux release into the lubricant and is common on new equipment/components. There is no indication of any contamination in the oil. Viscosity of sample indicates oil is within SAE 50 range, advise investigate. This plus the additive levels indicates that this is not the same brand, or type of oil as reported. The condition of the oil is acceptable for the time in service.

Depot: HIGSTT
Unique No: 5658554
Signed: Kevin Marson
Report Date: 17 Oct 2023

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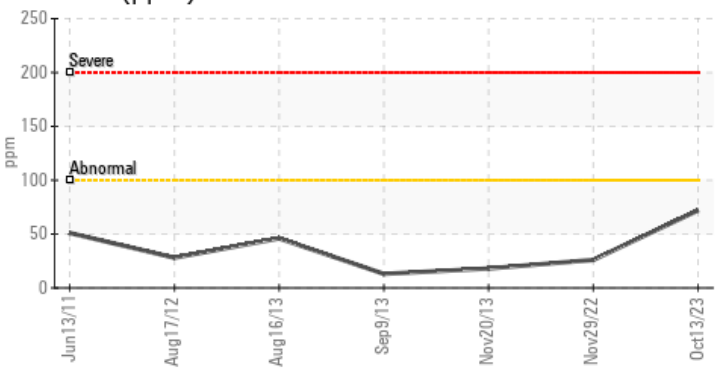
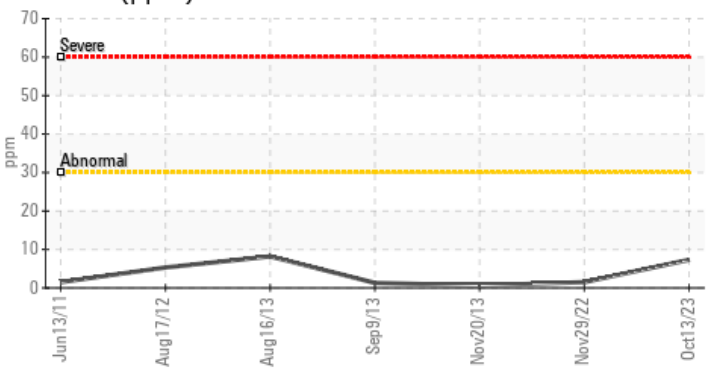
GRAPHS

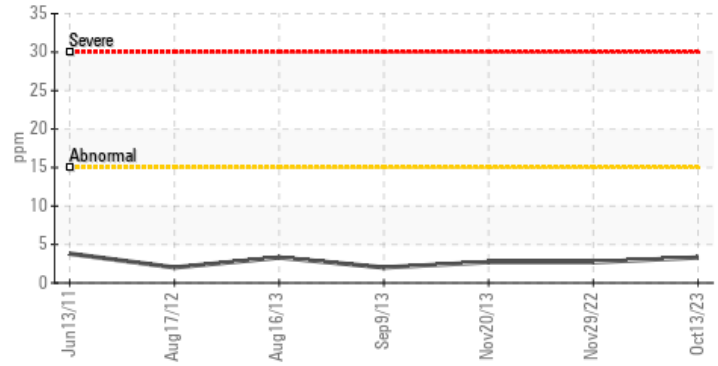
Iron (ppm)



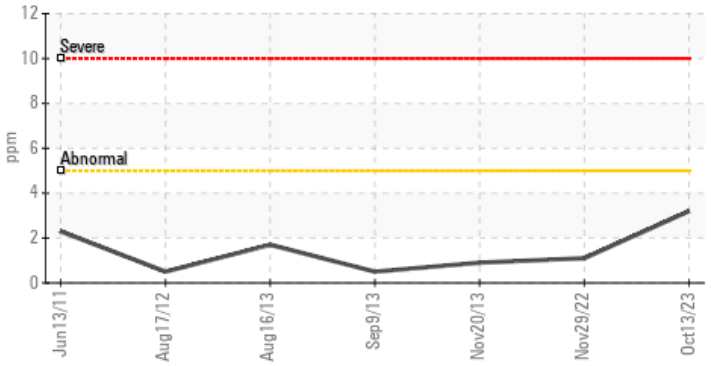
Lead (ppm)



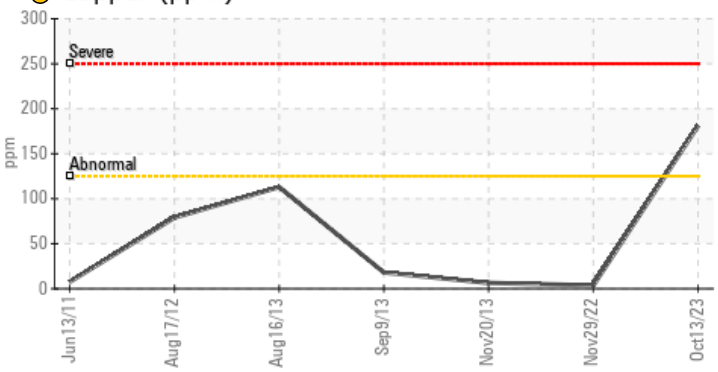
Aluminum (ppm)



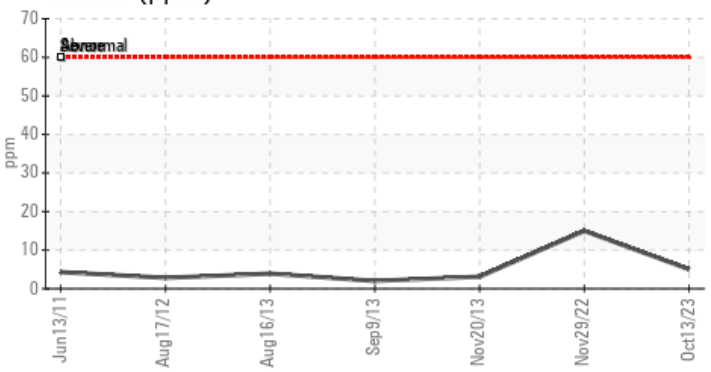
Chromium (ppm)



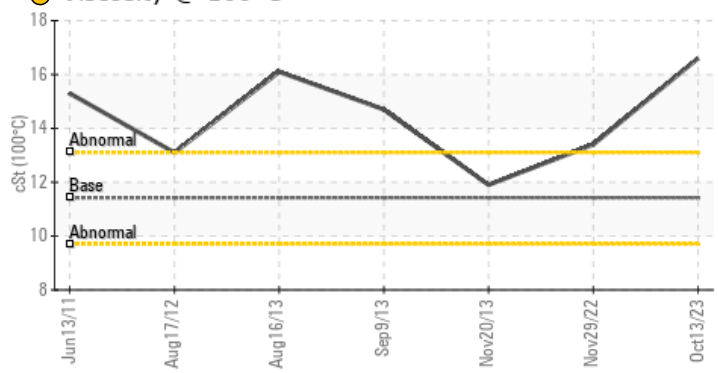
Copper (ppm)



Silicon (ppm)



Viscosity @ 100°C



Soot %