LIEBHERR
CONSTRUCTION EQUIPMENT

[RICHMOND STEEL] LIEBHERR R936 040309-1148 - Diesel Eng

Sample No: LH0192087

Oil Type: SAE 10W40

RICHMOND STEEL RECYCLING
11760 MITCHELL ROAD
RICHMOND, BC
CA V6V 1V8
Contact: Aaron Kaetler
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T:
F: (604)324-8617

SAMPLE INFORMATION

Sample Number		**LH0192087**	LH0119396	LH0092909	LH0092959
Sample Date		**17 Nov 2021**	07 May 2018	18 Aug 2016	25 Feb 2016
Machine Hours		**8375**	4983	1901	1139
Oil Hours		**0**	0	0	0
Oil Changed		**Changed**	Changed	Changed	Changed
Sample Status		**SEVERE**	NORMAL	NORMAL	NORMAL

OIL CONDITION

Visc @ 40°C	cSt	**---**	---	137	---
Visc @ 100°C	cSt	**12.6**	14.7	16.3	16.0
Viscosity Index (VI)	Scale	**---**	---	126	---
Base Number (BN)	mg KOH/g	**---**	---	---	7.11
Oxidation (PA)	%	**73**	70	104	101

CONTAMINATION

Soot %	%	**1.2**	0.7	1.7	1.4
Nitration (PA)	%	**100**	69	115	111
Sulfation (PA)	%	**75**	63	90	83
Glycol	%	**NEG**	NEG	NEG	NEG
Fuel	%	**<1.0**	<1.0	<1.0	<1.0
Silicon	ppm	**10**	10	11	11
Sodium	ppm	**3**	3	4	4
Potassium	ppm	**4**	2	2	3

WEAR METALS

Iron	ppm	**88**	10	51	39
Copper	ppm	**11**	7	21	57
Lead	ppm	**22**	<1	11	5
Tin	ppm	**2**	<1	<1	1
Aluminum	ppm	**60**	6	9	10
Chromium	ppm	**5**	<1	<1	<1
Molybdenum	ppm	**42**	89	97	95
Nickel	ppm	**<1**	<1	<1	<1
Titanium	ppm	**0**	<1	0	0
Silver	ppm	**<1**	<1	<1	<1
Manganese	ppm	**2**	<1	<1	<1
Vanadium	ppm	**<1**	<1	<1	<1

ADDITIVES

Calcium	ppm	**1744**	1518	1786	1891
Magnesium	ppm	**295**	396	450	452
Zinc	ppm	**948**	1265	1443	1430
Phosphorus	ppm	**852**	1047	1150	1143
Barium	ppm	**0**	0	<1	1
Boron	ppm	**22**	390	83	95

Diagnosis

The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition.Aluminum ppm levels are severe. Lead, chromium and iron ppm levels are abnormal. Cylinder, crank, or cam shaft wear is indicated. Ring wear is indicated. Piston wear is indicated. Bearing wear is indicated. There is no indication of any contamination in the oil. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

Depot: RIC117RIC
Unique No: 5316844
Signed: Bill Quesnel
Report Date: 19 Nov 2021

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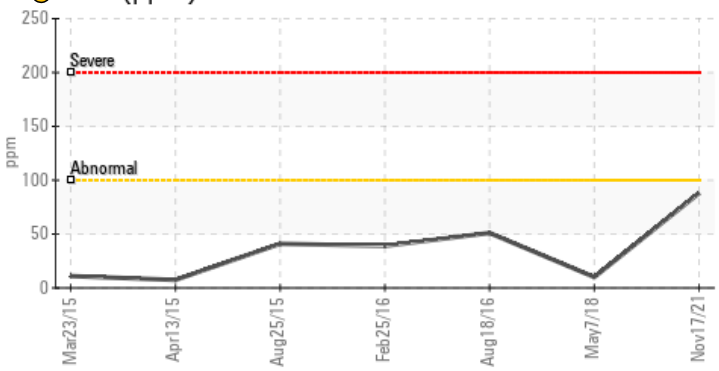
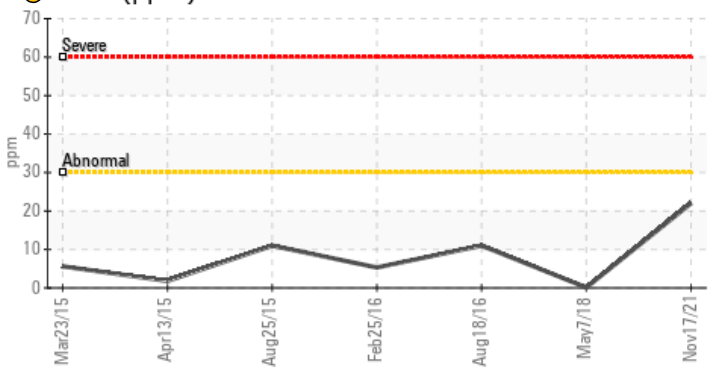
GRAPHS

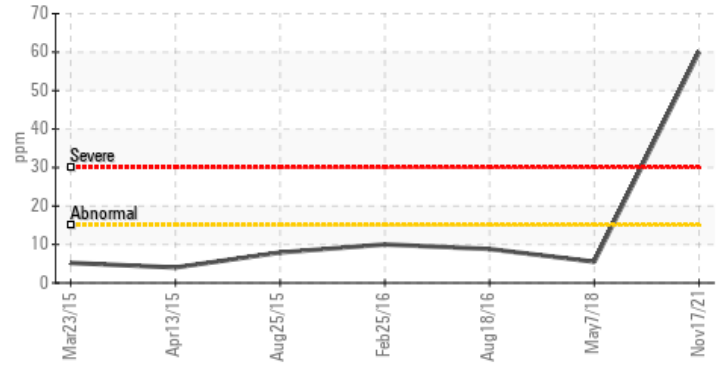
Iron (ppm)



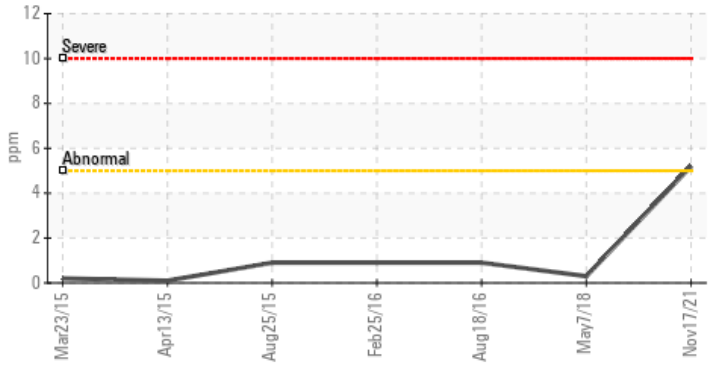
Lead (ppm)



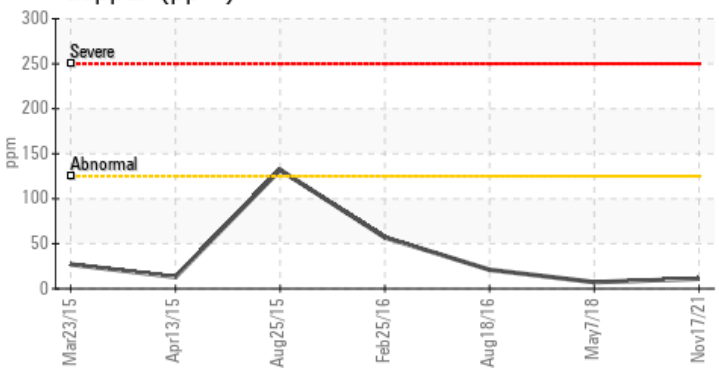
Aluminum (ppm)



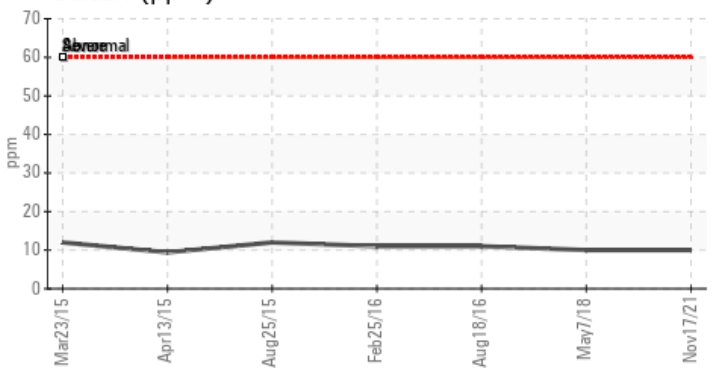
Chromium (ppm)



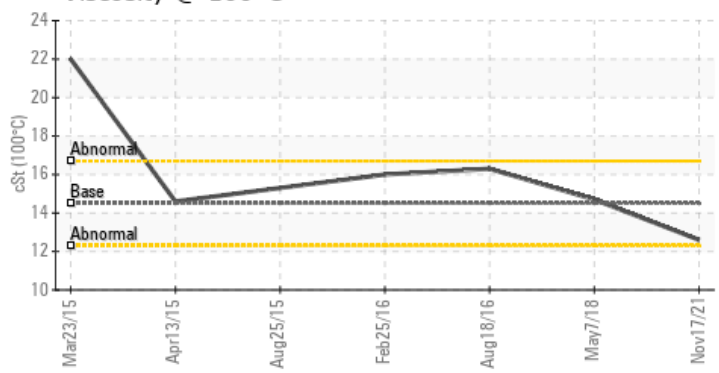
Copper (ppm)



Silicon (ppm)



Viscosity @ 100°C



Soot %