LIEBHERR
CONSTRUCTION EQUIPMENT

LIEBHERR A944C 032403-194 - Diesel Engine

Sample No: LH0244660

Oil Type: CONOCO PHILLIPS GUARDOL ECT 15W40

NILES IRON & METAL CO. INC.
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NILES, OH
US 44446
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SAMPLE INFORMATION

Sample Number		**LH0244660**	LH0244653	LH0207971	LH0244529
Sample Date		**16 Jun 2023**	12 May 2023	02 Mar 2023	09 Jan 2023
Machine Hours		**33276**	33136	32749	14552
Oil Hours		**300**	250	300	300
Oil Changed		**Changed**	Changed	Changed	Changed
Sample Status		**ATTENTION**	NORMAL	NORMAL	NORMAL

OIL CONDITION

Visc @ 100°C	cSt	**11.7**	12.5	12.5	13.2
Base Number (BN)	mg KOH/g	**6.5**	7.6	7.3	8.5
Oxidation (PA)	%	**45**	41	40	44

CONTAMINATION

Soot %	%	**0.9**	1.1	1	0.7
Nitration (PA)	%	**51**	55	55	56
Sulfation (PA)	%	**49**	52	51	51
Glycol	%	**NEG**	NEG	NEG	NEG
Fuel	%	**0.5**	<1.0	<1.0	<1.0
Silicon	ppm	**4**	3	4	4
Sodium	ppm	**0**	2	1	1
Potassium	ppm	**2**	2	1	4

WEAR METALS

Iron	ppm	**7**	6	6	4
Copper	ppm	**1**	<1	0	<1
Lead	ppm	**0**	0	0	<1
Tin	ppm	**0**	0	0	0
Aluminum	ppm	**2**	<1	<1	<1
Chromium	ppm	**0**	0	0	<1
Molybdenum	ppm	**17**	9	10	7
Nickel	ppm	**0**	0	0	0
Titanium	ppm	**13**	6	<1	1
Silver	ppm	**0**	0	0	0
Manganese	ppm	**0**	0	<1	1
Vanadium	ppm	**0**	0	0	0

ADDITIVES

Calcium	ppm	**1220**	1300	1244	1361
Magnesium	ppm	**357**	523	574	646
Zinc	ppm	**982**	1096	1137	1208
Phosphorus	ppm	**841**	890	920	968
Barium	ppm	**0**	0	0	0
Boron	ppm	**48**	53	52	70

Diagnosis

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.All component wear rates are normal. Fuel content negligible. There is no indication of any contamination in the oil. The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

Depot: NILNIL
Unique No: 10559326
Signed: Jonathan Hester
Report Date: 17 Jul 2023

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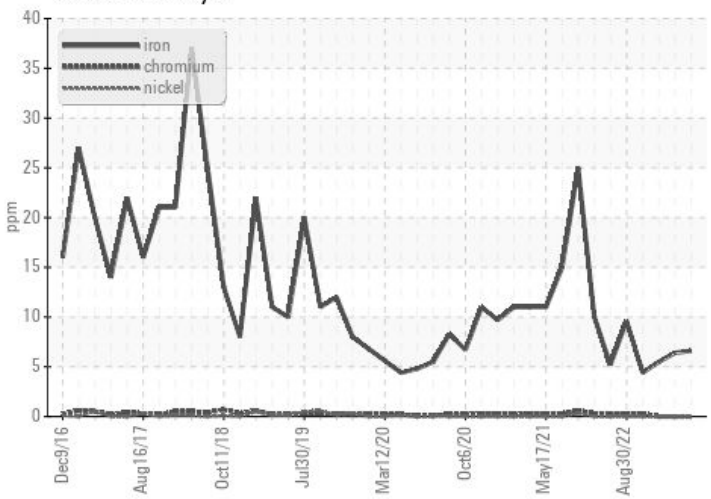
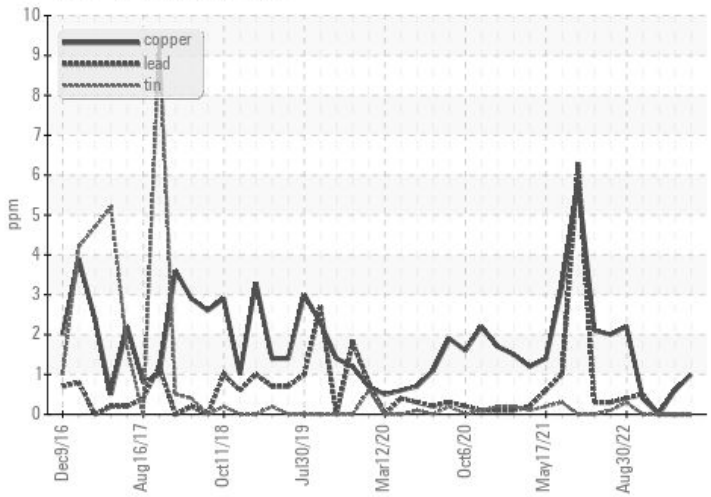
GRAPHS

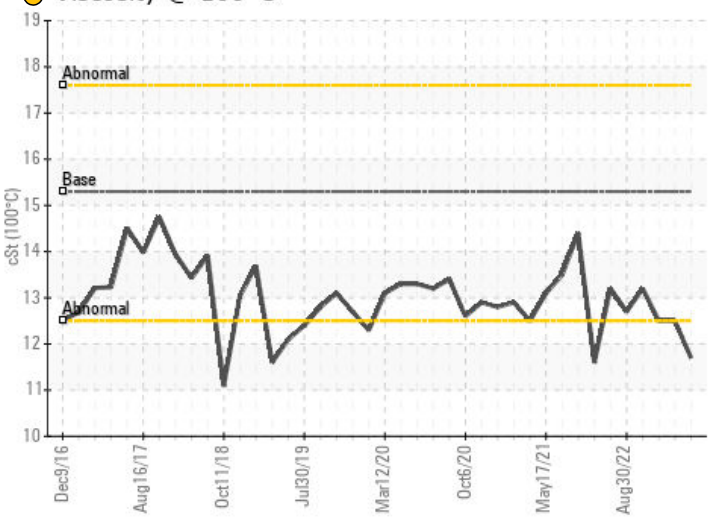
Ferrous Alloys



Non-ferrous Metals



Viscosity @ 100°C



Base Number