

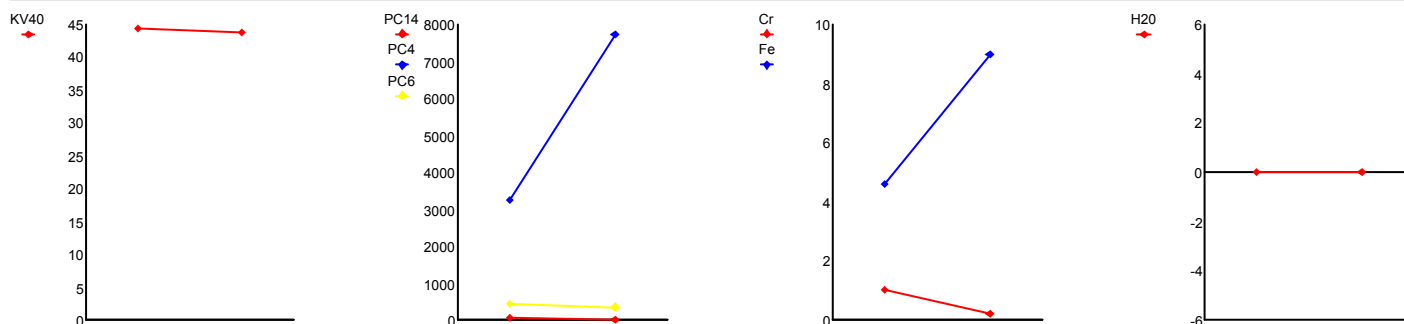
Make:	LIEBHERR	Sample No:	7568806
Model:	R922	Location:	DENBIGHSHIRE
Serial No:	1486/49965	Client:	JOHN KELLY
System:	HYDRAULIC	Kit Ref/Bottle No:	LIE425621
Brand:	LIEBHERR HYDRAULIC HVI	Job No.:	12105912
Grade:		Sampled:	06/05/21
Unique No.:	5161634	Received:	10/05/21

Diagnosis	Key:	Normal	Caution	Serious	Diagnostician: Peter Foy
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Wear appears satisfactory. No significant contamination. Advice : Monitor at the recommended sampling period.



Results		Current Sample	Historical Samples
Sample No		7568806	7462104
Status		✓	✓
Sampled		06/05/21	21/12/20
Fluid Age	HOURS		
Unit Age	HOURS	1050	612
Received		10/05/21	08/01/21
Fluid Condition			
Viscosity @ 40 °C	mm²/s	43.7	44.3
KV100	mm²/s	7.6	7.9
Appearance	-	Debris Present	Clear & Bright
Neut No.	mg KOH/g	0.86	1.44
ISO Code	-	20/16/11	19/16/12
Additives			
B (Boron)	mg/kg	0.0	4.8
Ba (Barium)	mg/kg	0.0	0.1
Ca (Calcium)	mg/kg	1345	1339
Mg (Magnesium)	mg/kg	5.1	5.8
P (Phosphorus)	mg/kg	573	551
Zn (Zinc)	mg/kg	683	678
Contamination			
Particles >4µm	particles/ml	7717	3248
Particles >6µm	particles/ml	350	415
Particles >14µm	particles/ml	13	29
Water	%	<0.1	<0.1
Na (Sodium)	mg/kg	4.1	5.2
Si (Silicon)	mg/kg	6.2	7.0
Li (Lithium)	mg/kg	0.0	1.3
Wear Metals			
Al (Aluminium)	mg/kg	0.4	0.5
Sn (Tin)	mg/kg	0.0	0.0
Pb (Lead)	mg/kg	3.3	1.2
Cu (Copper)	mg/kg	13	6.3
Fe (Iron)	mg/kg	9.0	4.6
Cr (Chromium)	mg/kg	0.2	1.0
Mo (Molybdenum)	mg/kg	0.0	0.8
Ag (Silver)	mg/kg	0.0	1.3
Ni (Nickel)	mg/kg	0.0	0.7
Mn (Manganese)	mg/kg	0.1	0.7
Ti (Titanium)	mg/kg	0.0	0.8
V (Vanadium)	mg/kg	0.0	0.7



FLUID ANALYSIS REPORT SYMBOLS & DEFINITIONS

	Normal
	Abnormal value. Monitor as advised
	Change oil
	Action required as indicated
	Oil requires cleaning or changing

Appearance	All Systems (excl. Engines)
10	Clear & Bright
20	Dark
30	Hazy
40	Cloudy
50	Emulsified
60	Free Water
70	Solid Debris
80	Solid Debris and water

VISCOSITY - the resistance to flow in a capillary tube under gravity.

FUEL DILUTION - by flash point & viscosity to detect rich mixtures & faulty injectors etc.

OIL CONDITION (OC) - arbitrary scale to measure soot, water and metals etc.

APPEARANCE (App) - arbitrary visual assessment of non-engine oils to identify visible contamination.

SOOT - by infra red light absorption indicates poor combustion, worn upper cylinders, rings.

SOOT residues to prevent blockages.

FERROUS DEBRIS (P.Q.) - arbitrary scale to detect small and large magnetic particles.

FERROGRAPHY - a microscopic study of wear particles to establish failure mode: available on request.

WATER - essential to detect coolant leaks or contamination by sea or fresh water.

BN - a measure of reserve alkalinity to protect the crankcase from acidic combustion gases.

SULPHATION - a measure of deterioration of the oil additives by sulphuric acid contamination.

AN - a measure of corrosive acidic materials in oxidised overheated oils.

OXIDATION & NITRATION - a measure of deterioration of the oil by reaction with air.

ISO CLEANLINESS CODE - a scale to indicate amount of particles in oils >4, >6 and >14 microns.

WEAR METALS - debris in oil from worn components.

ADDITIVE METALS - elements added by manufacturer to give particular properties to the oil.

CONTAMINATION METALS - elements indicative of dirt, coal & abrasive coolant residues etc.

ABBREVIATIONS

Ag - Silver	Na - Sodium
Al - Aluminium	Ni - Nickel
B - Boron	P - Phosphorus
Ba - Barium	Pb - Lead
Ca - Calcium	S = Sulphur
Cd - Cadmium	Si = Silicon
Cl - Chlorine	Sn - Tin
Cr - Chromium	Ti - Titanium
Cu - Copper	V - Vanadium
Fe - Iron	VI - Viscosity Index
K - Potassium	Zn - Zinc
Li - Lithium	RI - Refractive Index
Mg - Manganese	FAME - Fatty Acid Methyl Ester (Biofuel)
Mo - Molybdenum	

TEST

Kinematic Viscosity (KV) followed by temperature in °C Fuel
Oil Condition (OC)
Appearance (App)
Soot
Ferrous Debris / P.Q.
Water
Glycol
Base Number (TBN)
Acid Number (TAN)
Strong Acid Number (SAN)
Particle Count (ISO Code)
Initial PH

Units

Centistoke (cSt)
Normal Caution Serious
Arbitrary scale 0-100
Arbitrary scale 0-100
%
Arbitrary Scale 0-10000
% or ppm. 0.1% = 1000ppm
Normal Caution Serious, or % in mg KOH / gm
mg KOH / gm
mg KOH / gm
No. Particles / ml >4, >6, >14 microns Scale 0-14 , 7 = Neutral