

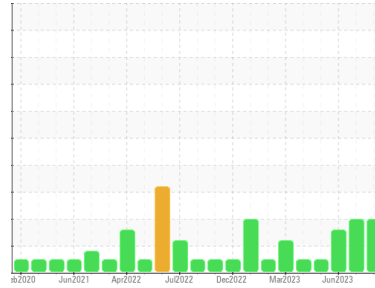


OIL ANALYSIS REPORT



Area
RIG 4
Machine Id
CATERPILLAR 3512 R4-G-02 NKL
Component
Diesel Engine
Fluid
CHEVRON 15W40 (--- GAL)

Sample Rating Trend



ISO



DIAGNOSIS

Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

There is a moderate amount of particulates present in the oil.

Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		KL0012981	KL0012766	KL0012496
Sample Date	Client Info		13 Sep 2023	28 Jul 2023	24 Jun 2023
Machine Age	days	Client Info	45180	45134	45099
Oil Age	days	Client Info	0	0	0
Oil Changed	Client Info		N/A	N/A	N/A
Sample Status			ATTENTION	ATTENTION	ATTENTION

CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>5	<1.0	<1.0	<1.0
Glycol	WC Method		NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >100	4	3	5
Chromium	ppm	ASTM D5185m >20	0	<1	<1
Nickel	ppm	ASTM D5185m >2	0	<1	0
Titanium	ppm	ASTM D5185m >2	0	0	0
Silver	ppm	ASTM D5185m >2	0	<1	0
Aluminum	ppm	ASTM D5185m >25	7	4	3
Lead	ppm	ASTM D5185m >40	0	0	<1
Copper	ppm	ASTM D5185m >330	8	7	6
Tin	ppm	ASTM D5185m >15	0	<1	<1
Vanadium	ppm	ASTM D5185m	0	<1	0
Cadmium	ppm	ASTM D5185m	0	0	0

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	389	339	406
Barium	ppm	ASTM D5185m	0	<1	0
Molybdenum	ppm	ASTM D5185m	135	135	141
Manganese	ppm	ASTM D5185m	0	<1	<1
Magnesium	ppm	ASTM D5185m	723	658	778
Calcium	ppm	ASTM D5185m	1636	1565	1783
Phosphorus	ppm	ASTM D5185m	731	684	779
Zinc	ppm	ASTM D5185m	888	852	939
Sulfur	ppm	ASTM D5185m	2543	2583	3162

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >25	5	8	8
Sodium	ppm	ASTM D5185m >50	1	2	2
Potassium	ppm	ASTM D5185m >20	0	1	2

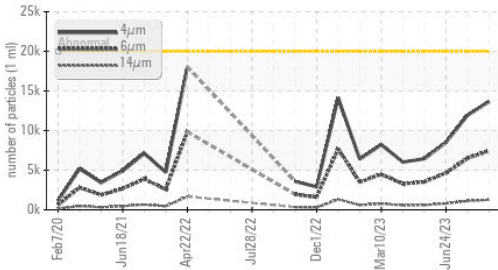
INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844 >3	0.2	0.1	0.2
Nitration	Abs/cm	*ASTM D7624 >20	7.7	6.9	7.8
Sulfation	Abs./1mm	*ASTM D7415 >30	23.9	24.2	24.7

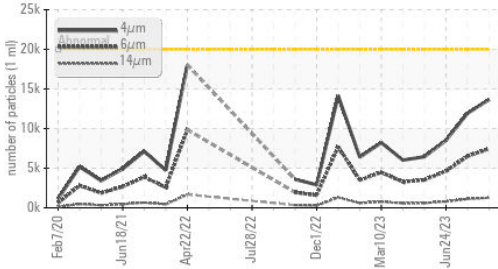


OIL ANALYSIS REPORT

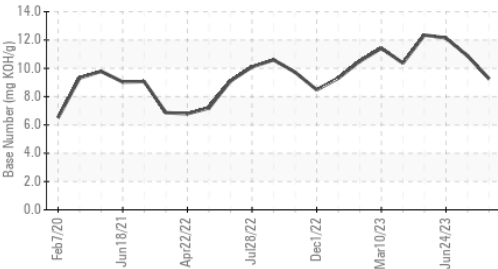
Particle Trend



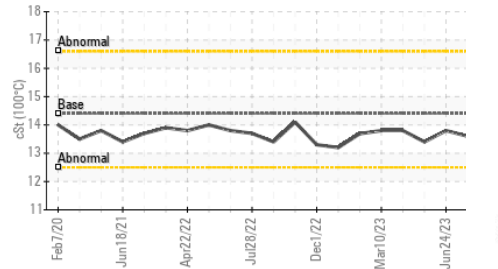
Particle Trend



Base Number



Viscosity @ 100°C



FLUID CLEANLINESS	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	>20000	13658	11927	8517
Particles >6µm	ASTM D7647	>5000	▲ 7441	▲ 6497	4640
Particles >14µm	ASTM D7647	>640	▲ 1266	▲ 1106	▲ 790
Particles >21µm	ASTM D7647	>160	▲ 427	▲ 372	▲ 266
Particles >38µm	ASTM D7647	>40	▲ 66	▲ 58	▲ 41
Particles >71µm	ASTM D7647	>10	7	6	4
Oil Cleanliness	ISO 4406 (c)	>21/19/16	▲ 21/20/17	▲ 21/20/17	▲ 20/19/17

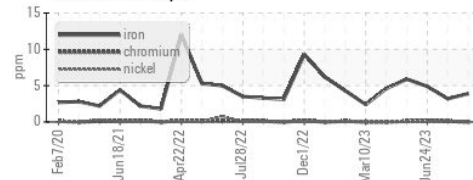
FLUID DEGRADATION	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm *ASTM D7414	>25	18.1	17.9	18.9
Base Number (BN)	mg KOH/g ASTM D2896		9.26	10.88	12.14

VISUAL	method	limit/base	current	history1	history2
White Metal	scalar *Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar *Visual	NONE	NONE	NONE	NONE
Precipitate	scalar *Visual	NONE	NONE	NONE	NONE
Silt	scalar *Visual	NONE	NONE	NONE	NONE
Debris	scalar *Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar *Visual	NONE	NONE	NONE	NONE
Appearance	scalar *Visual	NORML	NORML	NORML	NORML
Odor	scalar *Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar *Visual	>0.2	NEG	NEG	NEG
Free Water	scalar *Visual		NEG	NEG	NEG

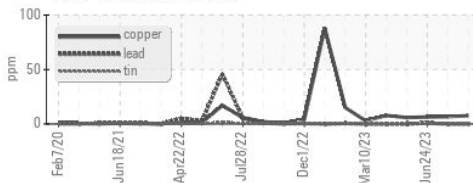
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt ASTM D445	14.4	13.4	13.6	13.8

GRAPHS

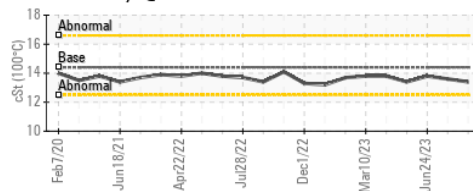
Ferrous Alloys



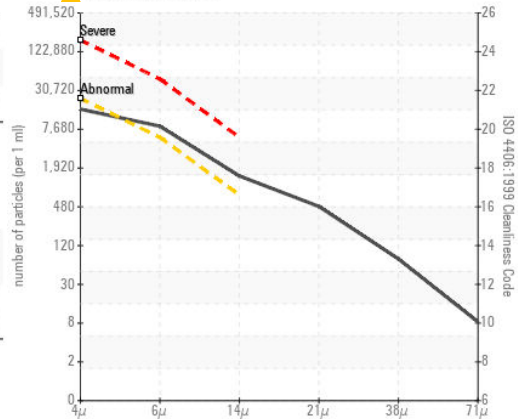
Non-ferrous Metals



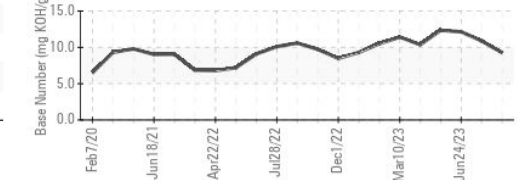
Viscosity @ 100°C



Particle Count



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0012981 **Received** : 29 Sep 2023
Lab Number : 05965533 **Diagnosed** : 04 Oct 2023
Unique Number : 10672084 **Diagnostician** : Jonathan Hester
Test Package : MOB 2 (Additional Tests: PrtCount)

To discuss this sample report, contact Customer Service at 1-800-237-1369.

* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

CITADEL DRILLING
 7550 W 120
 ODESSA, TX
 US 79763

Contact: MIKE COMBDEN
 mcombden@citadelldrilling.com

T: (780)955-5509

F: