

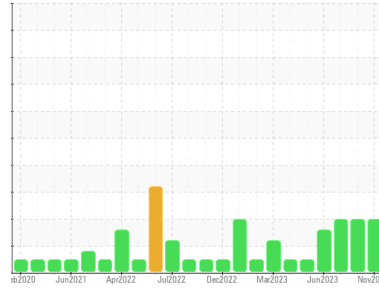


OIL ANALYSIS REPORT



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

Sample Rating Trend



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	KL0013131	KL0012981	KL0012766
Sample Date	Client Info	03 Nov 2023	13 Sep 2023	28 Jul 2023
Machine Age	days	45233	45180	45134
Oil Age	days	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
Water	WC Method >0.2	NEG	NEG	NEG
Glycol	WC Method	NEG	NEG	NEG

WEAR METALS

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

ADDITIVES

method	limit/base	current	history1	history2
Boron	ppm ASTM D5185m	345	389	339
Barium	ppm ASTM D5185m	0	0	<1
Molybdenum	ppm ASTM D5185m	129	135	135
Manganese	ppm ASTM D5185m	<1	0	<1
Magnesium	ppm ASTM D5185m	692	723	658
Calcium	ppm ASTM D5185m	1551	1636	1565
Phosphorus	ppm ASTM D5185m	732	731	684
Zinc	ppm ASTM D5185m	865	888	852
Sulfur	ppm ASTM D5185m	2535	2543	2583

CONTAMINANTS

method	limit/base	current	history1	history2
Silicon	ppm ASTM D5185m >25	6	5	8
Sodium	ppm ASTM D5185m >50	1	1	2
Potassium	ppm ASTM D5185m >20	0	0	1

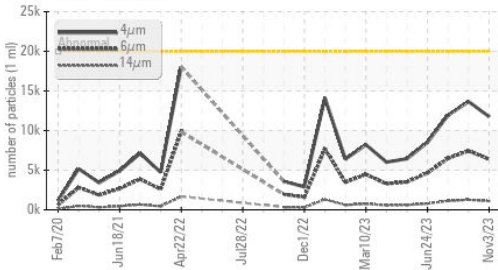
INFRA-RED

method	limit/base	current	history1	history2
Soot %	% *ASTM D7844 >3	0.1	0.2	0.1
Nitration	Abs/cm *ASTM D7624 >20	7.9	7.7	6.9
Sulfation	Abs.1mm *ASTM D7415 >30	25.0	23.9	24.2

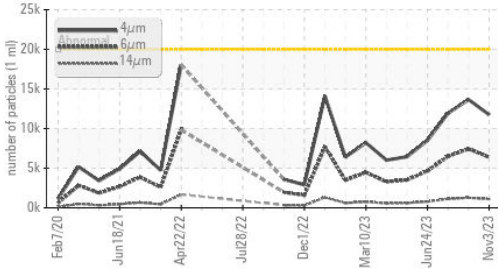


OIL ANALYSIS REPORT

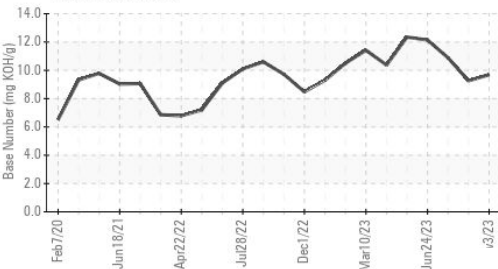
▲ Particle Trend



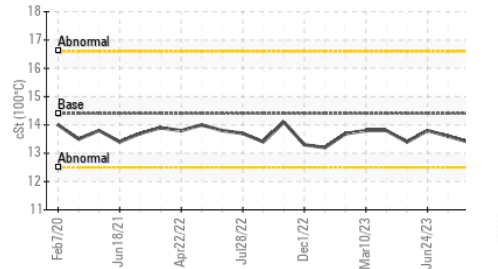
▲ Particle Trend



Base Number



Viscosity @ 100°C



FLUID CLEANLINESS method limit/base current history1 history2

Particles >4µm	ASTM D7647	>20000	11745	13658	11927
Particles >6µm	ASTM D7647	>5000	▲ 6398	▲ 7441	▲ 6497
Particles >14µm	ASTM D7647	>640	▲ 1089	▲ 1266	▲ 1106
Particles >21µm	ASTM D7647	>160	▲ 367	▲ 427	▲ 372
Particles >38µm	ASTM D7647	>40	▲ 57	▲ 66	▲ 58
Particles >71µm	ASTM D7647	>10	6	7	6
Oil Cleanliness	ISO 4406 (c)	>21/19/16	▲ 21/20/17	▲ 21/20/17	▲ 21/20/17

FLUID DEGRADATION method limit/base current history1 history2

Oxidation	Abs./1mm	*ASTM D7414	>25	19.2	18.1	17.9
Base Number (BN)	mg KOH/g	ASTM D2896		9.69	9.26	10.88

VISUAL method limit/base current history1 history2

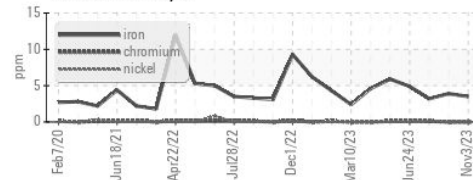
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	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

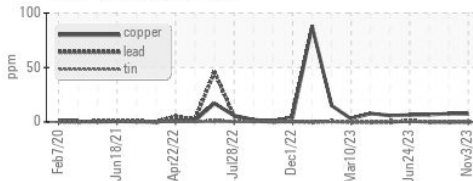
Visc @ 100°C	cSt	ASTM D445	14.4	13.4	13.4	13.6
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GRAPHS

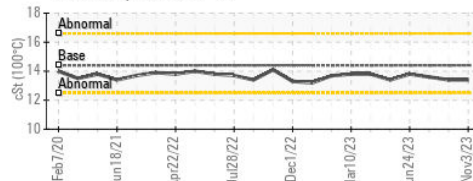
Ferrous Alloys



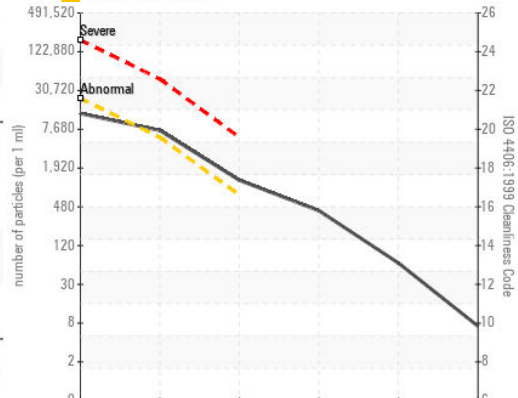
Non-ferrous Metals



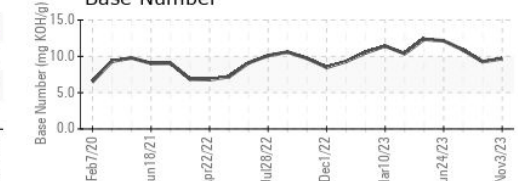
Viscosity @ 100°C



▲ Particle Count



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0013131 **Received** : 16 Nov 2023
Lab Number : 06010266 **Diagnosed** : 22 Nov 2023
Unique Number : 10749410 **Diagnostician** : Don Baldrige
Test Package : MOB 2 (Additional Tests: PrtCount)

CITADEL DRILLING
 7550 W 120
 ODESSA, TX
 US 79763

Contact: MIKE COMBDEN
 mcombden@citadelldrilling.com

T: (780)955-5509

F:

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)