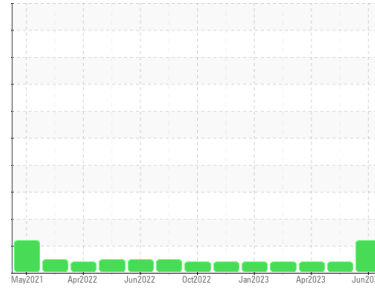




OIL ANALYSIS REPORT

Sample Rating Trend



VISCOSITY



Area
RIG 4
Machine Id
R4-TD-HYD

Component
Hydraulic System
Fluid

AW HYDRAULIC OIL ISO 32 (--- GAL)

DIAGNOSIS

Recommendation

No corrective action is recommended at this time. The filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

There is a moderate amount of silt (particulates < 14 microns in size) present in the oil.

Fluid Condition

Viscosity of sample indicates oil is within ISO 46 range, advise investigate. Confirm oil type. The AN level is acceptable for this fluid.

SAMPLE INFORMATION

method	limit/base	current	history1	history2
Sample Number	Client Info	KL0012493	KL0012459	KL0011890
Sample Date	Client Info	21 Jun 2023	19 May 2023	14 Apr 2023
Machine Age	days	45099	45063	45025
Oil Age	days	0	0	0
Oil Changed	Client Info	N/A	N/A	N/A
Sample Status		ATTENTION	ATTENTION	ATTENTION

WEAR METALS

method	limit/base	current	history1	history2	
Iron	ppm	ASTM D5185m >20	<1	0	0
Chromium	ppm	ASTM D5185m >10	0	0	0
Nickel	ppm	ASTM D5185m >10	0	0	0
Titanium	ppm	ASTM D5185m	0	<1	0
Silver	ppm	ASTM D5185m	0	0	0
Aluminum	ppm	ASTM D5185m >10	0	<1	<1
Lead	ppm	ASTM D5185m >10	<1	0	0
Copper	ppm	ASTM D5185m >75	<1	<1	0
Tin	ppm	ASTM D5185m >10	<1	0	0
Vanadium	ppm	ASTM D5185m	0	0	0
Cadmium	ppm	ASTM D5185m	0	0	0

ADDITIVES

method	limit/base	current	history1	history2	
Boron	ppm	ASTM D5185m 5	0	0	0
Barium	ppm	ASTM D5185m 5	0	0	0
Molybdenum	ppm	ASTM D5185m 5	<1	<1	1
Manganese	ppm	ASTM D5185m	<1	0	<1
Magnesium	ppm	ASTM D5185m 25	0	0	1
Calcium	ppm	ASTM D5185m 200	45	46	46
Phosphorus	ppm	ASTM D5185m 300	350	331	329
Zinc	ppm	ASTM D5185m 370	438	403	381
Sulfur	ppm	ASTM D5185m 2500	953	885	617

CONTAMINANTS

method	limit/base	current	history1	history2	
Silicon	ppm	ASTM D5185m >20	<1	<1	1
Sodium	ppm	ASTM D5185m	<1	<1	<1
Potassium	ppm	ASTM D5185m >20	2	0	0

FLUID CLEANLINESS

method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	7912	2933	1500
Particles >6µm	ASTM D7647 >1300	1585	328	168
Particles >14µm	ASTM D7647 >160	104	21	13
Particles >21µm	ASTM D7647 >40	32	6	5
Particles >38µm	ASTM D7647 >10	1	0	0
Particles >71µm	ASTM D7647 >3	0	0	0
Oil Cleanliness	ISO 4406 (c) >17/14	18/14	16/12	15/11

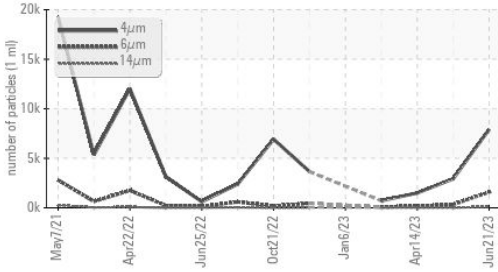
FLUID DEGRADATION

method	limit/base	current	history1	history2	
Acid Number (AN)	mg KOH/g	ASTM D8045 0.57	0.51	0.28	0.22

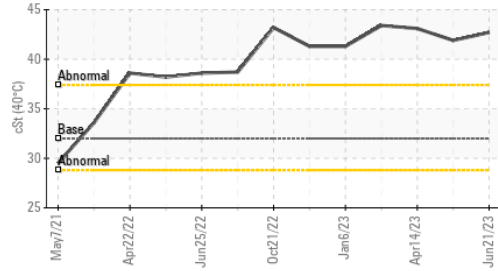


OIL ANALYSIS REPORT

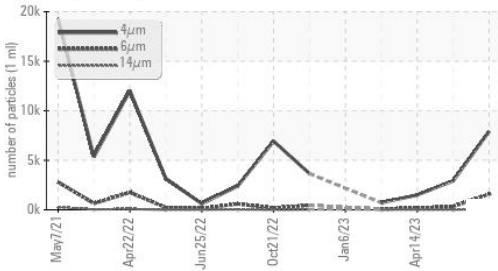
▲ Particle Trend



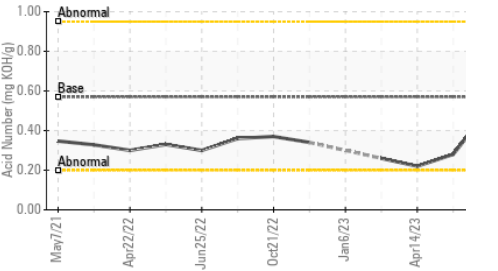
▲ Viscosity @ 40°C



▲ Particle Trend



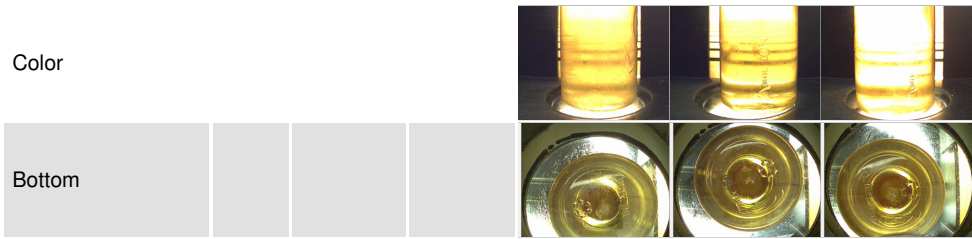
Acid Number



VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

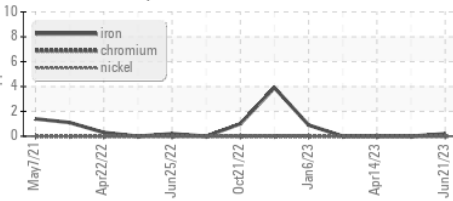
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445 32	▲ 42.7	▲ 41.9	▲ 43.1

SAMPLE IMAGES	method	limit/base	current	history1	history2
---------------	--------	------------	---------	----------	----------

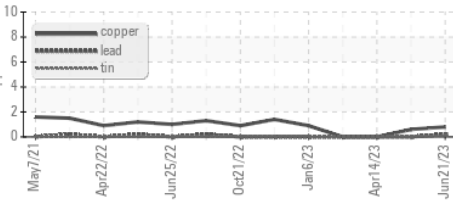


GRAPHS

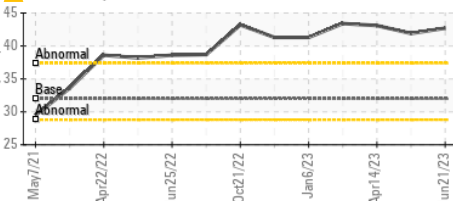
Ferrous Alloys



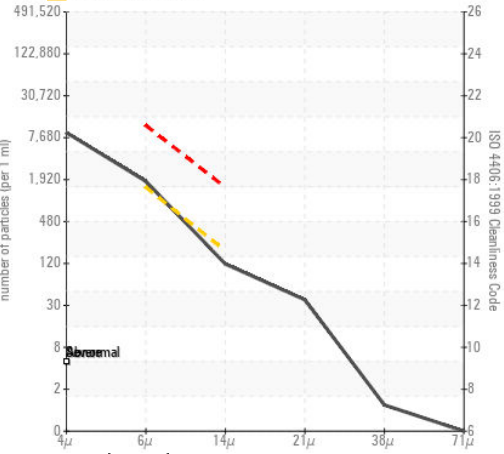
Non-ferrous Metals



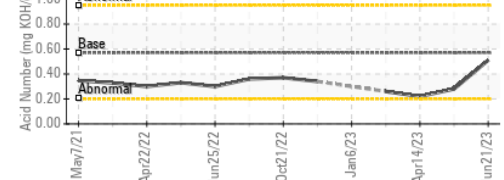
▲ Viscosity @ 40°C



▲ Particle Count



Acid Number



Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0012493 **Received** : 19 Jul 2023
Lab Number : 05902833 **Diagnosed** : 21 Jul 2023
Unique Number : 10564189 **Diagnostician** : Don Baldrige
Test Package : MOB 2

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)