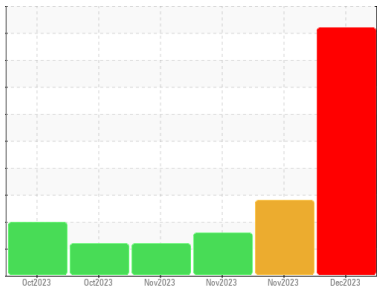
OIL ANALYSIS REPORT

Sample Rating Trend



DIRT

Area
RIG 813
Machine Id
R813-MP-02
Component
Gearbox
Fluid
GEAR OIL ISO 320 (--- GAL)

DIAGNOSIS

Recommendation
We advise that you check all areas where dirt can enter the system. We recommend an early resample to monitor this condition.

Wear
All component wear rates are normal.

Contamination
There is a moderate amount of particulates present in the oil. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress. There is a light concentration of water present in the oil.

Fluid Condition
The AN level is acceptable for this fluid.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**KL0004260**	KL0013157	KL0013162
Sample Date		Client Info		**01 Dec 2023**	21 Nov 2023	14 Nov 2023
Machine Age	hrs	Client Info		**0**	0	0
Oil Age	hrs	Client Info		**0**	0	0
Oil Changed		Client Info		**N/A**	N/A	N/A
Sample Status				**SEVERE**	ABNORMAL	ABNORMAL

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>200	**118**	29	25
Chromium	ppm	ASTM D5185m	>10	**1**	<1	<1
Nickel	ppm	ASTM D5185m	>10	**1**	<1	0
Titanium	ppm	ASTM D5185m		**4**	<1	<1
Silver	ppm	ASTM D5185m		**<1**	0	0
Aluminum	ppm	ASTM D5185m	>25	▲ **57**	5	5
Lead	ppm	ASTM D5185m	>50	**2**	1	2
Copper	ppm	ASTM D5185m	>200	**101**	78	82
Tin	ppm	ASTM D5185m	>10	**2**	<1	1
Vanadium	ppm	ASTM D5185m		**<1**	0	<1
Cadmium	ppm	ASTM D5185m		**<1**	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	50	**11**	7	2
Barium	ppm	ASTM D5185m	15	**46**	4	0
Molybdenum	ppm	ASTM D5185m	15	**0**	1	0
Manganese	ppm	ASTM D5185m		**1**	<1	<1
Magnesium	ppm	ASTM D5185m	50	**33**	14	0
Calcium	ppm	ASTM D5185m	50	**207**	52	28
Phosphorus	ppm	ASTM D5185m	350	**168**	138	126
Zinc	ppm	ASTM D5185m	100	**52**	28	31
Sulfur	ppm	ASTM D5185m	12500	**8722**	9781	8435

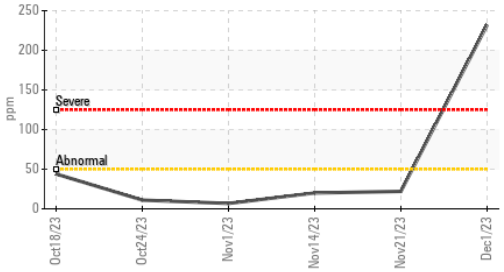
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>50	● **232**	22	20
Sodium	ppm	ASTM D5185m		**126**	▲ 263	229
Potassium	ppm	ASTM D5185m	>20	**40**	33	32
Water	%	ASTM D6304	>0.2	▲ **0.325**	▲ 0.763	▲ 0.433
ppm Water	ppm	ASTM D6304	>2000	▲ **3250**	▲ 7630	▲ 4330

FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647	>20000	**13258**	---	---
Particles >6µm		ASTM D7647	>5000	▲ **7223**	---	---
Particles >14µm		ASTM D7647	>640	▲ **1229**	---	---
Particles >21µm		ASTM D7647	>160	▲ **414**	---	---
Particles >38µm		ASTM D7647	>40	▲ **64**	---	---
Particles >71µm		ASTM D7647	>10	**7**	---	---
Oil Cleanliness		ISO 4406 (c)	>21/19/16	▲ **21/20/17**	---	---

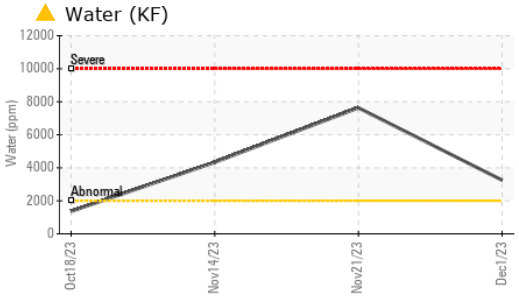
FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045	0.85	**0.32**	0.27	0.27

OIL ANALYSIS REPORT

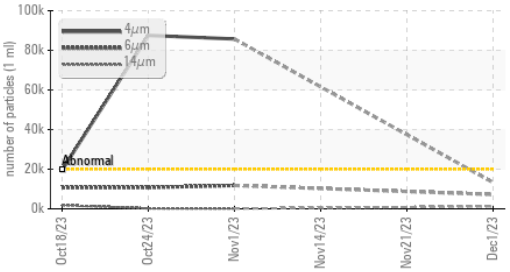
Silicon (ppm)



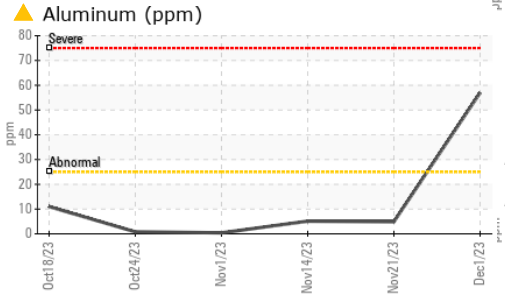
Water (KF)



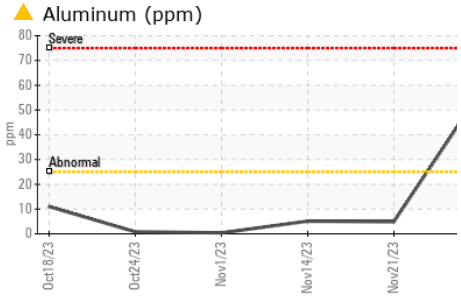
Particle Trend



Aluminum (ppm)



Aluminum (ppm)



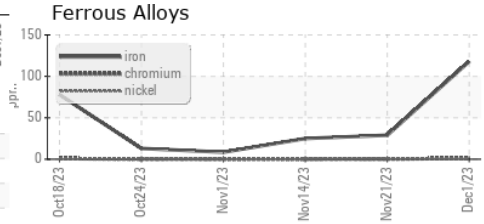
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Precipitate	scalar	*Visual	NONE	**NONE**	NONE	NONE
Silt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Debris	scalar	*Visual	NONE	**NONE**	NONE	NONE
Sand/Dirt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

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	320	**307**	306	309

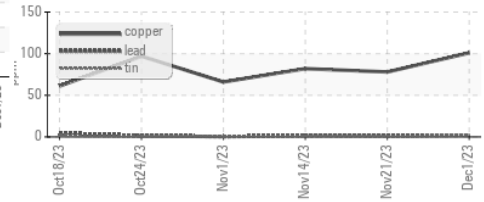
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

GRAPHS

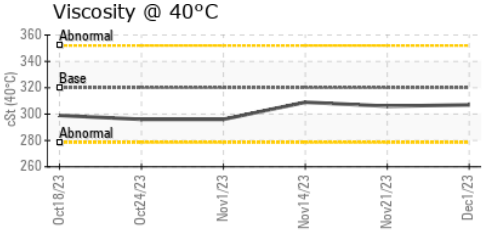
Ferrous Alloys



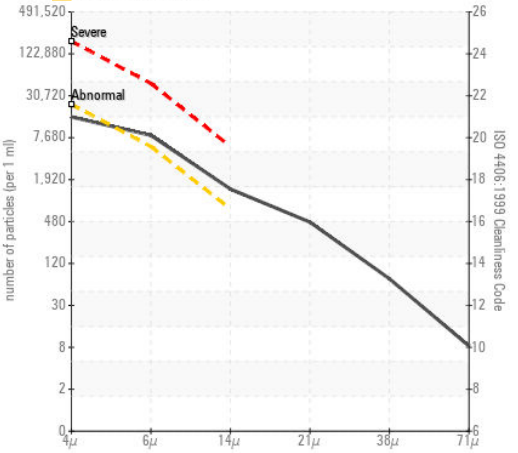
Non-ferrous Metals



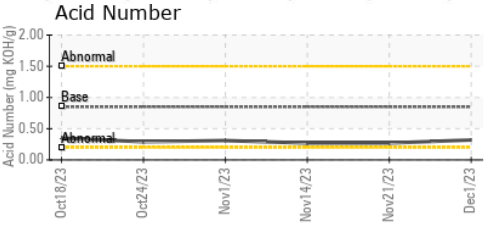
Viscosity @ 40°C



Particle Count



Acid Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0004260 **Received** : 07 Dec 2023
Lab Number : 06028659 **Diagnosed** : 14 Dec 2023
Unique Number : 10778450 **Diagnostician** : Jonathan Hester
Test Package : MOB 2 (Additional Tests: KF, 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)

PATTERSON - UTI DRILLING
9915 WEST INDUSTRIAL
MIDLAND, TX
US 79706
Contact: RICKY MATA
ricky.mata@patenergy.com
T: (832)219-4559
F: (432)561-9388

Report Id: PATMIDTX [WUSCAR] 06028659 (Generated: 12/14/2023 20:21:42) Rev: 1

Submitted By: Mike Richardson