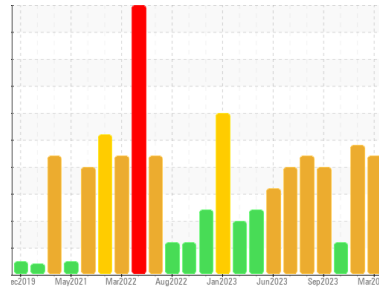




# OIL ANALYSIS REPORT

Sample Rating Trend



Area  
**RIG 1**  
 Machine Id  
**WHITE STAR 2450 R1-P-01G**  
 Component  
**Gearbox**  
 Fluid  
**GEAR OIL ISO 460 (--- GAL)**

## DIAGNOSIS

- Recommendation**  
We advise that you check all areas where dirt can enter the system. We recommend you service the filters on this component if applicable. Resample at the next service interval to monitor.
- Wear**  
Gear wear is indicated.
- Contamination**  
There is a high amount of particulates present in the oil. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.
- Fluid Condition**  
The AN level is acceptable for this fluid.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number	Client Info			<b>KL0013869</b>	KL0014024	KL0014071
Sample Date	Client Info			<b>20 Mar 2024</b>	16 Feb 2024	12 Dec 2023
Machine Age	days	Client Info		<b>45326</b>	45338	45272
Oil Age	days	Client Info		<b>0</b>	0	0
Oil Changed	Client Info			<b>N/A</b>	N/A	N/A
Sample Status				<b>ABNORMAL</b>	ABNORMAL	ABNORMAL

CONTAMINATION		method	limit/base	current	history1	history2
Water	WC Method		>0.2	<b>NEG</b>	NEG	NEG

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>200	<b>▲ 222</b>	▲ 332	191
Chromium	ppm	ASTM D5185m	>10	<b>3</b>	2	<1
Nickel	ppm	ASTM D5185m	>10	<b>2</b>	2	<1
Titanium	ppm	ASTM D5185m		<b>1</b>	1	0
Silver	ppm	ASTM D5185m		<b>0</b>	0	0
Aluminum	ppm	ASTM D5185m	>25	<b>● 26</b>	● 25	11
Lead	ppm	ASTM D5185m	>50	<b>0</b>	<1	0
Copper	ppm	ASTM D5185m	>200	<b>21</b>	51	15
Tin	ppm	ASTM D5185m	>10	<b>0</b>	0	0
Vanadium	ppm	ASTM D5185m		<b>0</b>	<1	0
Cadmium	ppm	ASTM D5185m		<b>0</b>	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	50	<b>12</b>	38	17
Barium	ppm	ASTM D5185m	15	<b>4</b>	41	14
Molybdenum	ppm	ASTM D5185m	15	<b>7</b>	12	29
Manganese	ppm	ASTM D5185m		<b>2</b>	3	<1
Magnesium	ppm	ASTM D5185m	50	<b>19</b>	56	5
Calcium	ppm	ASTM D5185m	50	<b>55</b>	176	27
Phosphorus	ppm	ASTM D5185m	350	<b>229</b>	248	214
Zinc	ppm	ASTM D5185m	100	<b>23</b>	69	6
Sulfur	ppm	ASTM D5185m	12500	<b>8836</b>	6293	7178

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>50	<b>▲ 85</b>	▲ 88	48
Sodium	ppm	ASTM D5185m		<b>108</b>	164	85
Potassium	ppm	ASTM D5185m	>20	<b>14</b>	91	4

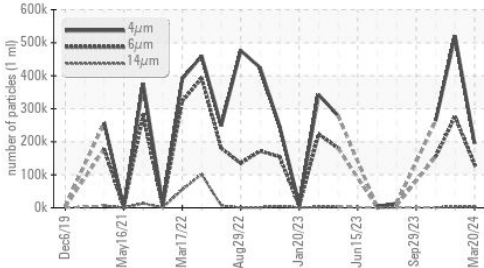
FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		<b>194912</b>	520610	263307
Particles >6µm		ASTM D7647	>5000	<b>▲ 131332</b>	▲ 276543	▲ 154296
Particles >14µm		ASTM D7647	>640	<b>▲ 2036</b>	▲ 2277	▲ 1486
Particles >21µm		ASTM D7647	>160	<b>87</b>	▲ 210	90
Particles >38µm		ASTM D7647	>40	<b>1</b>	3	1
Particles >71µm		ASTM D7647	>10	<b>0</b>	0	0
Oil Cleanliness		ISO 4406 (c)	>19/16	<b>▲ 24/18</b>	▲ 25/18	▲ 24/18

FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045	0.85	<b>0.43</b>	0.61	0.43

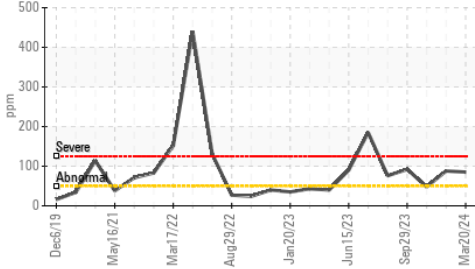


# OIL ANALYSIS REPORT

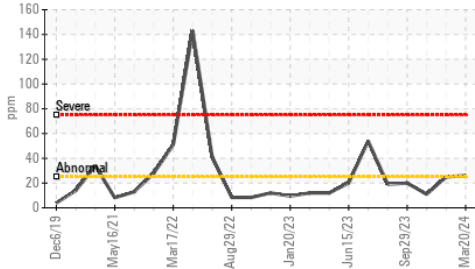
## Particle Trend



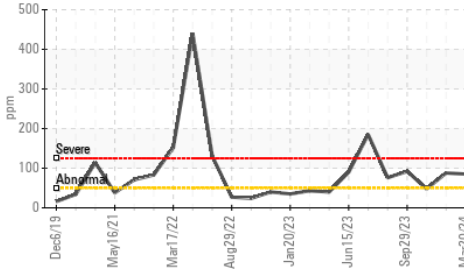
## Silicon (ppm)



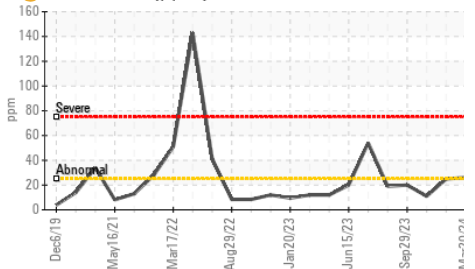
## Aluminum (ppm)



## Silicon (ppm)



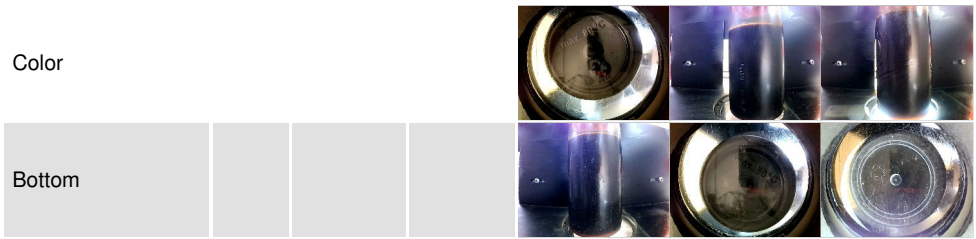
## Aluminum (ppm)



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	>0.2	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

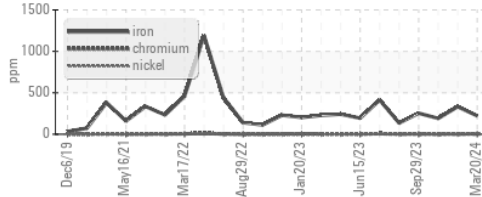
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	460	439	391

SAMPLE IMAGES	method	limit/base	current	history1	history2
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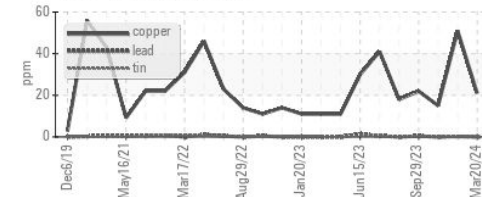


## GRAPHS

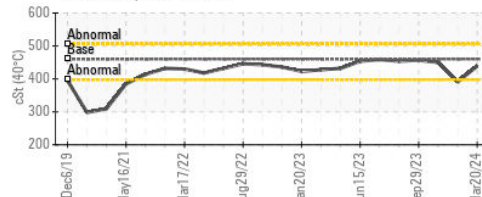
### Ferrous Alloys



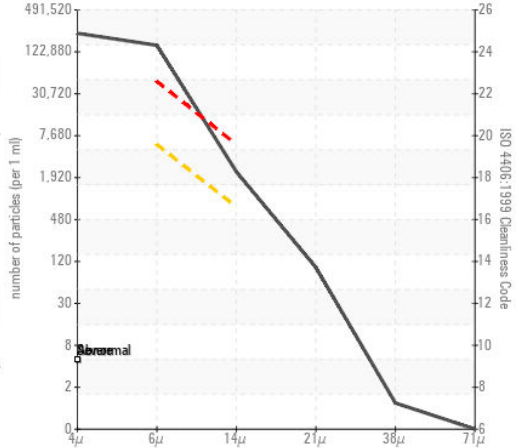
### Non-ferrous Metals



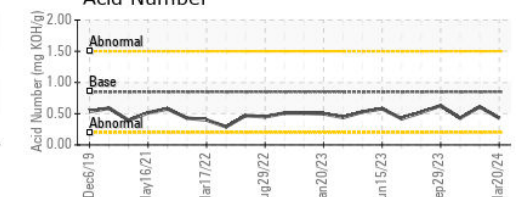
### Viscosity @ 40°C



### Particle Count



### Acid Number



Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513  
**Sample No.** : KL0013869 **Received** : 10 Apr 2024  
**Lab Number** : 06145277 **Tested** : 12 Apr 2024  
**Unique Number** : 10970085 **Diagnosed** : 13 Apr 2024 - Don Baldrige  
**Test Package** : MOB 2 ( Additional Tests: PrtCount )

**CITADEL DRILLING**  
 7550 W I20  
 ODESSA, TX  
 US 79763

Contact: MIKE COMBDEN  
 mcombden@citadelldrilling.com  
 T: (780)955-5509

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)