



# OIL ANALYSIS REPORT

WEAR	<b>ABNORMAL</b>
CONTAMINATION	<b>ABNORMAL</b>
FLUID CONDITION	<b>NORMAL</b>

Area  
**RIG 3**  
Machine Id  
**WHITE STAR 2450 R3-P-02G-NKL**  
Component  
**Gearbox**  
Fluid  
**Gearbox Oil (--- GAL)**

## 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. We were unable to perform a particle count due to a high concentration of particles present in this sample.

## WEAR

Gear wear is indicated.

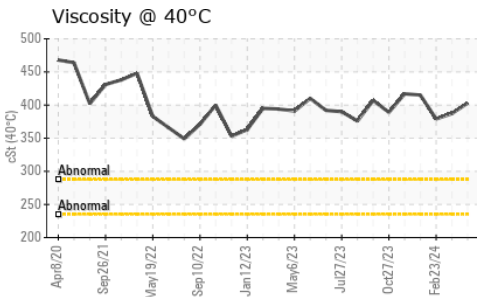
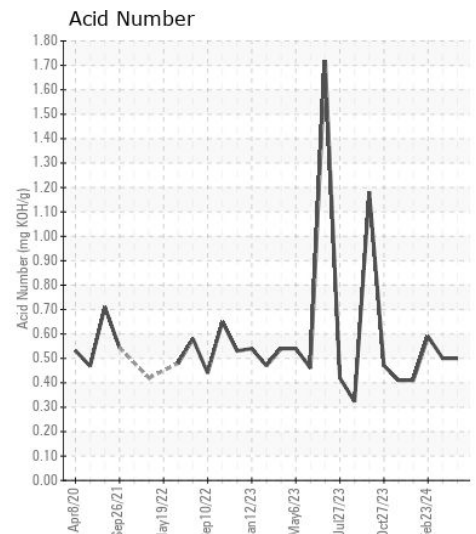
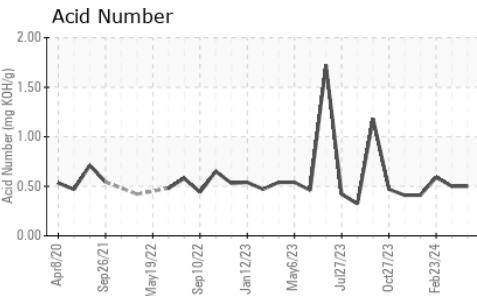
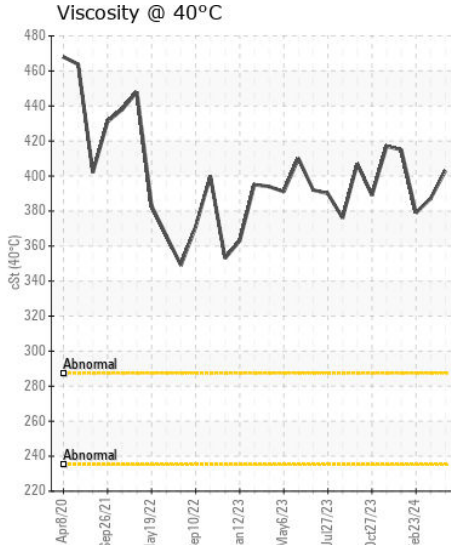
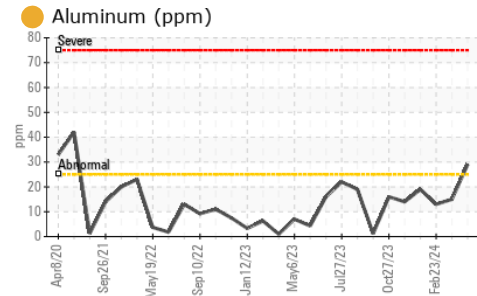
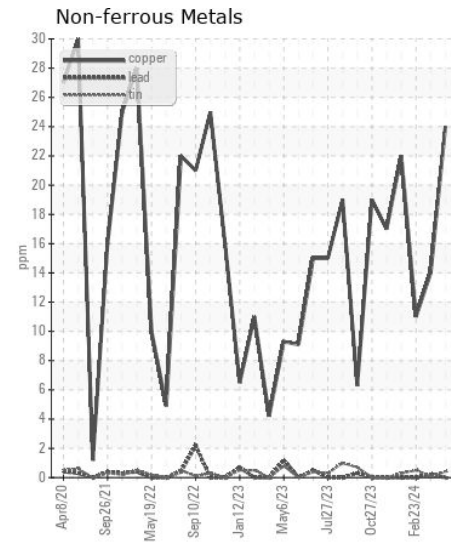
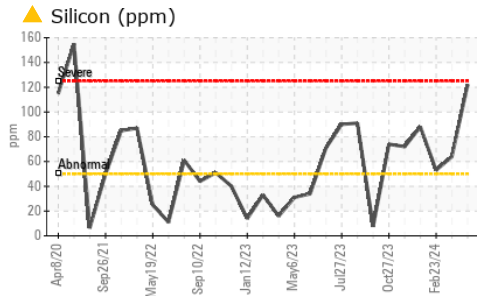
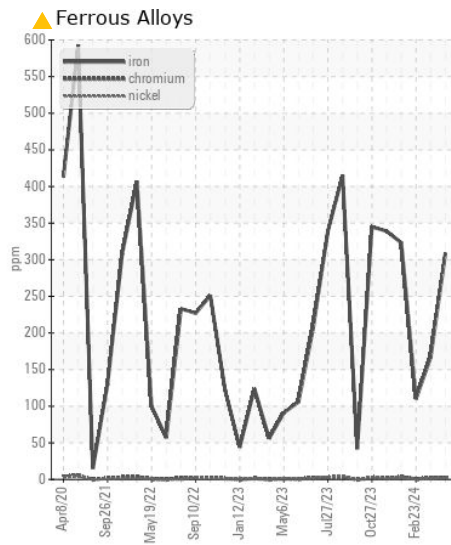
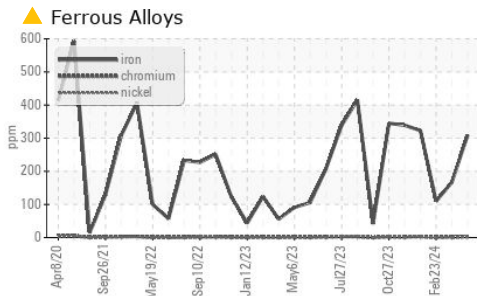
## CONTAMINATION

Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress. There is a high amount of visible silt present in the sample.

## FLUID CONDITION

The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		<b>KL0014254</b>	KL0014216	KL0013846
Sample Date		Client Info		<b>14 May 2024</b>	03 Apr 2024	23 Feb 2024
Machine Age	days	Client Info		<b>45416</b>	45375	45345
Oil Age	days	Client Info		<b>0</b>	0	0
Filter Age	days	Client Info		<b>0</b>	0	0
Oil Changed		Client Info		<b>N/A</b>	N/A	N/A
Filter Changed		Client Info		<b>N/A</b>	N/A	N/A
Sample Status				<b>ABNORMAL</b>	ABNORMAL	ABNORMAL
Iron	ppm	ASTM D5185m	>200	<b>▲ 309</b>	167	110
Chromium	ppm	ASTM D5185m	>10	<b>3</b>	2	<1
Nickel	ppm	ASTM D5185m	>10	<b>2</b>	1	0
Titanium	ppm	ASTM D5185m		<b>2</b>	1	<1
Silver	ppm	ASTM D5185m		<b>0</b>	0	0
Aluminum	ppm	ASTM D5185m	>25	<b>● 29</b>	● 15	● 13
Lead	ppm	ASTM D5185m	>50	<b>0</b>	<1	0
Copper	ppm	ASTM D5185m	>200	<b>24</b>	14	11
Tin	ppm	ASTM D5185m	>10	<b>&lt;1</b>	<1	<1
Vanadium	ppm	ASTM D5185m		<b>&lt;1</b>	<1	0
White Metal	scalar	*Visual	NONE	<b>NONE</b>	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	<b>NONE</b>	NONE	NONE
Silicon	ppm	ASTM D5185m	>50	<b>▲ 122</b>	▲ 64	▲ 53
Potassium	ppm	ASTM D5185m	>20	<b>25</b>	20	18
Water		WC Method	>0.2	<b>NEG</b>	NEG	NEG
Particles >4µm		ASTM D7647		<b>---</b>	---	---
Particles >6µm		ASTM D7647	>5000	<b>---</b>	---	---
Particles >14µm		ASTM D7647	>640	<b>---</b>	---	---
Particles >21µm		ASTM D7647	>160	<b>---</b>	---	---
Particles >38µm		ASTM D7647	>40	<b>---</b>	---	---
Particles >71µm		ASTM D7647	>10	<b>---</b>	---	---
Oil Cleanliness		ISO 4406 (c)	>19/16	<b>---</b>	---	---
Silt	scalar	*Visual	NONE	<b>▲ HEAVY</b>	▲ HEAVY	▲ HEAVY
Debris	scalar	*Visual	NONE	<b>NONE</b>	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	<b>NONE</b>	NONE	NONE
Appearance	scalar	*Visual	NORML	<b>NORML</b>	NORML	NORML
Odor	scalar	*Visual	NORML	<b>NORML</b>	NORML	NORML
Emulsified Water	scalar	*Visual	>0.2	<b>NEG</b>	NEG	NEG
Sodium	ppm	ASTM D5185m		<b>276</b>	225	200
Boron	ppm	ASTM D5185m		<b>29</b>	21	48
Barium	ppm	ASTM D5185m		<b>82</b>	45	38
Molybdenum	ppm	ASTM D5185m		<b>277</b>	314	428
Manganese	ppm	ASTM D5185m		<b>3</b>	1	2
Magnesium	ppm	ASTM D5185m		<b>49</b>	44	44
Calcium	ppm	ASTM D5185m		<b>178</b>	134	126
Phosphorus	ppm	ASTM D5185m		<b>228</b>	265	243
Zinc	ppm	ASTM D5185m		<b>29</b>	32	44
Sulfur	ppm	ASTM D5185m		<b>8672</b>	8570	8895
Acid Number (AN)	mg KOH/g	ASTM D8045		<b>0.50</b>	0.50	0.59
Visc @ 40°C	cSt	ASTM D445		<b>403</b>	● 387.2	● 379



Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513  
**Sample No.** : KL0014254 **Received** : 24 May 2024  
**Lab Number** : 06191005 **Tested** : 30 May 2024  
**Unique Number** : 11047757 **Diagnosed** : 30 May 2024 - Don Baldrige  
**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: