



OIL ANALYSIS REPORT

WEAR	ABNORMAL
CONTAMINATION	ABNORMAL
FLUID CONDITION	NORMAL

Area
RIG 3
Machine Id
WHITE STAR 2450 R3-P-01G-NKL
Component
Gearbox
Fluid
GEAR OIL ISO 460 (--- 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.

Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		KL0014010	KL0014064	KL0013119
Sample Date		Client Info		17 Jan 2024	28 Dec 2023	27 Oct 2023
Machine Age	days	Client Info		43803	45288	45225
Oil Age	days	Client Info		0	0	0
Filter Age	days	Client Info		0	0	0
Oil Changed		Client Info		N/A	N/A	N/A
Filter Changed		Client Info		N/A	N/A	N/A
Sample Status				ABNORMAL	SEVERE	ABNORMAL

WEAR

The iron level has decreased, but is still abnormal. Gear wear is indicated.

Iron	ppm	ASTM D5185m	>200	▲ 358	637	▲ 209
Chromium	ppm	ASTM D5185m	>10	3	4	1
Nickel	ppm	ASTM D5185m	>10	3	4	1
Titanium	ppm	ASTM D5185m		<1	0	0
Silver	ppm	ASTM D5185m		0	0	0
Aluminum	ppm	ASTM D5185m	>25	▲ 12	▲ 22	8
Lead	ppm	ASTM D5185m	>50	1	2	4
Copper	ppm	ASTM D5185m	>200	66	111	131
Tin	ppm	ASTM D5185m	>10	<1	<1	<1
Vanadium	ppm	ASTM D5185m		0	0	0
White Metal	scalar	*Visual	NONE	NONE	NONE	▲ MODER
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE

CONTAMINATION

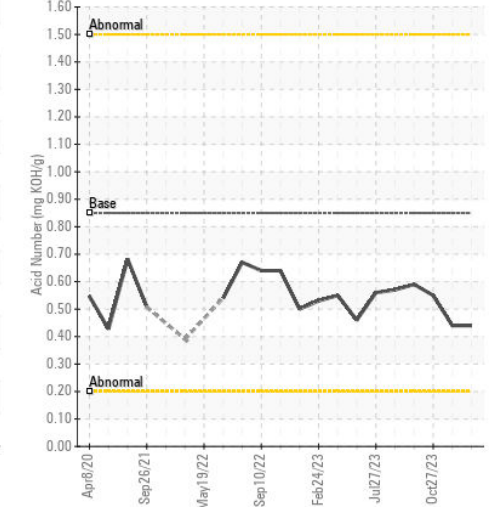
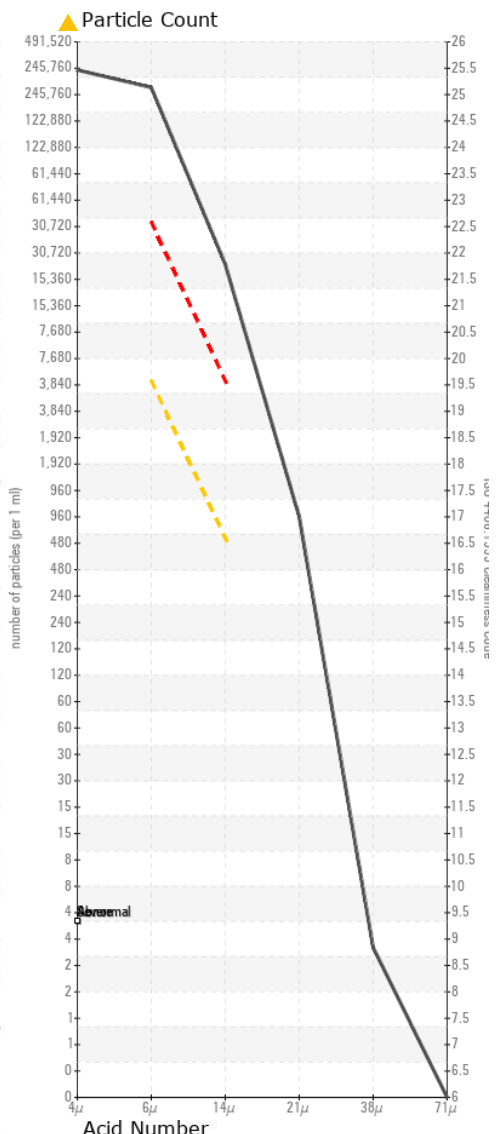
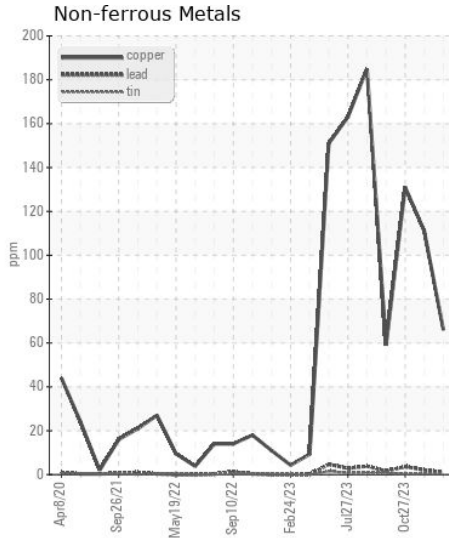
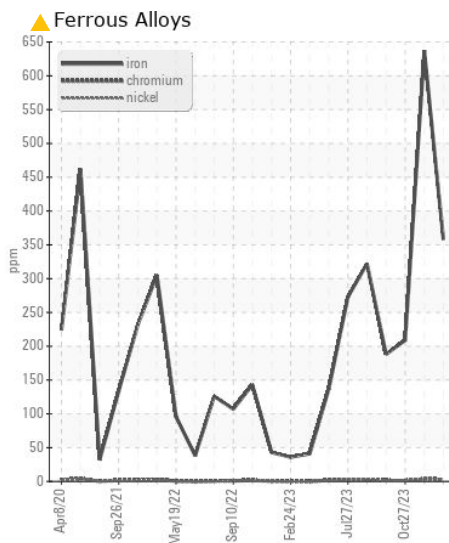
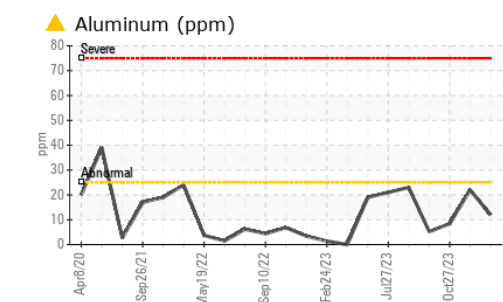
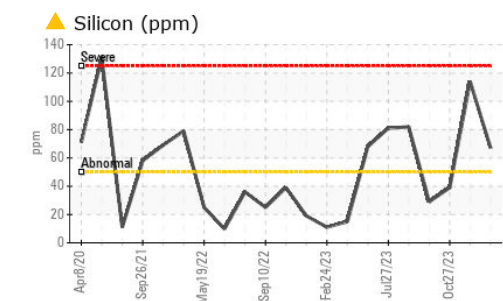
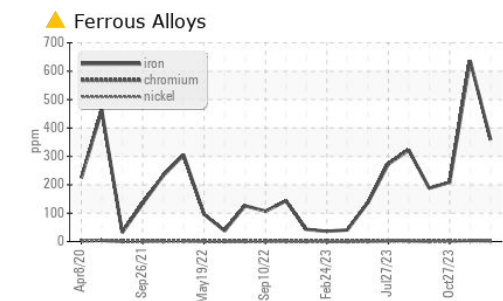
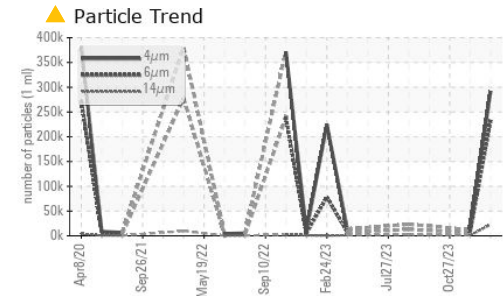
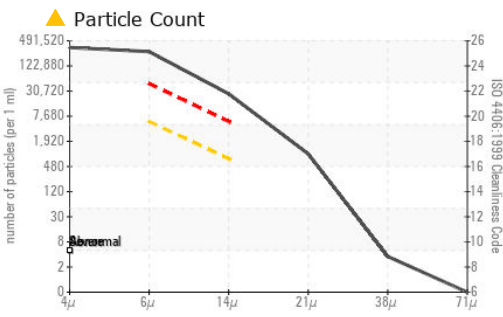
There is a high amount of particulates present in the oil. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.

Silicon	ppm	ASTM D5185m	>50	▲ 67	▲ 114	39
Potassium	ppm	ASTM D5185m	>20	24	27	9
Water		WC Method	>0.2	NEG	NEG	NEG
Particles >4µm		ASTM D7647		291813	11858	---
Particles >6µm		ASTM D7647	>5000	▲ 232014	▲ 6459	---
Particles >14µm		ASTM D7647	>640	▲ 22985	▲ 1099	---
Particles >21µm		ASTM D7647	>160	▲ 844	▲ 370	---
Particles >38µm		ASTM D7647	>40	3	▲ 57	---
Particles >71µm		ASTM D7647	>10	0	6	---
Oil Cleanliness		ISO 4406 (c)	>19/16	▲ 25/22	▲ 20/17	---
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

FLUID CONDITION

The AN level is acceptable for this fluid.

Sodium	ppm	ASTM D5185m		212	481	77
Boron	ppm	ASTM D5185m	50	29	21	18
Barium	ppm	ASTM D5185m	15	88	86	23
Molybdenum	ppm	ASTM D5185m	15	12	19	43
Manganese	ppm	ASTM D5185m		3	4	1
Magnesium	ppm	ASTM D5185m	50	30	31	9
Calcium	ppm	ASTM D5185m	50	89	93	54
Phosphorus	ppm	ASTM D5185m	350	239	240	231
Zinc	ppm	ASTM D5185m	100	50	68	108
Sulfur	ppm	ASTM D5185m	12500	8303	8509	7865
Acid Number (AN)	mg KOH/g	ASTM D8045	0.85	0.44	0.44	0.55
Visc @ 40°C	cSt	ASTM D445	460	423	443	444



Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0014010 **Received** : 07 Feb 2024
Lab Number : 06083055 **Tested** : 08 Feb 2024
Unique Number : 10870500 **Diagnosed** : 09 Feb 2024 - 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)