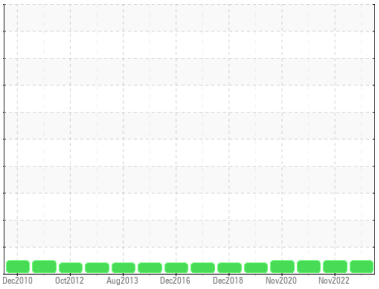
OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL

Area
MATTE PROCESSING/SEPARATION
Machine Id
2A BALL MILL (5118) (S/N 62-52-000-721)
Component
Gearbox
Fluid
SHELL OMALA 320 (80 LTR)

DIAGNOSIS

Recommendation
Confirm the source of the lubricant being utilized for top-up/fill. Resample at the next service interval to monitor. The fluid was specified as SHELL OMALA 320, however, a fluid match indicates that this fluid is ISO 320 Synthetic (PAO) Gear Oil. Please confirm the oil type and grade on your next sample.

Wear
All component wear rates are normal.

Contamination
There is no indication of any contamination in the oil.

Fluid Condition
Additive levels indicate the addition of a different brand, or type of oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0530928**	WC0623783	WC0623771
Sample Date		Client Info		**28 Nov 2023**	24 Nov 2022	29 Nov 2021
Machine Age	yrs	Client Info		**0**	0	0
Oil Age	yrs	Client Info		**0**	0	0
Oil Changed		Client Info		**Changed**	Changed	Changed
Sample Status				**NORMAL**	NORMAL	NORMAL

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

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*		**0**	0	0
Iron	ppm	ASTM D5185(m)	>200	**3**	3	22
Chromium	ppm	ASTM D5185(m)	>15	**0**	0	<1
Nickel	ppm	ASTM D5185(m)	>15	**<1**	1	<1
Titanium	ppm	ASTM D5185(m)		**0**	0	0
Silver	ppm	ASTM D5185(m)		**<1**	0	0
Aluminum	ppm	ASTM D5185(m)	>25	**0**	0	<1
Lead	ppm	ASTM D5185(m)	>100	**<1**	0	<1
Copper	ppm	ASTM D5185(m)	>200	**<1**	<1	1
Tin	ppm	ASTM D5185(m)	>25	**0**	0	0
Antimony	ppm	ASTM D5185(m)	>5	**0**	0	0
Vanadium	ppm	ASTM D5185(m)		**0**	0	0
Beryllium	ppm	ASTM D5185(m)		**0**	0	0
Cadmium	ppm	ASTM D5185(m)		**0**	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)	5.5	**29**	29	25
Barium	ppm	ASTM D5185(m)	0.4	**<1**	0	0
Molybdenum	ppm	ASTM D5185(m)	0.5	**0**	0	0
Manganese	ppm	ASTM D5185(m)		**0**	0	<1
Magnesium	ppm	ASTM D5185(m)	23	**0**	0	0
Calcium	ppm	ASTM D5185(m)	13	**<1**	0	1
Phosphorus	ppm	ASTM D5185(m)	450	**406**	447	400
Zinc	ppm	ASTM D5185(m)	9.9	**2**	4	3
Sulfur	ppm	ASTM D5185(m)	8181	**4910**	4958	4815
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>50	**2**	2	2
Sodium	ppm	ASTM D5185(m)		**<1**	<1	<1
Potassium	ppm	ASTM D5185(m)	>20	**<1**	0	<1

FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D974*		**1.166**	0.93	1.25

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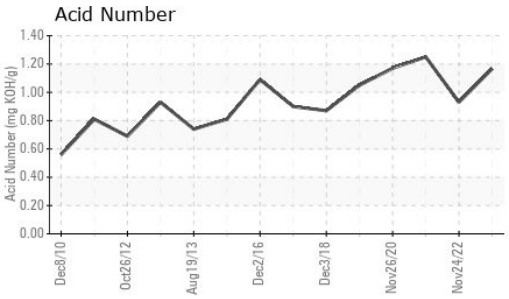
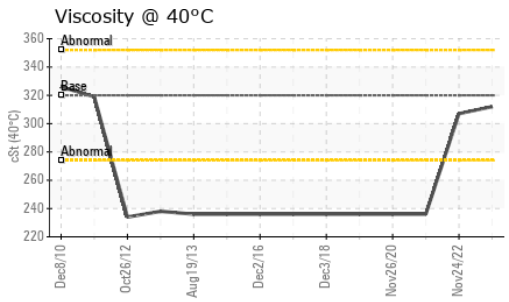
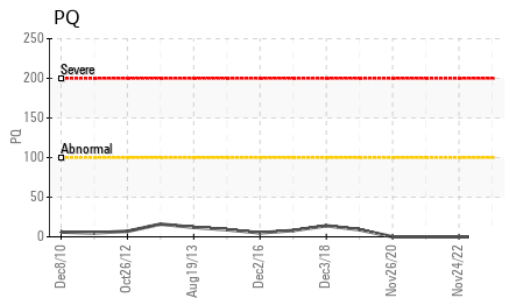


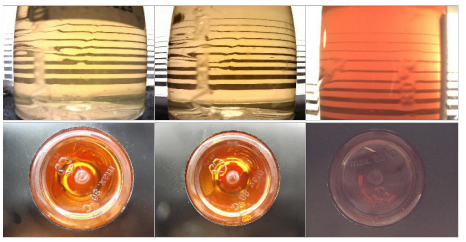




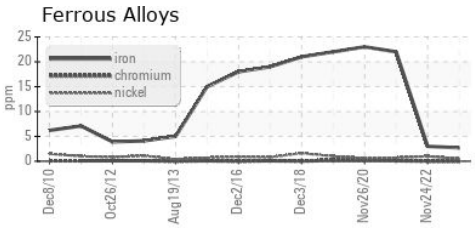
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	Visual*	NONE	**VLITE**	VLITE	LIGHT
Yellow Metal	scalar	Visual*	NONE	**NONE**	NONE	NONE
Precipitate	scalar	Visual*	NONE	**NONE**	NONE	NONE
Silt	scalar	Visual*	NONE	**NONE**	NONE	NONE
Debris	scalar	Visual*	NONE	**NONE**	NONE	NONE
Sand/Dirt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

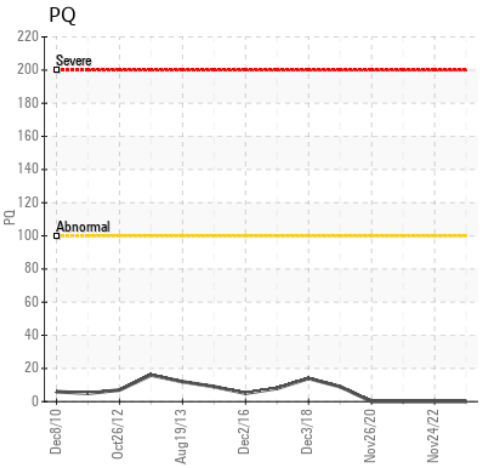
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	320	**312**	307	236

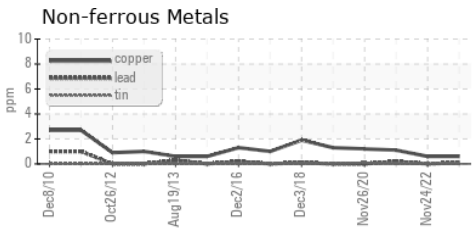
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

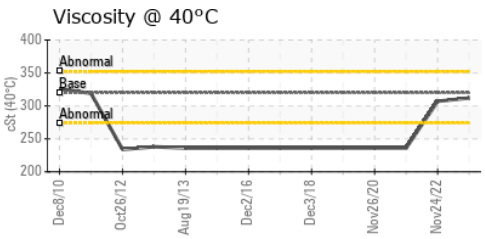


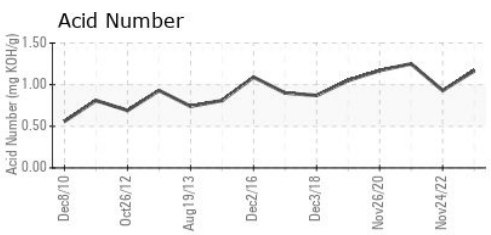
GRAPHS











ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC0530928 **Received** : 07 Dec 2023
Lab Number : 02601692 **Diagnosed** : 09 Dec 2023
Unique Number : 5694777 **Diagnostician** : Kevin Marson
Test Package : IND 2 (Additional Tests: TAN Man)

To discuss this sample report, contact Customer Service at 1-800-268-2131.
Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.
Validity of results and interpretation are based on the sample and information as supplied.

Vale - Copper Cliff Smelter
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