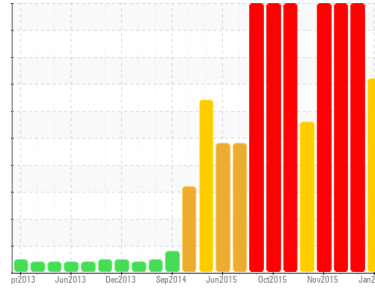




# OIL ANALYSIS REPORT

Sample Rating Trend



ISO



Area  
**Mining Equipment**  
Machine Id  
**SANDVIK MR360 MINING MACHINE 3GBR20 (S/N 33-3471)**  
Component  
**Cutterhead Gearbox**  
Fluid  
**MOBIL MOBILGEAR SHC 320 (69 LTR)**



## DIAGNOSIS

### Recommendation

We advise that you check all areas where contaminants can enter the system. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. The oil change at the time of sampling has been noted. Resample in 30-45 days to monitor this situation.

### Wear

Wear particle analysis indicates that the ferrous rubbing particles are noted. All other component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.

### Contaminants

Particles >14µm are severely high. Particles >6µm are severely high. Particles >4µm are severely high. Particles >21µm are abnormally high. Elemental levels of potassium (K) and sodium (Na) indicate potash, or flyash contamination. The water content is negligible.

### Oil Condition

The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.

## SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		<b>WC0273476</b>	WC0273479	WC0271332
Sample Date	Client Info		<b>03 Jan 2016</b>	01 Dec 2015	21 Nov 2015
Machine Age	hrs	Client Info	<b>5169</b>	0	4967
Oil Age	hrs	Client Info	<b>0</b>	0	0
Oil Changed	Client Info		<b>Changed</b>	N/A	Not Changd
Sample Status			<b>SEVERE</b>	SEVERE	SEVERE

## WEAR METALS

	method	limit/base	current	history1	history2
PQ	ASTM D8184*		<b>57</b>	43	51
Iron	ppm	ASTM D5185(m) >200	<b>68</b>	93	101
Chromium	ppm	ASTM D5185(m) >15	<b>&lt;1</b>	<1	<1
Nickel	ppm	ASTM D5185(m) >15	<b>&lt;1</b>	<1	<1
Titanium	ppm	ASTM D5185(m)	<b>0</b>	0	0
Silver	ppm	ASTM D5185(m)	<b>0</b>	0	0
Aluminum	ppm	ASTM D5185(m) >25	<b>&lt;1</b>	<1	<1
Lead	ppm	ASTM D5185(m) >100	<b>&lt;1</b>	<1	<1
Copper	ppm	ASTM D5185(m) >200	<b>5</b>	8	7
Tin	ppm	ASTM D5185(m) >25	<b>0</b>	0	0
Antimony	ppm	ASTM D5185(m)	<b>0</b>	0	<1
Vanadium	ppm	ASTM D5185(m)	<b>0</b>	0	0
Beryllium	ppm	ASTM D5185(m)	<b>0</b>	0	0
Cadmium	ppm	ASTM D5185(m)	<b>0</b>	0	0

## ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)	<b>&lt;1</b>	1	2
Barium	ppm	ASTM D5185(m)	<b>&lt;1</b>	0	<1
Molybdenum	ppm	ASTM D5185(m)	<b>2</b>	0	0
Manganese	ppm	ASTM D5185(m)	<b>&lt;1</b>	<1	<1
Magnesium	ppm	ASTM D5185(m)	<b>4</b>	0	0
Calcium	ppm	ASTM D5185(m)	<b>3</b>	14	16
Phosphorus	ppm	ASTM D5185(m)	<b>376</b>	339	362
Zinc	ppm	ASTM D5185(m)	<b>8</b>	13	11
Sulfur	ppm	ASTM D5185(m)	<b>1717</b>	1758	1876
Lithium	ppm	ASTM D5185(m)	<b>&lt;1</b>	<1	<1

## CONTAMINANTS

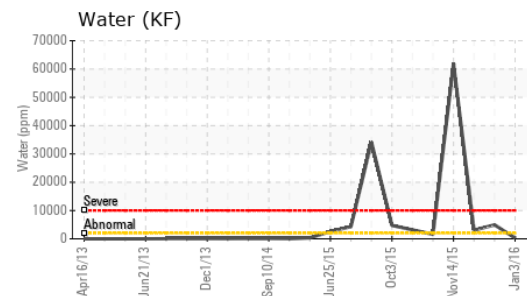
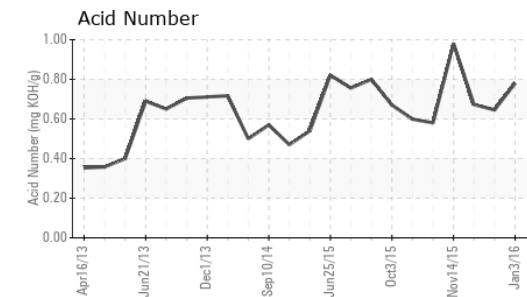
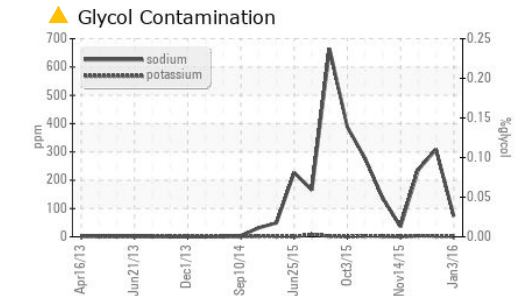
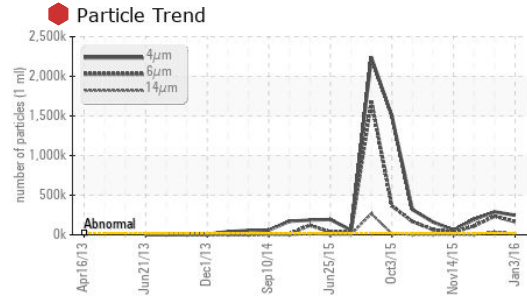
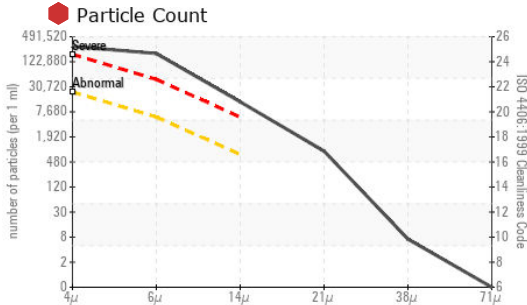
	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m) >50	<b>21</b>	14	18
Sodium	ppm	ASTM D5185(m)	<b>73</b>	308	237
Potassium	ppm	ASTM D5185(m) >20	<b>1</b>	2	3
Water	%	ASTM D6304* >0.2	<b>0.027</b>	0.493	0.305
ppm Water	ppm	ASTM D6304* >2000	<b>276.9</b>	4932.4	3054.6

## FLUID CLEANLINESS

	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	>20000	<b>246955</b>	290659	192894
Particles >6µm	ASTM D7647	>5000	<b>166662</b>	235442	110939
Particles >14µm	ASTM D7647	>640	<b>11640</b>	37982	1579
Particles >21µm	ASTM D7647	>160	<b>767</b>	3901	270
Particles >38µm	ASTM D7647	>40	<b>6</b>	18	21
Particles >71µm	ASTM D7647	>10	<b>0</b>	0	0
Oil Cleanliness	ISO 4406 (c)	>21/19/16	<b>25/25/21</b>	25/25/22	25/24/18



# OIL ANALYSIS REPORT



FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D974*		<b>0.780</b>	0.646	0.672

VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	Visual*	NONE	<b>NONE</b>	NONE	NONE
Yellow Metal	scalar	Visual*	NONE	<b>NONE</b>	NONE	NONE
Precipitate	scalar	Visual*	NONE	<b>NONE</b>	NONE	▲ LIGHT
Silt	scalar	Visual*	NONE	<b>VLITE</b>	NONE	NONE
Debris	scalar	Visual*	NONE	<b>VLITE</b>	VLITE	▲ LTMOD
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>	▲ .5%	▲ .2%
Free Water	scalar	Visual*		<b>NEG</b>	▲ .5%	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	320	<b>328</b>	329	329

SAMPLE IMAGES		method	limit/base	current	history1	history2
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Color			
Bottom			
PrtFilter	no image	no image	no image



**Laboratory** : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9  
**Sample No.** : WC1234567 **Received** : 17 May 2016  
**Lab Number** : **01234567** **Diagnosed** : 19 May 2016  
**Unique Number** : 12345678 **Diagnostician** : Kevin Marson  
**Test Package** : MOB 1 ( Additional Tests: A-Ferr, DR-Ferr, KF, PQ, PrtCount, TAN Auto, TAN Man )

**Cusany Logistics Inc.**  
 1212 Industrial Place  
 Centerville, OH  
 USA 75900  
 Contact: Jim Leduc  
 jim.leduc@cusanylogisticsinc.com  
 T: (305)555-1212  
 F: (305)555-1222

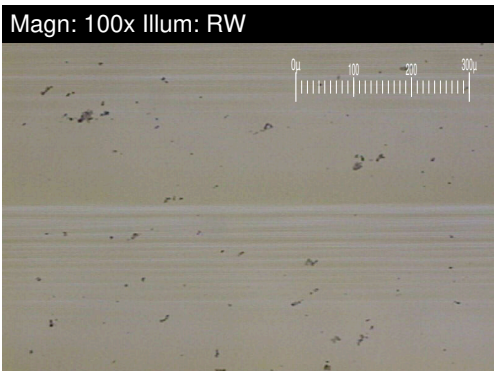
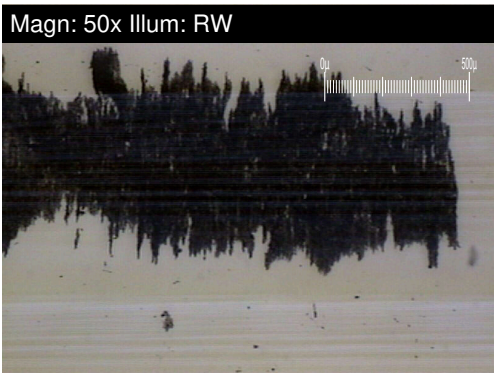
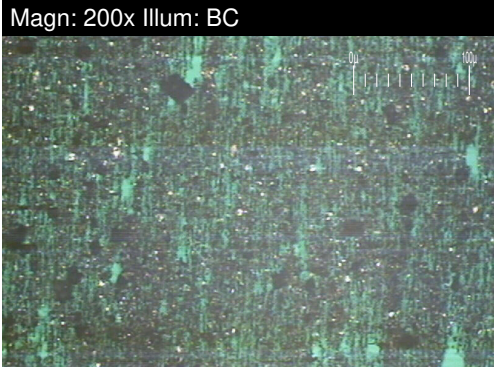
To discuss this sample report, contact Customer Service at 1-800-268-2131.  
 Test denoted (\*) outside scope of accreditation, (m) method modified, (e) tested at external lab.  
 Validity of results and interpretation are based on the sample and information as supplied.



# FERROGRAPHY REPORT



Area  
**Mining Equipment**  
 Machine Id  
**SANDVIK MR360 MINING MACHINE 3GBR20 (S/N 33-3471)**  
 Component  
**Cutterhead Gearbox**  
 Fluid  
**MOBIL MOBILGEAR SHC 320 (69 LTR)**

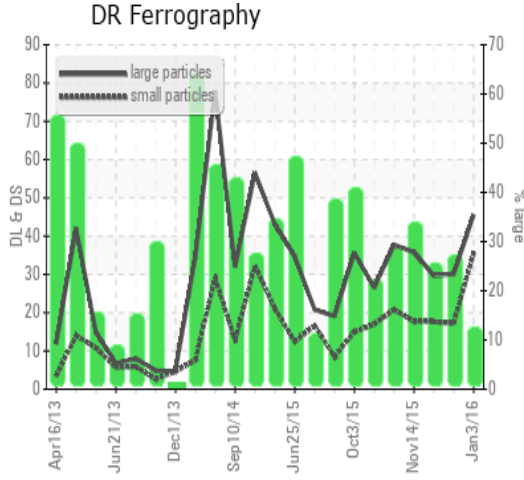


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		<b>45.5</b>	30.1	29.6
Small Particles		DR-Ferr*		<b>35.4</b>	17.2	17.6
Total Particles		DR-Ferr*	>---	<b>80.9</b>	47.3	47.2
Large Particles Percentage	%	DR-Ferr*		<b>12.5</b>	27.3	25.4
Severity Index		DR-Ferr*		<b>45955</b>	38829	35520

FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		▲ <b>5</b>	▲ 5	▲ 6
Ferrous Sliding	Scale 0-10	ASTM D7684*				
Ferrous Cutting	Scale 0-10	ASTM D7684*				
Ferrous Rolling	Scale 0-10	ASTM D7684*		■ <b>2</b>	■ 2	■ 2
Ferrous Break-in	Scale 0-10	ASTM D7684*				
Ferrous Spheres	Scale 0-10	ASTM D7684*				
Ferrous Black Oxides	Scale 0-10	ASTM D7684*		■ <b>1</b>		■ 1
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
Ferrous Corrosive	Scale 0-10	ASTM D7684*		■ <b>1</b>	■ 2	■ 2
Ferrous Other	Scale 0-10	ASTM D7684*				
Nonferrous Rubbing	Scale 0-10	ASTM D7684*				
Nonferrous Sliding	Scale 0-10	ASTM D7684*				
Nonferrous Cutting	Scale 0-10	ASTM D7684*				
Nonferrous Rolling	Scale 0-10	ASTM D7684*				
Nonferrous Other	Scale 0-10	ASTM D7684*				
Carbonaceous Material	Scale 0-10	ASTM D7684*				
Lubricant Degradation	Scale 0-10	ASTM D7684*			■ 2	■ 1
Sand/Dirt	Scale 0-10	ASTM D7684*		■ <b>1</b>	■ 2	■ 1
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		■ <b>1</b>	▲ 5	■ 2

## WEAR

Wear particle analysis indicates that the ferrous rubbing particles are noted. All other component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.



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