MAR III

WEAR CHECK

OIL ANALYSIS REPORT

WEAR	ABNORMAL
CONTAMINANTS	SEVERE
OIL CONDITION	ABNORMAL

Area
ENGINE ROOM FLOOR
Machine Id
21-A-6464 PORT MAIN ENGINE LUBE OIL (S/N Maint Plan 22463)
Component
Port Main Engine
Fluid
MOBIL MOBILGARD 412 (22300 LTR)

RECOMMENDATION

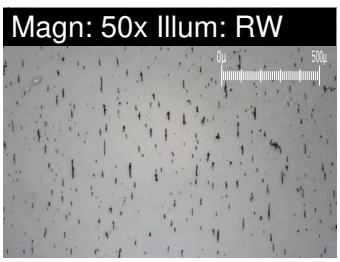
We advise that you check the fuel injection system. We recommend that you change the oil at the next available stoppage or outage. We recommend an early resample to monitor this condition.

WEAR

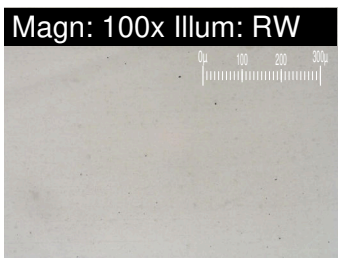
Wear particle analysis indicates that the ferrous cutting particles are abnormal. Cutting wear particles are caused by either hard protuberances (mis-aligned components, etc.), or abrasives entering the system and embedding themselves in softer materials (sand, etc.), and gouging out mating surfaces.

Magn: 200x Illum: BC

Magn: 50x Illum: RW



Magn: 100x Illum: RW



Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		PP	PP	PP
Sample Date		Client Info		18 Sep 2023	17 Jul 2023	21 May 2023
Machine Age	days	Client Info		0	0	0
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				SEVERE	ABNORMAL	NORMAL
PQ		ASTM D8184*		0	0	---
Iron	ppm	ASTM D5185(m)	>25	4	4	4
Chromium	ppm	ASTM D5185(m)	>5	0	0	0
Nickel	ppm	ASTM D5185(m)	>5	<1	<1	<1
Titanium	ppm	ASTM D5185(m)	>3	0	0	<1
Silver	ppm	ASTM D5185(m)	>2	<1	0	0
Aluminum	ppm	ASTM D5185(m)	>10	<1	1	<1
Lead	ppm	ASTM D5185(m)	>5	<1	0	<1
Copper	ppm	ASTM D5185(m)	>5	2	2	2
Tin	ppm	ASTM D5185(m)	>5	<1	<1	<1
Vanadium	ppm	ASTM D5185(m)		0	0	0
Large Particles		DR-Ferr*		19.0	7.3	---
Small Particles		DR-Ferr*		12.0	6.4	---
Total Particles		DR-Ferr*	>---	31	13.7	---
Large Particles Percentage	%	DR-Ferr*		22.6	6.6	---
Severity Index		DR-Ferr*		133	7	---
Ferrous Rubbing	Scale 0-10	ASTM D7684*		3	2	
Ferrous Sliding	Scale 0-10	ASTM D7684*		1		
Ferrous Cutting	Scale 0-10	ASTM D7684*		1	1	
Ferrous Rolling	Scale 0-10	ASTM D7684*		1	1	
Ferrous Break-in	Scale 0-10	ASTM D7684*				
Ferrous Spheres	Scale 0-10	ASTM D7684*				
Ferrous Black Oxides	Scale 0-10	ASTM D7684*			1	
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
Ferrous Corrosive	Scale 0-10	ASTM D7684*				
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*				

CONTAMINANTS

There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil.

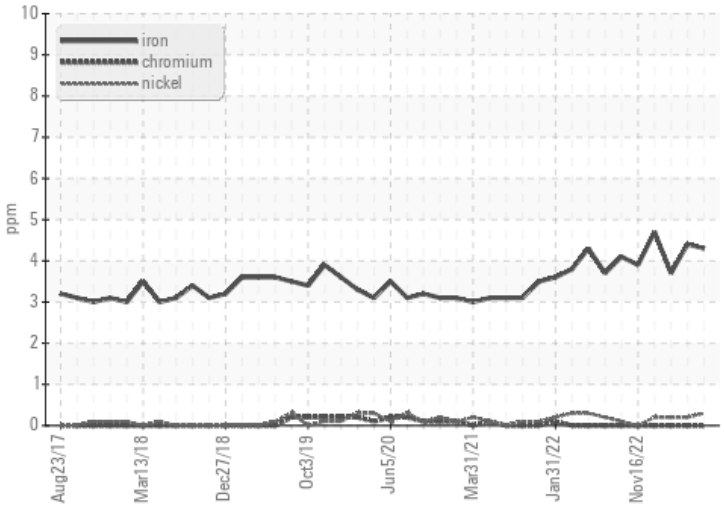
Silicon	ppm	ASTM D5185(m)	>20	**12**	11	12
Potassium	ppm	ASTM D5185(m)	>20	**<1**	<1	1
Fuel	%	ASTM D7593*	>4.0	▲ **9.3**	▲ 7.8	<1.0
Water		WC Method	>0.1	**NEG**	NEG	NEG
Glycol		WC Method		**NEG**	NEG	NEG
Soot %	%	ASTM D7844*	>2	**0**	0	0
Nitration	Abs/cm	ASTM D7624*	>20	**7.4**	6.8	5.9
Sulfation	Abs/.1mm	ASTM D7415*	>30	**16.3**	16.4	15.7
Emulsified Water	scalar	Visual*	>0.1	**NEG**	NEG	NEG
Carbonaceous Material	Scale 0-10	ASTM D7684*				
Sand/Dirt	Scale 0-10	ASTM D7684*		**1**	1	
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		**1**	1	

OIL CONDITION

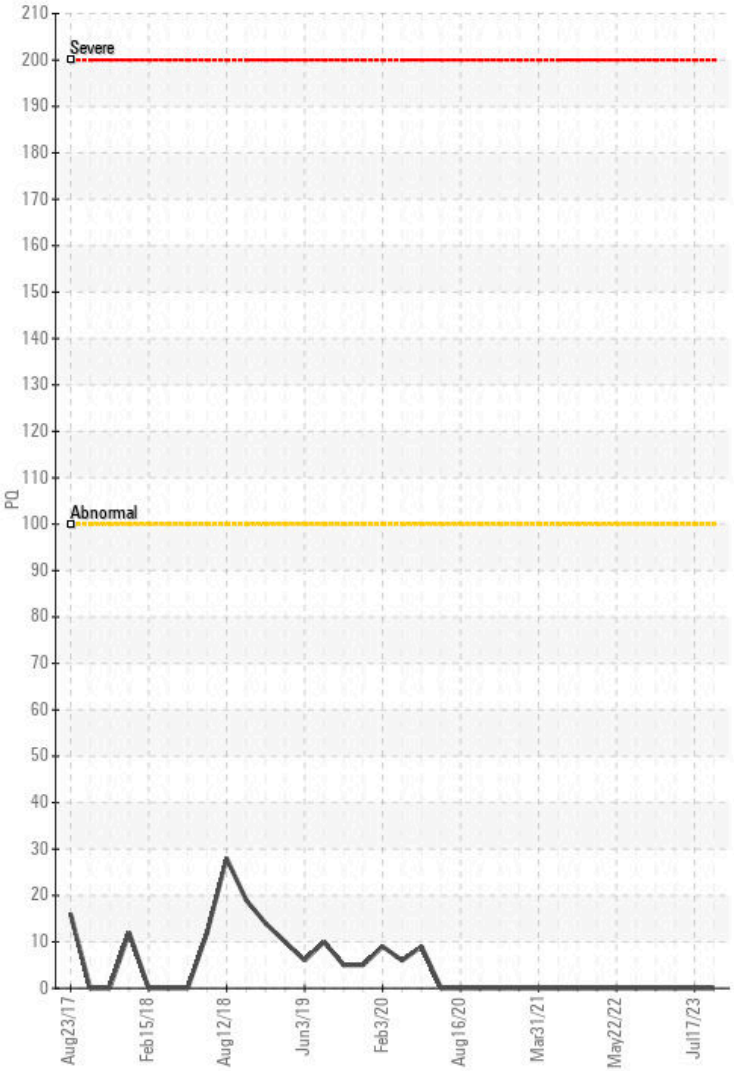
The BN result indicates that there is suitable alkalinity remaining in the oil. Fuel is present in the oil and is lowering the viscosity. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

Sodium	ppm	ASTM D5185(m)	>75	**6**	6	4
Boron	ppm	ASTM D5185(m)	0	**2**	1	<1
Barium	ppm	ASTM D5185(m)	0	**<1**	0	0
Molybdenum	ppm	ASTM D5185(m)	0	**0**	<1	<1
Manganese	ppm	ASTM D5185(m)	0	**0**	<1	<1
Magnesium	ppm	ASTM D5185(m)	18	**11**	11	13
Calcium	ppm	ASTM D5185(m)	6350	**3015**	3082	3234
Phosphorus	ppm	ASTM D5185(m)	200	**178**	185	209
Zinc	ppm	ASTM D5185(m)	380	**293**	295	300
Sulfur	ppm	ASTM D5185(m)	6950	**4823**	4798	5066
Oxidation	Abs/.1mm	ASTM D7414*	>25	**7.2**	6.7	6.1
Base Number (BN)	mg KOH/g	ASTM D2896*	15	**6.44**	6.95	7.02
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	▲ **10.9**	▲ 11.4	12.7
Lubricant Degradation	Scale 0-10	ASTM D7684*				

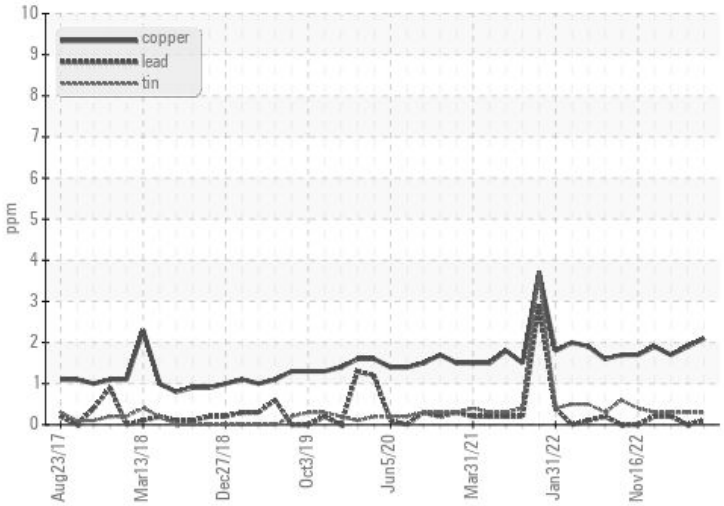
Ferrous Alloys



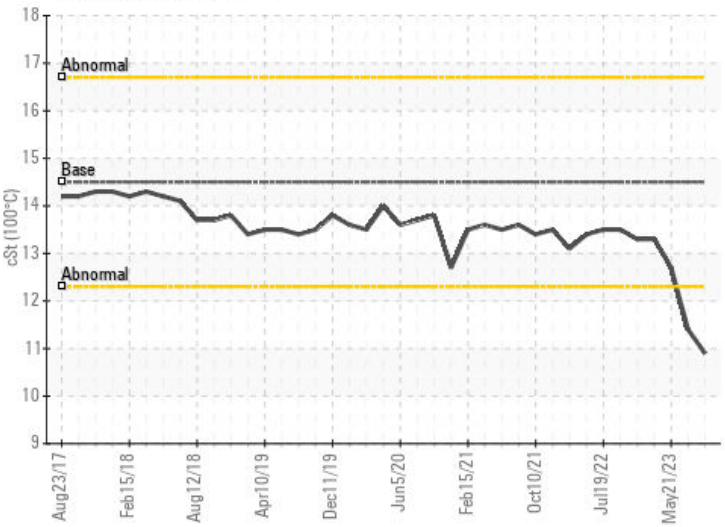
PQ



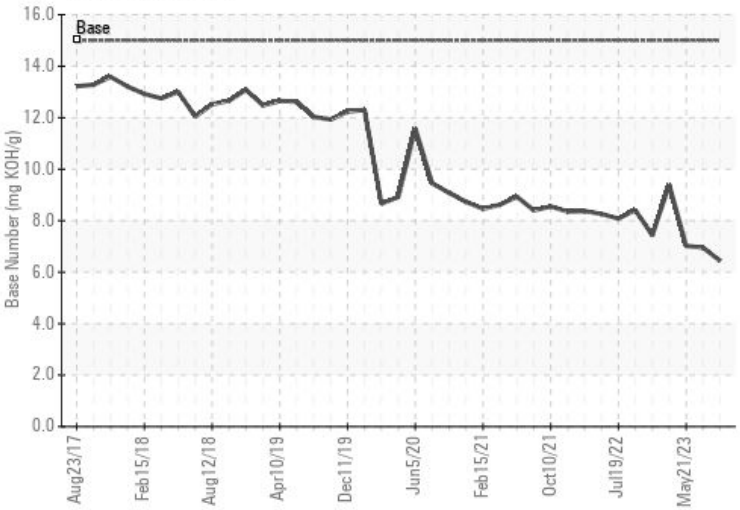
Non-ferrous Metals



▲ Viscosity @ 100°C



Base Number



ISO 17025:2017 Accredited Laboratory

Laboratory	: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9		
Sample No.	: PP	**Received**	: 26 Oct 2023
Lab Number	: 02591985	**Tested**	: 30 Oct 2023
Unique Number	: 5669064	**Diagnosed**	: 01 Nov 2023 - Kevin Marson
Test Package	: MAR 3 (Additional Tests: PercentFuel)		

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.

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