MAR III

WEAR CHECK

OIL ANALYSIS REPORT

WEAR	SEVERE
CONTAMINANTS	ABNORMAL
OIL CONDITION	NORMAL

Area
ENGINE ROOM FLOOR
Machine Id
21-A-6462 STARBOARD MAIN ENGINE LUBE OIL (S/N Maint Plan 22467)
Component
Starboard Main Engine
Fluid
MOBIL MOBILGARD 412 (22300 LTR)

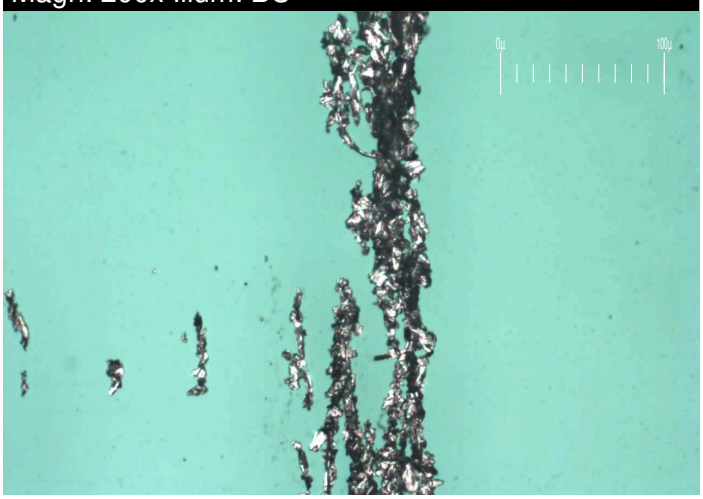
RECOMMENDATION

We recommend that you change the oil at the next available stoppage or outage. Re-sampling is suggested to confirm test results prior to significant maintenance activities being performed. Please indicate that this is a resample on your Sample Information Form (SIF). We recommend an early resample to monitor this condition.

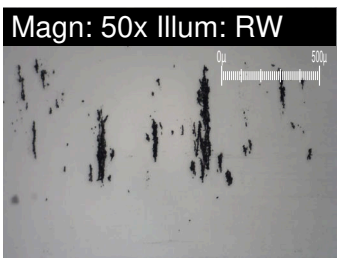
WEAR

Wear particle analysis indicates that the ferrous cutting particles are severe. 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



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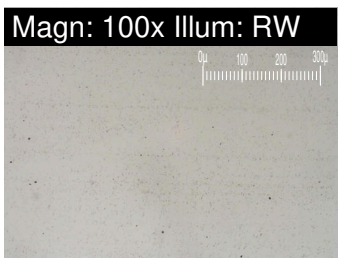


Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		PP	PP	PP
Sample Date		Client Info		27 Nov 2023	17 Oct 2023	26 Aug 2023
Machine Age	hrs	Client Info		0	0	0
Oil Age	hrs	Client Info		0	0	0
Filter Age	hrs	Client Info		0	0	0
Oil Changed		Client Info		N/A	N/A	N/A
Filter Changed		Client Info		N/A	N/A	N/A
Sample Status				SEVERE	ABNORMAL	ABNORMAL
PQ		ASTM D8184*		0	0	0
Iron	ppm	ASTM D5185(m)	>25	4	4	4
Chromium	ppm	ASTM D5185(m)	>5	0	0	<1
Nickel	ppm	ASTM D5185(m)	>5	<1	<1	0
Titanium	ppm	ASTM D5185(m)	>3	0	0	0
Silver	ppm	ASTM D5185(m)	>2	0	<1	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*		34.9	18.7	14.1
Small Particles		DR-Ferr*		12.2	10.7	7.9
Total Particles		DR-Ferr*	>---	47.1	29.4	22
Large Particles Percentage	%	DR-Ferr*		48.2	27.2	28.2
Severity Index		DR-Ferr*		792	150	87
Ferrous Rubbing	Scale 0-10	ASTM D7684*		4	3	2
Ferrous Sliding	Scale 0-10	ASTM D7684*				
Ferrous Cutting	Scale 0-10	ASTM D7684*		1	1	
Ferrous Rolling	Scale 0-10	ASTM D7684*		2	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	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 moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil.

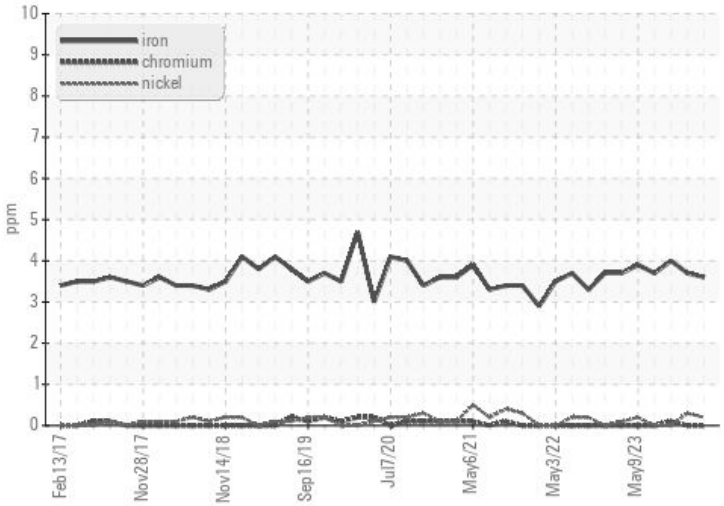
Silicon	ppm	ASTM D5185(m)	>20	**11**	8	11
Potassium	ppm	ASTM D5185(m)	>20	**<1**	0	1
Fuel	%	ASTM D7593*	>4.0	▲ **5.1**	▲ 6	▲ 6.3
Water		WC Method	>0.1	**NEG**	NEG	NEG
Glycol		WC Method		**NEG**	NEG	NEG
Soot %	%	ASTM D7844*	>2	**0.1**	0	0
Nitration	Abs/cm	ASTM D7624*	>20	**7.8**	8.0	8.1
Sulfation	Abs/.1mm	ASTM D7415*	>30	**17.4**	16.9	16.6
Emulsified Water	scalar	Visual*	>0.1	**NEG**	NEG	NEG
Carbonaceous Material	Scale 0-10	ASTM D7684*				2
Sand/Dirt	Scale 0-10	ASTM D7684*		**1**	1	1
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		**1**	1	

OIL CONDITION

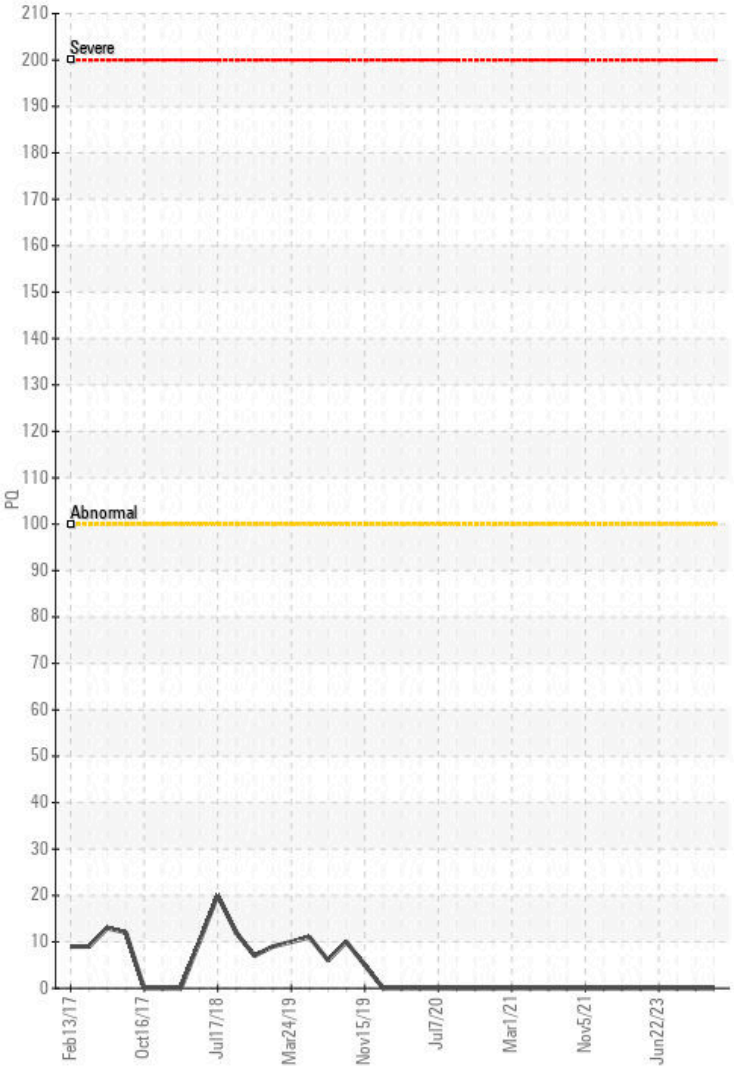
The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

Sodium	ppm	ASTM D5185(m)	>75	**14**	11	13
Boron	ppm	ASTM D5185(m)	0	**4**	3	3
Barium	ppm	ASTM D5185(m)	0	**0**	<1	0
Molybdenum	ppm	ASTM D5185(m)	0	**0**	0	<1
Manganese	ppm	ASTM D5185(m)	0	**0**	0	<1
Magnesium	ppm	ASTM D5185(m)	18	**16**	14	15
Calcium	ppm	ASTM D5185(m)	6350	**4818**	4814	4575
Phosphorus	ppm	ASTM D5185(m)	200	**201**	193	211
Zinc	ppm	ASTM D5185(m)	380	**328**	325	331
Sulfur	ppm	ASTM D5185(m)	6950	**5013**	4661	4799
Oxidation	Abs/.1mm	ASTM D7414*	>25	**6.3**	6.4	6.5
Base Number (BN)	mg KOH/g	ASTM D2896*	15	**11.80**	10.54	10.41
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	**12.4**	▲ 12.0	▲ 11.8
Lubricant Degradation	Scale 0-10	ASTM D7684*				

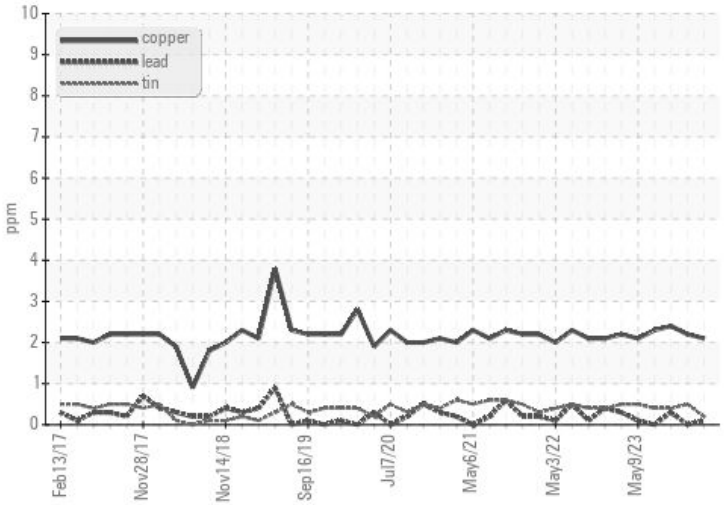
Ferrous Alloys



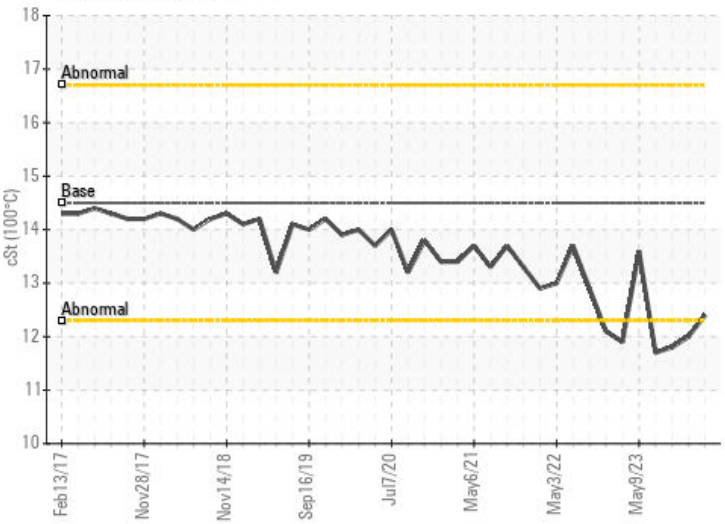
PQ



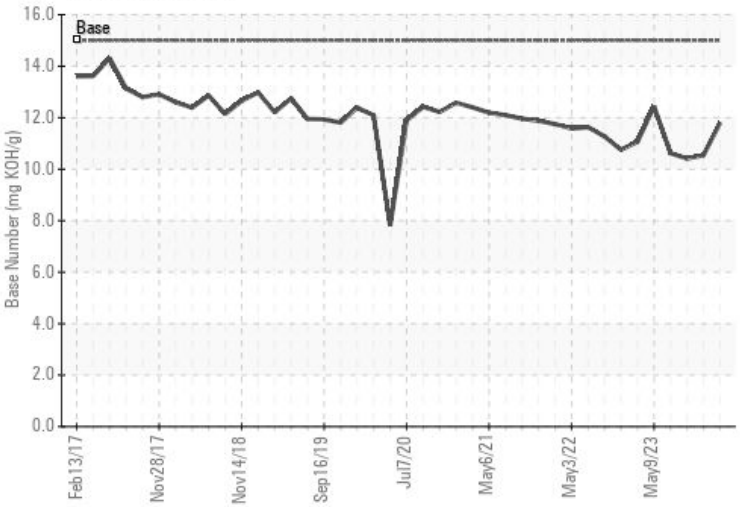
Non-ferrous Metals



Viscosity @ 100°C



Base Number



ISO 17025:2017 Accredited Laboratory

Laboratory	: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 **HUSKY SEA ROSE /AKER SOLUTIONS**		
Sample No.	: PP	**Recieved**	: 09 Jan 2024
Lab Number	: 02607418	**Diagnosed**	: 16 Jan 2024
Unique Number	: 5708504	**Diagnostician**	: 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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