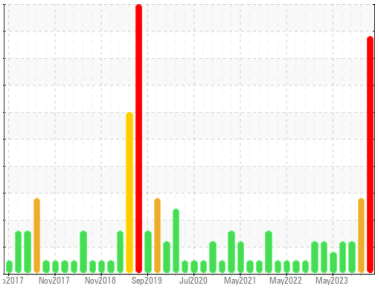
PROBLEM SUMMARY

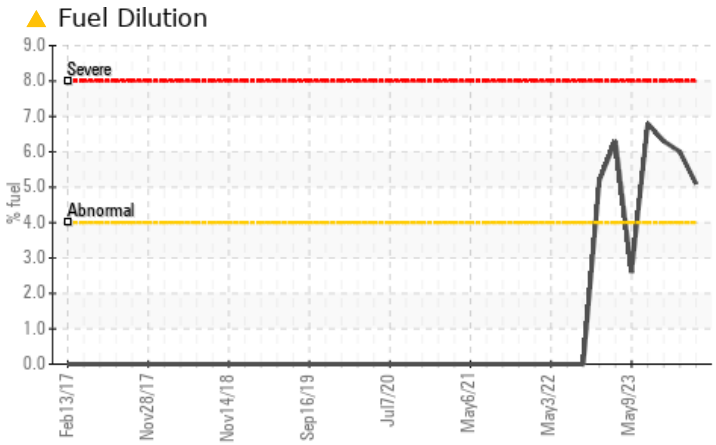
Sample Rating Trend



WEAR PARTICLES

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)

COMPONENT CONDITION SUMMARY



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.

PROBLEMATIC TEST RESULTS

Sample Status				**SEVERE**	ABNORMAL	ABNORMAL
Ferrous Cutting	Scale 0-10	ASTM D7684*		**1**	1	
Fuel	%	ASTM D7593*	>4.0	**5.1**	6	6.3

Customer Id: SPESTJ
Sample No.: PP
Lab Number: 02607418
Test Package: MAR 3

To manage this report scan the QR code

To discuss the diagnosis or test data:
Kevin Marson +1 (289)291-4644 x4644
Kevin.Marson@wearcheck.com

To change component or sample information:
Gloria Gonzalez +1 (289)291-4643 x4643
gloria.gonzalez@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Change Fluid	---	---	?	We recommend that you change the oil at the next available stoppage or outage.
Resample	---	---	?	We recommend an early resample to monitor this condition. 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).

HISTORICAL DIAGNOSIS

17 Oct 2023 Diag: Kevin Marson

WEAR PARTICLES

Due to this condition we recommend the following action... We advise an early resample to confirm this situation.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. There is a moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. Viscosity of sample indicates oil is within SAE 30 range, advise investigate. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

view report

26 Aug 2023 Diag: Bill Quesnel

FUEL

We recommend that you change the oil at the next available stoppage or outage. We recommend an early resample to monitor this condition.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. There is a moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. Viscosity of sample indicates oil is within SAE 30 range, advise investigate. The oil is no longer serviceable due to the presence of contaminants.

view report

22 Jun 2023 Diag: Kevin Marson

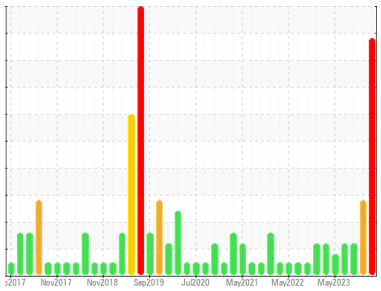
FUEL

We recommend that you change the oil at the next available stoppage or outage. We recommend an early resample to monitor this condition.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. There is a moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. 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 due to the presence of contaminants.

view report

OIL ANALYSIS REPORT

Sample Rating Trend



WEAR PARTICLES

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)

DIAGNOSIS

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.

Contaminants

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

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.

SAMPLE INFORMATION		method	limit/base	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
Oil Changed		Client Info		**N/A**	N/A	N/A
Sample Status				**SEVERE**	ABNORMAL	ABNORMAL

CONTAMINATION		method	limit/base	current	history1	history2
Water		WC Method	>0.1	**NEG**	NEG	NEG
Glycol		WC Method		**NEG**	NEG	NEG

WEAR METALS		method	limit/base	current	history1	history2
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
Antimony	ppm	ASTM D5185(m)		**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)	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
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>20	**11**	8	11
Sodium	ppm	ASTM D5185(m)	>75	**14**	11	13
Potassium	ppm	ASTM D5185(m)	>20	**<1**	0	1
Fuel	%	ASTM D7593*	>4.0	▲ **5.1**	▲ 6	▲ 6.3

INFRA-RED		method	limit/base	current	history1	history2
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

OIL ANALYSIS REPORT

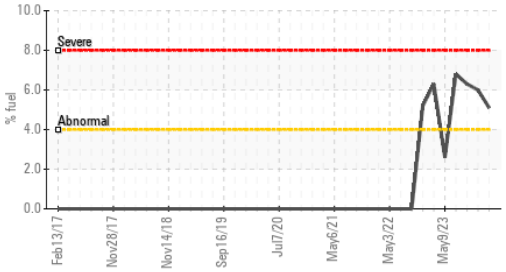
FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*	>25	**6.3**	6.4	6.5
Base Number (BN)	mg KOH/g	ASTM D2896*	15	**11.80**	10.54	10.41

VISUAL		method	limit/base	current	history1	history2
Emulsified Water	scalar	Visual*	>0.1	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

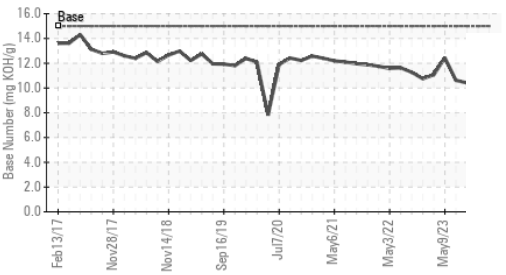
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	**12.4**	▲ 12.0	▲ 11.8

GRAPHS

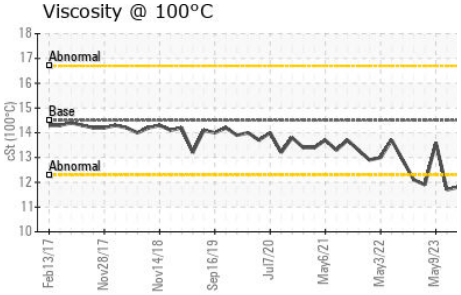
Fuel Dilution



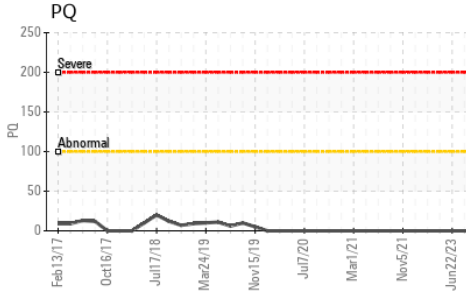
Base Number



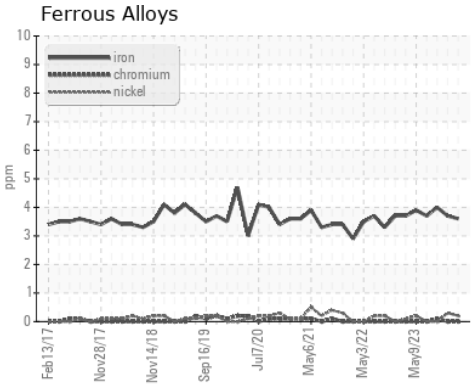
Viscosity @ 100°C



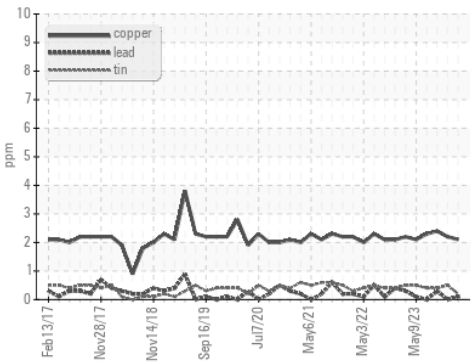
PQ



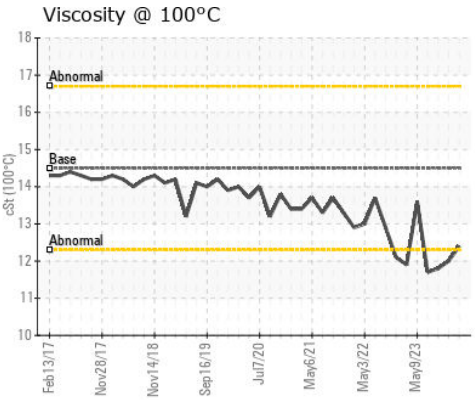
Ferrous Alloys



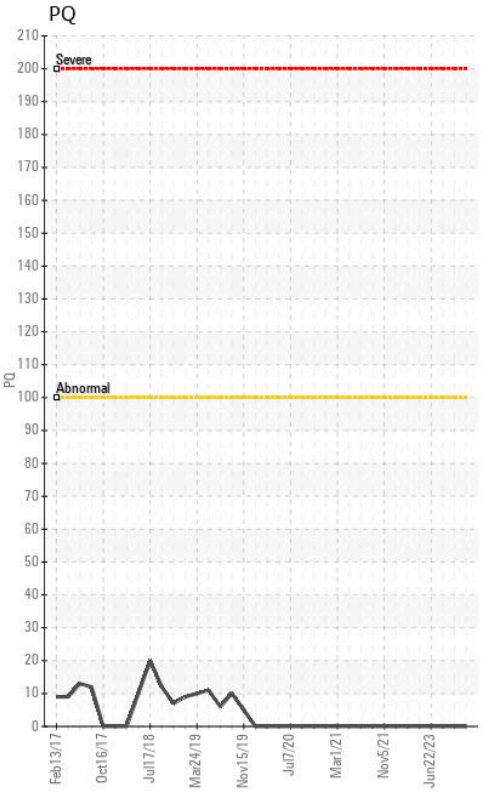
Non-ferrous Metals



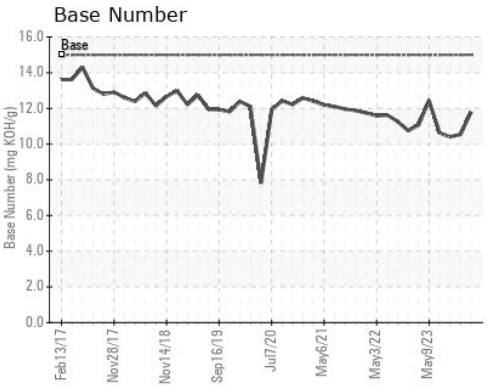
Viscosity @ 100°C



PQ



Base Number



ISO 17025:2017 Accredited Laboratory

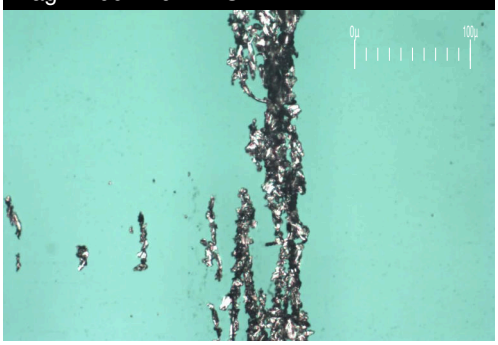
Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 **HUSKY SEA ROSE /AKER SOLUTIONS**
Sample No. : PP **Recieved** : 09 Jan 2024 PO BOX 20
Lab Number : 02607418 **Diagnosed** : 16 Jan 2024 ST. JOHN`S, NL
Unique Number : 5708504 **Diagnostician** : Kevin Marson CA A1C 6C9
Test Package : MAR 3 (Additional Tests: PercentFuel) Contact: Maintenance Supervisor

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

FERROGRAPHY REPORT

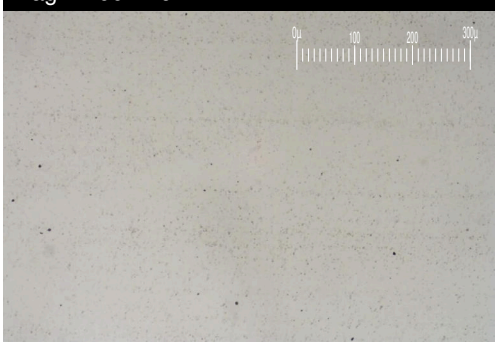
Area
ENGINE ROOM FLOOR
Machine Id
21-A-6462 STARBOARD MAIN ENGINE LUBE OIL (S/N Maint Plan 22467)
Component
Starboard Main Engine
Fluid
MOBIL MOBILGARD 412 (22300 LTR)

Magn: 200x Illum: BC



Magn: 50x Illum: RW

Magn: 100x Illum: RW

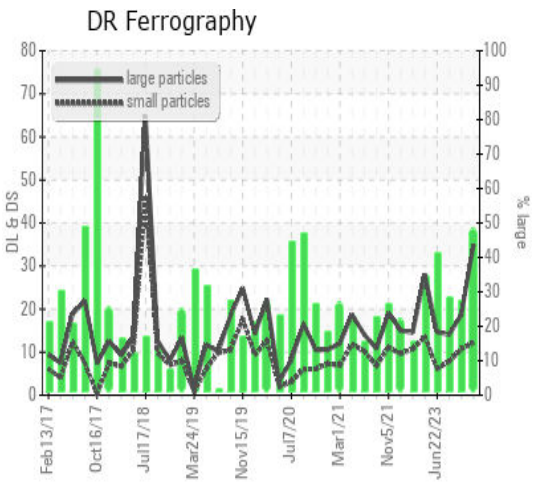


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		**34.9**	18.7	14.1
Small Particles		DR-Ferr*		**12.2**	10.7	7.9
Total Particles		DR-Ferr*	>---	**47.1**	29.4	22
Large Particles Percentage	%	DR-Ferr*		**48.2**	27.2	28.2
Severity Index		DR-Ferr*		**792**	150	87

FERROGRAPHY		method	limit/base	current	history1	history2
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*				
Carbonaceous Material	Scale 0-10	ASTM D7684*				2
Lubricant Degradation	Scale 0-10	ASTM D7684*				
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	

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.



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