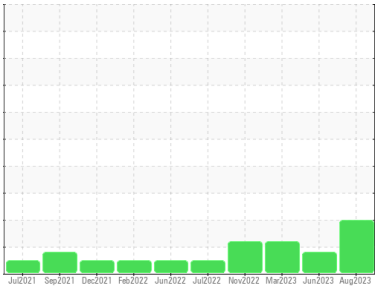
PROBLEM SUMMARY

Area
Power Generation
Machine Id
Main Engine #3 (S/N PAG00365)
Component
3 Main Engine
Fluid
CASTROL CRB Multi 15W-40 CK-4 (800 LTR)

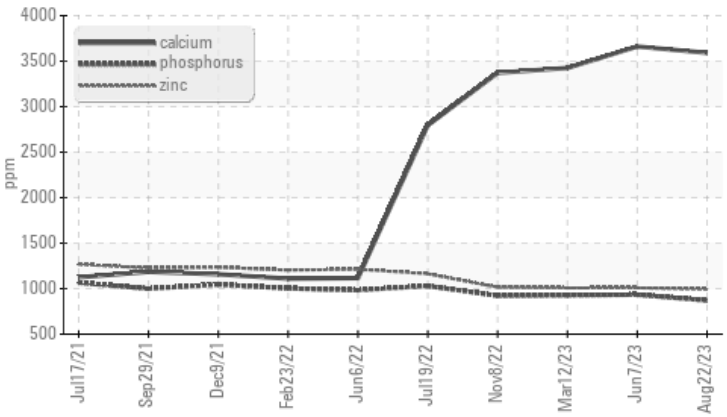
Sample Rating Trend



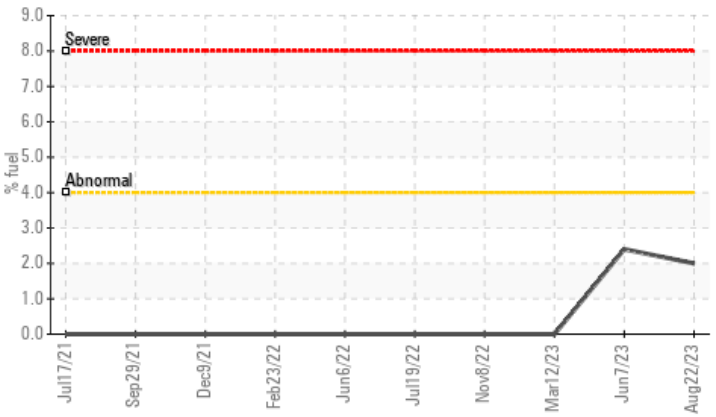
FUEL

COMPONENT CONDITION SUMMARY

▲ Additives



▲ Fuel Dilution



RECOMMENDATION

We advise that you check the cylinder liner seals for deterioration to ensure that cooling water is not entering the sump. The oil change at the time of sampling has been noted. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition. No other corrective action is recommended at this time. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. this testkit includes BN to determine the suitability of the oil for continued use.

PROBLEMATIC TEST RESULTS

Sample Status				ATTENTION	MARGINAL	ATTENTION
Boron	ppm	ASTM D5185(m)		▲ **52**	55	▲ 45
Magnesium	ppm	ASTM D5185(m)		▲ **24**	39	▲ 79
Calcium	ppm	ASTM D5185(m)		▲ **3591**	3661	▲ 3425
Fuel	%	ASTM D7593*	>4.0	▲ **2**	▲ 2.4	<1.0

Customer Id: HORIZONENA
Sample No.: WC0754032
Lab Number: 02580552
Test Package: MAR 1

To manage this report scan the QR code

To discuss the diagnosis or test data:
Wes Davis +1 905-569-8600 x223
wesd@wearcheck.ca

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
Resample	---	---	?	We recommend an early resample to monitor this condition.
Contact Required	---	---	?	Please contact your representative for information regarding the proper sampling kits for your service.
Alert	---	---	?	NOTE: We recommend using MAR 3 test kits,
Check Fluid Source	---	---	?	Confirm the source of the lubricant being utilized for top-up/fill.
Check Seals	---	---	?	We advise that you check the cylinder liner seals for deterioration to ensure that cooling water is not entering the sump.

HISTORICAL DIAGNOSIS

07 Jun 2023 Diag: Wes Davis

FUEL

No corrective action is recommended at this time. Resample at the next service interval to monitor. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. this testkit includes BN to determine the suitability of the oil for continued use.Component wear rates appear to be normal (unconfirmed). Light fuel dilution occurring. No other contaminants were detected in the oil. The condition of the oil is acceptable for the time in service (unconfirmed). The condition of the oil is acceptable for the time in service.

view report

12 Mar 2023 Diag: Kevin Marson

ADDITIVES

We advise that you check the cylinder liner seals for deterioration to ensure that cooling water is not entering the sump. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. this testkit includes BN to determine the suitability of the oil for continued use.Component wear rates appear to be normal (unconfirmed). Elemental level of sodium (Na) and/or boron (B) indicates a possible cooling water leak. Additive levels indicate the addition of a different brand, or type of oil. The condition of the oil is acceptable for the time in service (unconfirmed).

view report

08 Nov 2022 Diag: Bill Quesnel

ADDITIVES

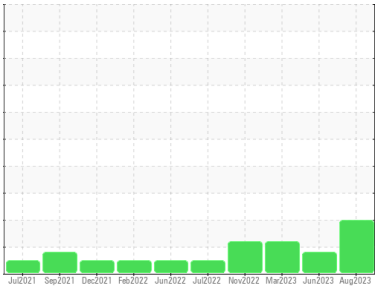
We advise that you check the cylinder liner seals for deterioration to ensure that cooling water is not entering the sump. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. this testkit includes BN to determine the suitability of the oil for continued use.Component wear rates appear to be normal (unconfirmed). Elemental level of sodium (Na) and/or boron (B) indicates a possible cooling water leak. Additive levels indicate the addition of a different brand, or type of oil. The condition of the oil is acceptable for the time in service (unconfirmed).

view report

OIL ANALYSIS REPORT

Area
Power Generation
Machine Id
Main Engine #3 (S/N PAG00365)
Component
3 Main Engine
Fluid
CASTROL CRB Multi 15W-40 CK-4 (800 LTR)

Sample Rating Trend



FUEL

DIAGNOSIS

Recommendation

We advise that you check the cylinder liner seals for deterioration to ensure that cooling water is not entering the sump. The oil change at the time of sampling has been noted. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition. No other corrective action is recommended at this time. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. this testkit includes BN to determine the suitability of the oil for continued use.

Wear

Component wear rates appear to be normal (unconfirmed).

Contamination

Elemental level of sodium (Na) and/or boron (B) indicates a possible cooling water leak. Light fuel dilution occurring. No other contaminants were detected in the oil.

Fluid Condition

Additive levels indicate the addition of a different brand, or type of oil. The condition of the oil is acceptable for the time in service (unconfirmed). The condition of the oil is acceptable for the time in service.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0754032**	WC0754023	WC0754046
Sample Date		Client Info		**22 Aug 2023**	07 Jun 2023	12 Mar 2023
Machine Age	hrs	Client Info		**51464**	50278	49458
Oil Age	hrs	Client Info		**998**	820	1000
Oil Changed		Client Info		**Changed**	Not Changd	Changed
Sample Status				**ATTENTION**	MARGINAL	ATTENTION

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

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185(m)	>75	**5**	4	4
Chromium	ppm	ASTM D5185(m)	>8	**0**	0	0
Nickel	ppm	ASTM D5185(m)	>2	**0**	<1	0
Titanium	ppm	ASTM D5185(m)	>3	**0**	<1	<1
Silver	ppm	ASTM D5185(m)	>2	**0**	<1	0
Aluminum	ppm	ASTM D5185(m)	>15	**1**	1	1
Lead	ppm	ASTM D5185(m)	>18	**2**	1	1
Copper	ppm	ASTM D5185(m)	>80	**2**	<1	1
Tin	ppm	ASTM D5185(m)	>14	**0**	<1	<1
Antimony	ppm	ASTM D5185(m)		**0**	<1	0
Vanadium	ppm	ASTM D5185(m)		**0**	0	0
Beryllium	ppm	ASTM D5185(m)		**0**	0	0
Cadmium	ppm	ASTM D5185(m)		**<1**	<1	<1

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)		▲ **52**	55	▲ 45
Barium	ppm	ASTM D5185(m)		**0**	0	0
Molybdenum	ppm	ASTM D5185(m)		**34**	33	30
Manganese	ppm	ASTM D5185(m)		**<1**	<1	<1
Magnesium	ppm	ASTM D5185(m)		▲ **24**	39	▲ 79
Calcium	ppm	ASTM D5185(m)		▲ **3591**	3661	▲ 3425
Phosphorus	ppm	ASTM D5185(m)		**870**	934	928
Zinc	ppm	ASTM D5185(m)		**992**	1009	1008
Sulfur	ppm	ASTM D5185(m)		**2803**	2988	2960
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

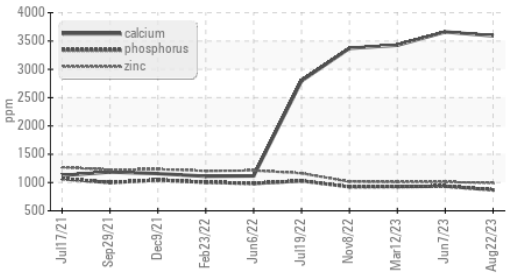
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>20	**3**	4	3
Sodium	ppm	ASTM D5185(m)	>75	**1**	<1	<1
Potassium	ppm	ASTM D5185(m)	>20	**<1**	<1	<1
Fuel	%	ASTM D7593*	>4.0	▲ **2**	▲ 2.4	<1.0

INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	ASTM D7844*		**0**	0	0
Nitration	Abs/cm	ASTM D7624*	>20	**9.1**	7.5	7.7
Sulfation	Abs/.1mm	ASTM D7415*	>30	**19.8**	17.2	17.9

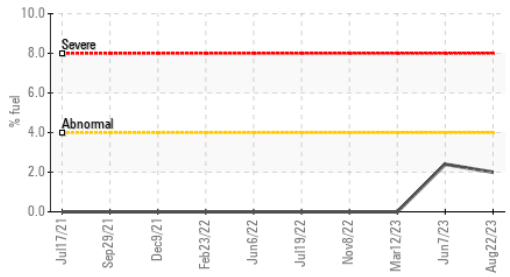
FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*	>25	**12.5**	11.1	11.5

OIL ANALYSIS REPORT

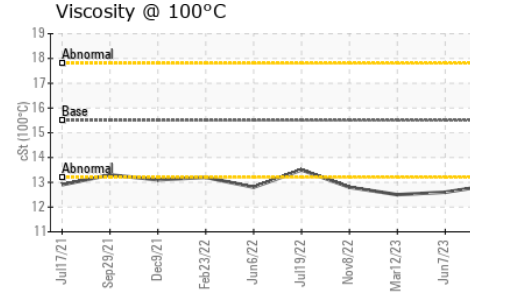
Additives



Fuel Dilution



Viscosity @ 100°C

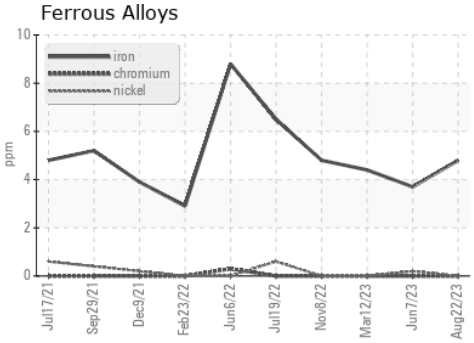


VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	Visual*	NONE	**VLITE**	NONE	NONE
Yellow Metal	scalar	Visual*	NONE	**NONE**	NONE	NONE
Precipitate	scalar	Visual*	NONE	**NONE**	NONE	NONE
Silt	scalar	Visual*	NONE	**NONE**	NONE	NONE
Debris	scalar	Visual*	NONE	**NONE**	NONE	NONE
Sand/Dirt	scalar	Visual*	NONE	**NONE**	NONE	NONE
Appearance	scalar	Visual*	NORML	**NORML**	NORML	NORML
Odor	scalar	Visual*	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	Visual*	>0.1	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

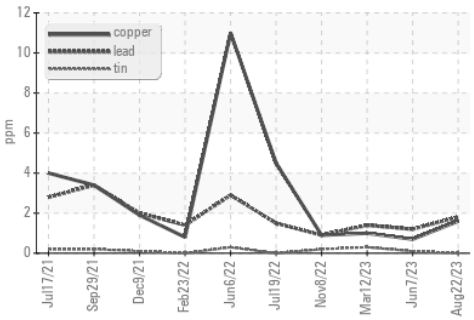
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D7279(m)	15.5	**12.9**	12.6	12.5

GRAPHS

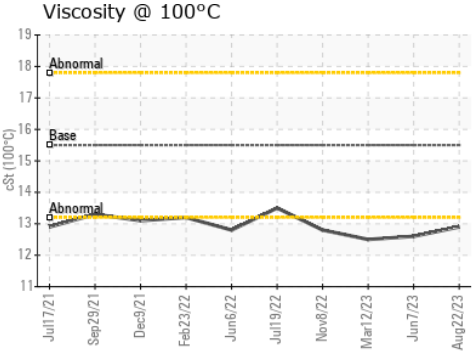
Ferrous Alloys



Non-ferrous Metals



Viscosity @ 100°C



ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 **Horizon Maritime Services Ltd. - Horizon Enabler**
Sample No. : WC0754032 **Received** : 06 Sep 2023 87 Water Street, 2nd Floor
Lab Number : 02580552 **Diagnosed** : 07 Sep 2023 St. John`s, NL
Unique Number : 5633612 **Diagnostician** : Wes Davis CA A1C 1A5
Test Package : MAR 1 (Additional Tests: FuelDilution, PercentFuel) Contact: Andrew Whalen

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