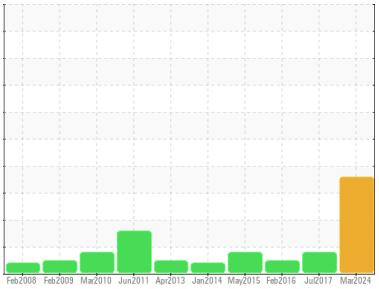
OIL ANALYSIS REPORT

Sample Rating Trend



WEAR PARTICLES

Area
OIL ANALYSIS/UNIT 3/MAIN BOILER FEED PUMP TURBINE
Machine Id
X03-43320
Component
Turbine
Fluid
ESSO TERESSO ISO 32 (--- LTR)

DIAGNOSIS

Recommendation

We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. We recommend an early resample to monitor this condition. No other corrective action is recommended at this time. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

Wear

Wear particle analysis indicates that the ferrous rolling particles are marginal. All other component wear rates are normal.

Contaminants

There is a moderate amount of particulates (2 to 100 microns in size) present in the oil. 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		**WC**	WC	WC
Sample Date		Client Info		**25 Mar 2024**	06 Jul 2017	10 Feb 2016
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				**ABNORMAL**	ATTENTION	NORMAL

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*		**0**	---	---
Iron	ppm	ASTM D5185(m)	>15	**1**	<1	<1
Chromium	ppm	ASTM D5185(m)	>4	**0**	0	0
Nickel	ppm	ASTM D5185(m)	>2	**0**	0	0
Titanium	ppm	ASTM D5185(m)		**0**	0	0
Silver	ppm	ASTM D5185(m)		**0**	0	0
Aluminum	ppm	ASTM D5185(m)	>10	**0**	<1	0
Lead	ppm	ASTM D5185(m)		**0**	<1	<1
Copper	ppm	ASTM D5185(m)	>5	**0**	0	0
Tin	ppm	ASTM D5185(m)	>5	**<1**	<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)		**0**	0	0

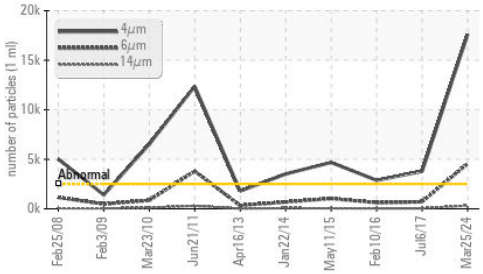
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)		**0**	<1	<1
Barium	ppm	ASTM D5185(m)		**0**	0	0
Molybdenum	ppm	ASTM D5185(m)		**0**	0	0
Manganese	ppm	ASTM D5185(m)		**0**	0	0
Magnesium	ppm	ASTM D5185(m)		**0**	0	0
Calcium	ppm	ASTM D5185(m)		**0**	0	0
Phosphorus	ppm	ASTM D5185(m)		**4**	8	7
Zinc	ppm	ASTM D5185(m)		**<1**	<1	<1
Sulfur	ppm	ASTM D5185(m)		**1124**	1744	1788
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>15	**0**	<1	<1
Sodium	ppm	ASTM D5185(m)		**0**	<1	1
Potassium	ppm	ASTM D5185(m)	>20	**0**	<1	0
Water	%	ASTM D6304*	>0.03	**0.002**	0.000	0.000
ppm Water	ppm	ASTM D6304*	>300	**16**	9.1	0.5

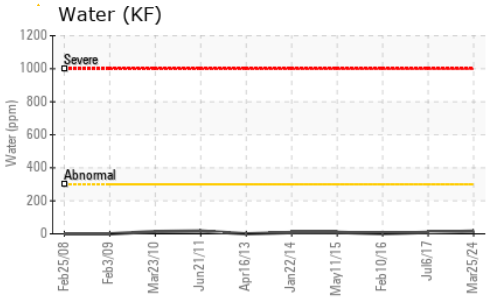
FLUID CLEANLINESS	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	>2500	▲ **17599**	3782	2871
Particles >6µm	ASTM D7647	>640	▲ **4538**	711	619
Particles >14µm	ASTM D7647	>80	▲ **325**	35	38
Particles >21µm	ASTM D7647	>20	▲ **88**	6	10
Particles >38µm	ASTM D7647	>4	**6**	0	0
Particles >71µm	ASTM D7647	>3	**1**	0	0
Oil Cleanliness	ISO 4406 (c)	>18/16/13	▲ **21/19/16**	19/17/12	19/16/12

OIL ANALYSIS REPORT

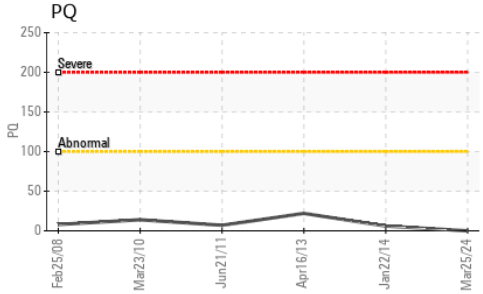
Particle Trend



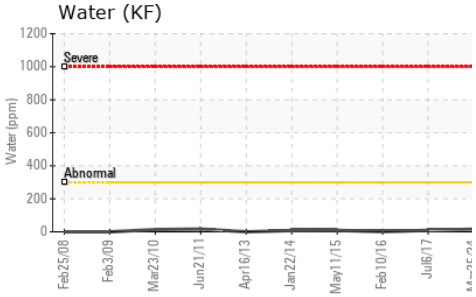
Water (KF)



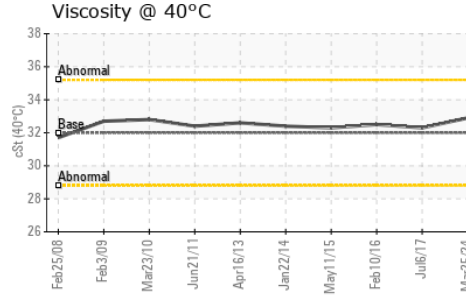
PQ



Water (KF)



Viscosity @ 40°C

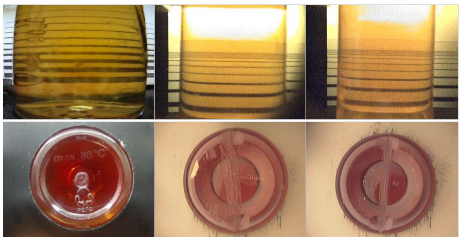


FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D974*		**0.07**	0.076	0.086

VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	Visual*	NONE	**NONE**	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*	>0.03	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

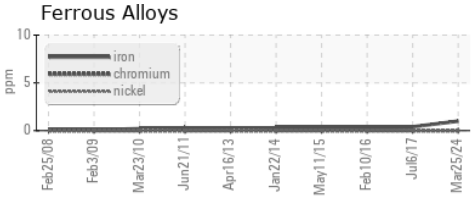
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	32	**32.9**	32.3	32.5

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

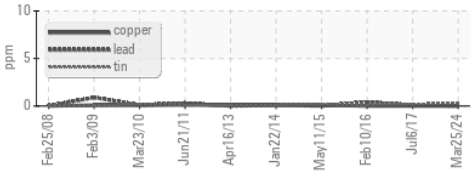


GRAPHS

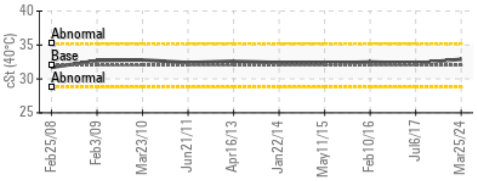
Ferrous Alloys



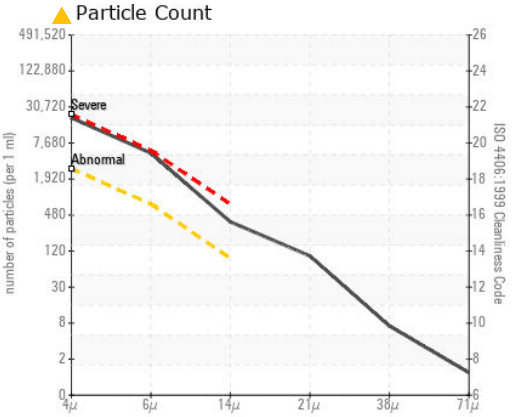
Non-ferrous Metals



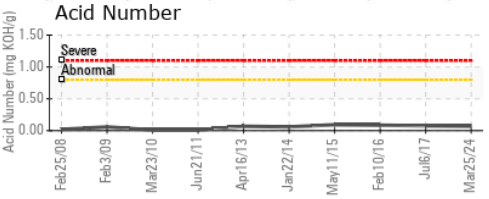
Viscosity @ 40°C



Particle Count



Acid Number



CALA
ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC
Lab Number : 02625199
Unique Number : 5750318
Test Package : IND 3

Received : 28 Mar 2024
Tested : 03 Apr 2024
Diagnosed : 03 Apr 2024 - Kevin Marson

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.

Ontario Power Generation
7263 Hwy #33 , P.O.Box 1000
BATH, ON
CA K0H 1G0
Contact: Abbas Eskandari
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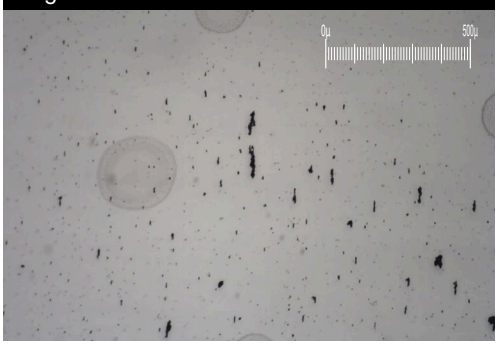
FERROGRAPHY REPORT

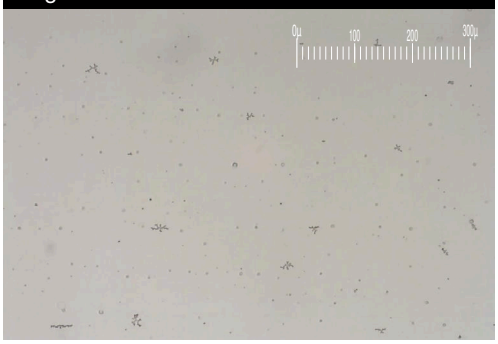
Area
OIL ANALYSIS/UNIT 3/MAIN BOILER FEED PUMP TURBINE
Machine Id
X03-43320
Component
Turbine
Fluid
ESSO TERESSO ISO 32 (--- LTR)

Magn: 200x Illum: BC

Magn: 50x Illum: RW



Magn: 100x Illum: RW

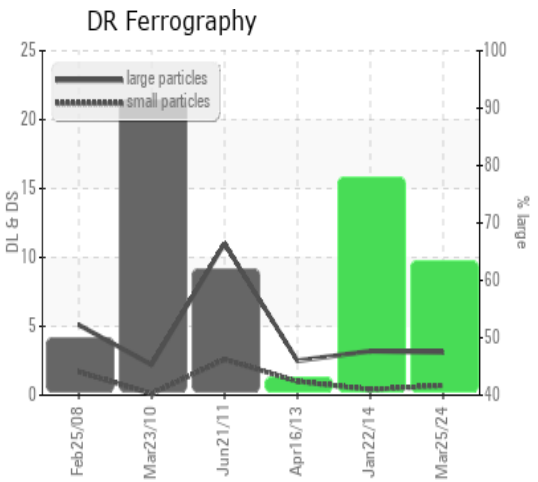


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		**3.1**	---	---
Small Particles		DR-Ferr*		**0.7**	---	---
Total Particles		DR-Ferr*	>---	**3.8**	---	---
Large Particles Percentage	%	DR-Ferr*		**63.2**	---	---
Severity Index		DR-Ferr*		**7**	---	---

FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		**2**		
Ferrous Sliding	Scale 0-10	ASTM D7684*				
Ferrous Cutting	Scale 0-10	ASTM D7684*				
Ferrous Rolling	Scale 0-10	ASTM D7684*		**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*				
Carbonaceous Material	Scale 0-10	ASTM D7684*				
Lubricant Degradation	Scale 0-10	ASTM D7684*				
Sand/Dirt	Scale 0-10	ASTM D7684*		**1**		
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		**1**		

WEAR

Wear particle analysis indicates that the ferrous rolling particles are marginal. All other component wear rates are normal.



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