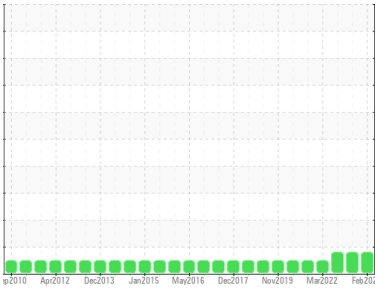
OIL ANALYSIS REPORT

Area
POWER PLANT-ENGINEERING DEPT
Machine Id
Black Start Diesel Generating Set #2 (S/N Equip. Tag No: 00XJA20AE001)
Component
Diesel Engine
Fluid
SHELL 15W40 (1703 LTR)

Sample Rating Trend



FUEL

DIAGNOSIS

Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor.

Wear

All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.

Contaminants

Light fuel dilution occurring. The water content is negligible. No other contaminants were detected in the oil.

Oil Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC**	WC	WC
Sample Date		Client Info		**28 Feb 2023**	27 Oct 2022	22 Jun 2022
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				**MARGINAL**	MARGINAL	MARGINAL

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185(m)	>100	**9**	10	10
Chromium	ppm	ASTM D5185(m)	>20	**<1**	0	0
Nickel	ppm	ASTM D5185(m)	>2	**<1**	<1	0
Titanium	ppm	ASTM D5185(m)	>2	**<1**	<1	<1
Silver	ppm	ASTM D5185(m)	>2	**0**	<1	0
Aluminum	ppm	ASTM D5185(m)	>25	**2**	2	2
Lead	ppm	ASTM D5185(m)	>40	**<1**	<1	1
Copper	ppm	ASTM D5185(m)	>330	**12**	12	12
Tin	ppm	ASTM D5185(m)	>15	**<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

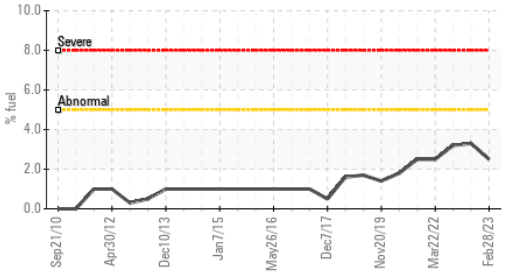
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)		**2**	2	2
Barium	ppm	ASTM D5185(m)		**<1**	<1	<1
Molybdenum	ppm	ASTM D5185(m)		**7**	7	7
Manganese	ppm	ASTM D5185(m)		**<1**	<1	<1
Magnesium	ppm	ASTM D5185(m)		**391**	401	407
Calcium	ppm	ASTM D5185(m)		**2560**	2561	2574
Phosphorus	ppm	ASTM D5185(m)		**1221**	1237	1164
Zinc	ppm	ASTM D5185(m)		**1310**	1333	1356
Sulfur	ppm	ASTM D5185(m)		**5226**	5335	5434
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>25	**3**	3	3
Sodium	ppm	ASTM D5185(m)	>150	**2**	2	2
Potassium	ppm	ASTM D5185(m)	>20	**1**	<1	<1
Fuel	%	ASTM D7593*	>5	▲ **2.5**	▲ 3.3	▲ 3.2
Water	%	ASTM D6304*	>0.2	**0.073**	0.055	0.068
ppm Water	ppm	ASTM D6304*	>2000	**732.8**	553.9	686.2
Glycol	%	ASTM D7922*		**0.0**	0.0	0.0

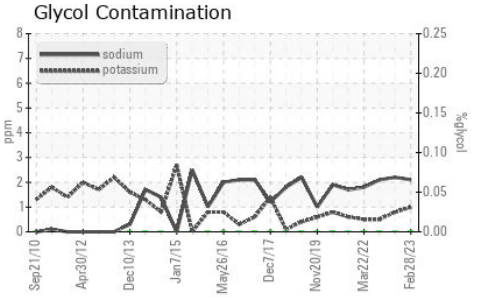
INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	ASTM D7844*	>3	**0**	0	0
Nitration	Abs/cm	ASTM D7624*	>20	**7.5**	7.4	7.5
Sulfation	Abs/.1mm	ASTM D7415*	>30	**19.2**	17.9	19.3

OIL ANALYSIS REPORT

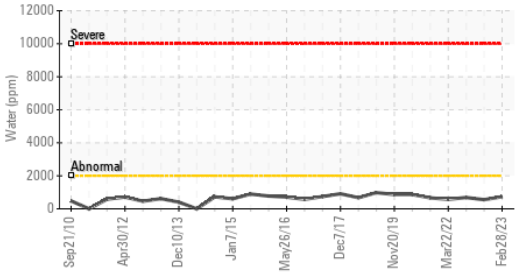
Fuel Dilution



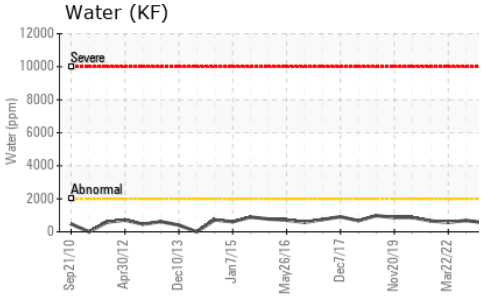
Glycol Contamination



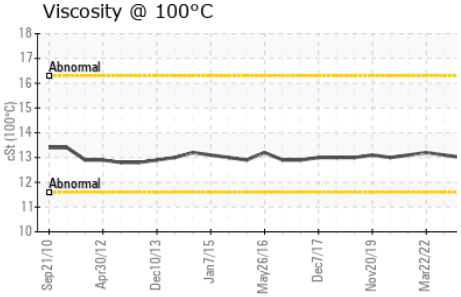
Water (KF)



Water (KF)



Viscosity @ 100°C



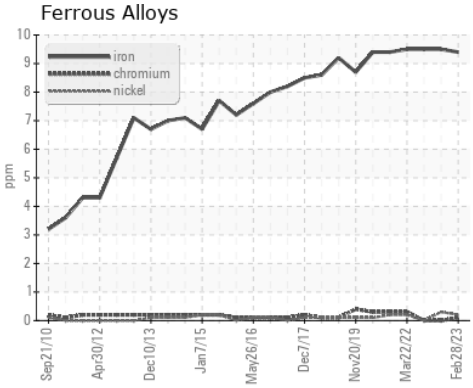
FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*	>25	**12.9**	13.0	13.1
Base Number (BN)	mg KOH/g	ASTM D2896*		**9.89**	11.02	11.18

VISUAL		method	limit/base	current	history1	history2
Emulsified Water	scalar	Visual*	>0.2	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

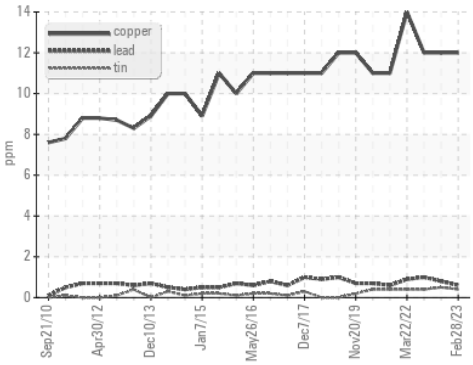
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D7279(m)		**13.0**	13.0	13.1

GRAPHS

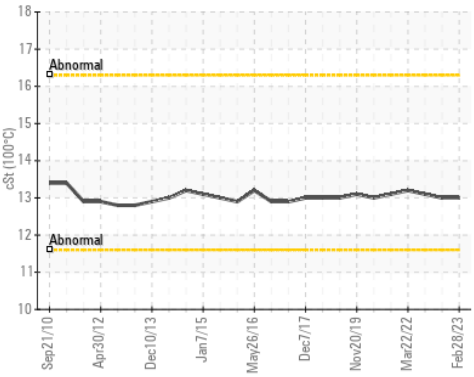
Ferrous Alloys



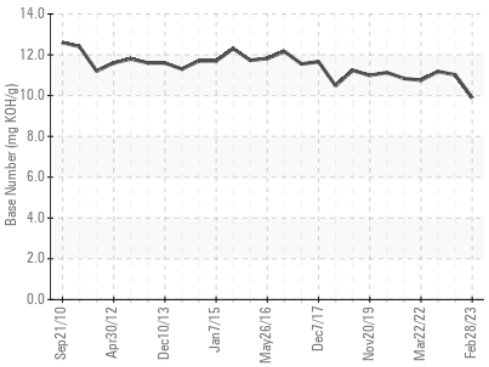
Non-ferrous Metals



Viscosity @ 100°C



Base Number



ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC **Recieved** : 15 Mar 2023
Lab Number : 02545255 **Diagnosed** : 21 Mar 2023
Unique Number : 5542260 **Diagnostician** : Bill Quesnel
Test Package : DE TP (Additional Tests: FT-IR, PercentFuel, Spat)

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.

Qatar Aluminium - Qatalum
C Ring Road
Doha, ZZ
QA 23086
Contact: Elmer Magadia
Elmer.Magadia@qatalum.com
T: 9(744)403-1718
F: 9(743)319-2163

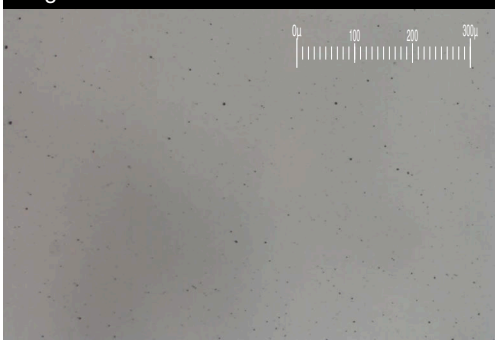
FERROGRAPHY REPORT

Area
POWER PLANT-ENGINEERING DEPT
Machine Id
Black Start Diesel Generating Set #2 (S/N Equip. Tag No: 00XJA20AE001)
Component
Diesel Engine
Fluid
SHELL 15W40 (1703 LTR)

Magn: 200x Illum: BC

Magn: 50x Illum: RW

Magn: 100x Illum: RW

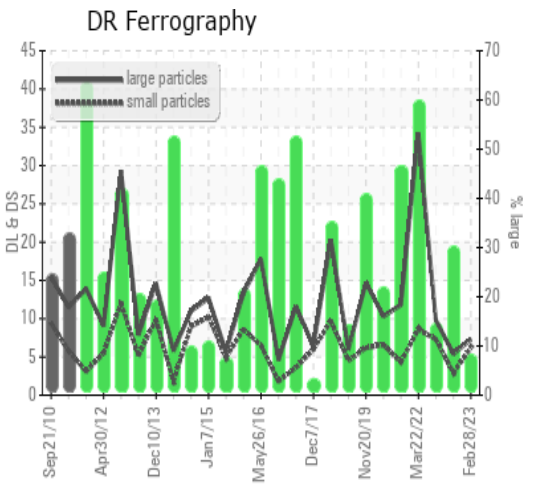


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		**7.3**	5.4	9.8
Small Particles		DR-Ferr*		**6.2**	2.9	7.3
Total Particles		DR-Ferr*	>---	**13.5**	8.3	17.1
Large Particles Percentage	%	DR-Ferr*		**8.1**	30.1	14.6
Severity Index		DR-Ferr*		**8**	14	25

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

WEAR

All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.



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