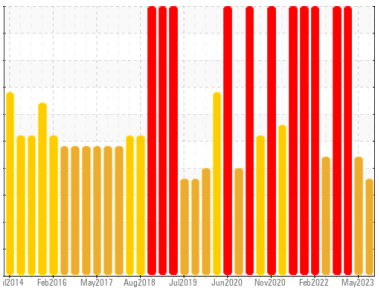
PROBLEM SUMMARY

Sample Rating Trend

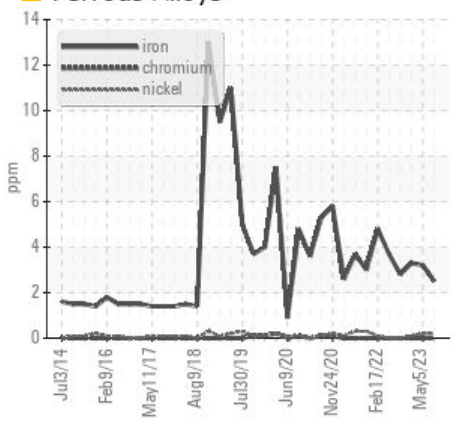


WATER

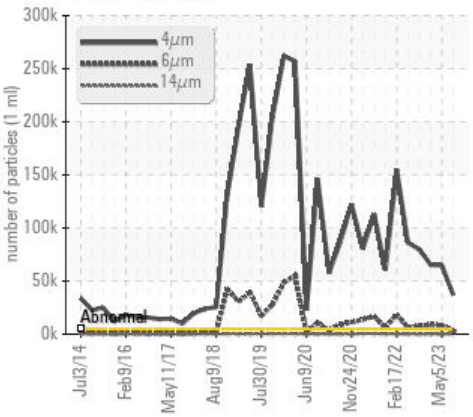
Area
BRUCE B/0B/54600
Machine Id
0B-54600-SG7-Avon Level Gauge
Component
Jet Turbine
Fluid
SHELL AEROSHELL 500 (--- GAL)

COMPONENT CONDITION SUMMARY

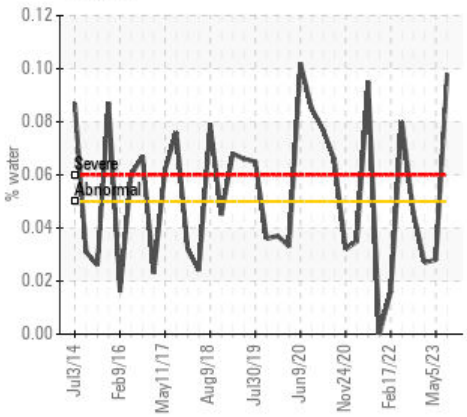
Ferrous Alloys



Particle Trend



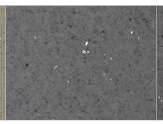
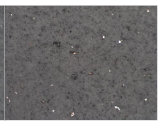
Water



RECOMMENDATION

The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend you service the filters on this component. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

PROBLEMATIC TEST RESULTS

Sample Status				ABNORMAL	SEVERE	SEVERE
Iron	ppm	ASTM D5185(m)	>2	▲ **2**	▲ 3	▲ 3
Water	%	ASTM D6304*	>0.05	▲ **0.098**	0.028	0.027
ppm Water	ppm	ASTM D6304*	>500	▲ **980.0**	280.9	272.1
Particles >4µm		ASTM D7647	>5000	▲ **36957**	⬢ 64915	⬢ 65281
Particles >6µm		ASTM D7647	>1300	▲ **3166**	▲ 8381	▲ 8980
Oil Cleanliness		ISO 4406 (c)	>19/17/15	▲ **22/19/14**	⬢ 23/20/13	⬢ 23/20/13
PrtFilter						

Customer Id: BRUTIV
Sample No.: WC0535185
Lab Number: 02580356
Test Package: IND2+

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 Filter	---	---	?	We recommend you service the filters on this component.
Resample	---	---	?	We recommend an early resample to monitor this condition.
Information Required	---	---	?	NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.
Check Breathers	---	---	?	The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather.

HISTORICAL DIAGNOSIS

WEAR PARTICLES

05 May 2023 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend you service the filters on this component. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.Wear particle analysis indicates that the ferrous cutting particles are abnormal. Iron ppm levels are abnormal. Cutting wear particles are caused by either hard protuberances (mis-aligned components, etc.), or abrasives entering the system and embeding themselves in softer materials (sand, etc.), and gouging out mating surfaces. There is a high amount of silt (particulates < 14 microns in size) present in the oil. The water content is negligible. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

view report

WEAR PARTICLES

05 Jan 2023 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check for visible metal particles in the oil. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend you service the filters on this component. Resample in 30-45 days to monitor this situation.Wear particle analysis indicates that the ferrous cutting. Wear particle analysis indicates that the ferrous cutting particles are severe. Iron ppm levels are abnormal. Light concentration of visible metal present. Bearing and/or gear wear is indicated. Particles >4µm and oil cleanliness are severely high. Particles >6µm are abnormally high. The water content is negligible. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

view report

WEAR PARTICLES

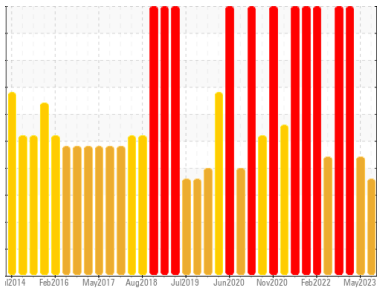
30 Sep 2022 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check for visible metal particles in the oil. We recommend that you drain the oil from the component if this has not already been done. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend you service the filters on this component. Resample in 30-45 days to monitor this situation. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.Wear particle analysis indicates that the ferrous cuttingWear particle analysis indicates that the ferrous cutting particles are severe. Iron ppm levels are abnormal. Light concentration of visible metal present. Bearing and/or gear wear is indicated. Cutting wear particles are caused by either hard protuberances (mis-aligned components, etc.), or abrasives entering the system and embeding themselves in softer materials (sand, etc.), and gouging out mating surfaces. Particles >4µm and oil cleanliness are severely high. Particles >6µm are abnormally high. The water content is negligible. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

view report

OIL ANALYSIS REPORT

Sample Rating Trend



WATER

Area
BRUCE B/0B/54600
Machine Id
0B-54600-SG7-Avon Level Gauge
Component
Jet Turbine
Fluid
SHELL AEROSHELL 500 (--- GAL)

DIAGNOSIS

Recommendation

The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We recommend you service the filters on this component. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

Wear

Iron ppm levels are abnormal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.

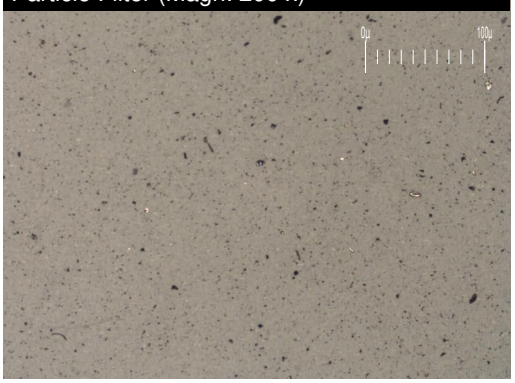
Contaminants

There is a moderate amount of silt (particulates < 14 microns in size) present in the oil. There is a trace of moisture present in the oil. The system cleanliness is above the acceptable limit for the target ISO 4406 cleanliness code.

Oil Condition

The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

Particle Filter (Magn: 200 x)



SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0535185**	WC0548190	WC0535170
Sample Date		Client Info		**29 Aug 2023**	05 May 2023	05 Jan 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				**ABNORMAL**	SEVERE	SEVERE

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*		**0**	0	0
Iron	ppm	ASTM D5185(m)	>2	▲ **2**	▲ 3	▲ 3
Chromium	ppm	ASTM D5185(m)	>1	**0**	0	0
Nickel	ppm	ASTM D5185(m)	>1	**<1**	<1	<1
Titanium	ppm	ASTM D5185(m)	>5	**0**	0	0
Silver	ppm	ASTM D5185(m)	>2	**0**	0	0
Aluminum	ppm	ASTM D5185(m)	>1	**0**	0	<1
Lead	ppm	ASTM D5185(m)	>2	**0**	<1	0
Copper	ppm	ASTM D5185(m)	>1	**<1**	<1	<1
Tin	ppm	ASTM D5185(m)	>1	**0**	0	0
Antimony	ppm	ASTM D5185(m)		**0**	0	<1
Vanadium	ppm	ASTM D5185(m)		**0**	0	0
Beryllium	ppm	ASTM D5185(m)		**0**	0	0
Cadmium	ppm	ASTM D5185(m)		**0**	0	0

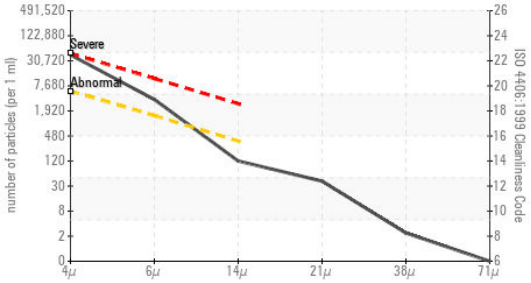
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)	0	**<1**	0	<1
Barium	ppm	ASTM D5185(m)	0	**0**	0	0
Molybdenum	ppm	ASTM D5185(m)	0	**0**	0	0
Manganese	ppm	ASTM D5185(m)	0	**0**	0	0
Magnesium	ppm	ASTM D5185(m)	0	**0**	0	0
Calcium	ppm	ASTM D5185(m)	0	**0**	0	0
Phosphorus	ppm	ASTM D5185(m)	1000	**1075**	1079	1068
Zinc	ppm	ASTM D5185(m)	5	**1**	<1	<1
Sulfur	ppm	ASTM D5185(m)	0	**2**	<1	<1
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>5	**2**	2	2
Sodium	ppm	ASTM D5185(m)	>5	**<1**	<1	<1
Potassium	ppm	ASTM D5185(m)	>20	**<1**	0	<1
Water	%	ASTM D6304*	>0.05	▲ **0.098**	0.028	0.027
ppm Water	ppm	ASTM D6304*	>500	▲ **980.0**	280.9	272.1

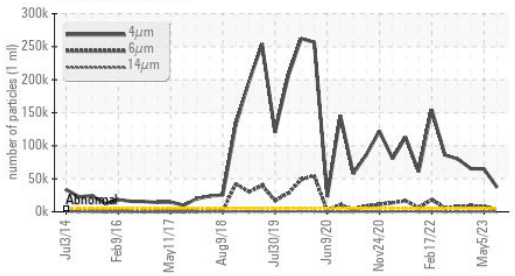
FLUID CLEANLINESS	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	>5000	▲ **36957**	⬢ 64915	⬢ 65281
Particles >6µm	ASTM D7647	>1300	▲ **3166**	▲ 8381	▲ 8980
Particles >14µm	ASTM D7647	>320	**106**	78	57
Particles >21µm	ASTM D7647	>80	**35**	15	7
Particles >38µm	ASTM D7647	>20	**2**	1	2
Particles >71µm	ASTM D7647	>4	**0**	1	2
Oil Cleanliness	ISO 4406 (c)	>19/17/15	▲ **22/19/14**	⬢ 23/20/13	⬢ 23/20/13

OIL ANALYSIS REPORT

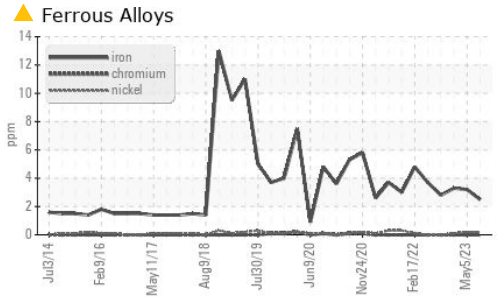
Particle Count



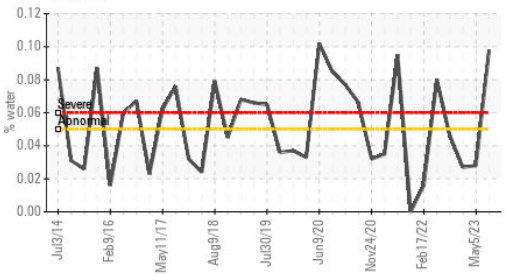
Particle Trend



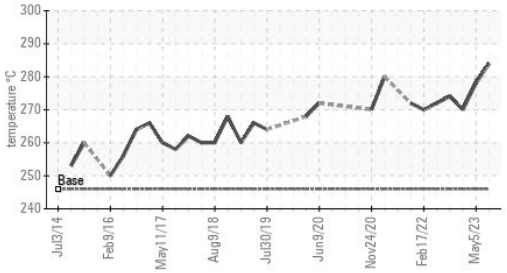
Ferrous Alloys



Water



Flash Point (°C)

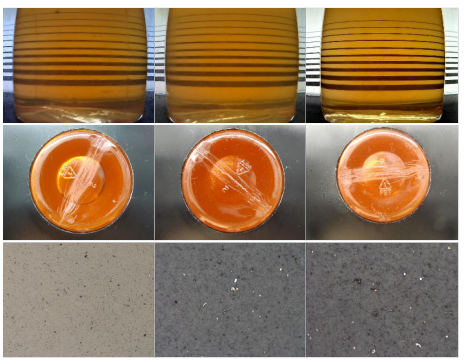


FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D974*	0.11	**0.03**	0.02	0.06

VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	Visual*	NONE	**NONE**	NONE	▲ LIGHT
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*	>0.05	**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)	25.3	**25.2**	25.4	24.6
Visc @ 100°C	cSt	ASTM D7279(m)	5.2	**5.1**	5.2	5
Viscosity Index (VI)	Scale	ASTM D2270*	141	**134**	140	132
COC Flash Point	°C	ASTM D92*	246	**284**	278	270

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					
PrtFilter					



ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC0535185 **Received** : 05 Sep 2023
Lab Number : 02580356 **Diagnosed** : 08 Sep 2023
Unique Number : 5633416 **Diagnostician** : Kevin Marson
Test Package : IND2+ (Additional Tests: A-FERR, BottomAnalysis, DR-FERR, PQ, PrtFilter, Spat, VI, Visual)

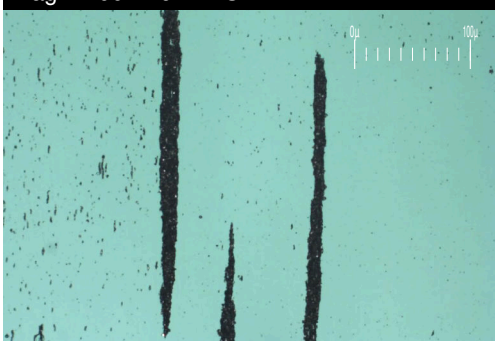
To discuss this sample report, contact Customer Service at 1-800-268-2131.
Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.
Validity of results and interpretation are based on the sample and information as supplied.

Bruce Power - Bruce A PdM
P.O.Box 1540, 177 Tie Road,, RM-222 U2 Column 2N11 615`
Tiverton, ON
CA N0G 2T0
Contact: Pierre Adouki
pierre.adouki@brucepower.com
T: (519)361-2673
F:

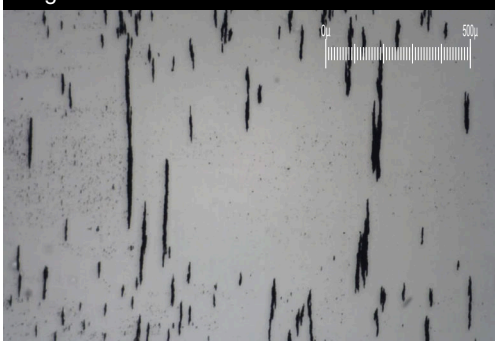
FERROGRAPHY REPORT

Area
BRUCE B/0B/54600
Machine Id
0B-54600-SG7-Avon Level Gauge
Component
Jet Turbine
Fluid
SHELL AEROSHELL 500 (--- GAL)

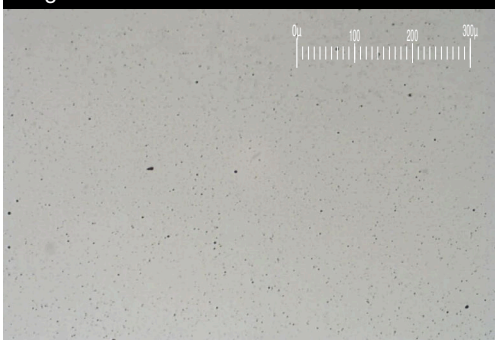
Magn: 200x Illum: BC



Magn: 50x Illum: RW



Magn: 100x Illum: RW

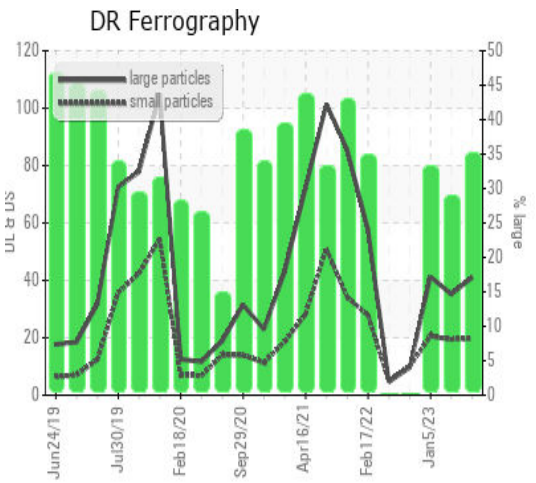


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		**41.0**	35.2	41.2
Small Particles		DR-Ferr*		**19.7**	19.4	20.6
Total Particles		DR-Ferr*	>---	**60.7**	54.6	61.8
Large Particles Percentage	%	DR-Ferr*		**35.1**	28.9	33.3
Severity Index		DR-Ferr*		**873**	556	849

FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		**4**	4	4
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*				
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
Ferrous Corrosive	Scale 0-10	ASTM D7684*		**1**	1	
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**	1	1
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		**2**	2	1

WEAR

Iron ppm levels are abnormal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.



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