



OIL ANALYSIS REPORT

WEAR	<b>SEVERE</b>
CONTAMINANTS	<b>SEVERE</b>
OIL CONDITION	<b>NORMAL</b>

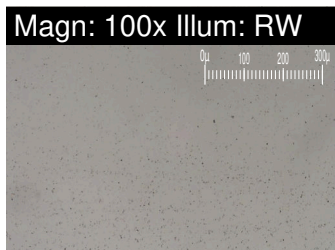
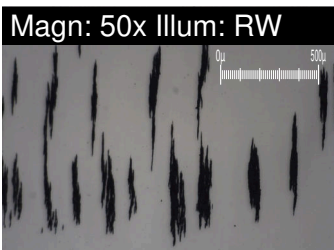
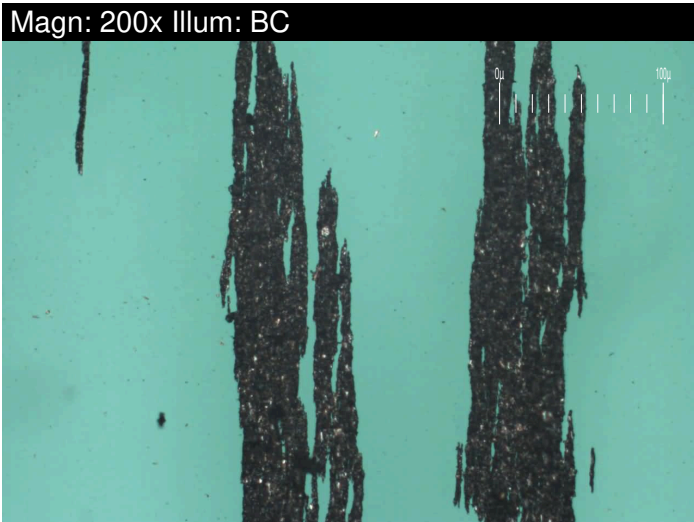
Area  
**BRUCE B/5/43230**  
Machine Id  
**5-43230-P4-P OB Brg Drn**  
Component  
**Outboard Bearing**  
Fluid  
**ESSO NUTO H ISO 46 (--- GAL)**

**RECOMMENDATION**

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 advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. 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**

Copper ppm levels are severe. Lead ppm levels are abnormal. Bearing wear is indicated. The ferrography results are normal indicating no abnormal wear in the system.



Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		<b>WC0900630</b>	WC0744592	WC0791595
Sample Date		Client Info		<b>20 Feb 2024</b>	28 Nov 2023	08 Aug 2023
Machine Age	hrs	Client Info		<b>0</b>	0	0
Oil Age	hrs	Client Info		<b>0</b>	0	0
Filter Age	hrs	Client Info		<b>0</b>	0	0
Oil Changed		Client Info		<b>N/A</b>	N/A	N/A
Filter Changed		Client Info		<b>N/A</b>	N/A	N/A
Sample Status				<b>SEVERE</b>	SEVERE	SEVERE
Iron	ppm	ASTM D5185(m)	>10	<b>4</b>	8	6
Chromium	ppm	ASTM D5185(m)	>5	<b>&lt;1</b>	<1	<1
Nickel	ppm	ASTM D5185(m)	>5	<b>&lt;1</b>	<1	<1
Titanium	ppm	ASTM D5185(m)	>5	<b>0</b>	0	0
Silver	ppm	ASTM D5185(m)		<b>0</b>	<1	0
Aluminum	ppm	ASTM D5185(m)	>5	<b>&lt;1</b>	<1	<1
Lead	ppm	ASTM D5185(m)	>5	<b>▲ 5</b>	▲ 7	3
Copper	ppm	ASTM D5185(m)	>5	<b>▲ 35</b>	▲ 49	▲ 21
Tin	ppm	ASTM D5185(m)	>5	<b>2</b>	3	1
Vanadium	ppm	ASTM D5185(m)		<b>0</b>	0	0
White Metal	scalar	Visual*	NONE	<b>NONE</b>	NONE	VLITE
Yellow Metal	scalar	Visual*	NONE	<b>NONE</b>	NONE	NONE
Large Particles		DR-Ferr*		<b>64.8</b>	98.8	80.6
Small Particles		DR-Ferr*		<b>32.3</b>	55.3	42.2
Total Particles		DR-Ferr*	>---	<b>97.1</b>	154.1	122.8
Large Particles Percentage	%	DR-Ferr*		<b>33.5</b>	28.2	31.3
Severity Index		DR-Ferr*		<b>2106</b>	4298	3095
Ferrous Rubbing	Scale 0-10	ASTM D7684*		<b>5</b>	5	4
Ferrous Sliding	Scale 0-10	ASTM D7684*				
Ferrous Cutting	Scale 0-10	ASTM D7684*				▲ 1
Ferrous Rolling	Scale 0-10	ASTM D7684*		<b>2</b>	2	2
Ferrous Break-in	Scale 0-10	ASTM D7684*				
Ferrous Spheres	Scale 0-10	ASTM D7684*				
Ferrous Black Oxides	Scale 0-10	ASTM D7684*		<b>1</b>	1	
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
Ferrous Corrosive	Scale 0-10	ASTM D7684*		<b>1</b>	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*				

## CONTAMINANTS

There is a high amount of silt (particulates < 14 microns in size) present in the oil. Elemental level of silicon (Si) above normal indicating ingress of seal material. The water content is negligible. The system cleanliness code is much higher than the acceptable limit for the target ISO 4406 cleanliness code.

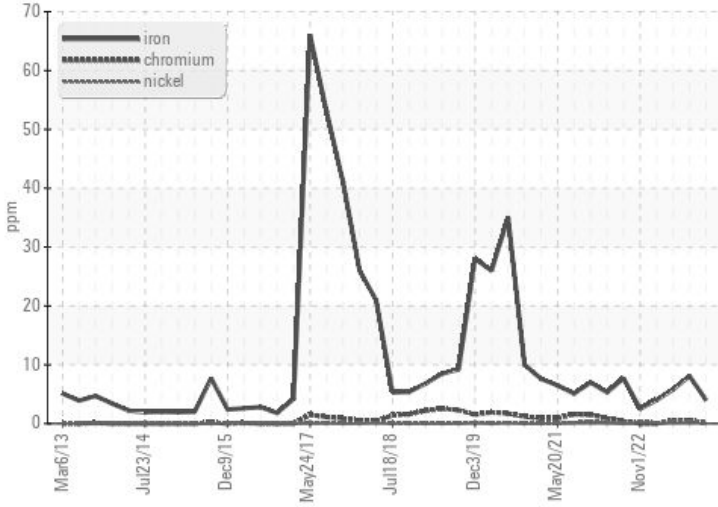
Silicon	ppm	ASTM D5185(m)	>5	▲ 13	▲ 16	▲ 11
Potassium	ppm	ASTM D5185(m)	>20	<1	0	0
Water	%	ASTM D6304*	>0.005	<b>0.001</b>	0.001	0.00
ppm Water	ppm	ASTM D6304*	>50	<b>4</b>	13	0.00
Particles >4µm		ASTM D7647	>5000	▲ <b>136469</b>	▲ 145640	▲ 192904
Particles >6µm		ASTM D7647	>1300	▲ <b>10804</b>	▲ 56692	▲ 29098
Particles >14µm		ASTM D7647	>320	<b>62</b>	180	237
Particles >21µm		ASTM D7647	>80	<b>7</b>	20	32
Particles >38µm		ASTM D7647	>20	<b>1</b>	2	2
Particles >71µm		ASTM D7647	>4	<b>0</b>	1	0
Oil Cleanliness		ISO 4406 (c)	>19/17/15	▲ <b>24/21/13</b>	▲ 24/23/15	▲ 25/22/15
Silt	scalar	Visual*	NONE	<b>NONE</b>	NONE	VLITE
Debris	scalar	Visual*	NONE	<b>NONE</b>	NONE	NONE
Sand/Dirt	scalar	Visual*	NONE	<b>NONE</b>	NONE	NONE
Appearance	scalar	Visual*	NORML	<b>NORML</b>	NORML	NORML
Odor	scalar	Visual*	NORML	<b>NORML</b>	NORML	NORML
Emulsified Water	scalar	Visual*	>0.005	<b>NEG</b>	NEG	NEG
Carbonaceous Material	Scale 0-10	ASTM D7684*				
Sand/Dirt	Scale 0-10	ASTM D7684*		<b>1</b>	1	1
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		<b>1</b>	2	2

## 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.

Sodium	ppm	ASTM D5185(m)	>5	<b>0</b>	<1	0
Boron	ppm	ASTM D5185(m)	0	<b>0</b>	<1	0
Barium	ppm	ASTM D5185(m)	0	<b>0</b>	<1	0
Molybdenum	ppm	ASTM D5185(m)	0	<b>0</b>	0	0
Manganese	ppm	ASTM D5185(m)		<b>0</b>	0	0
Magnesium	ppm	ASTM D5185(m)	5	<1	0	<1
Calcium	ppm	ASTM D5185(m)	50	<b>53</b>	53	54
Phosphorus	ppm	ASTM D5185(m)	330	<b>353</b>	346	383
Zinc	ppm	ASTM D5185(m)	410	<b>431</b>	442	449
Sulfur	ppm	ASTM D5185(m)	2700	<b>5920</b>	5662	5872
Acid Number (AN)	mg KOH/g	ASTM D974*	0.45	<b>0.35</b>	0.37	0.33
Visc @ 40°C	cSt	ASTM D7279(m)	46	<b>43.6</b>	43.6	43.3
Lubricant Degradation	Scale 0-10	ASTM D7684*				

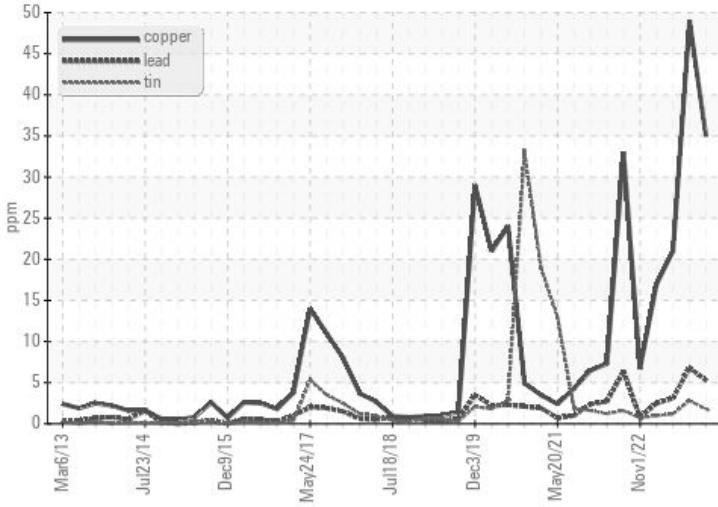
### Ferrous Alloys



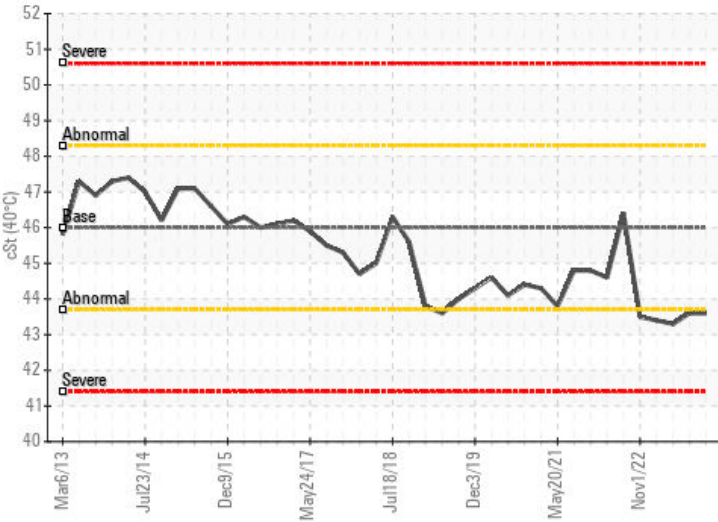
### Particle Filter (Magn: 200 x)



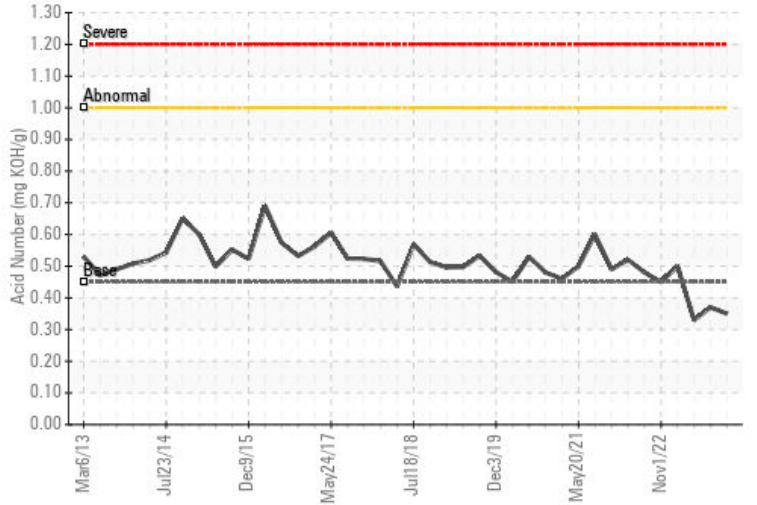
### Non-ferrous Metals



### Viscosity @ 40°C



### Acid Number



**Laboratory** : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9  
**Sample No.** : WC0900630  
**Lab Number** : 02618383  
**Unique Number** : 5735493  
**Test Package** : IND 2 ( Additional Tests: A-FERR, BottomAnalysis, DR-FERR, FILTERPATCH, PrintOut)

**Bruce Power - Bruce A PdM**  
 P.O.Box 1540, 177 Tie Road., RM-222 U2 Column 2N11 615  
 Tiverton, ON  
 CA N0G 2T0  
 Contact: Andrew Roffey  
 andrew.roffey@brucepower.com  
 T: (519)361-2673 x:17186  
 F:

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.

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