

OIL ANALYSIS REPORT

Main Engine #1 Main Engine #1 Sump

Component **Right Main Engine** CASTROL MHP 154 (--- GAL)

Recommendation

Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

Wear

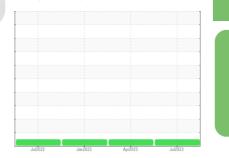
All component wear rates are normal. The directreading & analytical ferrographic results are normal indicating no abnormal wear in the system.

Contaminants

There is no indication of any contamination 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 Rating Trend



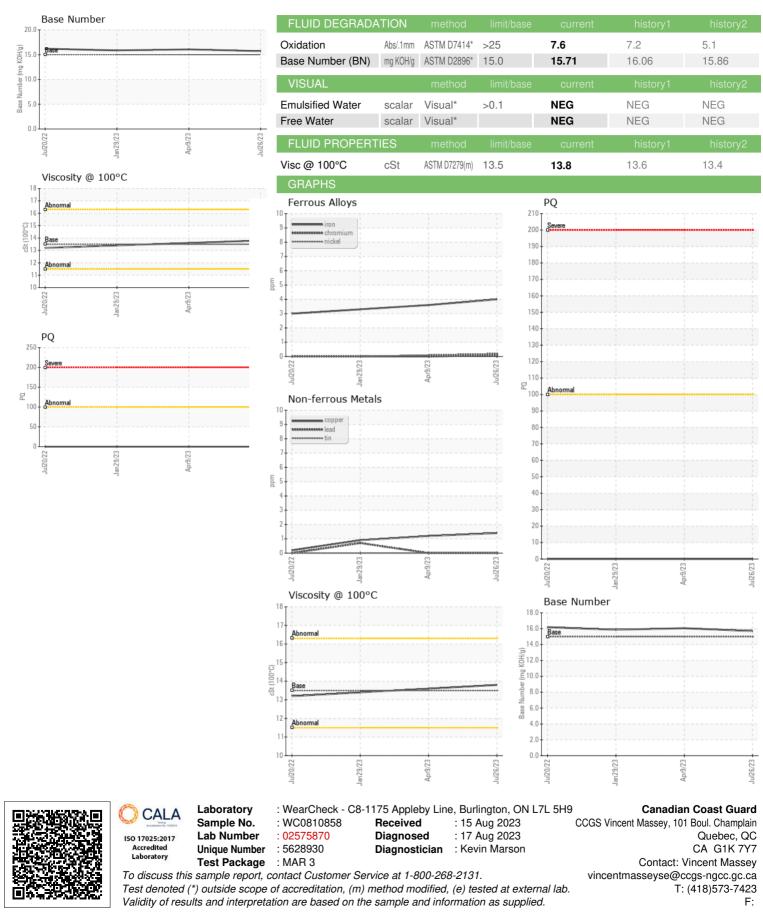
NORMAL

SAMPLE INFORMATION method limit/base current history1 history2 Sample Number Client Info 26 Jul 2023 09 Apr 2023 29 Jan 2023 Machine Age hrs Client Info 75011 0 0 Oil Age hrs Client Info 75011 0 0 Oil Age hrs Client Info 77011 0 0 Oil Age hrs Client Info 77011 0 0 Sample Status Imit Mathia NORMAL NORMAL NORMAL NORMAL Chromitum Method 54.0 <1.0 <1.0 <1.0 Glycol MSTM 051641 O 0 0 0 Iron ppm ASTM 05165119 57.5 4 4 3 Silver ppm ASTM 05165119 52 2 2 2 PQ ASTM 0516519 52 2 2 2 2 Iran ppm ASTM 0516519 <th></th> <th></th> <th>Jui202</th> <th>2 Jan2023</th> <th>Apr2023</th> <th>ul2023</th> <th></th>			Jui202	2 Jan2023	Apr2023	ul2023	
Sample Date Client Info 26 Jul 2023 09 Apr 2023 29 Jan 2023 Machine Age hrs Client Info 75011 0 0 Oil Age hrs Client Info 75011 0 0 Oil Changed Client Info N/A N/A Nock And Nock And Sample Status Imit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 Glycol WC Method >57.5 4 44 3 Chromium ppm ASTM D5185(m) >2 <1 <1 0 Nickel ppm ASTM D5185(m) >2 <1 <1 0 1 Silver ppm ASTM D5185(m) >2 0 0 0 1 <1 <1 0 1 <1 0 1 <1 0 0 1 <1 <1 0 1 <1 <1 1 <1 1 1 <th>SAMPLE INFORM</th> <th>MATION</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 75011 0 0 Oil Age hrs Client Info 75011 0 0 Oil Changed Client Info N/A N/A N/A NOC Changd Sample Status Imit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 <1.0 NEG NEG WEAR METALS method limit/base current history1 history2 PQ ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >2 <1 <1 0 Silver ppm ASTM D5185(m) >2 <0 0 <1 <1 <1 <1 0 0 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 1 1 1 1 <th>Sample Number</th> <th></th> <th>Client Info</th> <th></th> <th>WC0810858</th> <th>WC0763455</th> <th>WC0763486</th>	Sample Number		Client Info		WC0810858	WC0763455	WC0763486
Oil Age hrs Client Info 75011 0 0 Oil Changed Client Info N/A N/A Not Changed Sample Status Imit/base current NISORMAL NORMAL NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method NEG NEG NEG NEG VEAR METALS method limit/base current history1 history2 PQ ASTM D5185(m) >75 4 4 3 Chromium pm ASTM D5185(m) >2 <1 <1 0 0 Nickel ppm ASTM D5185(m) >2 0 0 0 0 0 1 <1 <1 1 <1 1 1 1 1 1 1	Sample Date		Client Info		26 Jul 2023	09 Apr 2023	29 Jan 2023
Oil Changed Sample Status Client Info N/A NORMAL N/A NORMAL N/A NORMAL Not Changd NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 <1.0 <1.0 <1.0 <1.0 WEAR METALS method imit/base current history1 history2 PQ ASTM D6184* 0 0 0 0 Iron ppm ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >2 <1 <1 0 Nickel ppm ASTM D5185(m) >2 <1 <1 0 Nickel ppm ASTM D5185(m) >2 0 0 0 Silver ppm ASTM D5185(m) >1 1 <1 0 Silver ppm ASTM D5185(m) >1 1 <1 0 Copper ppm ASTM D5185(m) >1 0 0 0 Antimony ppm ASTM D5185(m) 0 0 0 0 Vanadium<	Machine Age	hrs	Client Info		75011	0	0
Sample Status Image NORMAL NORMAL NORMAL NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 PQ ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >2 <1 <1 0 Nickel ppm ASTM D5185(m) >2 0 0 0 Aluminum ppm ASTM D5185(m) >3 0 <1 <1 Copper ppm ASTM D5185(m) >16 0 0 <1 Antimony ppm ASTM D5185(m) >14 0 0 <1 Vanadium ppm ASTM D5185(m) 0 0 0 0 Antimonyp	Oil Age	hrs	Client Info		75011	0	0
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 NEG NEG NEG WEAR METALS method imit/base current history1 history2 PQ ASTM 05185(m) >75 4 4 3 Chromium ppm ASTM 05185(m) >2 <1 0 0 Nickel ppm ASTM 05185(m) >2 <1 <1 0 Silver ppm ASTM 05185(m) >2 0 0 <1 <1 <1 <1 <1 0 <1 <1 0 <1 <1 0 <1 <1 <1 <1 <1 <1 <1 <1 <1 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1<	Oil Changed		Client Info		N/A	N/A	Not Changd
Fuel WC Method >4.0 <1.0	Sample Status				NORMAL	NORMAL	NORMAL
Network Network Network Network Network Glycol WC Method Imit/base current history1 history2 PQ ASTM D6184* 0 0 0 0 Iron ppm ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >2 <1 0 0 Nickel ppm ASTM D5185(m) >2 <1 <1 0 Silver ppm ASTM D5185(m) >2 0 0 0 Aluminum ppm ASTM D5185(m) >15 2 2 2 Lead ppm ASTM D5185(m) >14 0 0 0 Antimony ppm ASTM D5185(m) >14 0 0 0 Astm D5185(m) 0 0 0 0 0 0 Astm D5185(m) 0 0 0 0 0 0 Astm D5185(m)	CONTAMINATION	N	method	limit/base	current	history1	history2
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PQ ASTM D8184* 0 0 0 0 Iron ppm ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >8 <1	Glycol		WC Method		NEG	NEG	NEG
Iron ppm ASTM D5185(m) >75 4 4 3 Chromium ppm ASTM D5185(m) >8 <1 0 0 Nickel ppm ASTM D5185(m) >2 <1 <1 0 Titanium ppm ASTM D5185(m) >3 0 <1 <1 Silver ppm ASTM D5185(m) >15 2 2 2 Lead ppm ASTM D5185(m) >18 0 0 <11 Copper ppm ASTM D5185(m) >14 0 0 0 Antimony ppm ASTM D5185(m) 0 0 0 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Cadmium ppm ASTM D5185(m) 0 0 0 0 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) <1 <1 <1 </th <th>WEAR METALS</th> <th></th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	WEAR METALS		method	limit/base	current	history1	history2
Chromium ppm ASTM D5185(m) >8 <1	PQ		ASTM D8184*		0	0	0
Nickel ppm ASTM D5185(m) >2 <1	Iron	ppm	ASTM D5185(m)	>75	4	4	3
Titanium ppm ASTM D5185(m) >3 0 <1	Chromium	ppm	ASTM D5185(m)	>8	<1	0	0
Silver ppm ASTM D5185(m) >2 0 0 0 Aluminum ppm ASTM D5185(m) >15 2 2 2 Lead ppm ASTM D5185(m) >18 0 0 <11 Copper ppm ASTM D5185(m) >80 1 1 <1 Tin ppm ASTM D5185(m) >14 0 0 0 Antimony ppm ASTM D5185(m) 0 0 0 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Cadmium ppm ASTM D5185(m) 0 0 0 0 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 922 957 939 <	Nickel	ppm	ASTM D5185(m)	>2	<1	<1	0
Aluminum ppm ASTM D5185(m) >15 2 2 2 Lead ppm ASTM D5185(m) >18 0 0 <11	Titanium	ppm	ASTM D5185(m)	>3	0	<1	<1
Lead ppm ASTM D5185(m) >18 0 0 <1	Silver	ppm	ASTM D5185(m)	>2	0	0	0
Copper ppm ASTM D5185(m) >80 1 1 <1	Aluminum	ppm	ASTM D5185(m)	>15	2	2	2
Tin ppm ASTM D5185(m) >14 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 Cadmium ppm ASTM D5185(m) 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 0 Molybdenum ppm ASTM D5185(m) <1 <1 <1 <1 Magnesium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 922 957 939 2inc ppm ASTM D5185(m) 922 957	Lead	ppm	ASTM D5185(m)	>18	0	0	<1
Antimony ppm ASTM D5185(m) 0 0 <1	Copper	ppm	ASTM D5185(m)	>80	1	1	<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 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 0 Molybdenum ppm ASTM D5185(m) 21 <1	Tin	ppm	ASTM D5185(m)	>14	0	0	0
Beryllium ppm ASTM D5185(m) 0 0 0 Cadmium ppm ASTM D5185(m) 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 0 Molybdenum ppm ASTM D5185(m) c1 <1	Antimony	ppm	ASTM D5185(m)		0	0	<1
Cadmium ppm ASTM D5185(m) 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 0 Molybdenum ppm ASTM D5185(m) <1	Vanadium	ppm	ASTM D5185(m)		0	0	0
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 2 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 0 Molybdenum ppm ASTM D5185(m) <1 <1 <1 <1 Manganese ppm ASTM D5185(m) <1 <1 <1 <1 Magnesium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 5382 5582 5696 Phosphorus ppm ASTM D5185(m) 922 957 939 2inc ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) 9988 10289 10045 1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 8	Beryllium	ppm	ASTM D5185(m)		0	0	0
Boron ppm ASTM D5185(m) 2 2 2 Barium ppm ASTM D5185(m) 0 0 0 Molybdenum ppm ASTM D5185(m) <1 <1 <1 Manganese ppm ASTM D5185(m) <1 <1 <1 Magnesium ppm ASTM D5185(m) <1 <1 <1 Magnesium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 5382 5582 5696 Phosphorus ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 1013 1010 989 Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6	Cadmium	ppm	ASTM D5185(m)		0	0	0
Barium ppm ASTM D5185(m) 0 0 0 Molybdenum ppm ASTM D5185(m) <1 <1 <1 Manganese ppm ASTM D5185(m) <1 <1 <1 Magnesium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 5382 5582 5696 Phosphorus ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185(m) <1	Boron	ppm	ASTM D5185(m)		2	2	2
Manganese ppm ASTM D5185(m) <1	Barium	ppm	ASTM D5185(m)		0	0	0
Magnesium ppm ASTM D5185(m) 26 27 26 Calcium ppm ASTM D5185(m) 5382 5582 5696 Phosphorus ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 1013 1010 989 Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) <	Molybdenum	ppm	ASTM D5185(m)		<1	<1	<1
Calcium ppm ASTM D5185(m) 5382 5582 5696 Phosphorus ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 1013 1010 989 Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	Manganese	ppm	ASTM D5185(m)		<1	<1	<1
Phosphorus ppm ASTM D5185(m) 922 957 939 Zinc ppm ASTM D5185(m) 1013 1010 989 Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	Magnesium	ppm	ASTM D5185(m)		26		26
Zinc ppm ASTM D5185(m) 1013 1010 989 Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	Calcium	ppm	ASTM D5185(m)		5382	5582	5696
Sulfur ppm ASTM D5185(m) 9988 10289 10045 Lithium ppm ASTM D5185(m) 10289 10045 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	Phosphorus	ppm	ASTM D5185(m)		-	957	939
Lithium ppm ASTM D5185(m) <1		ppm	ASTM D5185(m)		1013	1010	989
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1		ppm			9988		
Silicon ppm ASTM D5185(m) >20 6 6 8 Sodium ppm ASTM D5185(m) >75 1 1 1	Lithium	ppm	ASTM D5185(m)		<1	<1	<1
Sodium ppm ASTM D5185(m) >75 1 1 1	CONTAMINANTS		method	limit/base	current	history1	history2
	Silicon	ppm	ASTM D5185(m)	>20	6	6	8
Potassium ppm ASTM D5185(m) >20 <1	Sodium	ppm	ASTM D5185(m)	>75	1	1	1
	Potassium	ppm	ASTM D5185(m)	>20	<1	2	<1

INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	ASTM D7844*	>2	0	0	0
Nitration	Abs/cm	ASTM D7624*	>20	9.7	8.7	5.1
Sulfation	Abs/.1mm	ASTM D7415*	>30	15.0	13.8	13.8



OIL ANALYSIS REPORT

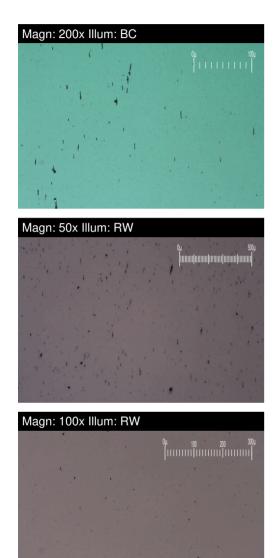




FERROGRAPHY REPORT

Main Engine #1 Machine Id Main Engine #1 Sump

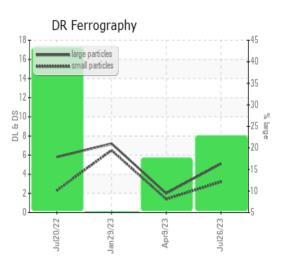
Right Main Engine Fluid CASTROL MHP 154 (--- GAL)



DR-FERROGRAP	ΉY	method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		5.1	2.0	7.2
Small Particles		DR-Ferr*		3.2	1.4	6.5
Total Particles		DR-Ferr*	>	8.3	3.4	13.7
Large Particles Percentage	%	DR-Ferr*		22.9	17.6	5.1
Severity Index		DR-Ferr*		10	1	5
FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		2	1	1
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	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	1	
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		1	1	1

WEAF

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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