

## **OIL ANALYSIS REPORT**

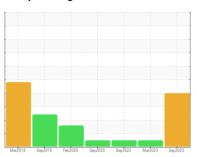
#### Sample Rating Trend

# **COOL CHEMICALS**

# PRIMARY AIR FAN F2 - outboard bearing (S/N 1-31100-F2)

**Outboard Bearing** 

ESSO NUTO H ISO 46 (--- GAL)





#### **DIAGNOSIS**

#### Recommendation

We recommend that you drain the oil from the component if this has not already been done. 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

Copper ppm levels are abnormal. Lead ppm levels are marginal. Bearing wear is indicated.

#### Contamination

Elemental levels of potassium (K) and sodium (Na) indicate potash, or flyash contamination. The water content is negligible. Abnormal element levels due to process contamination.

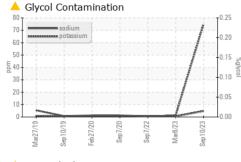
#### Fluid Condition

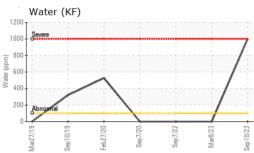
Viscosity of sample indicates oil is within ISO 68 range, advise investigate. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

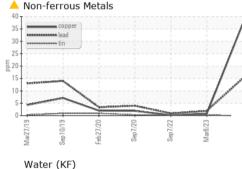
Sample Number         Client Info         WC0851405         WC0794192         WC0736           Sample Date         Client Info         10 Sep 2023         08 Mar 2023         07 Sep 2           Machine Age         hrs         Client Info         0         0         0           Oil Age         hrs         Client Info         N/A         N/A         N/A         N/A           Oil Changed         Client Info         N/A         N/A         N/A         N/A         N/A           Sample Status         method         limit/base         current         history1         history1           WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185(m)         >20         <1	Mar <sup>2</sup> 019 Sap <sup>2</sup> 019 Fab <sup>2</sup> 020 Sap <sup>2</sup> 020 Sap <sup>2</sup> 022 Mar <sup>2</sup> 023 Sap <sup>2</sup> 023						
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         0         0         0         0           Oil Age         hrs         Client Info         0         0         0         0           Oil Changed         Client Info         N/A         N/A         N/A         N/A           Sample Status         Page 1         ASTM D5185(m)         20         ASTM D5185(m)         NORMAL         NORMAL           WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185(m)         >20         <1         <1         <1           Chromium         ppm         ASTM D5185(m)         >20         <1         <0         0           Nickel         ppm         ASTM D5185(m)         >20         <1         0         0           Silver         ppm         ASTM D5185(m)         >20         <15         2         <1           Copper         ppm         ASTM D5185(m)         >20         <15         2         <1           Copper         ppm         ASTM D5185(m)         >20         <15         2         <1           Capper         ppm         ASTM D5185(m)         0	Sample Number		Client Info		WC0851405	WC0794192	WC0736558
Oil Age         hrs         Client Info         N/A         N/A         N/A         N/A           Sample Status         Method         limit/base         current         history1         history1           WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185(m)         >20         <1	Sample Date		Client Info		10 Sep 2023	08 Mar 2023	07 Sep 2022
Oil Changed Sample Status         Client Info         N/A         N/A         N/A         N/A         N/A         N/A         N/A         N/A         N/A         SAM DRMAL         NORMAL         NORMAL	Machine Age	hrs	Client Info		0	0	0
Sample Status         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185(m)         >20         <1	Oil Age	hrs	Client Info		0	0	0
WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185(m)         >20         <1	Oil Changed		Client Info		N/A	N/A	N/A
Iron	Sample Status				ABNORMAL	NORMAL	NORMAL
Chromium         ppm         ASTM D5185(m)         >20         0         0         0           Nickel         ppm         ASTM D5185(m)         >20         <1         0         0           Titanium         ppm         ASTM D5185(m)         0         0         0           Silver         ppm         ASTM D5185(m)         <1         0         0           Aluminum         ppm         ASTM D5185(m)         >20         <1         0         0           Aluminum         ppm         ASTM D5185(m)         >20         <1         0         0           Lead         ppm         ASTM D5185(m)         >20         <15         2         <1           Copper         ppm         ASTM D5185(m)         >20         0         <1         <1           Tin         ppm         ASTM D5185(m)         >20         0         <1         <1           Antimony         ppm         ASTM D5185(m)         0         0         <1         <1           Vanadium         ppm         ASTM D5185(m)         0         0         <1         <1           Vanadium         ppm         ASTM D5185(m)         0         0         <1         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel ppm ASTM D5185(m) > 20 < 1 0 0 0  Titanium ppm ASTM D5185(m)	Iron	ppm	ASTM D5185(m)	>20	<1	<1	<1
Titanium         ppm         ASTM D5185(m)         0         0         0           Silver         ppm         ASTM D5185(m)         <1	Chromium	ppm	ASTM D5185(m)	>20	0	0	0
Silver	Nickel	ppm	ASTM D5185(m)	>20	<1	0	0
Aluminum         ppm         ASTM D5185(m)         >20         <1         0         0           Lead         ppm         ASTM D5185(m)         >20         ▲ 15         2         <1	Titanium	ppm	ASTM D5185(m)		0	0	0
Lead         ppm         ASTM D5185(m)         >20         ▲ 15         2         <1           Copper         ppm         ASTM D5185(m)         >20         ▲ 37         <1         <1           Tin         ppm         ASTM D5185(m)         >20         0         <1         <1           Antimony         ppm         ASTM D5185(m)         0         0         <1         <1           Antimony         ppm         ASTM D5185(m)         0         0         0         <1         <1           Vanadium         ppm         ASTM D5185(m)         0         0         0         0         0           Vanadium         ppm         ASTM D5185(m)         0         0         0         0         0           Beryllium         ppm         ASTM D5185(m)         0         <1         0         0         0         0           Cadmium         ppm         ASTM D5185(m)         0         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1	Silver	ppm	ASTM D5185(m)		<1	0	0
Copper         ppm         ASTM D5185(m)         >20         37         <1         <1           Tin         ppm         ASTM D5185(m)         >20         0         <1	Aluminum	ppm	ASTM D5185(m)	>20	<1	0	0
Tin ppm ASTM D5185(m) >20 0 <1 <1 <1	Lead	ppm	ASTM D5185(m)	>20	<u> </u>	2	<1
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         <1	Copper	ppm	ASTM D5185(m)	>20	<u>^</u> 37	<1	<1
Vanadium         ppm         ASTM D5185(m)         0         0         0           Beryllium         ppm         ASTM D5185(m)         0         0         0           Cadmium         ppm         ASTM D5185(m)         0         <1         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185(m)         0         <1         <1         <1           Barium         ppm         ASTM D5185(m)         0         <1         0         0           Molybdenum         ppm         ASTM D5185(m)         0         0         0         0           Magnesium         ppm         ASTM D5185(m)         5         3         1         <1           Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1	Tin	ppm	ASTM D5185(m)	>20	0	<1	<1
Beryllium         ppm         ASTM D5185(m)         0         0         0           Cadmium         ppm         ASTM D5185(m)         0         <1         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185(m)         0         <1         <1         <1           Barium         ppm         ASTM D5185(m)         0         <1         0         0           Molybdenum         ppm         ASTM D5185(m)         0         0         0         0           Magnesium         ppm         ASTM D5185(m)         5         3         1         <1           Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         30         347         345         366           Zinc         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         >15         3         2	Antimony	ppm	ASTM D5185(m)		0	0	<1
Cadmium         ppm         ASTM D5185(m)         0         <1         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185(m)         0         <1	Vanadium	ppm	ASTM D5185(m)		0	0	0
ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185(m)         0         <1	Beryllium	ppm	ASTM D5185(m)		0	0	0
Boron         ppm         ASTM D5185(m)         0         <1	Cadmium	ppm	ASTM D5185(m)		0	<1	0
Barium         ppm         ASTM D5185(m)         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185(m)         0         0         0         0           Manganese         ppm         ASTM D5185(m)         0         0         0         0           Magnesium         ppm         ASTM D5185(m)         5         3         1         <1           Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         330         347         345         366           Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         >20         75         1         <1           Potassium         ppm         ASTM D6304*         >2 <th< td=""><td>Boron</td><td>ppm</td><td>ASTM D5185(m)</td><td>0</td><th>&lt;1</th><td>&lt;1</td><td>&lt;1</td></th<>	Boron	ppm	ASTM D5185(m)	0	<1	<1	<1
Manganese         ppm         ASTM D5185(m)         0         0         0           Magnesium         ppm         ASTM D5185(m)         5         3         1         <1           Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         330         347         345         366           Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         >20         75         1         <1           Potassium         ppm         ASTM D6304*         >2         0.100             Water         %	Barium	ppm	ASTM D5185(m)	0	<1	0	0
Magnesium         ppm         ASTM D5185(m)         5         3         1         <1           Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         330         347         345         366           Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1         <1           Potassium         ppm         ASTM D5185(m)         >20         75         1         <1           Water         %         ASTM D6304*         >2         0.100	Molybdenum	ppm	ASTM D5185(m)	0	0	0	0
Calcium         ppm         ASTM D5185(m)         50         58         53         54           Phosphorus         ppm         ASTM D5185(m)         330         347         345         366           Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1	Manganese	ppm	ASTM D5185(m)		0	0	0
Phosphorus         ppm         ASTM D5185(m)         330         347         345         366           Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1	Magnesium	ppm	ASTM D5185(m)	5	3	1	<1
Zinc         ppm         ASTM D5185(m)         410         399         393         407           Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1	Calcium	ppm	ASTM D5185(m)	50	58	53	54
Sulfur         ppm         ASTM D5185(m)         2700         1892         2307         2452           Lithium         ppm         ASTM D5185(m)         <1         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1	Phosphorus	ppm	ASTM D5185(m)	330	347	345	366
Lithium         ppm         ASTM D5185(m)         <1         <1         <1           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1	Zinc	ppm	ASTM D5185(m)	410	399	393	407
CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1	Sulfur	ppm	ASTM D5185(m)	2700	1892	2307	2452
Silicon         ppm         ASTM D5185(m)         >15         3         2         2           Sodium         ppm         ASTM D5185(m)         5         <1         <1           Potassium         ppm         ASTM D5185(m)         >20         ▲ 75         1         <1           Water         %         ASTM D6304*         >2         0.100	Lithium	ppm	ASTM D5185(m)		<1	<1	<1
Sodium         ppm         ASTM D5185(m)         5         <1	CONTAMINANTS	3	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185(m)         >20         ▲ 75         1         <1           Water         %         ASTM D6304*         >2         0.100	Silicon	ppm	ASTM D5185(m)	>15	3	2	2
Water % ASTM D6304* >2 <b>0.100</b>	Sodium	ppm	ASTM D5185(m)		5	<1	<1
	Potassium	ppm	ASTM D5185(m)	>20	<b>^</b> 75	1	<1
ppm Water	Water	%	ASTM D6304*	>2	0.100		
	ppm Water	ppm	ASTM D6304*		1002		

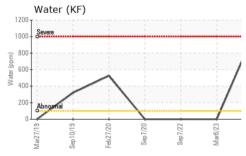


## **OIL ANALYSIS REPORT**









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	VLITE	NONE	NONE
Sand/Dirt	scalar	Visual*	NONE	NONE	NONE	NONE
Appearance	scalar	Visual*	NORML	HAZY	NORML	NORML
Odor	scalar	Visual*	NORML	NORML	NORML	NORML
<b>Emulsified Water</b>	scalar	Visual*	>2	.2%	NEG	NEG
Free Water	scalar	Visual*		NEG	NEG	NEG

FLUID PROPER	RIIES	method	ilmit/base	current	nistory i	nistoryz
Visc @ 40°C	cSt	ASTM D7279(m)	46	<b>△</b> 58.4	48.6	48.7

SAMPLE IMAGES	method
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limit/base

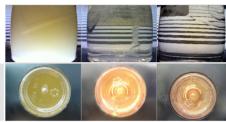
current

history1

history2

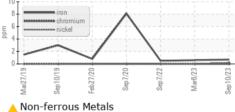
Color

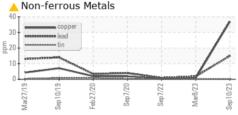
**Bottom** 

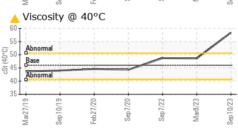


#### **GRAPHS**

Ferrous Alloys









CALA ISO 17025:2017 Accredited Laboratory

Laboratory Sample No. Lab Number Unique Number : 5697241

: 02604156

: WC0851405

: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Recieved Diagnosed

: 19 Dec 2023 : 20 Dec 2023 Diagnostician : Kevin Marson

Test Package : IND 1 (Additional Tests: KF)

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** ATIKOKAN T.G.S., BOX 1900 ATIKOKAN, ON

> CA POT 1C0 Contact: Dale Anthony dale.anthony@opg.com

> > F: (807)597-1198

Submitted By: ?

T: