

PROBLEM SUMMARY

Sample Rating Trend

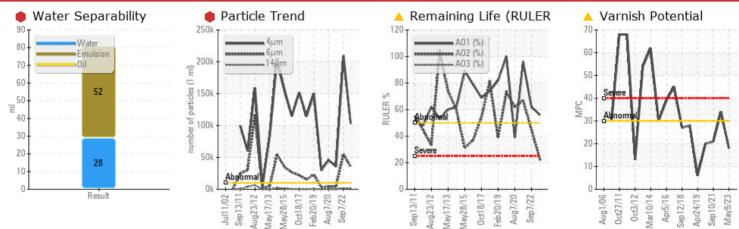
CONTAMINANT

Area [02437560] Machine Id A5 - Thrust Bearing Component

Thrust Bearing

PETRO CANADA TURBOFLO R&O 46 (4920 LTR)

COMPONENT CONDITION SUMMARY



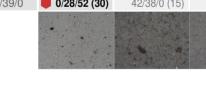
RECOMMENDATION

We recommend that you perform vacuum distillation and/or air drying to attempt to remove any residual water and/or entrained gases from this oil that may be contributing to abnormal foaming and/or poor water separability. We advise that you check all areas where contaminants can enter the system. We advise that you perform a filter service, and use offline filtration to improve the cleanliness of the system fluid. 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. Resample in 30-45 days to monitor this situation. No other corrective action is recommended at this time.

PROBLEMATIC TEST RESULTS

PROBLEMATIC I		30L13				
Sample Status				SEVERE	SEVERE	ABNORMAL
Particles >4µm		ASTM D7647	>10000	e 103064	209422	▲ 35594
Particles >6µm		ASTM D7647	>2500	• 35233	• 54774	4234
Particles >14µm		ASTM D7647	>160	e 1734	1332	104
Particles >21µm		ASTM D7647	>40	• 400	a 251	22
Particles >38µm		ASTM D7647	>10	<u> </u>	6	2
Oil Cleanliness		ISO 4406 (c)	>20/18/14	e 24/22/18	• 25/23/18	🔺 22/19/14
Anti-Oxidant 2	%	ASTM D6971*	<25	<u> </u>	45	67
MPC Varnish Potential	Scale	ASTM D7843(m)*	>15	<u> </u>	4 34	<u> </u>
Separability	oil/h2o/em	ASTM D1401*	41/39/0	• 0/28/52 (30)	42/38/0 (15)	41/39/0 (25)
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PrtFilter



Customer Id: CHUCHU Sample No.: WC0786878 Lab Number: 02579995 Test Package: AOM 3



To manage this report scan the QR code

To discuss the diagnosis or test data: Bill Quesnel CLS,OMA II,MLA-III,LLA-I +1 (289)291-4641 x4641 Bill.Quesnel@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 advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid.					
Resample			?	Resample in 30-45 days to monitor this situation.					
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.					
Check Dirt Access			?	We advise that you check all areas where contaminants can enter the system.					
Check Fluid Source			?	Confirm the source of the lubricant being utilized for top-up/fill.					
Filter Fluid			?	We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluic We recommend that you perform vacuum distillation and/or air drying to attempt to remove any residual water and/or entrained gases from this oil that may be contributing to abnormal foaming and/or poor water separability.					

HISTORICAL DIAGNOSIS

07 Sep 2022 Diag: Bill Quesnel



We advise that you check all areas where contaminants can enter the system. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. 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 that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. Resample in 30-45 days to monitor this situation. All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. Particles >14µm are severely high. Particles >6µm are severely high. Particles >4µm are severely high. Oil Cleanliness are severely high. MPC Varnish Potential contamination levels are abnormally high. Particles >21 µm are abnormally high. MPC (Membrane Patch Colorimetry) test indicates a moderate concentration of varnish present. The water content is negligible. The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.



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10 Sep 2021 Diag: Bill Quesnel





We recommend that you perform vacuum distillation and/or air drying to attempt to remove any residual water and/or entrained gases from this oil that may be contributing to abnormal foaming and/or poor water separability. We recommend you service the filters on this component. We recommend an early resample to monitor this condition. No other corrective action is recommended at this time. All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. Particles >4µm are abnormally high. Particles >6µm are notably high. MPC Varnish Potential contamination levels are marginally high. MPC (Membrane Patch Colorimetry) test indicates a light concentration of varnish present. The water content is negligible. Water Separability results (ASTM D1401) indicate good water shedding properties. Foaming Tendency stage I (ASTM D892) result is abnormal indicating a tendency for oil foaming. The Air Release Value (ASTM D3427) indicates that the oil has good deaeration properties. Linear Sweep Voltammetry (RULER – ASTM D6971) testing indicates normal levels of anti-oxidants present in the oil. The Rotating Pressure Vessel Oxidation Test (RPVOT – ASTM D2272) result indicates suitable amounts of anti-oxidant(s) present in the oil. The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable . levels.

07 Aug 2020 Diag: Bill Quesnel



We recommend you service the filters on this component. We recommend an early resample to monitor this condition. No other corrective action is recommended at this time. All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. Particles >4µm are abnormally high. Particles >6µm are notably high. MPC Varnish Potential contamination levels are marginally high. MPC (Membrane Patch Colorimetry) test indicates a light concentration of varnish present. The water content is negligible. Water Separability results (ASTM D1401) indicate good water shedding properties. The Air Release Value (ASTM D3427) indicates that the oil has good deaeration properties. Foaming Tendency and Stability (ASTM D892) results all within normal range Linear Sweep Voltammetry (RULER - ASTM D6971) testing indicates normal levels of antioxidants present in the oil. The Rotating Pressure Vessel Oxidation Test (RPVOT - ASTM D2272) result indicates suitable amounts of anti-oxidant(s) present in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report





OIL ANALYSIS REPORT

Machine Id Machine Id A5 - Thrust Bearing Component

Thrust Bearing

PETRO CANADA TURBOFLO R&O 46 (4920 LTR)

DIAGNOSIS

Recommendation

We recommend that you perform vacuum distillation and/or air drying to attempt to remove any residual water and/or entrained gases from this oil that may be contributing to abnormal foaming and/or poor water separability. We advise that you check all areas where contaminants can enter the system. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. 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. Resample in 30-45 days to monitor this situation. No other corrective action is recommended at this time.

Wear

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

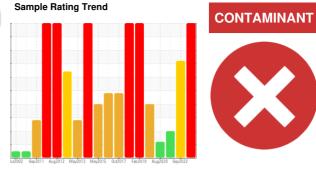
Contaminants

There is a high amount of particulates (2 to 100 microns in size) present in the oil. MPC (Membrane Patch Colorimetry) test indicates a light concentration of varnish present. Water Separability results (ASTM D1401) are poor and indicate that the oil will form emulsions with water. The water content is negligible.

Oil Condition

Linear Sweep Voltammetry (RULER– ASTM D6971) testing indicates a low amount of one of the anti-oxidants present in the oil, however, the other anti-oxidant(s) are still performing adequately. Rust Prevention test (ASTM D665) indicates the oil retains good anti-corrosion properties. The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.

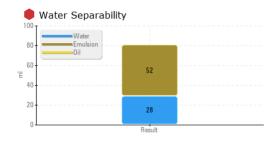
Particle Filter (Magn: 200 x)

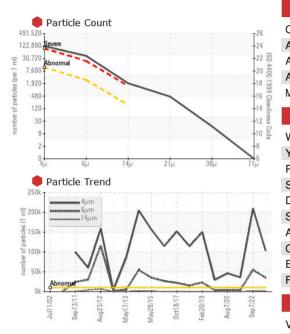


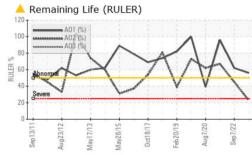
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Dil Changed Sample Status Client Info N/A N/A N/A N/A WEAR METALS method limit/base current history1 history2 PQ ASTM D8184' 0 0 0 0 Iron ppm ASTM D5185(m) >20 0 0 0 Kickel ppm ASTM D5185(m) >20 0 0 0 Nickel ppm ASTM D5185(m) >20 0 0 0 Silver ppm ASTM D5185(m) >40 <1	Machine Age	hrs	Client Info		0	0	0
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Copper ppm ASTM D5185(m) >7 <1 <1 <1 Tin ppm ASTM D5185(m) >40 0 0 <1	Aluminum	ppm	ASTM D5185(m)	>40	<1	<1	<1
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Potassium ppm ASTM D5185(m) >20 <1 <1 <1 Water % ASTM D6304* >2 0.001 0.016 0.001 opm Water ppm ASTM D6304* >2 0.001 0.016 0.001 opm Water ppm ASTM D6304* 7.8 161.7 10.3 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 0 Nitration Abs/cm ASTM D7624* 1.8 1.7 1.6	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	0 3 0	0 0 0 0 <1 4 2 146 <1	<1 0 0 <1 <1 3 1 144 <1	<1 0 0 0 <1 5 1 142 <1
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oppm Water ppm ASTM D6304* 7.8 161.7 10.3 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 0 Nitration Abs/cm ASTM D7624* 1.8 1.7 1.6	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base	0 0 0 0 <1 4 2 146 <1 2 current 2	<1 0 0 <1 <1 3 1 1 44 <1 history1 7	<1 0 0 0 <1 5 1 142 <1 history2 <1
INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%ASTM D7844*000NitrationAbs/cmASTM D7624*1.81.71.6	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base >20	0 0 0 0 <1 4 2 146 <1 2 146 <1 2 0	<1 0 0 <1 <1 3 1 1 44 <1 history1 7 <1	<1 0 0 0 <1 5 1 1 42 <1 history2 <1 0
Soot % % ASTM D7844* 0 0 0 Nitration Abs/cm ASTM D7624* 1.8 1.7 1.6	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium	ppm ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base >20 >20	0 0 0 0 <1 4 2 146 <1 2 146 <1 2 0 4	<1 0 0 <1 <1 3 1 1 44 <1 history1 7 <1 <1	<1 0 0 0 <1 5 1 1 142 <1 history2 <1 0 <1
Nitration Abs/cm ASTM D7624* 1.8 1.7 1.6	Boron Barium Molybdenum Manganese Magnesium Calcium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium	ppm ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base >20 >20	0 0 0 0 <1 4 2 146 <1 current 2 0 <1 0 <1 0.001	<1 0 0 <1 <1 3 1 144 <1 history1 7 <1 <1 <1 0.016	<1 0 0 0 <1 5 1 1 42 <1 history2 <1 0 <1 0 <1 0.001
Nitration Abs/cm ASTM D7624* 1.8 1.7 1.6	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water ppm Water	ppm ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base >20 >20 >20 >2	0 0 0 0 <1 4 2 146 <1 2 146 <1 2 0 <1 0 <1 0.001 7.8	<1 0 0 (1 (1 3 1 1 44 (1 7 7 (1 (1 5 7 (1 (1 1 0.016 161.7	<1 0 0 0 <1 5 1 142 <1 history2 <1 0 <1 0 0 <1 0.001 10.3
	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water ppm Water INFRA-RED	ppm	ASTM D5185(m) ASTM D5185(m)	0 3 0 limit/base >20 >20 >20 >2	0 0 0 0 (1 4 2 146 <1 2 146 <1 2 0 (1 0 0 <1 0,001 7.8 0 0 1 7.8	<1 0 0 0 <1 <1 3 1 144 <1 history1 7 <1 <1 0.016 161.7 history1	<1 0 0 0 (1 5 1 1 42 <1 history2 <1 0 <1 0 0 <1 0.001 10.3 history2
Sulfation Abs/.1mm ASTM D7415* 12.1 11.4 11.7	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water ppm Water	ppm % %	ASTM D5185(m) ASTM D6304* ASTM D6304* ASTM D6304*	0 3 0 limit/base >20 >20 >20 >2	0 0 0 0 <1 4 2 146 <1 2 0 <1 0 <1 0.001 7.8 current 0	<1 0 0 0 <1 <1 3 1 144 <1 history1 7 <1 <1 0.016 161.7 history1 0	<1 0 0 0 0 (1 5 1 1 42 <1 1 42 <1 history2 <1 0 (0 1 0.001 10.3 history2 0

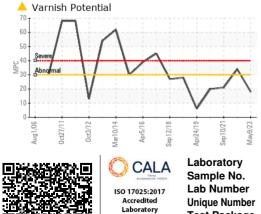


OIL ANALYSIS REPORT







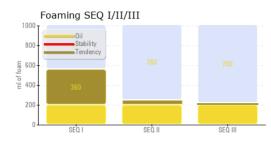


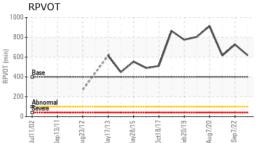
Particles >4µm ASTM D7647 >10000 103064 209422 35594 Particles >6µm ASTM D7647 >2500 35233 54774 4224 Particles >6µm ASTM D7647 >2600 35233 54774 4224 Particles >1µm ASTM D7647 >400 4251 22 Particles >1µm ASTM D7647 >30 0 0 0 Oil Cleanliness ISO 4406 (c) >20/18/14 24/22/18 2/5/23/18 4 2/19/14 FLUID DEGRADATION method Imit/base current history1 history1 42/19/14 Acid Number (AN) mg KMig ASTM D744* 2.4 2.9 2.7 6.6 Anti-Oxidant 1 % ASTM D784m" >15 5 6 62 96 Anti-Oxidant 2 % ASTM D784m" >15 18 34 21 VISUAL method limit/base current history1 history1 VISUAL method limit/base	FLUID CLEANLIN	ESS	method	limit/base	current	history1	history2
Particles >6µm ASTM D7647 >2500 35233 54774 ▲ 4234 Particles >14µm ASTM D7647 >160 1734 1332 104 Particles >21µm ASTM D7647 >100 400 251 22 Particles >38µm ASTM D7647 >10 15 6 2 Particles >71µm ASTM D7647 >3 0 0 0 0 Oll Cleanliness ISO 4006 (c) >20/18/14 24/22/18 25/23/18 22/19/14 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs.ftm ASTM D744" 0.12 0.08 0.08 0.08 Anti-Oxidant 1 % ASTM D784" >15 4 18 34 21 VISUAL method limit/base current history1 history2 White Metal scalar Visual* NONE NONE NONE NONE Youdw Metal scalar Visual*	Particles >4µm		ASTM D7647	>10000	• 103064	209422	▲ 35594
Particles >21µm ASTM 07647 >40 400 ▲ 251 22 Particles >38µm ASTM 07647 >10 ▲ 15 6 2 Particles >71µm ASTM 07647 >3 0 0 0 0 Cil Cleanliness ISO 4406 (c) >20/18/14 24/22/18 25/23/18 22/19/14 FLUID DEGRADATION method Imit/base current history1 history2 Oxidation Abs/Irm ASTM 07847 0.12 0.08 0.08 0.08 Acid Number (AN) mg/KHg ASTM 06971* <25	Particles >6µm		ASTM D7647	>2500	• 35233	b 54774	4234
Particles >38µm ASTM D7647 >10 ▲ 15 6 2 Particles >71µm ASTM D7647 >3 0 0 0 Oll Cleanliness ISO 4406 (c) >20/18/14 24/22/18 25/23/18 22/19/14 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/imm ASTM D6971 2.5 56 62 96 Anti-Oxidant 1 % ASTM D6971 2.5 56 62 96 Anti-Oxidant 2 % ASTM D6971 2.5 2.3 45 67 MCV Arnish Potential Scale ASTM D6971 2.5 2.3 45 67 MCV Arnish Potential Scalar Visual* NONE NONE NONE NONE VISUAL method Imit/base current history1 history2 White Metal scalar Visual* NONE NONE NONE NONE Yellow Metal scalar V	Particles >14µm		ASTM D7647	>160	e 1734	1332	104
Particles >71µm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >20/18/14 24/22/18 25/23/18 22/19/14 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/1mm ASTM D7414* 2.4 2.9 2.7 Acid Number (AN) mgKOHg ASTM D6971* <25	Particles >21µm		ASTM D7647	>40	400	A 251	22
Oil Cleanliness ISO 4406 (c) >20/18/14 24/22/18 25/23/18 ▲ 22/19/14 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.tmm ASTM D7414* 2.4 2.9 2.7 Acid Number (AN) mg/KHg ASTM D741* 0.12 0.08 0.08 0.08 Anti-Oxidant 1 % ASTM D797* 2.5 56 62 96 Anti-Oxidant 2 % ASTM D6971* <25	Particles >38µm		ASTM D7647	>10	<u> </u>	6	2
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/1mm ASTM D7414* 2.4 2.9 2.7 Acid Number (AN) mg KOHig ASTM D7414* 2.4 2.9 2.7 Acid Number (AN) mg KOHig ASTM D7414* 0.12 0.08 0.08 0.08 Anti-Oxidant 1 % ASTM D6971* <25	Particles >71µm		ASTM D7647	>3	0	0	0
Oxidation Abs/.tmm ASTM D7414* 2.4 2.9 2.7 Acid Number (AN) mg/K0Hg ASTM D974* 0.12 0.08 0.08 0.08 Anti-Oxidant 1 % ASTM D971* <25	Oil Cleanliness		ISO 4406 (c)	>20/18/14	• 24/22/18	25/23/18	22/19/14
Acid Number (AN) mg KOHg ASTM D974* 0.12 0.08 0.08 0.08 Anti-Oxidant 1 % ASTM D6971* <25	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Anti-Oxidant 1 % ASTM D6971* <25	Oxidation	Abs/.1mm	ASTM D7414*		2.4	2.9	2.7
Anti-Oxidant 2 % ASTM D6971' <25 ▲ 23 45 67 MPC Varnish Potential Scale ASTM D7843(m)' >15 ▲ 18 ▲ 34 ▲ 21 VISUAL method limit/base current history1 history2 White Metal scalar Visual* NONE Sadar Visual* NONE NONE NONE NONE NORE	Acid Number (AN)	mg KOH/g	ASTM D974*	0.12	0.08	0.08	0.08
MPC Varnish Potential Scale ASTM D7843(m)*<>15 ▲ 18 ▲ 34 ▲ 21 VISUAL method limit/base current history1 history2 White Metal scalar Visual* NONE Sadar Visual* NOR NONE NONE NORE	Anti-Oxidant 1	%	ASTM D6971*	<25	56	62	96
VISUALmethodlimit/basecurrenthistory1history2White MetalscalarVisual*NONENONENONENONENONEYellow MetalscalarVisual*NONENONENONENONENONEPrecipitatescalarVisual*NONENONENONENONENONESiltscalarVisual*NONENONENONENONENONEDebrisscalarVisual*NONENONENONENONENONESand/DirtscalarVisual*NONENONENONENONENONEAppearancescalarVisual*NORMLNORMLHAZYNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLCdorscalarVisual*NORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEGNEGNEGFree WaterscalarVisual*NEGNEGNEGNEGVisc @ 40°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D7279(m)6.726.96.86.00Separabilityoilh2demASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D2270*104109106109Separabilityvill/11/11ASTM D892*00/0/00/0/00/0/0Foam Tendency <th>Anti-Oxidant 2</th> <td>%</td> <td>ASTM D6971*</td> <td><25</td> <th><mark>/</mark> 23</th> <td>45</td> <td>67</td>	Anti-Oxidant 2	%	ASTM D6971*	<25	<mark>/</mark> 23	45	67
White Metal scalar Visual* NONE NONE NONE NONE NONE NONE Yellow Metal scalar Visual* NONE NONE NONE NONE NONE Precipitate scalar Visual* NONE NONE NONE NONE NONE Silt scalar Visual* NONE NONE NONE NONE NONE Debris scalar Visual* NONE NONE NONE NONE NONE Sand/Dirt scalar Visual* NORML NORML NORML NORML NORML Odor scalar Visual* NORML NORML NORML NORML NORML Odor scalar Visual* NORML NORML NORML NORML NORML Emulsified Water scalar Visual* NOR NEG NEG NEG FLUID PROPERTIES method Imit/base current history1 history2 Visc @ 40°C cSt ASTM D727(m) 6.72 6.9 6.8 6.9 </td <th>MPC Varnish Potential</th> <td>Scale</td> <td>ASTM D7843(m)*</td> <td>>15</td> <th><mark>/</mark> 18</th> <td>4 34</td> <td>21</td>	MPC Varnish Potential	Scale	ASTM D7843(m)*	>15	<mark>/</mark> 18	4 34	2 1
Yellow MetalscalarVisual*NONENONENONENONEPrecipitatescalarVisual*NONENONENONENONENONESiltscalarVisual*NONENONENONENONENONEDebrisscalarVisual*NONENONENONENONENONESand/DirtscalarVisual*NONENONENONENONENONEAppearancescalarVisual*NORMLNORMLNORMLNORMLNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLCdorscalarVisual*NORMLNORMLNORMLNORMLNORMLCdorscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*>2NEGNEGNEGFlUID PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270'104109106109Separabilityøih2olenASTM D327'3.57.009.306.00Foam TendencyI/I/IIIASTM D327'3.57.009.306.00Foam TendencyI/I/IIIASTM D892'00/0/00/0/00/0/0ASTM D665'PASSPASSPASSPASSPASSOxidation Test (RPVOT)minueASTM D665'	VISUAL		method	limit/base	current	history1	history2
PrecipitatescalarVisual*NONENONENONENONESiltscalarVisual*NONENONENONENONENONEDebrisscalarVisual*NONEVLITENONENONESand/DirtscalarVisual*NONENONENONENONEAppearancescalarVisual*NORMLNORMLNORMLNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*>2NEGNEGNEGFull D PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D2270*104109106109Separabilityoilh2oiemASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.009.306.00Foam Tendency///////////////ASTM D892*00/0/00/0/00/0/0ASTM ColorscalarASTM D892*00/0/00/0/00/0/0ASTM ColorscalarASTM D65*PASSPASSPASSPASSOxidation Test (RPVOT)minutesASTM D2272*400618727616SEDIMENTmethodimit/bas	White Metal	scalar	Visual*	NONE	NONE	NONE	NONE
SiltscalarVisual*NONENONENONENONENONEDebrisscalarVisual*NONEVLITENONENONESand/DirtscalarVisual*NONENONENONENONEAppearancescalarVisual*NORMLNORMLNONENONEOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*>2NEGNEGNEGFLUID PROPERTIESmethodimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityøi/h2ø/emASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.009.306.00Foam TendencyI/II/IIASTM D892*00/0/00/0/00/0/0ASTM ColorscalarASTM D150*0.5L1.0<1.0	Yellow Metal	scalar	Visual*	NONE	NONE	NONE	NONE
DebrisscalarVisual*NONEVLITENONENONENONESand/DirtscalarVisual*NONENONENONENONENONEAppearancescalarVisual*NORMLNORMLHAZYNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*>2NEGNEGNEGFLUID PROPERTIESmethodImit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityoilh2olenASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.009.306.00Foam TendencyI/II/IIASTM D892*10360/50/2010/60/0480/35/30Foam StabilityI/II/IIIASTM D1500*0.5L1.0<1.0	Precipitate	scalar	Visual*	NONE	NONE	NONE	NONE
Sand/DirtscalarVisual*NONENONENONENONENONEAppearancescalarVisual*NORMLNORMLHAZYNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*>2NEGNEGNEGFree WaterscalarVisual*NORMEGNEGNEGVisc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilitydilh2olemASTM D3427*3.57.009.306.00Foam TendencyI/II/IIIASTM D892*10360/50/2010/60/0480/35/30Foam StabilityI/II/IIIASTM D892*00/0/00/0/00/0/0ASTM ColorscalarASTM D1500*0.5L1.0<1.0	Silt	scalar	Visual*	NONE	NONE	NONE	NONE
AppearancescalarVisual*NORMLNORMLNARMLHAZYNORMLOdorscalarVisual*NORMLNORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGNEGFree WaterscalarVisual*NEGNEGNEGNEGNEGFluid PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityoil/h2olemASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.009.306.00Foam TendencyI/II/IIIASTM D892*10360/50/2010/60/0▲ 480/35/30Foam StabilityI/II/IIIASTM D892*00/0/00/0/00/0/0ASTM ColorscalarASTM D1500*0.5L1.0<1.0	Debris	scalar	Visual*	NONE	VLITE	NONE	NONE
OdorscalarVisual*NORMLNORMLNORMLNORMLNORMLEmulsified WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*NEGNEGNEGNEGFLUID PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityoilh2o/emASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.009.306.00Foam TendencyI/II/IIIASTM D892*10360/50/2010/60/0480/35/30Foam StabilityI/II/IIIASTM D150*0.5L1.0<1.0	Sand/Dirt	scalar	Visual*	NONE	NONE	NONE	NONE
Emulsified Water Free WaterscalarVisual*>2NEG.2%NEGFree WaterscalarVisual*Imit/basecurrentNEGNEGFLUID PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityoilh2olemASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.00▲ 9.306.00Foam Tendency//II/IIIASTM D892*10360/50/2010/60/0▲ 480/35/30Foam Stability//II/IIIASTM D892*00/000/0/00/0/0ASTM ColorscalarASTM D1500*0.5L1.0<1.0	Appearance	scalar	Visual*	NORML	NORML	HAZY	NORML
Free WaterscalarVisual*NEGNEGNEGFLUID PROPERTIESmethodlimit/basecurrenthistory1history2Visc @ 40°CcStASTM D7279(m)44.444.944.844.9Visc @ 100°CcStASTM D7279(m)6.726.96.86.9Viscosity Index (VI)ScaleASTM D2270*104109106109Separabilityoil/h2o/emASTM D1401*41/39/00/28/52 (30)42/38/0 (15)41/39/0 (25)Air Release TimeminASTM D3427*3.57.00▲ 9.306.00Foam TendencyI/II/IIIASTM D892*10360/50/2010/60/0▲ 480/35/30Foam StabilityI/II/IIIASTM D892*00/000/0/00/0/0ASTM ColorscalarASTM D1500*0.5L1.0<1.0	Odor	scalar	Visual*	NORML	NORML	NORML	NORML
FLUID PROPERTIES method limit/base current history1 history2 Visc @ 40°C cSt ASTM D7279(m) 44.4 44.9 44.8 44.9 Visc @ 100°C cSt ASTM D7279(m) 6.72 6.9 6.8 6.9 Viscosity Index (VI) Scale ASTM D7279(m) 6.72 6.9 6.8 6.9 Viscosity Index (VI) Scale ASTM D7279(m) 6.72 6.9 6.8 6.9 Viscosity Index (VI) Scale ASTM D2270* 104 109 106 109 Separability oilh2o/em ASTM D1401* 41/39/0 0/28/52 (30) 42/38/0 (15) 41/39/0 (25) Air Release Time min ASTM D3427* 3.5 7.00 9.30 6.00 Foam Tendency //II/II ASTM D892* 10 360/50/20 10/60/0 480/35/30 Foam Stability //II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D665*	Emulsified Water	scalar	Visual*	>2	NEG	.2%	NEG
Visc @ 40°C cSt ASTM D7279(m) 44.4 44.9 44.8 44.9 Visc @ 100°C cSt ASTM D7279(m) 6.72 6.9 6.8 6.9 Viscosity Index (VI) Scale ASTM D2270* 104 109 106 109 Separability oil/h2o/em ASTM D1401* 41/39/0 0/28/52 (30) 42/38/0 (15) 41/39/0 (25) Air Release Time min ASTM D3427* 3.5 7.00 9.30 6.00 Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Free Water	scalar	Visual*		NEG	NEG	NEG
Visc @ 100°C cSt ASTM D7279(m) 6.72 6.9 6.8 6.9 Viscosity Index (VI) Scale ASTM D2270* 104 109 106 109 Separability oil/h2o/em ASTM D1401* 41/39/0 0/28/52 (30) 42/38/0 (15) 41/39/0 (25) Air Release Time min ASTM D3427* 3.5 7.00 ● 9.30 6.00 Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 ▲ 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0 0.5 Rust Prevention PASS/FAIL ASTM D2272* 400 618 727 616 SEDIMENT method limit/base current history1 history2 Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	FLUID PROPERT	IES	method	limit/base	current	history1	history2
Viscosity Index (VI) Scale ASTM D2270* 104 109 106 109 Separability oil/h2o/em ASTM D1401* 41/39/0 0/28/52 (30) 42/38/0 (15) 41/39/0 (25) Air Release Time min ASTM D3427* 3.5 7.00 ● 9.30 6.00 Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 ▲ 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Visc @ 40°C	cSt	ASTM D7279(m)	44.4	44.9	44.8	44.9
Separability oil/h2o/em ASTM D1401* 41/39/0 0/28/52 (30) 42/38/0 (15) 41/39/0 (25) Air Release Time min ASTM D3427* 3.5 7.00 ▲ 9.30 6.00 Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 ▲ 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Visc @ 100°C	cSt	ASTM D7279(m)	6.72	6.9	6.8	6.9
Air Release Time min ASTM D3427* 3.5 7.00 9.30 6.00 Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Viscosity Index (VI)	Scale	ASTM D2270*	104	109	106	109
Foam Tendency I/II/III ASTM D892* 10 360/50/20 10/60/0 ▲ 480/35/30 Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Separability	oil/h2o/em	ASTM D1401*	41/39/0	• 0/28/52 (30)	42/38/0 (15)	41/39/0 (25)
Foam Stability I/II/III ASTM D892* 0 0/0/0 0/0/0 0/0/0 ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0	Air Release Time	min	ASTM D3427*	3.5	7.00	9 .30	6.00
ASTM Color scalar ASTM D1500* 0.5 L1.0 <1.0 0.5 Rust Prevention PASS/FAIL ASTM D665* PASS PASS PASS PASS Oxidation Test (RPVOT) minutes ASTM D2272* 400 618 727 616 SEDIMENT method limit/base current history1 history2 Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	Foam Tendency	1/11/111	ASTM D892*	10	360/50/20	10/60/0	480/35/30
Rust Prevention PASS/FAIL ASTM D665* PASS PASS PASS PASS Oxidation Test (RPVOT) minutes ASTM D2272* 400 618 727 616 SEDIMENT method limit/base current history1 history2 Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	Foam Stability	1/11/111	ASTM D892*	0	0/0/0	0/0/0	0/0/0
Oxidation Test (RPVOT) minutes ASTM D2272* 400 618 727 616 SEDIMENT method limit/base current history1 history2 Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	ASTM Color	scalar	ASTM D1500*	0.5	L1.0	<1.0	0.5
SEDIMENT method limit/base current history1 history2 Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	Rust Prevention	PASS/FAIL	ASTM D665*	PASS	PASS	PASS	PASS
Pentane Insolubles % ASTM D893(m)* 0.031 0.042 0.027	Oxidation Test (RPVOT)	minutes	ASTM D2272*	400	618	727	616
	SEDIMENT		method	limit/base	current	history1	history2
Toluene Insolubles % ASTM D893(m)* 0.010 0.011 0.024	Pentane Insolubles	%	ASTM D893(m)*		0.031	0.042	0.027
	Toluene Insolubles	%	ASTM D893(m)*			0.011	0.024

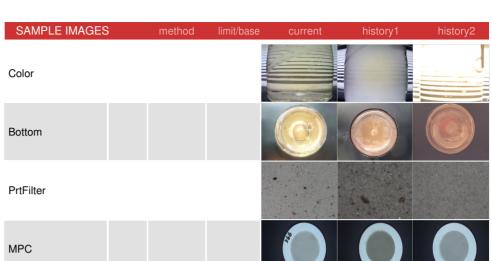
4455467A 🗐	CALA	Laboratory	: WearCheck - C8-	1175 Appleby Lin	e, Burlington, ON L7L 5H9	Nalcor Ener	gy - Churchill Falls	
	Accreditation No. 1205218	Sample No.	: WC0786878	Received	: 01 Sep 2023		PO Box 310	
	ISO 17025:2017	Lab Number	: 02579995	Diagnosed	: 18 Sep 2023		Churchill Falls, NL	
Accredite Laborato	Accredited	Unique Number	: 5633055	Diagnostician	: Bill Quesnel		CA A0R 1A0	
	Laboratory	Test Package	: AOM 3 (Addition	al Tests: BottomA	nalysis, FilterPatch, PrtFilter,	, Tollnsol) (Contact: Robert Noel	
	To discuss this	sample report, c	ontact Customer Se	ervice at 1-800-26	8-2131.	r	robertnoel@nlh.nl.ca	
9. 3 .68	Test denoted (T: (709)925-8294					
7" ASTAL 78-193	Validity of results and interpretation are based on the sample and information as supplied.							

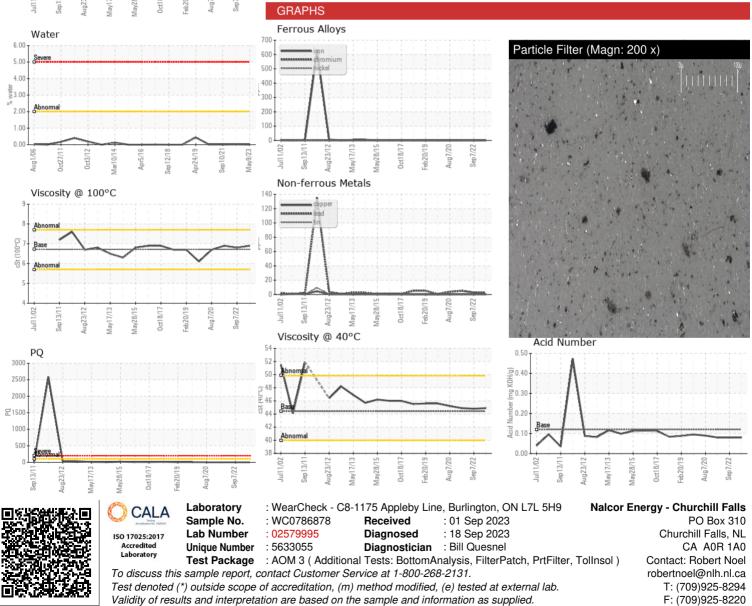


OIL ANALYSIS REPORT









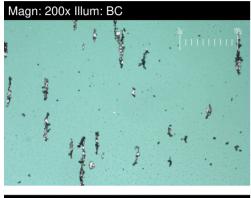
EA

FERROGRAPHY REPORT

Area [02437560] Machine Id A5 - Thrust Bearing

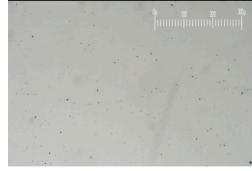
Thrust Bearing

PETRO CANADA TURBOFLO R&O 46 (4920 LTR)





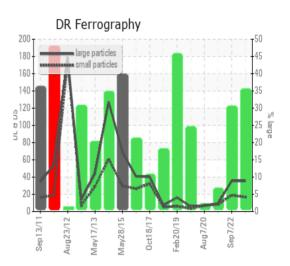
Magn: 100x Illum: RW

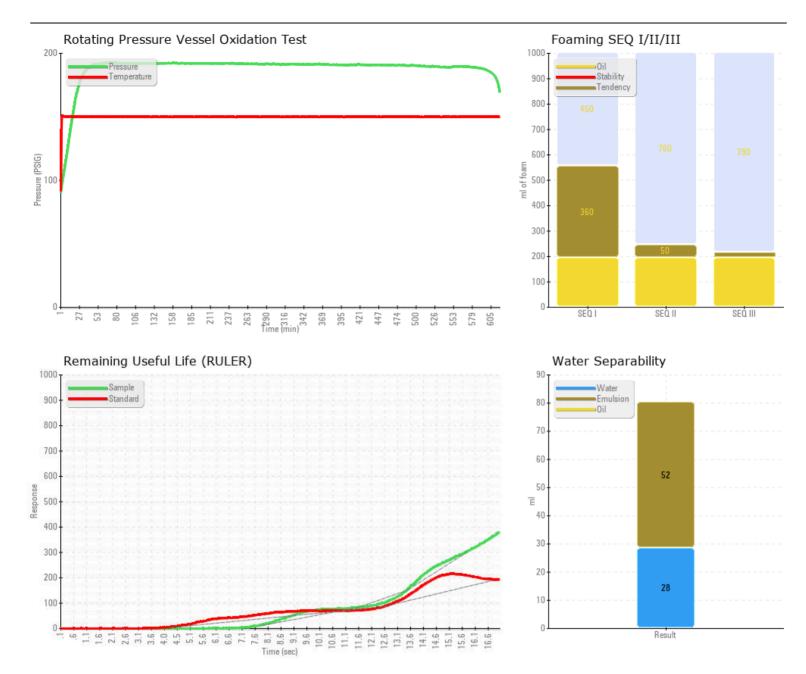


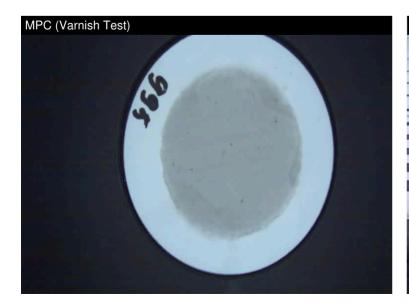
DR-FERROGRAP	РΗΥ	method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		35.4	35.6	9.4
Small Particles		DR-Ferr*		16.8	18.9	8.2
Total Particles		DR-Ferr*	>	52.2	54.5	17.6
Large Particles Percentage	%	DR-Ferr*		35.6	30.6	6.8
Severity Index		DR-Ferr*		658	595	11.3
FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		3	3	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*			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*		1	2	2

WEAR

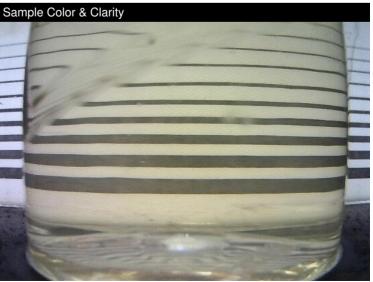
All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.







Report Id: CHUCHU [WCAMIS] 02579995 (Generated: 09/18/2023 20:20:57) Rev: 3



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