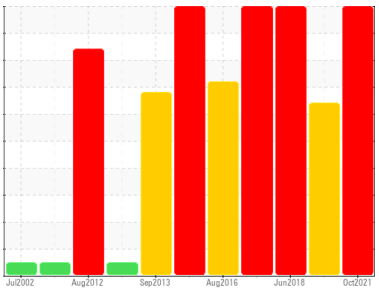
PROBLEM SUMMARY

Sample Rating Trend

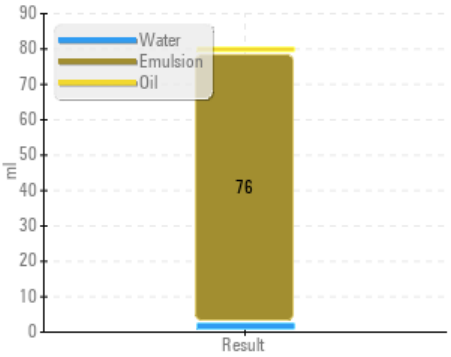


CONTAMINANT

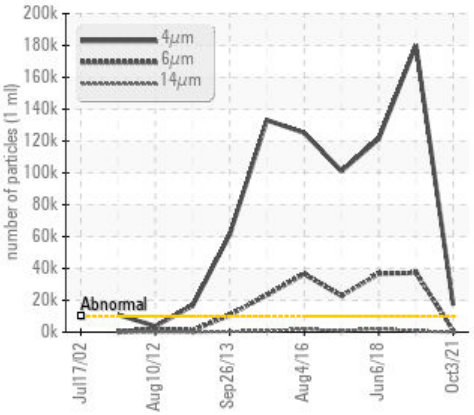
Machine Id
A7 - Thrust Bearing
Component
Thrust Bearing
Fluid
PETRO CANADA TURBOFLO R&O 46 (5705 LTR)

COMPONENT CONDITION SUMMARY

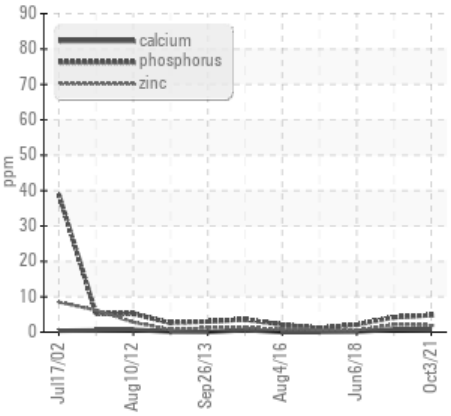
Water Separability



Particle Trend



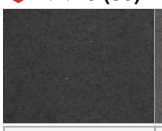
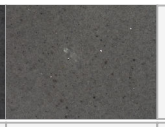
Additives



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 recommend you service the filters on this component. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition.

PROBLEMATIC TEST RESULTS

Sample Status				**SEVERE**	SEVERE	SEVERE
Phosphorus	ppm	ASTM D5185(m)	3	▲ **5**	4	2
Particles >4µm		ASTM D7647	>10000	▲ **17142**	⬢ 180130	⬢ 121285
Oil Cleanliness		ISO 4406 (c)	>20/18/14	▲ **21/17/11**	⬢ 25/22/17	⬢ 24/22/18
Separability	oil/h2o/em	ASTM D1401	41/39/0	⬢ **2/2/76 (30)**	41/39/0 (25)	41/39/0 (30)
PrtFilter						*no image*
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Customer Id: CUSANY
Sample No.: WC1234567
Lab Number: 01234567
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 (905)569-8600 x4641
Bill.Quesnel@wearcheck.com

To change component or sample information:
Gloria Gonzalez +1 (905)569-8600 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.
Check Fluid Source	---	---	?	Confirm the source of the lubricant being utilized for top-up/fill.
Filter Fluid	---	---	?	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

ISO

21 May 2020 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. Diagnostician's Comments: It appears as if you did a sweetening of the oil (or used some type of resin filtration), and this has restored some properties of the oil, however, it has also liberated more varnish (probably older varnish that was lining piping). Advise that you look at purchasing some type of varnish removal filtration system.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. Particles >6µm are severely high. MPC Varnish Potential contamination levels are severely high. Particles >4µm are severely high. Particles >4µm are severely high.. Particles >14µm are abnormally high. Particles >21µm are abnormally high. MPC (Membrane Patch Colorimetry) test indicates a high 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 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.

view report

OFF SPEC

06 Jun 2018 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 advise that you check all areas where contaminants can enter the system. We recommend that you investigate the system for introduction of a surfactant to the reservoir. Some potential surfactants include incorrect oil make-up with an oil containing emulsifying agents (engine oil, compressor oil, gear oil), or soaps entering the system after wash down. 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.Wear particle analysis indicates that the nonferrous rolling particles are abnormal. Particles >14µm are severely high. Particles >21µm are severely high. Particles >6µm are severely high. Particles >4µm are severely high. MPC Varnish Potential contamination levels are abnormally high. Particles >38µm are abnormally high. MPC (Membrane Patch Calorimetery) test indicates a moderate 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 the oil has poor deaeration properties. Foaming Stability stage I (ASTM D892) result is abnormal indicating an oil foaming problem that could lead to erratic operation. 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 no longer serviceable as a result of the abnormal and/or severe wear.

view report

OFF SPEC

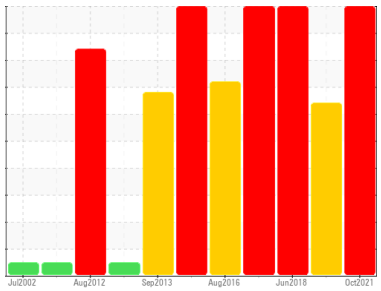
06 Jun 2017 Diag: Bill Quesnel

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 advise that you check all areas where contaminants can enter the system. We recommend that you investigate the system for introduction of a surfactant to the reservoir. Some potential surfactants include incorrect oil make-up with an oil containing emulsifying agents (engine oil, compressor oil, gear oil), or soaps entering the system after wash down. 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.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. Particles >6µm are severely high. Particles >4µm are severely high. Particles >14µm are abnormally high. Particles >21µm are abnormally high. Separability (Water) % is marginally low. MPC Varnish Potential contamination levels are marginally high. MPC (Membrane Patch Calorimetery) 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 the oil has poor deaeration properties. Foaming Stability stage I (ASTM D892) result is abnormal indicating an oil foaming problem that could lead to erratic operation. 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. 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.

view report

OIL ANALYSIS REPORT

Sample Rating Trend



CONTAMINANT

Machine Id
A7 - Thrust Bearing
Component
Thrust Bearing
Fluid
PETRO CANADA TURBOFLO R&O 46 (5705 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 recommend you service the filters on this component. Confirm the source of the lubricant being utilized for top-up/fill. We recommend an early resample to monitor this condition.

Wear

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

Contaminants

There is a light amount of silt (particulates < 14 microns in size) present in the oil. MPC (Membrane Patch Colorimetry) test indicates acceptable levels 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

Additive levels indicate the addition of a different brand, or type of oil. 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 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.

SAMPLE INFORMATION	method	limit/base	current	history 1	history 2
Sample Number			**WC0308164**	WC944663	WC987346
Sample Date			**03 Oct 2021**	21 May 2020	06 Jun 2018
Machine Age	hrs		**0**	0	0
Oil Age	hrs		**0**	0	0
Oil Changed			**N/A**	N/A	N/A
Sample Status			**SEVERE**	SEVERE	SEVERE

WEAR METALS		method	limit/base	current	history 1	history 2
PQ		ASTM D8184		**0**	0	14
Iron	ppm	ASTM D5185(m)	>85	**1**	3	<1
Chromium	ppm	ASTM D5185(m)		**0**	0	0
Nickel	ppm	ASTM D5185(m)		**0**	0	0
Titanium	ppm	ASTM D5185(m)		**0**	0	0
Silver	ppm	ASTM D5185(m)		**0**	<1	0
Aluminum	ppm	ASTM D5185(m)	>40	**<1**	<1	<1
Lead	ppm	ASTM D5185(m)	>60	**13**	9	1
Copper	ppm	ASTM D5185(m)	>7	**<1**	<1	0
Tin	ppm	ASTM D5185(m)	>40	**0**	0	0
Antimony	ppm	ASTM D5185(m)		**0**	<1	0
Vanadium	ppm	ASTM D5185(m)		**0**	0	0
Beryllium	ppm	ASTM D5185(m)		**0**	0	0
Cadmium	ppm	ASTM D5185(m)		**0**	0	<1

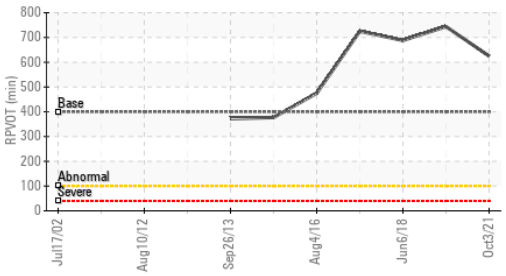
ADDITIVES		method	limit/base	current	history 1	history 2
Boron	ppm	ASTM D5185(m)		**<1**	0	0
Barium	ppm	ASTM D5185(m)		**0**	0	0
Molybdenum	ppm	ASTM D5185(m)		**0**	0	0
Manganese	ppm	ASTM D5185(m)		**0**	0	<1
Magnesium	ppm	ASTM D5185(m)		**<1**	0	<1
Calcium	ppm	ASTM D5185(m)	0	**<1**	<1	<1
Phosphorus	ppm	ASTM D5185(m)	3	▲ **5**	4	2
Zinc	ppm	ASTM D5185(m)	0	**2**	2	<1
Sulfur	ppm	ASTM D5185(m)		**128**	141	31
Lithium	ppm	ASTM D5185(m)		**<1**	<1	0

CONTAMINANTS		method	limit/base	current	history 1	history 2
Silicon	ppm	ASTM D5185(m)	>20	**0**	0	2
Sodium	ppm	ASTM D5185(m)		**0**	0	0
Potassium	ppm	ASTM D5185(m)	>20	**<1**	<1	<1
Water	%	ASTM D6304	>2	**0.002**	0.006	0.00
ppm Water	ppm	ASTM D6304		**21.1**	62.9	0.00

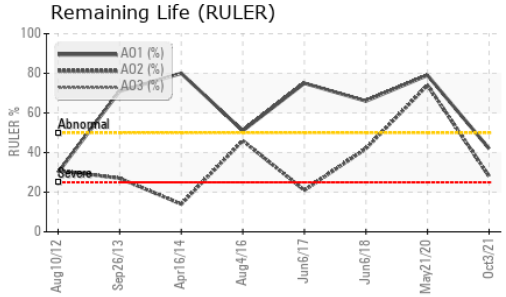
INFRA-RED		method	limit/base	current	history 1	history 2
Soot %	%	ASTM D7686		**0**	0	---
Nitration	Abs/cm	ASTM D7624		**1.6**	2.8	---
Sulfation	Abs/.1mm	ASTM D7415		**11.5**	15.5	---

OIL ANALYSIS REPORT

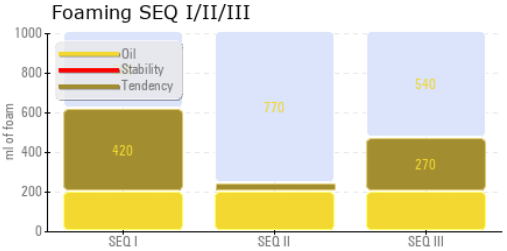
RPVOT



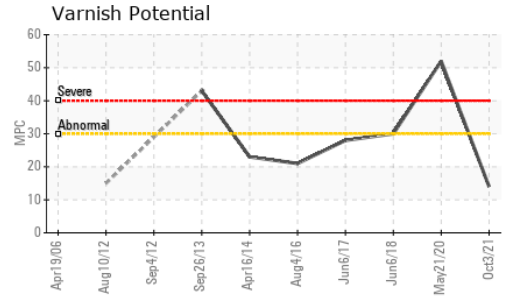
Remaining Life (RULER)



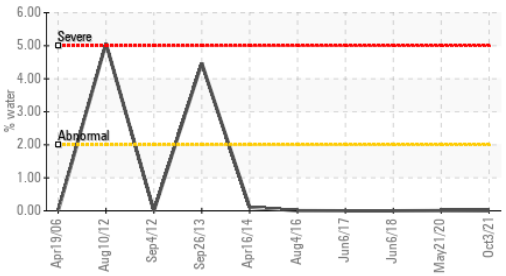
Foaming SEQ I/II/III



Varnish Potential



Water



FLUID CLEANLINESS	method	limit/base	current	history 1	history 2
Particles >4µm	ASTM D7647	>10000	▲ **17142**	⬢ 180130	⬢ 121285
Particles >6µm	ASTM D7647	>2500	**1041**	⬢ 37244	⬢ 36674
Particles >14µm	ASTM D7647	>160	**13**	▲ 768	⬢ 2108
Particles >21µm	ASTM D7647	>40	**3**	▲ 130	⬢ 619
Particles >38µm	ASTM D7647	>10	**0**	1	▲ 21
Particles >71µm	ASTM D7647	>3	**0**	0	1
Oil Cleanliness	ISO 4406 (c)	>20/18/14	▲ **21/17/11**	⬢ 25/22/17	⬢ 24/22/18

FLUID DEGRADATION		method	limit/base	current	history 1	history 2
Oxidation	Abs/.1mm	ASTM D7414		**2.5**	2.5	---
Acid Number (AN)	mg KOH/g	ASTM D974	0.12	**0.07**	0.08	0.102
Anti-Oxidant 1	%	ASTM D6971	<25	**42**	79	66
Anti-Oxidant 2	%	ASTM D6971	<25	**28**	74	42
MPC Varnish Potential	Scale	ASTM D7843(m)	>15	**14**	⬢ 52	▲ 30

VISUAL		method	limit/base	current	history 1	history 2
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	**NONE**	VLITE	VLITE
Sand/Dirt	scalar	Visual	NONE	**NONE**	NONE	NONE
Appearance	scalar	Visual	NORML	**NORML**	▲ HAZY	NORML
Odor	scalar	Visual	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	Visual	>2	**NEG**	.2%	NEG
Free Water	scalar	Visual		**NEG**	NEG	NEG

FLUID PROPERTIES		method	limit/base	current	history 1	history 2
Visc @ 40°C	cSt	ASTM D7279(m)	44.4	**44.5**	44.3	45.3
Visc @ 100°C	cSt	ASTM D7279(m)	6.72	**6.8**	6.7	6.8
Viscosity Index (VI)	Scale	ASTM D2270	104	**107**	103	104
Separability	oil/h2o/em	ASTM D1401	41/39/0	⬢ **2/2/76 (30)**	41/39/0 (25)	41/39/0 (30)
Air Release Time	min	ASTM D3427	3.5	**5.30**	3.40	▲ 9.85
Foam Tendency	I/II/III	ASTM D892	10	**420/40/270**	390/10/110	▲ 560/60/350
Foam Stability	I/II/III	ASTM D892	0	**0/0/0**	0/0/0	⬢ 50/0/0
ASTM Color	scalar	ASTM D1500	0.5	**<1.0**	<1.0	<1.0
Rust Prevention	PASS/FAIL	ASTM D665	PASS	**PASS**	PASS	PASS
Rotary Bomb Oxidation Test	minutes	ASTM D2272	400	**625**	744	688

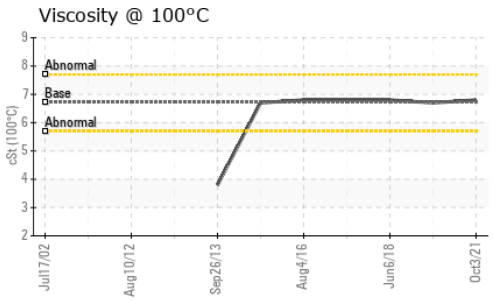
SEDIMENT		method	limit/base	current	history 1	history 2
Pentane Insolubles	%	ASTM D893(m)		**0.110**	0.101	0.044
Toluene Insolubles	%	ASTM D893(m)		**0.055**	0.040	0.025

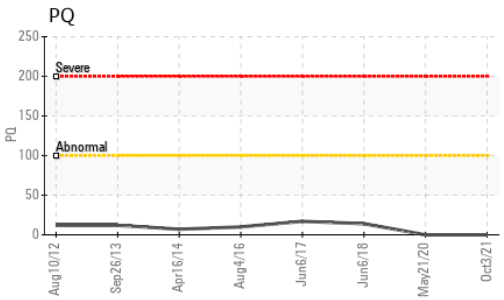
Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC1234567 **Received** : 04 Oct 2021
Lab Number : 01234567 **Diagnosed** : 14 Oct 2021
Unique Number : 12345678 **Diagnostician** : Bill Quesnel
Test Package : AOM 3 (Additional Tests: BottomAnalysis, FilterPatch, TolInsol)

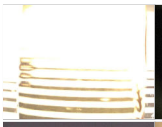
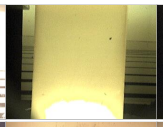
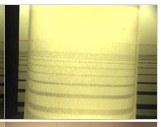
To discuss this sample report, contact Customer Service at 1-800-268-2131.
(m) Denotes a modified test method, (e) Denotes a test conducted using an external laboratory.

Cusany Logistics Inc.
1212 Industrial Place
Centerville, OH
USA 75900
Contact: Jim Leduc
jim.leduc@cusanylogisticsinc.com
T: (305)555-1212
F: (305)555-1222

OIL ANALYSIS REPORT





SAMPLE IMAGES	method	limit/base	current	history 1	history 2
Color					
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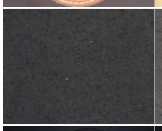
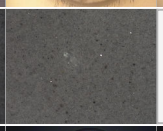
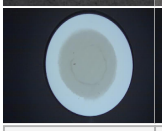
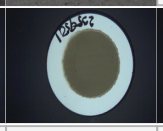
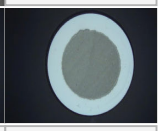
PrtFilter					*no image*
MPC					
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Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : WC1234567 **Received** : 04 Oct 2021
Lab Number : 01234567 **Diagnosed** : 14 Oct 2021
Unique Number : 12345678 **Diagnostician** : Bill Quesnel
Test Package : AOM 3 (Additional Tests: BottomAnalysis, FilterPatch, TolInsol)
To discuss this sample report, contact Customer Service at 1-800-268-2131.
(m) Denotes a modified test method, (e) Denotes a test conducted using an external laboratory.

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Centerville, OH
USA 75900
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jim.leduc@cusanylogisticsinc.com
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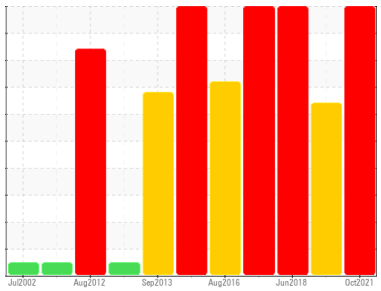
FERROGRAPHY REPORT

Sample Rating Trend



CONTAMINANT

Machine Id
A7 - Thrust Bearing
Component
Thrust Bearing
Fluid
PETRO CANADA TURBOFLO R&O 46 (5705 LTR)

Magn: 200x Illum: BC

Magn: 50x Illum: RW

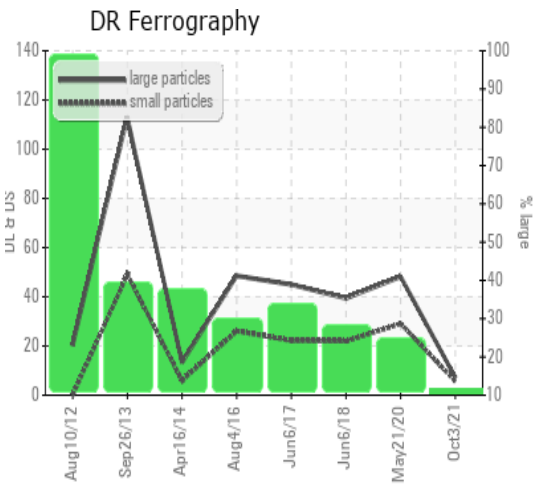
Magn: 100x Illum: RW

DR-FERROGRAPHY		method	limit/base	current	history 1	history 2
Large Particles		DR-Ferr		**7.2**	48.2	39.4
Small Particles		DR-Ferr		**5.7**	29.1	22.0
Total Particles		DR-Ferr	>0.0	**12.9**	77.3	61.4
Large Particles Percentage	%	DR-Ferr		**11.6**	24.7	28.3
Severity Index		DR-Ferr		**10.8**	921	686

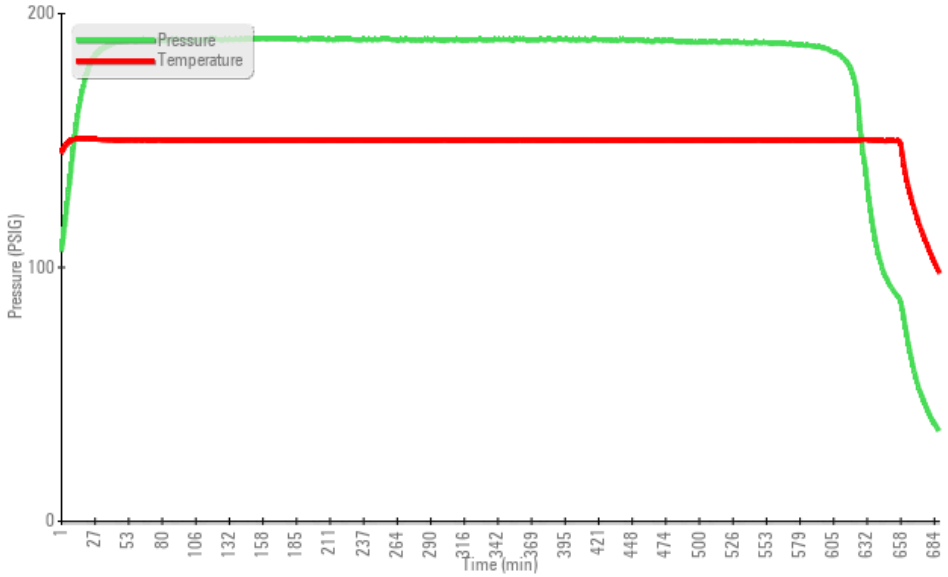
FERROGRAPHY		method	limit/base	current	history 1	history 2
Ferrous Rubbing	Scale 0-10	ASTM D7684		**2**	3	3
Ferrous Sliding	Scale 0-10	ASTM D7684				
Ferrous Cutting	Scale 0-10	ASTM D7684				
Ferrous Rolling	Scale 0-10	ASTM D7684		**1**	1	1
Ferrous Break-in	Scale 0-10	ASTM D7684				
Ferrous Spheres	Scale 0-10	ASTM D7684				
Ferrous Black Oxides	Scale 0-10	ASTM D7684				
Ferrous Red Oxides	Scale 0-10	ASTM D7684				1
Ferrous Corrosive	Scale 0-10	ASTM D7684			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				2
Nonferrous Other	Scale 0-10	ASTM D7684				
Carbonaceous Material	Scale 0-10	ASTM D7684				
Lubricant Degradation	Scale 0-10	ASTM D7684		**1**	3	
Sand/Dirt	Scale 0-10	ASTM D7684		**1**	1	2
Fibres	Scale 0-10	ASTM D7684				
Spheres	Scale 0-10	ASTM D7684				
Other	Scale 0-10	ASTM D7684		**2**	2	

WEAR

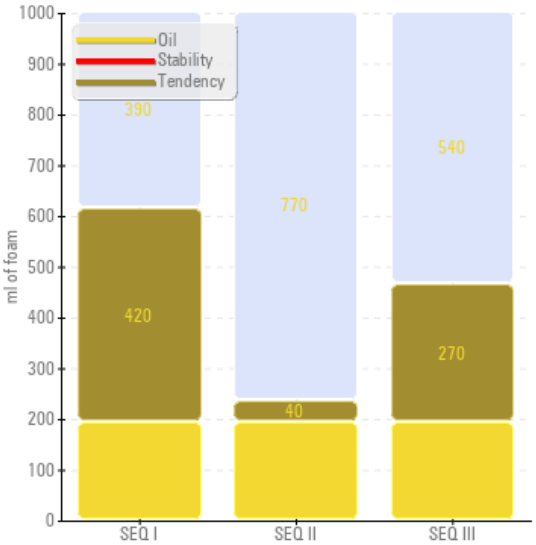
All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.



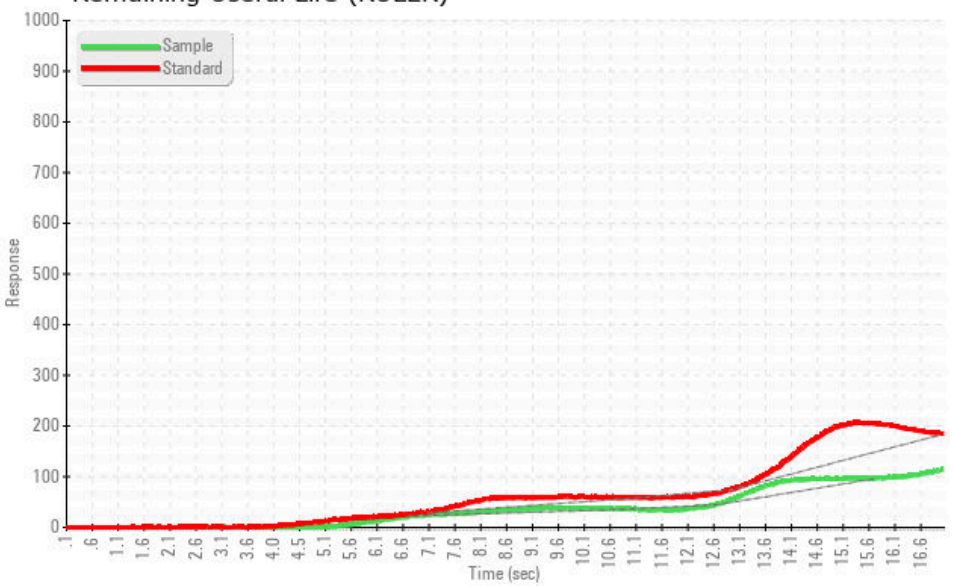
Rotating Pressure Vessel Oxidation Test



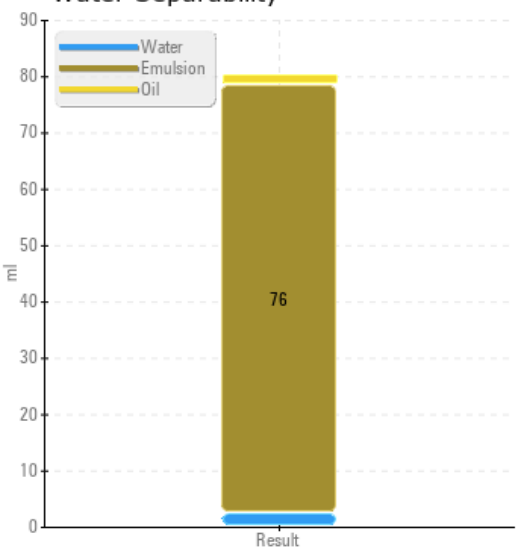
Foaming SEQ I/II/III



Remaining Useful Life (RULER)

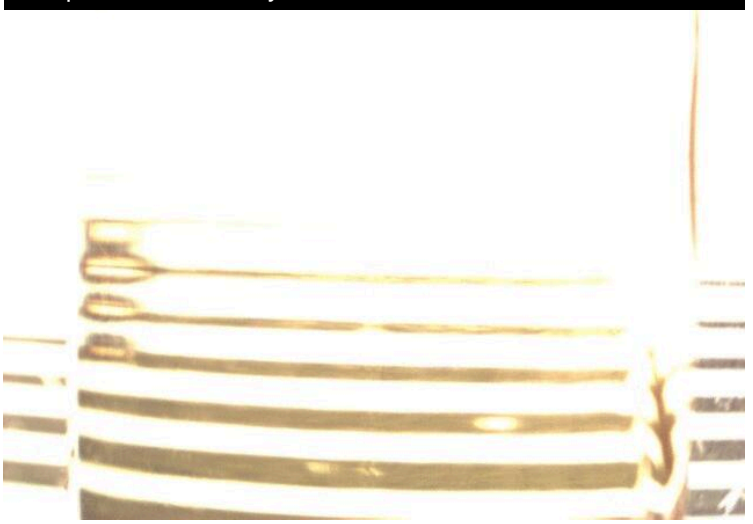


Water Separability



MPC (Varnish Test)

Sample Color & Clarity



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