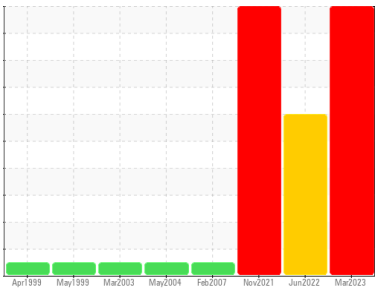
PROBLEM SUMMARY

Sample Rating Trend

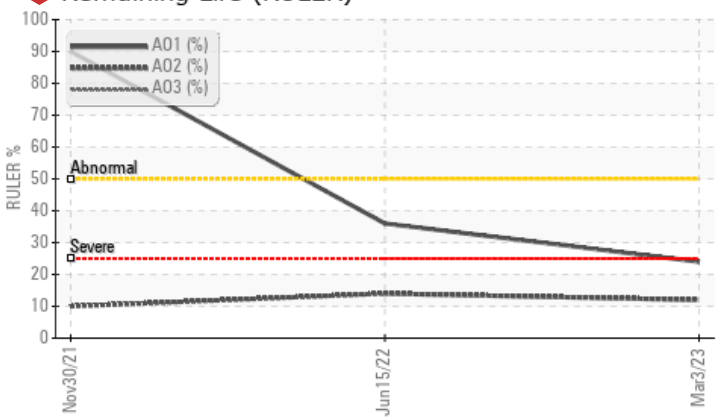


DEGRADATION

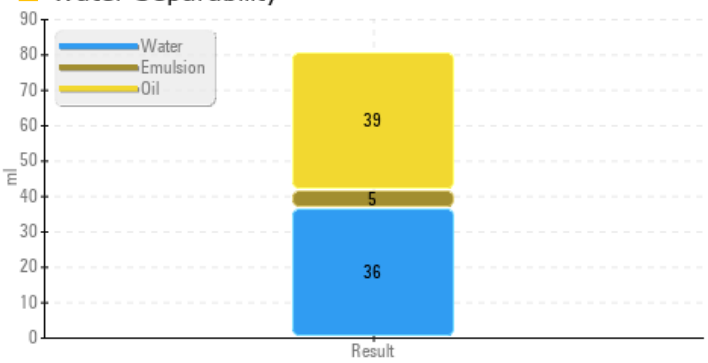
Machine Id
STEAM TURBINE
Component
Turbine
Fluid
PETRO CANADA TURBOFLO XL32 (3650 GAL)

COMPONENT CONDITION SUMMARY

Remaining Life (RULER)



Water Separability



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. The oil is near the end of it`s useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. (Customer Sample Comment: 3um filter)

PROBLEMATIC TEST RESULTS

Sample Status				**SEVERE**	SEVERE	SEVERE
Anti-Oxidant 1	%	ASTM D6971*	<25	**24**	36	90
Anti-Oxidant 2	%	ASTM D6971*	<25	**12**	14	10
Separability	oil/h2o/em	ASTM D1401*	40/40/0	**39/36/5 (30)**	41/39/0 (20)	0/37/43 (20)

Customer Id: CARCAR
Sample No.: WC0755037
Lab Number: 02543160
Test Package: AOM 3

To manage this report scan the QR code

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RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Service/change Fluid	---	---	?	The oil is near the end of it's useful service life, recommend schedule an oil change.
Resample	---	---	?	We recommend an early resample to monitor this condition.
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

DEGRADATION

15 Jun 2022 Diag: Bill Quesnel

We recommend that you sweeten the oil by draining off half the system oil (50%) and replacing with new oil. Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. MPC (Membrane Patch Colorimetry) test indicates acceptable levels of varnish present. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. Water Separability results (ASTM D1401) indicate good water shedding properties. The system and fluid cleanliness is acceptable. Linear Sweep Voltammetry (RULER– ASTM D6971) testing indicates one of the anti-oxidants present in the oil will soon be depleted. 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. 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.

view report

DEGRADATION

30 Nov 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 that you sweeten the oil by draining off half the system oil (50%) and replacing with new oil. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. 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 system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. Linear Sweep Voltammetry (RULER– ASTM D6971) testing indicates one of the anti-oxidants present in the oil will soon be depleted. 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. 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.

view report

NORMAL

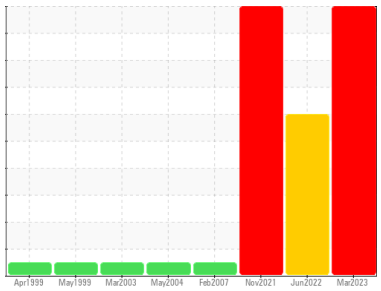
14 Feb 2007 Diag:

Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. NOTE: RPVOT TEST RESULT is 1317 minutes.All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The system and fluid cleanliness is acceptable. The condition of oil is suitable for further service.

view report

OIL ANALYSIS REPORT

Sample Rating Trend



DEGRADATION

Machine Id
STEAM TURBINE
Component
Turbine
Fluid
PETRO CANADA TURBOFLO XL32 (3650 GAL)

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. The oil is near the end of it`s useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. (Customer Sample Comment: 3um filter)

Wear

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

Contaminants

Water Separability results (ASTM D1401) are poor and indicate that the oil will form emulsions with water. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible.

Oil Condition

Linear Sweep Voltammetry (RULER– ASTM D6971) testing indicates both anti-oxidants present in the oil will soon be depleted. The AN level is acceptable for this fluid.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0755037**	WC0711962	WC0646867
Sample Date		Client Info		**03 Mar 2023**	15 Jun 2022	30 Nov 2021
Machine Age	yrs	Client Info		**30**	27	27
Oil Age	yrs	Client Info		**10**	0	9
Oil Changed		Client Info		**N/A**	N/A	N/A
Sample Status				**SEVERE**	SEVERE	SEVERE

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*		**0**	0	0
Iron	ppm	ASTM D5185(m)	>15	**0**	0	0
Chromium	ppm	ASTM D5185(m)	>4	**0**	0	0
Nickel	ppm	ASTM D5185(m)	>2	**0**	0	<1
Titanium	ppm	ASTM D5185(m)		**0**	0	0
Silver	ppm	ASTM D5185(m)		**0**	0	<1
Aluminum	ppm	ASTM D5185(m)	>10	**0**	0	<1
Lead	ppm	ASTM D5185(m)		**0**	0	0
Copper	ppm	ASTM D5185(m)	>5	**0**	<1	<1
Tin	ppm	ASTM D5185(m)	>5	**0**	<1	0
Antimony	ppm	ASTM D5185(m)		**<1**	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

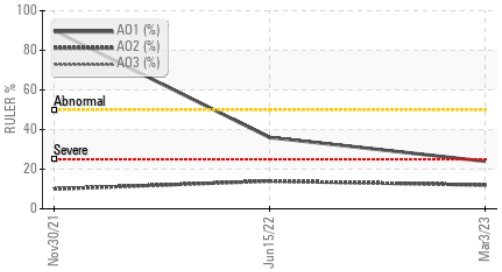
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)	0	**<1**	<1	<1
Barium	ppm	ASTM D5185(m)	0	**0**	0	0
Molybdenum	ppm	ASTM D5185(m)	0	**0**	0	0
Manganese	ppm	ASTM D5185(m)	0	**0**	0	0
Magnesium	ppm	ASTM D5185(m)	0	**0**	0	0
Calcium	ppm	ASTM D5185(m)	0	**0**	<1	<1
Phosphorus	ppm	ASTM D5185(m)	5	**90**	86	106
Zinc	ppm	ASTM D5185(m)	0	**<1**	<1	<1
Sulfur	ppm	ASTM D5185(m)	750	**155**	150	40
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>15	**<1**	<1	<1
Sodium	ppm	ASTM D5185(m)		**0**	0	0
Potassium	ppm	ASTM D5185(m)	>20	**<1**	0	<1
Water	%	ASTM D6304*	>0.03	**0.001**	0.001	0.001
ppm Water	ppm	ASTM D6304*	>300	**4.1**	0.2	7.5

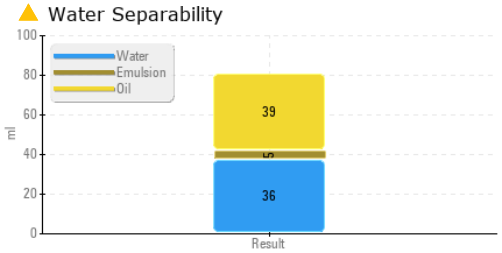
INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	ASTM D7844*		**0**	0	0
Nitration	Abs/cm	ASTM D7624*		**2.0**	2.0	1.8
Sulfation	Abs/.1mm	ASTM D7415*		**12.6**	13.0	12.0

OIL ANALYSIS REPORT

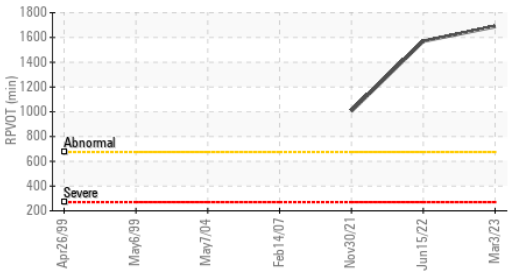
Remaining Life (RULER)



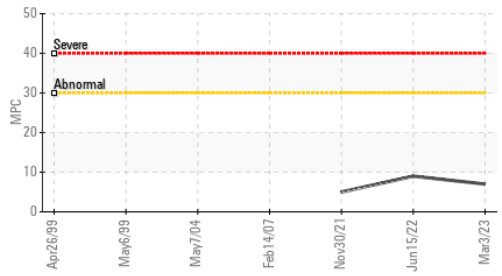
Water Separability



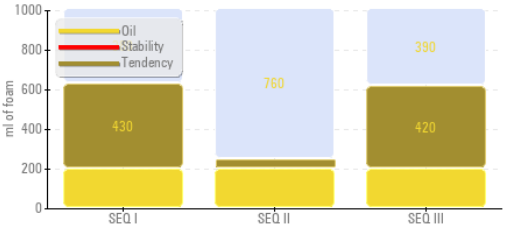
RPVOT



Varnish Potential



Foaming SEQ I/II/III



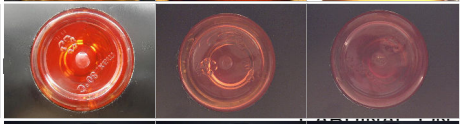
FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647	>2500	**559**	216	1138
Particles >6µm		ASTM D7647	>640	**274**	72	266
Particles >14µm		ASTM D7647	>80	**26**	7	18
Particles >21µm		ASTM D7647	>20	**4**	1	4
Particles >38µm		ASTM D7647	>4	**0**	0	0
Particles >71µm		ASTM D7647	>3	**0**	0	0
Oil Cleanliness		ISO 4406 (c)	>18/16/13	**16/15/12**	15/13/10	17/15/11

FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*		**2.9**	2.7	2.9
Acid Number (AN)	mg KOH/g	ASTM D974*	0.04	**0.04**	0.06	0.05
Anti-Oxidant 1	%	ASTM D6971*	<25	▲ **24**	36	90
Anti-Oxidant 2	%	ASTM D6971*	<25	⬢ **12**	⬢ 14	⬢ 10
MPC Varnish Potential	Scale	ASTM D7843(m)*	>15	**7**	9	5

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	**NONE**	NONE	NONE
Sand/Dirt	scalar	Visual*	NONE	**NONE**	NONE	NONE
Appearance	scalar	Visual*	NORML	**NORML**	NORML	NORML
Odor	scalar	Visual*	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	Visual*	>0.03	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	33.86	**33.8**	33.9	33.9
Visc @ 100°C	cSt	ASTM D7279(m)	5.60	**5.6**	5.6	5.7
Viscosity Index (VI)	Scale	ASTM D2270*	101	**102**	102	107
Separability	oil/h2o/em	ASTM D1401*	40/40/0	▲ **39/36/5 (30)**	41/39/0 (20)	⬢ 0/37/43 (20)
Air Release Time	min	ASTM D3427*	3	**4.40**	4.40	3.50
Foam Tendency	I/II/III	ASTM D892*	0	**430/50/420**	410/40/420	160/40/150
Foam Stability	I/II/III	ASTM D892*	0	**0/0/0**	0/0/0	0/0/0
ASTM Color	scalar	ASTM D1500*	0.5	**<3.5**	<3.5	>3.0
Rust Prevention	PASS/FAIL	ASTM D665*		**PASS**	PASS	PASS
Oxidation Test (RPVOT)	minutes	ASTM D2272*	2700	**1688**	1570	1005

SEDIMENT		method	limit/base	current	history1	history2
Pentane Insolubles	%	ASTM D893(m)*		**0.162**	0.011	0.028
Toluene Insolubles	%	ASTM D893(m)*		**0.027**	0.001	0.005

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					
MPC					

CALA
ISO 17025:2017 Accredited Laboratory

Laboratory
Sample No.
Lab Number
Unique Number
Test Package

To discuss this sample report, cc
Test denoted (*) outside scope o
Validity of results and interpretation are based on the sample and information as supplied.

F: (613)657-1402

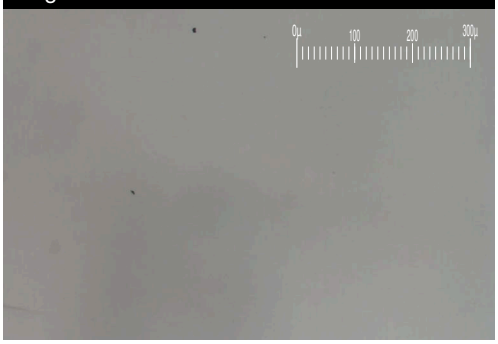
FERROGRAPHY REPORT

Machine Id
STEAM TURBINE
Component
Turbine
Fluid
PETRO CANADA TURBOFLO XL32 (3650 GAL)

Magn: 200x Illum: BC

Magn: 50x Illum: RW

Magn: 100x Illum: RW

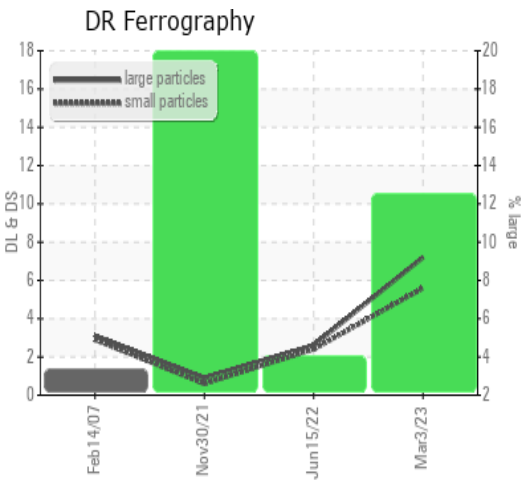


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		DR-Ferr*		**7.2**	2.6	0.9
Small Particles		DR-Ferr*		**5.6**	2.4	0.6
Total Particles		DR-Ferr*	>---	**12.8**	5	1.5
Large Particles Percentage	%	DR-Ferr*		**12.5**	4	20
Severity Index		DR-Ferr*		**12**	1	0

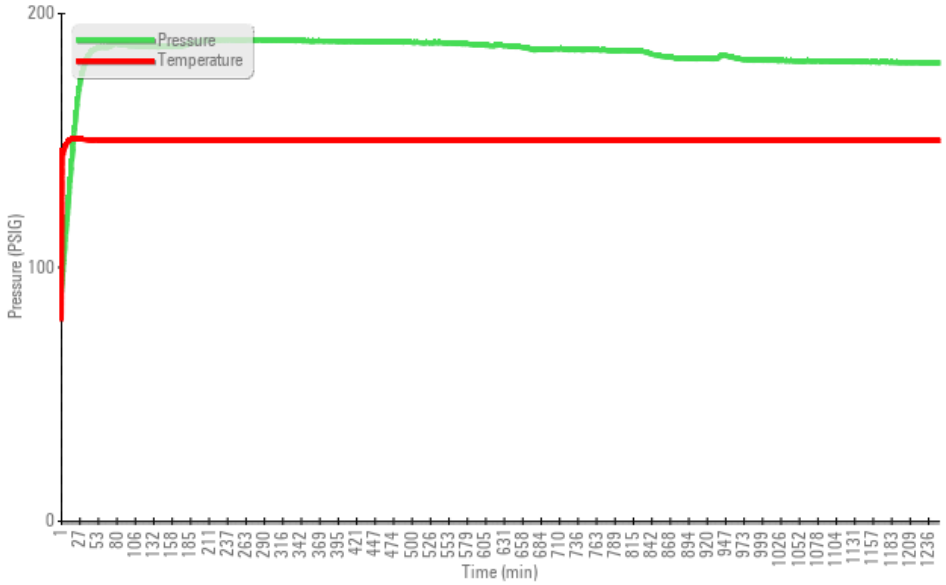
FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	ASTM D7684*		**1**	1	1
Ferrous Sliding	Scale 0-10	ASTM D7684*				
Ferrous Cutting	Scale 0-10	ASTM D7684*				
Ferrous Rolling	Scale 0-10	ASTM D7684*			1	1
Ferrous Break-in	Scale 0-10	ASTM D7684*				
Ferrous Spheres	Scale 0-10	ASTM D7684*				
Ferrous Black Oxides	Scale 0-10	ASTM D7684*				
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
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*				
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	2
Fibres	Scale 0-10	ASTM D7684*				
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*		**1**	2	

WEAR

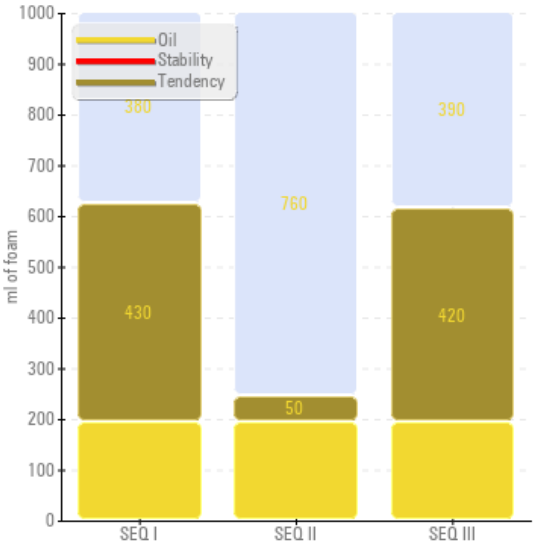
All component wear rates are normal. The direct-reading & analytical ferrographic results are normal indicating no abnormal wear in the system.



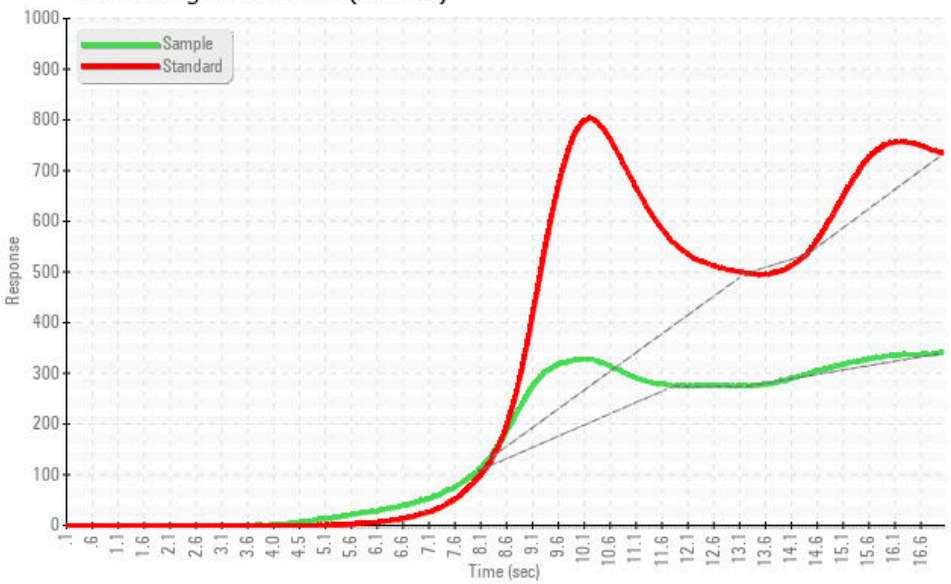
Rotating Pressure Vessel Oxidation Test



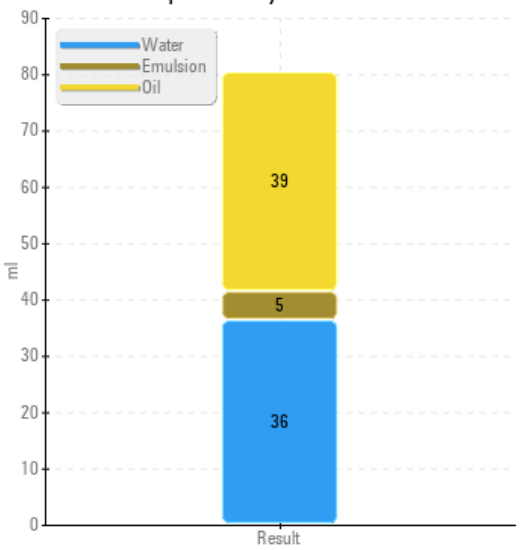
Foaming SEQ I/II/III



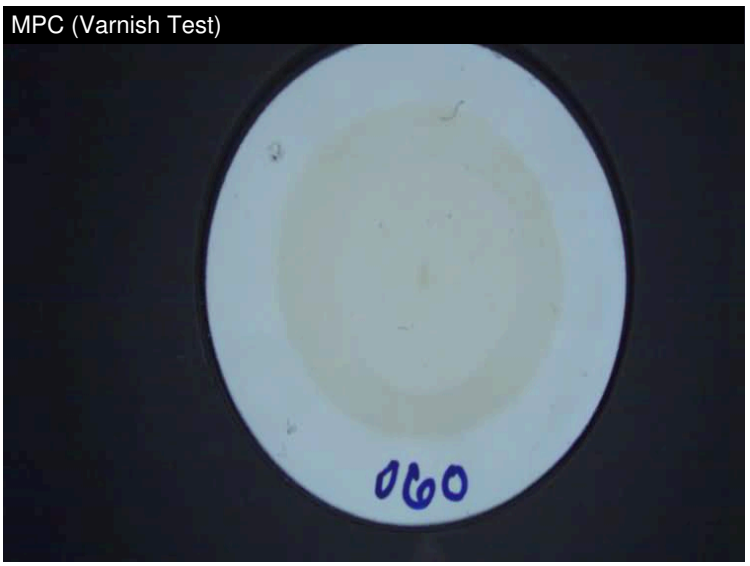
Remaining Useful Life (RULER)



Water Separability



MPC (Varnish Test)



Sample Color & Clarity