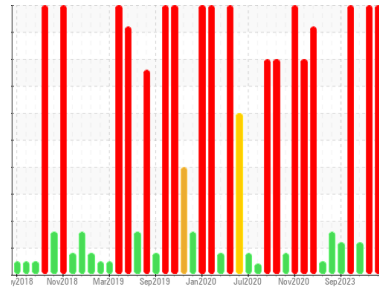
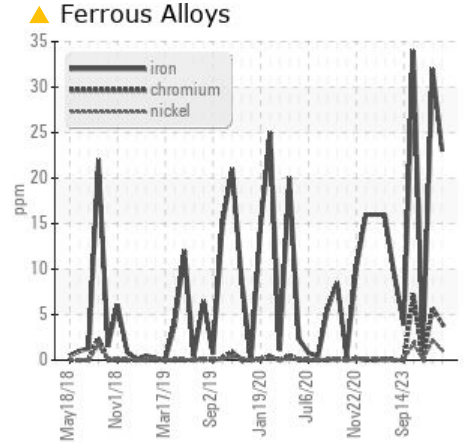
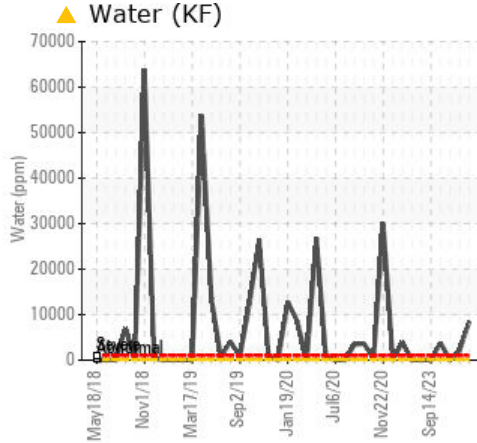
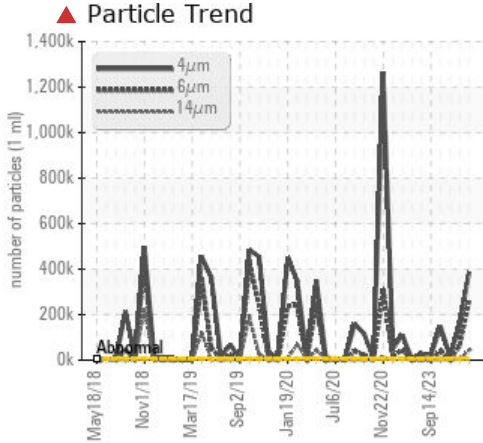




Area
Aft Machinery Space [450296544]
Machine Id
Thruster Aft Starboard - Seal Oil System (S/N Sample Tag CL-06003-S3)
Component
Sealing System
Fluid
PETRO CANADA ENERGOL GR-XP ISO 150 (65 LTR)



COMPONENT CONDITION SUMMARY



RECOMMENDATION

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. 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 advise that you use off-line filtration with water adsorbent filters to attempt to remove the water from this fluid. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. We recommend that you change the oil. Resample in 30-45 days to monitor this situation.

PROBLEMATIC TEST RESULTS

Sample Status				SEVERE	SEVERE	ABNORMAL
Chromium	ppm	ASTM D5185(m)	>3	▲ 4	▲ 6	0
Water	%	ASTM D6304*		▲ 0.846	▲ 0.207	---
ppm Water	ppm	ASTM D6304*		▲ 8469	▲ 2075	---
Particles >4µm		ASTM D7647	>5000	▲ 387454	▲ 154564	▲ 15578
Particles >6µm		ASTM D7647	>1300	▲ 262293	▲ 63227	▲ 2817
Particles >14µm		ASTM D7647	>160	▲ 42037	▲ 4563	148
Particles >21µm		ASTM D7647	>40	▲ 10195	▲ 466	44
Particles >38µm		ASTM D7647	>10	▲ 109	2	7
Oil Cleanliness		ISO 4406 (c)	>19/17/14	▲ 26/25/23	▲ 24/23/19	▲ 21/19/14
Precipitate	scalar	Visual*	NONE	▲ MODER	NONE	NONE
Appearance	scalar	Visual*	NORML	▲ HAZY	▲ LAYRD	NORML
Emulsified Water	scalar	Visual*		▲ .5%	▲ 1%	NEG
Free Water	scalar	Visual*		▲ 5%	▲ >10%	NEG

Customer Id: TERHAM
Sample No.: PC
Lab Number: 02631777
Test Package: MAR 2



To manage this report scan the QR code

To discuss the diagnosis or test data:
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Kevin.Marson@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 Fluid	---	---	?	We recommend that you change the oil.
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 Seals	---	---	?	Check seals and/or filters for points of contaminant entry.
Filter Fluid	---	---	?	We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid.

HISTORICAL DIAGNOSIS

ISO



26 Feb 2024 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. 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 advise that you use off-line filtration with water adsorbent filters to attempt to remove the water from this fluid. We advise that you follow the water drain-off procedure for this component. Resample in 30-45 days to monitor this situation. Chromium ppm levels are abnormal. There is a high amount of particulates (2 to 100 microns in size) present in the fluid. There is a moderate concentration of water present in the fluid. Excessive free water present. The AN level is acceptable for this fluid. The fluid is no longer serviceable as a result of the abnormal and/or severe wear.

view report



ISO



05 Jan 2024 Diag: Kevin Marson

We recommend you service the filters on this component. We recommend an early resample to monitor this condition. All component wear rates are normal. There is a moderate amount of silt (particulates < 14 microns in size) present in the fluid. The AN level is acceptable for this fluid. The fluid is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.

view report



WEAR

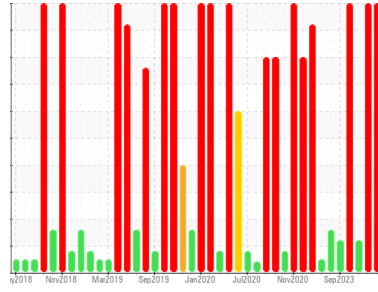


04 Jan 2024 Diag: Kevin Marson

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. 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 drain the fluid from the component if this has not already been done. Resample in 30-45 days to monitor this situation. Chromium ppm levels are severe. There is a high amount of particulates (2 to 100 microns in size) present in the fluid. There is a moderate concentration of water present in the fluid. Free water present. Abnormal water content and sodium(Na) level indicate possible sea water contamination. The AN level is acceptable for this fluid. The fluid is no longer serviceable as a result of the abnormal and/or severe wear.

view report





Area

Aft Machinery Space [450296544]

Machine ID
Thruster Aft Starboard - Seal Oil System (S/N Sample Tag CL-06003-S3)

Component

Sealing System

Fluid

PETRO CANADA ENERGOL GR-XP ISO 150 (65 LTR)

DIAGNOSIS

▲ Recommendation

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. 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 advise that you use off-line filtration with water adsorbent filters to attempt to remove the water from this fluid. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. We recommend that you change the oil. Resample in 30-45 days to monitor this situation.

▲ Wear

Chromium ppm levels are abnormal.

▲ Contamination

There is a high amount of particulates (2 to 100 microns in size) present in the fluid. There is a moderate concentration of water present in the fluid. Free water present.

▲ Fluid Condition

The white residue present in the sample is fluid additive precipitate. The AN level is acceptable for this fluid. The fluid is no longer serviceable as a result of the abnormal and/or severe wear.

SAMPLE INFORMATION

method	limit/base	current	history1	history2
Sample Number	Client Info	PC	PC0082719	PC
Sample Date	Client Info	30 Mar 2024	26 Feb 2024	05 Jan 2024
Machine Age	hrs	0	0	0
Oil Age	hrs	0	0	0
Oil Changed	Client Info	N/A	N/A	N/A
Sample Status		SEVERE	SEVERE	ABNORMAL

WEAR METALS

method	limit/base	current	history1	history2	
PQ	ASTM D8184*	0	0	0	
Iron	ppm	ASTM D5185(m) >100	23	32	2
Chromium	ppm	ASTM D5185(m) >3	4	6	0
Nickel	ppm	ASTM D5185(m) >8	1	2	<1
Titanium	ppm	ASTM D5185(m)	0	0	0
Silver	ppm	ASTM D5185(m)	0	0	0
Aluminum	ppm	ASTM D5185(m) >3	0	<1	<1
Lead	ppm	ASTM D5185(m)	0	0	0
Copper	ppm	ASTM D5185(m) >3	<1	1	<1
Tin	ppm	ASTM D5185(m)	0	0	0
Antimony	ppm	ASTM D5185(m)	0	0	0
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)	1	<1	12
Barium	ppm	ASTM D5185(m)	0	0	0
Molybdenum	ppm	ASTM D5185(m)	0	0	0
Manganese	ppm	ASTM D5185(m)	0	0	0
Magnesium	ppm	ASTM D5185(m)	3	3	<1
Calcium	ppm	ASTM D5185(m)	3	5	5
Phosphorus	ppm	ASTM D5185(m)	128	134	170
Zinc	ppm	ASTM D5185(m)	6	8	4
Sulfur	ppm	ASTM D5185(m)	8508	9073	10729
Lithium	ppm	ASTM D5185(m)	<1	<1	<1

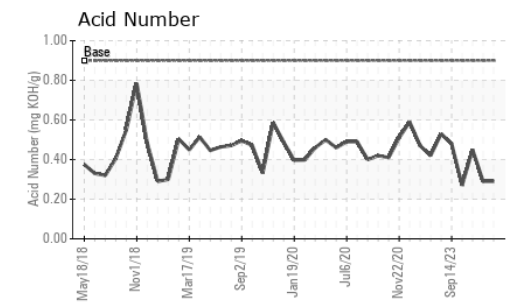
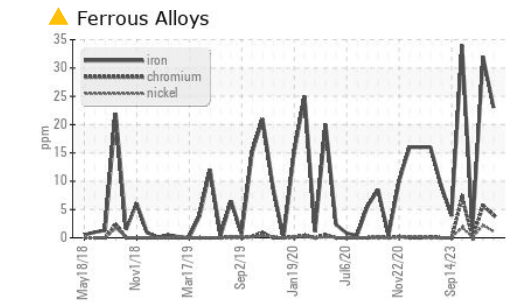
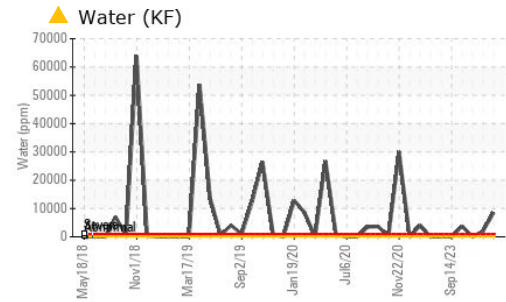
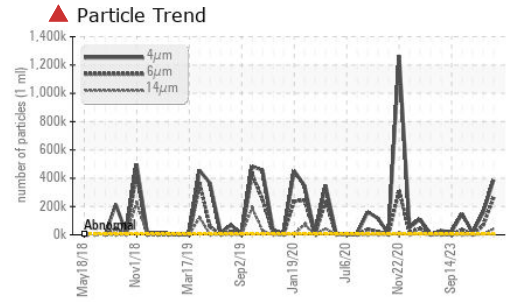
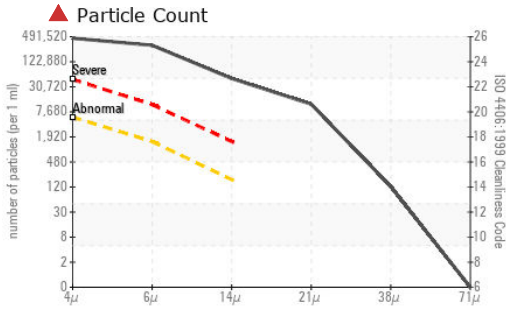
CONTAMINANTS

method	limit/base	current	history1	history2	
Silicon	ppm	ASTM D5185(m) >25	2	4	4
Sodium	ppm	ASTM D5185(m)	13	17	2
Potassium	ppm	ASTM D5185(m) >20	<1	1	<1
Water	%	ASTM D6304*	0.846	0.207	---
ppm Water	ppm	ASTM D6304*	8469	2075	---

FLUID CLEANLINESS

method	limit/base	current	history1	history2	
Particles >4µm	ASTM D7647	>5000	387454	154564	15578
Particles >6µm	ASTM D7647	>1300	262293	63227	2817
Particles >14µm	ASTM D7647	>160	42037	4563	148
Particles >21µm	ASTM D7647	>40	10195	466	44
Particles >38µm	ASTM D7647	>10	109	2	7
Particles >71µm	ASTM D7647	>3	0	1	1
Oil Cleanliness	ISO 4406 (c)	>19/17/14	26/25/23	24/23/19	21/19/14

OIL ANALYSIS REPORT

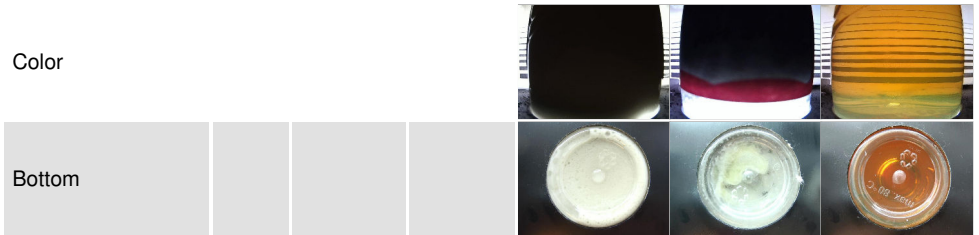


FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D974*	0.9	0.29	0.29	0.45

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	▲ MODER	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	▲ HAZY	▲ LAYRD	NORML
Odor	scalar	Visual*	NORML	NORML	NORML	NORML
Emulsified Water	scalar	Visual*		▲ .5%	▲ 1%	NEG
Free Water	scalar	Visual*		▲ 5%	▲ >10%	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	149	142	144	145
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	13.7	24.8	14.2
Viscosity Index (VI)	Scale	ASTM D2270*		91	▲ 206	94

SAMPLE IMAGES



Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : PC
Lab Number : 02631777
Unique Number : 5772930
Test Package : MAR 2 (Additional Tests: Bottom, KF, KV100, PQ, PrtCount, TAN Man, VI)

Suncor - Terra Nova Projects
 Scotia Centre, 235 Water Strret
 St. John`s, NL
 CA A1C 1B6
 Contact: Josh Hynes
 joshynes@suncor.com
 T: (709)778-3575
 F: (709)724-2835

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.