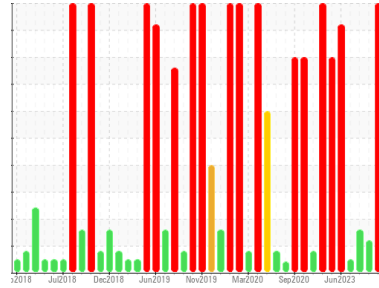
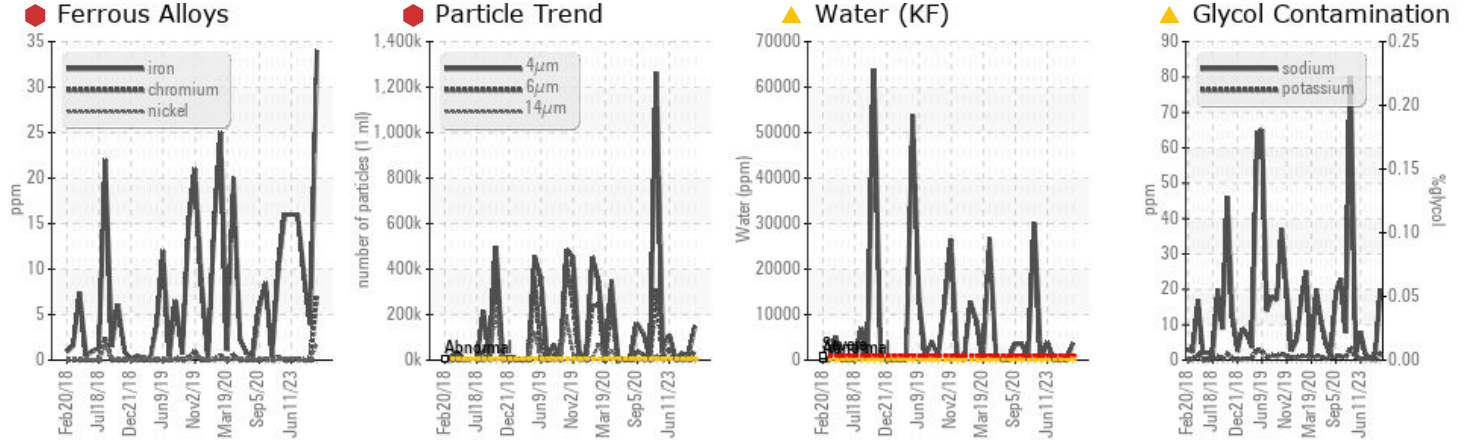


Area
Aft Machinery Space
Machine Id
Thruster Aft Starboard - Seal Oil System (S/N Sample Tag CL-06003-S3)
Component
Sealing System
Fluid
PETRO CANADA ENERGOL GR-XP ISO 150 (65 LTR)



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 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.

PROBLEMATIC TEST RESULTS

Sample Status				SEVERE	ABNORMAL	ABNORMAL
Chromium	ppm	ASTM D5185(m)	>3	7	0	0
Water	%	ASTM D6304*		0.378	---	---
ppm Water	ppm	ASTM D6304*		3783	---	---
Particles >4µm		ASTM D7647	>5000	148164	21592	28148
Particles >6µm		ASTM D7647	>1300	38031	3089	6179
Particles >14µm		ASTM D7647	>160	1586	83	184
Particles >21µm		ASTM D7647	>40	261	20	28
Oil Cleanliness		ISO 4406 (c)	>19/17/14	24/22/18	22/19/14	22/20/15
Appearance	scalar	Visual*	NORML	WGOIL	NORML	NORML
Emulsified Water	scalar	Visual*		1%	NEG	NEG
Free Water	scalar	Visual*		1%	NEG	NEG
Viscosity Index (VI)	Scale	ASTM D2270*		54	94	95

Customer Id: TERHAM
Sample No.: PC
Lab Number: 02611113
Test Package: MAR 2



To manage this report scan the QR code

To discuss the diagnosis or test data:
Kevin Marson +1 (289)291-4644 x4644
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	MISSED	Jan 26 2024	?	We recommend that you drain the fluid from the component if this has not already been done.
Resample	MISSED	Jan 26 2024	?	Resample in 30-45 days to monitor this situation.
Check Breathers	MISSED	Jan 26 2024	?	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	MISSED	Jan 26 2024	?	We advise that you check all areas where contaminants can enter the system.
Check Seals	MISSED	Jan 26 2024	?	Check seals and/or filters for points of contaminant entry.

HISTORICAL DIAGNOSIS

14 Sep 2023 Diag: Bill Quesnel

ISO



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



14 Aug 2023 Diag: Kevin Marson

ISO



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



19 Jul 2023 Diag: Kevin Marson

NORMAL

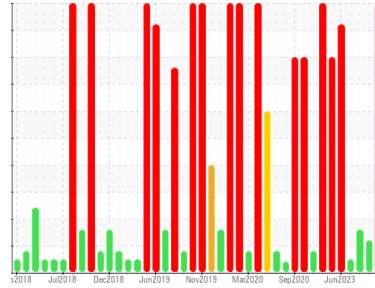


Resample at the next service interval to monitor. All component wear rates are normal. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The system and fluid cleanliness is acceptable. The AN level is acceptable for this fluid. The condition of the fluid is suitable for further service.

view report



Area
Aft Machinery Space
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 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.

Wear
Chromium ppm levels are severe.

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. Abnormal water content and sodium(Na) level indicate possible sea water contamination.

Fluid Condition
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	PC	PC
Sample Date	Client Info	04 Jan 2024	14 Sep 2023	14 Aug 2023
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	ABNORMAL	ABNORMAL

WEAR METALS

method	limit/base	current	history1	history2	
PQ	ASTM D8184*	0	0	0	
Iron	ppm	ASTM D5185(m) >100	34	4	9
Chromium	ppm	ASTM D5185(m) >3	7	0	0
Nickel	ppm	ASTM D5185(m) >8	2	<1	0
Titanium	ppm	ASTM D5185(m)	0	0	0
Silver	ppm	ASTM D5185(m)	0	<1	0
Aluminum	ppm	ASTM D5185(m) >3	<1	0	<1
Lead	ppm	ASTM D5185(m)	<1	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	8	11
Barium	ppm	ASTM D5185(m)	0	<1	0
Molybdenum	ppm	ASTM D5185(m)	0	0	<1
Manganese	ppm	ASTM D5185(m)	0	0	<1
Magnesium	ppm	ASTM D5185(m)	4	2	<1
Calcium	ppm	ASTM D5185(m)	6	8	4
Phosphorus	ppm	ASTM D5185(m)	138	176	268
Zinc	ppm	ASTM D5185(m)	10	8	8
Sulfur	ppm	ASTM D5185(m)	8796	14368	13115
Lithium	ppm	ASTM D5185(m)	<1	<1	<1

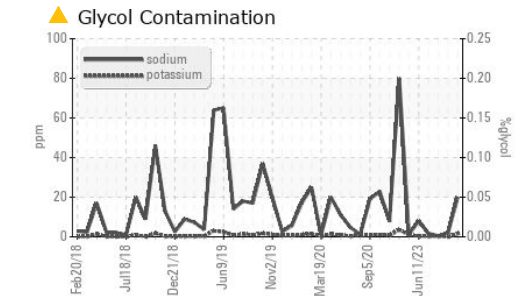
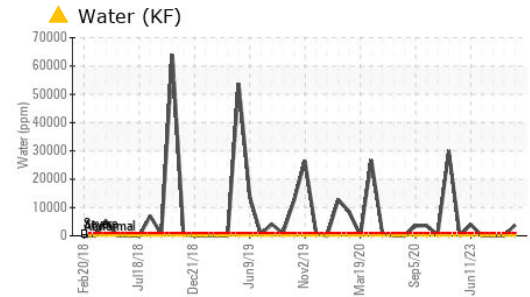
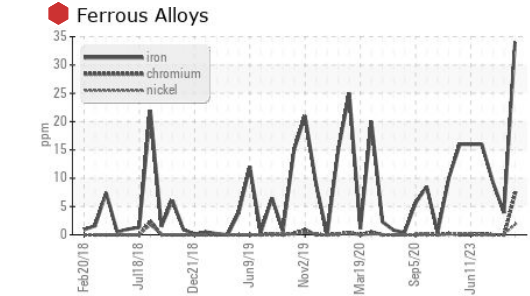
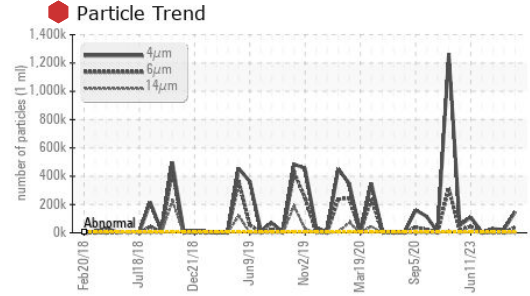
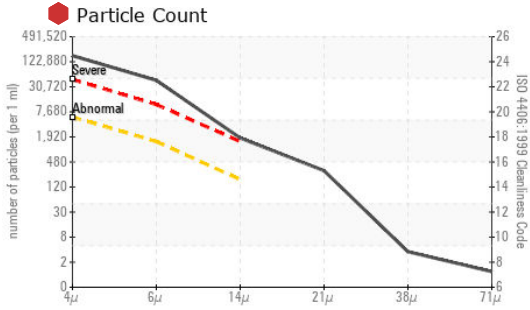
CONTAMINANTS

method	limit/base	current	history1	history2	
Silicon	ppm	ASTM D5185(m) >25	9	8	1
Sodium	ppm	ASTM D5185(m)	20	2	<1
Potassium	ppm	ASTM D5185(m) >20	2	0	<1
Water	%	ASTM D6304*	0.378	---	---
ppm Water	ppm	ASTM D6304*	3783	---	---

FLUID CLEANLINESS

method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647 >5000	148164	21592	28148
Particles >6µm	ASTM D7647 >1300	38031	3089	6179
Particles >14µm	ASTM D7647 >160	1586	83	184
Particles >21µm	ASTM D7647 >40	261	20	28
Particles >38µm	ASTM D7647 >10	3	2	1
Particles >71µm	ASTM D7647 >3	1	1	1
Oil Cleanliness	ISO 4406 (c) >19/17/14	24/22/18	22/19/14	22/20/15

OIL ANALYSIS REPORT



FLUID DEGRADATION

method	limit/base	current	history1	history2	
Acid Number (AN) mg KOH/g	ASTM D974*	0.9	0.27	0.48	0.53

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	VLITE
Sand/Dirt	scalar	Visual*	NONE	NONE	NONE	NONE
Appearance	scalar	Visual*	NORML	▲ WGOIL	NORML	NORML
Odor	scalar	Visual*	NORML	NORML	NORML	NORML
Emulsified Water	scalar	Visual*		▲ 1%	NEG	NEG
Free Water	scalar	Visual*		▲ 1%	NEG	NEG

FLUID PROPERTIES

method	limit/base	current	history1	history2		
Visc @ 40°C	cSt	ASTM D7279(m)	149	143	146	145
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	11.6	14.2	14.3
Viscosity Index (VI)	Scale	ASTM D2270*		▲ 54	94	95

SAMPLE IMAGES



Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : PC
Lab Number : 02611113
Unique Number : 5720208
Test Package : MAR 2 (Additional Tests: KF, KV100, PQ, PrtCount, VI)
Received : 25 Jan 2024
Diagnosed : 26 Jan 2024
Diagnostician : Kevin Marson

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 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.