

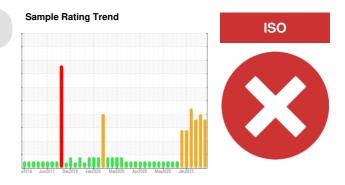
PROBLEM SUMMARY

Fwd Machinery Space [450252221]

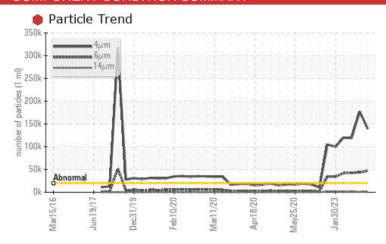
Pump - Fire Water (Stbd) - Gearbox (S/N Sample Tag PA-71001B-S2)

Starboard Gearbox

PETRO CANADA PREMIUM R&O 220 (98 LTR)



COMPONENT CONDITION SUMMARY



RECOMMENDATION

Check seals and/or filters for points of contaminant entry. 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 you service the filters on this component. Resample in 30-45 days to monitor this situation.

PROBLEMATIC TE	EST RESULTS			
Sample Status		SEVERE	SEVERE	SEVERE
Particles >4µm	ASTM D7647 >2000	0 4 139168	177354	<u>▲</u> 119221
Particles >6µm	ASTM D7647 >5000	47007	43611	42704
Oil Cleanliness	ISO 4406 (c) >21/19)/16 Q4/23/17	2 5/23/17	2 4/23/17

Customer Id: TERHAM Sample No.: PC Lab Number: 02614798 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 Filter ? We recommend you service the filters on this component. Resample ? Resample in 30-45 days to monitor this situation. The air breather requires service. If unrated, we recommend that you replace with a ? **Check Breathers** suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather Check seals and/or filters for points of contaminant entry. Check Seals ?

HISTORICAL DIAGNOSIS

06 Dec 2023 Diag: Kevin Marson



Check seals and/or filters for points of contaminant entry. 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 you service the filters on this component. Resample in 30-45 days to monitor this situation. All component wear rates are normal. There is a high amount of silt (particulates < 14 microns in size) 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.



13 Oct 2023 Diag: Kevin Marson





Check seals and/or filters for points of contaminant entry. 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 you service the filters on this component. Confirm the source of the lubricant being utilized for top-up/fill. Resample in 30-45 days to monitor this situation. All component wear rates are normal. There is a high amount of silt (particulates < 14 microns in size) present in the oil. Additive levels indicate the addition of a different brand, or type of 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.



30 Aug 2023 Diag: Kevin Marson





Check seals and/or filters for points of contaminant entry. 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 you service the filters on this component. Confirm the source of the lubricant being utilized for top-up/fill. Resample in 30-45 days to monitor this situation. All component wear rates are normal. There is a high amount of silt (particulates < 14 microns in size) present in the oil. Additive levels indicate the addition of a different brand, or type of 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.





OIL ANALYSIS REPORT

<u>Area</u>

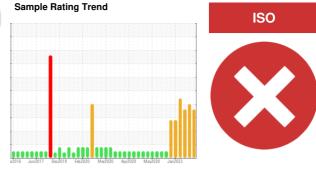
Fwd Machinery Space [450252221]

Pump - Fire Water (Stbd) - Gearbox (S/N Sample Tag PA-71001B-S2)

Component

Starboard Gearbox

PETRO CANADA PREMIUM R&O 220 (98 LTR)



DIAGNOSIS

Recommendation

Check seals and/or filters for points of contaminant entry. 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 you service the filters on this component. Resample in 30-45 days to monitor this situation.

Wear

All component wear rates are normal.

Contamination

There is a high amount of silt (particulates < 14 microns in size) present in the oil.

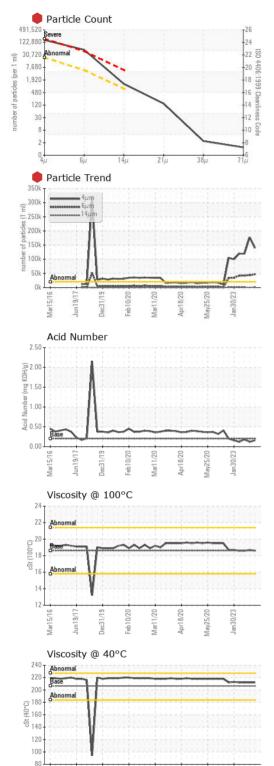
Fluid Condition

The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.

SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		PC	PC0076275	PC
Sample Date		Client Info		16 Jan 2024	06 Dec 2023	13 Oct 2023
Machine Age	hrs	Client Info		0	0	0
Oil Age	hrs	Client Info		0	0	0
Oil Changed		Client Info		N/A	N/A	N/A
Sample Status				SEVERE	SEVERE	SEVERE
CONTAMINAT	ION	method	limit/base	current	history1	history2
Water		WC Method	>0.2	NEG	NEG	NEG
WEAR METAL	S	method	limit/base	current	history1	history2
PQ		ASTM D8184*		0	0	1
Iron	ppm	ASTM D5185(m)	>150	6	6	5
Chromium	ppm	ASTM D5185(m)	>10	0	0	0
Nickel	ppm	ASTM D5185(m)	>10	<1	<1	0
Titanium	ppm	ASTM D5185(m)		0	0	0
Silver	ppm	ASTM D5185(m)		0	0	<1
Aluminum	ppm	ASTM D5185(m)	>5	<1	<1	<1
Lead	ppm	ASTM D5185(m)	>65	<1	<1	<1
Copper	ppm	ASTM D5185(m)	>80	<1	<1	<1
Tin	ppm	ASTM D5185(m)	>8	0	0	0
Antimony	ppm	ASTM D5185(m)	>5	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)		3	4	4
Barium	ppm	ASTM D5185(m)		0	0	<1
Molybdenum	ppm	ASTM D5185(m)		0	0	0
Manganese	ppm	ASTM D5185(m)		0	0	0
Magnesium	ppm	ASTM D5185(m)	0	1	<1	0
Calcium	ppm	ASTM D5185(m)		7	7	6
Phosphorus	ppm	ASTM D5185(m)	0	32	31	31
Zinc	ppm	ASTM D5185(m)		4	4	4
Sulfur	ppm	ASTM D5185(m)	500	3430	3489	3319
Lithium	ppm	ASTM D5185(m)		<1	<1	<1
CONTAMINAN	TS	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>20	3	1	2
Sodium	ppm	ASTM D5185(m)		0	<1	<1
Potassium	ppm	ASTM D5185(m)	>20	<1	0	0



OIL ANALYSIS REPORT



Particles >6µm Particles >14µm Particles >21µm Particles >21µm Particles >38µm Particles >71µm Oil Cleanliness FLUID DEGRADATION Acid Number (AN) White Metal Yellow Metal Precipitate Silt Silt Sand/Dirt Appearance Odor Emulsified Water Free Water Visc @ 40°C Visc @ 100°C ASTI	ethod limit/ ual* NONE ual* NORI ual* NORI ual* NORI ual* >0.2	47007	43611 ▲ 807 79 2 0 7	none None None None None None None None
Particles >14µm ASTI Particles >21µm ASTI Particles >21µm ASTI Particles >38µm ASTI Particles >71µm ASTI Oil Cleanliness ISO FLUID DEGRADATION MATERIAL ASTI Acid Number (AN) MATERIAL ASTI VISUAL MATERIAL ASTI White Metal Scalar Visual Yellow Metal Scalar Visual Yellow Metal Scalar Visual Yellow Metal Scalar Visual Scalar	M D7647 >640 M D7647 >160 M D7647 >40 M D7647 >10 4406 (c) >21/19 ethod limit/ M D974* 0.20 ethod limit/ ual* NONE ual* NORE	## 1091 125 2 1 9/16 24/23/1 /base	A 807 79 2 0 7	1109 143 8 5 7
Particles >21µm ASTI Particles >38µm ASTI Particles >71µm ASTI Oil Cleanliness ISO FLUID DEGRADATION Mg KOH/g ASTI VISUAL Mg KOH/g ASTI VISUAL Scalar Visu Yellow Metal Scalar Visu Precipitate Scalar Visu Silt Scalar Visu Debris Scalar Visu Sand/Dirt Scalar Visu Sand/Dirt Scalar Visu Appearance Scalar Visu Chor Scalar Visu Emulsified Water Scalar Visu Free Water Scalar Visu FLUID PROPERTIES Mg Visc @ 40°C CSt ASTIM VISTING ASTIM VISC @ 40°C CST ASTIM VISC @	M D7647 > 160 M D7647 > 40 M D7647 > 10 4406 (c) > 21/1! ethod limit/ M D974* 0.20 ethod limit/ ual* NONE ual* NORE	125 2 1 9/16 24/23/1 24/23/1 24/23/1 20.16 Currer 0.16 NONE NONE NONE NONE NONE NONE NONE NO	79 2 0 10 25/23/17 nt history 0.12 nt history NONE NONE NONE NONE NONE NONE NONE NON	143 8 5 7 24/23/17 history2 0.18 none None None None None None None None
Particles >38µm ASTI Particles >71µm Oil Cleanliness ISO FLUID DEGRADATION MACID ACID NUMBER (AN) MACHID ACID NUMBER (AN) MACID NUMBER (A	M D7647 >40 M D7647 >10 4406 (c) >21/19 ethod limit/ M D974* 0.20 ethod limit/ ual* NONE ual* NORE ual* NORE ual* NORE ual* NORE ual* NORE ual* NORE	2 1 9/16 24/23/1 /base currer 0.16 /base currer NONE NONE NONE NONE NONE NONE NONE NON	2 0 25/23/17 nt history 0.12 nt history NONE NONE NONE NONE NONE NONE NONE NON	8 5 7
Particles >71µm	ethod limit/ ual* NONE ual* NORE	1 9/16 24/23/1 /base currer 0.16 /base currer NONE NONE NONE NONE NONE NONE NONE NON	nt history 0.12 nt history NONE NONE NONE NONE NONE NONE NONE NON	5 7
Oil Cleanliness ISO FLUID DEGRADATION me Acid Number (AN) mg KOHg ASTI VISUAL me White Metal scalar Visu Precipitate scalar Visu Silt scalar Visu Debris scalar Visu Sand/Dirt scalar Visu Appearance scalar Visu Appearance scalar Visu Emulsified Water scalar Visu Free Water scalar Visu FLUID PROPERTIES me Visc @ 40°C cSt ASTIM VISUAL IMPLICATION ME VISO ASTIM VISO ASTIM VISO ASTI	ethod limit/ "M D974" 0.20 ethod limit/ ual" NONE	9/16 24/23/1 /base currer 0.16 /base currer NONE NONE NONE NONE NONE NONE NONE NO	nt history 0.12 nt history NONE NONE NONE NONE NONE NONE NONE NON	7 24/23/17 history2 0.18 history2 NONE NONE NONE NONE NONE NONE NONE NON
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Acid Number (AN) mg KOH/g ASTI VISUAL mg White Metal scalar Visu Yellow Metal scalar Visu Precipitate scalar Visu Silt scalar Visu Debris scalar Visu Sand/Dirt scalar Visu Appearance scalar Visu Appearance scalar Visu Emulsified Water scalar Visu Free Water scalar Visu FLUID PROPERTIES mg Visc @ 40°C cSt ASTIM Visc @ 100°C cSt ASTIM	ethod limit/ ual* NONE ual* NORI ual* NORI ual* NORI ual* >0.2	0.16 NONE NONE NONE NONE NONE NONE NONE NO	nt history NONE NONE NONE NONE NONE NONE NONE NONE NONE NORML NORML NEG	0.18 NONE NONE NONE NONE NONE NONE NONE NO
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Precipitate scalar Visus Silt scalar Visus Appearance scalar Visus Emulsified Water scalar Visus Free Water scalar Visus FLUID PROPERTIES model Visus @ 40°C cSt ASTM Visus @ 100°C cSt ASTM Visus @	ual* NONE ual* NONE ual* NONE ual* NONE ual* NORE ual* NORE ual* NORE ual* >0.2	NONE NONE NONE NONE NONE NORMI NORMI NORMI	NONE NONE NONE NORML NORML NEG	NONE NONE NONE NONE NORML NORML
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Debris scalar Visus Sand/Dirt scalar Visus Appearance scalar Visus Odor scalar Visus Emulsified Water scalar Visus FLUID PROPERTIES The Visc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM STM Sand Visus Sand Visus Research State St	ual* NONE ual* NONE ual* NORE ual* NORE ual* >0.2	NONE NONE NORML NORML NORML	NONE NONE NORML NORML	NONE NONE NORML NORML
Sand/Dirt scalar Visus Appearance scalar Visus Odor scalar Visus Emulsified Water scalar Visus Free Water scalar Visus FLUID PROPERTIES Model of the Water Scalar Visus Wisc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM	ual* NONE ual* NORM ual* NORM ual* >0.2	NONE NORMI NORMI NEG	NONE NORML NORML	NONE NORML NORML
Appearance scalar Visus Odor scalar Visus Emulsified Water scalar Visus Free Water scalar Visus FLUID PROPERTIES MOVISC @ 40°C cSt ASTM Visc @ 100°C cSt ASTM	ual* NORMual* NORMual* >0.2	ML NORMI NORMI NEG	NORML NORML	NORML NORML
Odor scalar Visus Emulsified Water scalar Visus Free Water scalar Visus FLUID PROPERTIES model Visc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM	ual* NORMual* >0.2	ML NORML NEG	NORML NEG	. NORML
Emulsified Water scalar Vistories Water scala	ual* >0.2	NEG	NEG	
Free Water scalar Visu FLUID PROPERTIES mo Visc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM		-		NEG
FLUID PROPERTIES me Visc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM	ual*	NEG		NEG
Visc @ 40°C cSt ASTM Visc @ 100°C cSt ASTM			NEG	NEG
Visc @ 100°C cSt ASTM	ethod limit/	base curre	nt history	1 history2
	M D7279(m) 206.5	212	212	212
Viscosity Index (VI) Scale ASTM	M D7279(m) 18.6	18.6	18.7	18.6
, ,	M D2270* 96	97	98	97
SAMPLE IMAGES me	ethod limit/	base curre	nt history	1 history2
Color				
Bottom				



CALA ISO 17025:2017 Accredited Laboratory

Laboratory

Sample No.

: PC Lab Number : 02614798

Unique Number : 5723893 Test Package: MAR 2 (Additional Tests: KV100, PQ, PrtCount, TAN Man, VI)

: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Received : 09 Feb 2024 **Tested** : 13 Feb 2024 Diagnosed : 13 Feb 2024 - Kevin Marson

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.

Suncor - Terra Nova Projects Scotia Centre, 235 Water Strret

St. John's, NL CA A1C 1B6 Contact: Josh Hynes

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