

PROBLEM SUMMARY

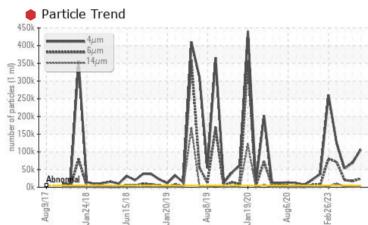
Aft Machinery Space

Thruster Aft Center - Seal Oil System (S/N Sample Tag CL-06001-S3)

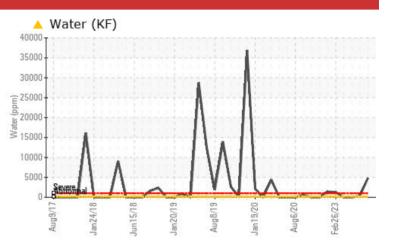
Component Sealing System

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

COMPONENT CONDITION SUMMARY







SEVERE

SEVERE

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 offline filtration to improve the cleanliness of the system fluid. Resample in 30-45 days to monitor this situation.

PROBLEMATIC TEST RESULTS Sample Status SEVERE Water % ASTM D6304* ▲ 0.483

Water	%	ASTM D6304*			0.483	0.037	
ppm Water	ppm	ASTM D6304*			4837	379.2	
Particles >4µm		ASTM D7647	>5000		106205	69020	b 53288
Particles >6µm		ASTM D7647	>1300	۲	24198	17397	e 20211
Particles >14µm		ASTM D7647	>160		946	1 143	2241
Particles >21µm		ASTM D7647	>40		144	<u> </u>	• 710
Oil Cleanliness		ISO 4406 (c)	>19/17/14		24/22/17	23/21/17	23/22/18
Emulsified Water	scalar	Visual*			.5%	2%	NEG

Customer Id: TERHAM Sample No.: PC Lab Number: 02611253 Test Package: MAR 2



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 (289)291-4641 x4641 Bill.Quesnel@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 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

14 Sep 2023 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. Resample in 30-45 days to monitor this situation.All component wear rates are normal. There is a high amount of particulates (2 to 100 microns in size) present in the fluid. The water content is negligible. 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



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. Resample in 30-45 days to monitor this situation.All component wear rates are normal. There is a high amount of particulates (2 to 100 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.

31 Mar 2023 Diag: Kevin Marson



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. Resample in 30-45 days to monitor this situation.All component wear rates are normal. There is a high amount of particulates (2 to 100 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.







OIL ANALYSIS REPORT

Aft Machinery Space Thruster Aft Center - Seal Oil System (S/N Sample Tag CL-06001-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. Resample in 30-45 days to monitor this situation.

Wear

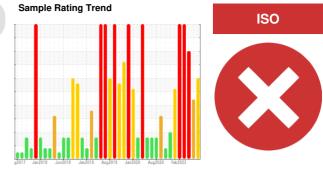
All component wear rates are normal.

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.

Fluid Condition

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



SAMPLE INFOF	RMATION	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	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
WEAR METAI	S	method	limit/base	current	history1	history2
PQ		ASTM D8184*		0	0	0
Iron	ppm	ASTM D5185(m)	>100	15	36	21
Chromium	ppm	ASTM D5185(m)	>3	<1	<1	<1
Nickel		ASTM D5185(m)		<1	<1	<1
Titanium	ppm	ASTM D5185(m) ASTM D5185(m)	>0	< 1 0	0	0
	ppm					
Silver	ppm	ASTM D5185(m)	0	0	<1	<1
Aluminum	ppm	ASTM D5185(m)	>3	<1	<1	<1
Lead	ppm	ASTM D5185(m)	0	0	<1	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	2	3
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	4	<1
Calcium	ppm	ASTM D5185(m)		6	7	4
Phosphorus	ppm	ASTM D5185(m)		173	253	314
Zinc	ppm	ASTM D5185(m)		10	14	12
Sulfur	ppm	ASTM D5185(m)		8297	9395	9717
Lithium	ppm	ASTM D5185(m)		<1	<1	<1
CONTAMINA	NTS	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>25	4	16	3
Sodium	ppm	ASTM D5185(m)		21	4	1
Potassium	ppm	ASTM D5185(m)	>20	2	<1	<1
Water	%	ASTM D6304*		6 0.483	0.037	
ppm Water	ppm	ASTM D6304*		4837	379.2	
FLUID CLEAN	ILINESS	method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647	>5000	106205	69020	53288
Particles >6µm		ASTM D7647	>1300	24198	17397	20211
Particles >14µm		ASTM D7647	>160	▲ 946	▲ 1143	2241
Particles >21µm		ASTM D7647		<u>▲</u> 144	▲ 239	710
· · · · · · · - · - · - · · - · · · · ·						▲ 20
Particles >38um		ASTM D7647	>10	2	3	20
Particles >38µm Particles >71µm		ASTM D7647 ASTM D7647	>10 >3		3	
Particles >38µm Particles >71µm Oil Cleanliness		ASTM D7647 ASTM D7647 ISO 4406 (c)		2 0 24/22/17	3 1 23/21/17	1



Particle Count

Particle Trend

Jan24/1

Water (KF)

Jan24/

144

1/0/us

214

491,520

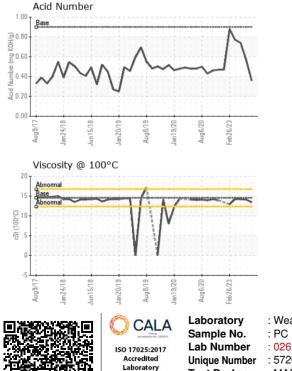
(m 30,720 7,680 1,920 380 1,920 480 120 30 30 30 8

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OIL ANALYSIS REPORT

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FLUID DEGRAL	JATION	method	limit/base		nistory i	history2
Acid Number (AN)	mg KOH/g	ASTM D974*	0.9	0.36	0.57	0.74
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	VLITE
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*		. 5%	.2%	NEG
Free Water	scalar	Visual*		NEG	NEG	NEG
FLUID PROPE	RTIES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	149	142	144	144
Visc @ 100°C	cSt	ASTM D7279(m)	14.5	13.4	14.1	14.2
Viscosity Index (VI)	Scale	ASTM D2270*		87	94	95
SAMPLE IMAG	iES	method	limit/base	current	history1	history2
Color						
Bottom						
	Acid Number (AN) VISUAL White Metal Yellow Metal Precipitate Silt Debris Sand/Dirt Appearance Odor Emulsified Water Free Water Free Water Visc @ 40°C Visc @ 100°C Viscosity Index (VI) SAMPLE IMAC	Acid Number (AN)mg KOH/gVISUALVISUALWhite MetalscalarYellow MetalscalarPrecipitatescalarSiltscalarDebrisscalarSand/DirtscalarAppearancescalarOdorscalarEmulsified WaterscalarFree WaterscalarVisc @ 40°CcStVisc @ 100°CcStViscosity Index (VI)ScaleSAMPLE IMAGESColorImage: State Stat	VISUAL method White Metal scalar Visual* Yellow Metal scalar Visual* Precipitate scalar Visual* Silt scalar Visual* Debris scalar Visual* Sand/Dirt scalar Visual* Appearance scalar Visual* Odor scalar Visual* Emulsified Water scalar Visual* Free Water scalar Visual* Visc @ 40°C cSt ASTM D7279(m) Visc @ 100°C cSt ASTM D7279(m) Viscosity Index (VI) Scale ASTM D2270* SAMPLE IMAGES method	Acid Number (AN)mg KOH/gASTM D974*0.9VISUALmethodlimit/baseWhite MetalscalarVisual*NONEYellow MetalscalarVisual*NONEPrecipitatescalarVisual*NONESiltscalarVisual*NONEDebrisscalarVisual*NONESand/DirtscalarVisual*NONEAppearancescalarVisual*NORMLOdorscalarVisual*NORMLEmulsified WaterscalarVisual*NORMLFree WaterscalarVisual*NORMLVisc @ 40°CcStASTM D7279(m)149Visc @ 100°CcStASTM D7279(m)14.5Viscosity Index (VI)ScaleASTM D2270*SAMPLE IMAGESmethodImit/baseColorImit/base	Acid Number (AN) mg KOH/g ASTM D974* 0.9 0.36 VISUAL method limit/base current White Metal scalar Visual* NONE NONE Yellow Metal scalar Visual* NONE NONE Precipitate scalar Visual* NONE NONE Silt scalar Visual* NONE NONE Debris scalar Visual* NONE NONE Sand/Dirt scalar Visual* NOR NONE Appearance scalar Visual* NORML WGOIL Odor scalar Visual* NORML NORML Emulsified Water scalar Visual* NORML NEG Free Water scalar Visual* NEG Imit/base current Visc @ 40°C cSt ASTM D7279(m) 149 142 Visc @ 100°C cSt ASTM D2270* 87 SAMPLE IMAGES method limit/base current Color Imethod limit/base current<	Acid Number (AN) mg KOH/g ASTM D974* 0.9 0.36 0.57 VISUAL method limit/base current history1 White Metal scalar Visual* 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 WGOIL NORML Odor scalar Visual* NORML NORML NORML Emulsified Water scalar Visual* NORML NORML Story1 Visc @ 40°C cSt ASTM D2270m 149 142 144 Visc @ 100°C cSt ASTM D2270m 87 94 <tr< td=""></tr<>



: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Suncor - Terra Nova Projects Recieved : 25 Jan 2024 Scotia Centre, 235 Water Strret : 02611253 Diagnosed : 29 Jan 2024 St. John`s, NL : 5720348 Diagnostician : Bill Quesnel CA A1C 1B6 Test Package : MAR 2 (Additional Tests: KF, KV100, PQ, PrtCount, TAN Man, VI) Contact: Josh Hynes To discuss this sample report, contact Customer Service at 1-800-268-2131. joshynes@suncor.com T: (709)778-3575 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. F: (709)724-2835

Contact/Location: Josh Hynes - TERHAM