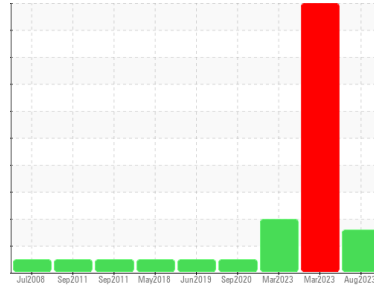


PROBLEM SUMMARY

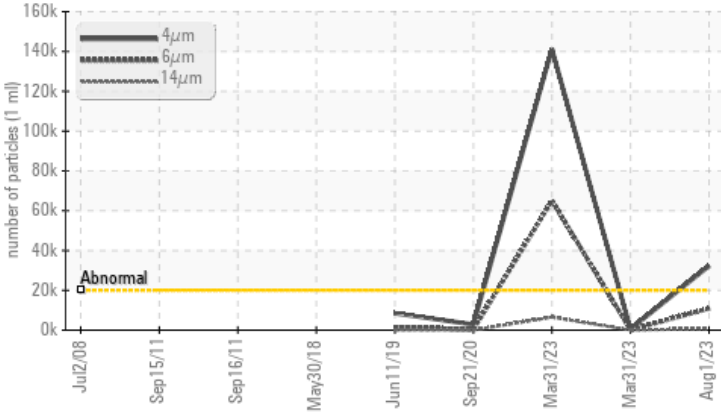
Area
[450164935]
 Machine Id
Thruster Aft Stbd - Lower Gearbox (S/N Sample Tag CL-06003- S6)
 Component
Lower Gearbox
 Fluid
PETRO CANADA ENERGOL GR-XP ISO 150 (5000 LTR)

Sample Rating Trend



COMPONENT CONDITION SUMMARY

▲ Particle Trend



RECOMMENDATION

We recommend you service the filters on this component. We recommend an early resample to monitor this condition.

PROBLEMATIC TEST RESULTS

| Sample Status | | | ABNORMAL | SEVERE | ABNORMAL |
|-----------------|--------------|-----------|------------|------------|----------|
| Particles >4µm | ASTM D7647 | >20000 | ▲ 32305 | ▲ 141143 | 497 |
| Particles >6µm | ASTM D7647 | >5000 | ▲ 10884 | ● 65087 | 121 |
| Particles >14µm | ASTM D7647 | >640 | ▲ 774 | ● 6508 | 15 |
| Oil Cleanliness | ISO 4406 (c) | >21/19/16 | ▲ 22/21/17 | ● 24/23/20 | 16/14/11 |

Customer Id: TERHAM
 Sample No.: PC
 Lab Number: 02573833
 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 | --- | --- | ? | We recommend an early resample to monitor this condition. |

HISTORICAL DIAGNOSIS

DIRT



31 Mar 2023 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 oil. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. We advise that you follow the water drain-off procedure for this component. Resample in 30-45 days to monitor this situation. Please contact your representative for information regarding the proper sampling kits for your service. NOTE: We recommend using MAR 3 test kits, this testkit includes Analytical Ferrography which provides a detailed morphological analysis of wear particles present in the fluid. Component wear rates appear to be normal (unconfirmed). There is a high amount of particulates (2 to 100 microns in size) present in the oil. There is a moderate concentration of water present in the oil. Excessive free water present. High concentration of dirt 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.

[view report](#)



VISCOSITY



31 Mar 2023 Diag: Kevin Marson

Due to this condition we recommend the following action... We advise an early resample to confirm this situation. NOTE: The current sample results do not match this units historical trend, indicating the sample may not be from this component/unit. 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. Viscosity of sample indicates oil is within ISO 32 range, advise investigate. This plus the additive levels indicates that this is not the same brand, or type of oil as reported. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

[view report](#)



NORMAL



21 Sep 2020 Diag: Kevin Marson

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 oil is suitable for further service.

[view report](#)

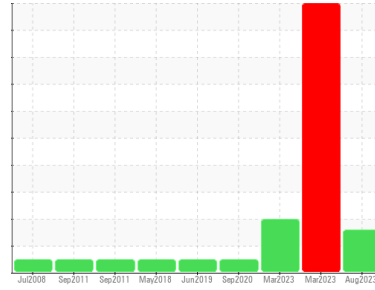


Area
[450164935]

Machine Id
Thruster Aft Stbd - Lower Gearbox (S/N Sample Tag CL-06003- S6)

Component
Lower Gearbox

Fluid
PETRO CANADA ENERGOL GR-XP ISO 150 (5000 LTR)



DIAGNOSIS

Recommendation

We recommend you service the filters on this component. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

Contamination

There is a moderate amount of silt (particulates < 14 microns in size) present in the oil. The water content is negligible.

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 INFORMATION

| method | limit/base | current | history1 | history2 |
|---------------|-------------|--------------------|-------------|-------------|
| Sample Number | Client Info | PC | PC | PC |
| Sample Date | Client Info | 01 Aug 2023 | 31 Mar 2023 | 31 Mar 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 | | ABNORMAL | SEVERE | ABNORMAL |

WEAR METALS

| method | limit/base | current | history1 | history2 | |
|-----------|------------|--------------------|--------------|----------|----|
| Iron | ppm | ASTM D5185(m) >150 | 2 | 39 | 2 |
| Chromium | ppm | ASTM D5185(m) >10 | 0 | 2 | 0 |
| Nickel | ppm | ASTM D5185(m) >10 | 0 | <1 | <1 |
| Titanium | ppm | ASTM D5185(m) | 0 | 0 | 0 |
| Silver | ppm | ASTM D5185(m) | 0 | 0 | 0 |
| Aluminum | ppm | ASTM D5185(m) >5 | <1 | <1 | 0 |
| Lead | ppm | ASTM D5185(m) >65 | 0 | 0 | <1 |
| Copper | ppm | ASTM D5185(m) >80 | <1 | 2 | 7 |
| 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) | 8 | <1 | 0 |
| Barium | ppm | ASTM D5185(m) | 0 | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | 0 | <1 | 0 |
| Manganese | ppm | ASTM D5185(m) | 0 | <1 | 0 |
| Magnesium | ppm | ASTM D5185(m) | <1 | 3 | <1 |
| Calcium | ppm | ASTM D5185(m) | 2 | 4 | ▲ 74 |
| Phosphorus | ppm | ASTM D5185(m) | 178 | 234 | 342 |
| Zinc | ppm | ASTM D5185(m) | 6 | 11 | ▲ 373 |
| Sulfur | ppm | ASTM D5185(m) | 12231 | 8235 | ▲ 884 |
| Lithium | ppm | ASTM D5185(m) | <1 | <1 | <1 |

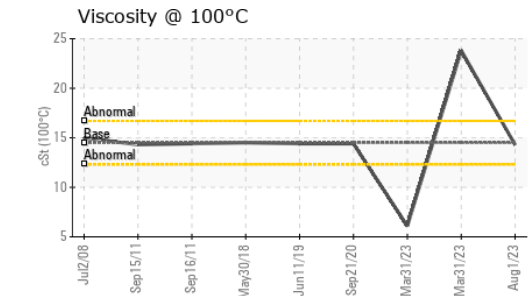
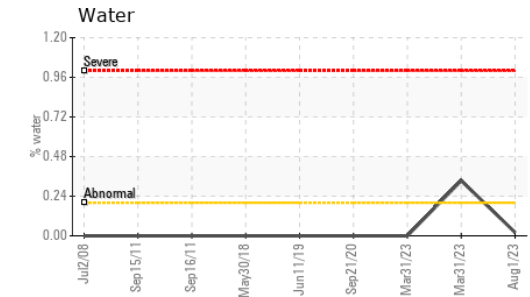
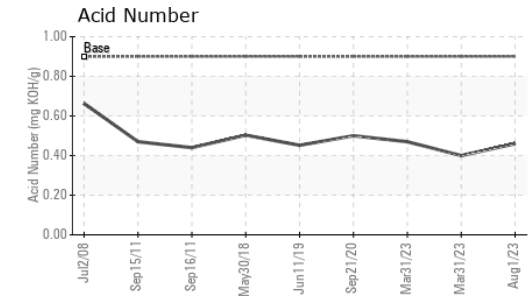
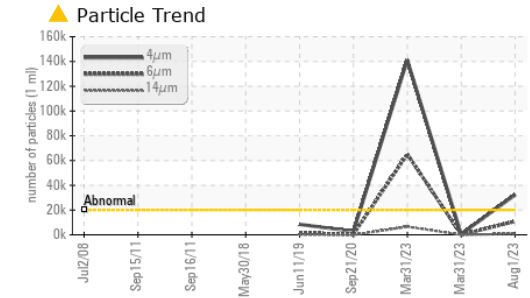
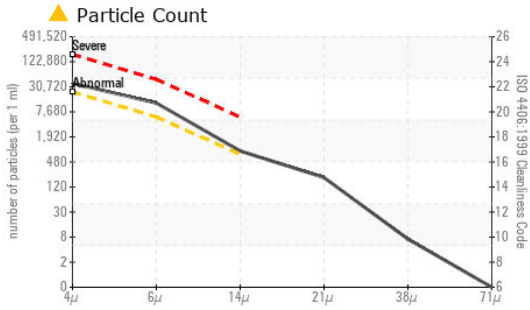
CONTAMINANTS

| method | limit/base | current | history1 | history2 | |
|-----------|------------|-------------------|--------------|----------|-----|
| Silicon | ppm | ASTM D5185(m) >20 | 2 | ◆ 119 | 0 |
| Sodium | ppm | ASTM D5185(m) | 0 | 7 | 0 |
| Potassium | ppm | ASTM D5185(m) >20 | 0 | 0 | 0 |
| Water | % | ASTM D6304* >0.2 | 0.020 | ▲ 0.334 | --- |
| ppm Water | ppm | ASTM D6304* >2000 | 209.3 | ▲ 3346.7 | --- |

FLUID CLEANLINESS

| method | limit/base | current | history1 | history2 |
|-----------------|------------------------|-------------------|------------|----------|
| Particles >4µm | ASTM D7647 >20000 | ▲ 32305 | ▲ 141143 | 497 |
| Particles >6µm | ASTM D7647 >5000 | ▲ 10884 | ◆ 65087 | 121 |
| Particles >14µm | ASTM D7647 >640 | ▲ 774 | ◆ 6508 | 15 |
| Particles >21µm | ASTM D7647 >160 | 178 | ▲ 1262 | 6 |
| Particles >38µm | ASTM D7647 >40 | 6 | 7 | 0 |
| Particles >71µm | ASTM D7647 >10 | 0 | 1 | 0 |
| Oil Cleanliness | ISO 4406 (c) >21/19/16 | ▲ 22/21/17 | ◆ 24/23/20 | 16/14/11 |

OIL ANALYSIS REPORT



Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : PC
Lab Number : 02573833
Unique Number : 5618884
Test Package : MAR 2 (Additional Tests: KF, KV100, VI)

Suncor - Terra Nova Projects
 Scotia Centre, 235 Water Street
 St. John's, NL
 CA A1C 1B6
 Contact: Josh Hynes
 joshhynes@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.

| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|-------------------|----------|------------|------------|-------------|----------|----------|
| Acid Number (AN) | mg KOH/g | ASTM D974* | 0.9 | 0.46 | 0.40 | 0.47 |

| 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 | VLITE | NONE | NONE |
| Debris | scalar | Visual* | NONE | VLITE | NONE | NONE |
| Sand/Dirt | scalar | Visual* | NONE | NONE | NONE | NONE |
| Appearance | scalar | Visual* | NORML | NORML | ▲ LAYRD | NORML |
| Odor | scalar | Visual* | NORML | NORML | NORML | NORML |
| Emulsified Water | scalar | Visual* | >0.2 | NEG | ▲ .5% | NEG |
| Free Water | scalar | Visual* | | NEG | ▲ >10% | NEG |

| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|----------------------|-------|---------------|------------|-------------|----------|----------|
| Visc @ 40°C | cSt | ASTM D7279(m) | 149 | 145 | 142 | ▲ 31.6 |
| Visc @ 100°C | cSt | ASTM D7279(m) | 14.5 | 14.3 | 23.8 | ▲ 6.1 |
| Viscosity Index (VI) | Scale | ASTM D2270* | | 95 | ▲ 199 | 144 |

SAMPLE IMAGES

