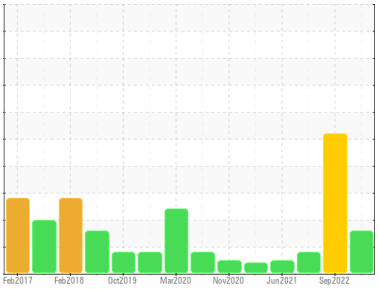
# PROBLEM SUMMARY

Sample Rating Trend

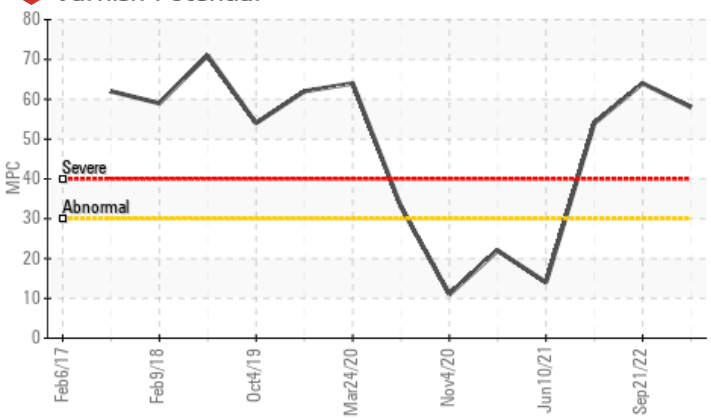



**INSOLUBLES**

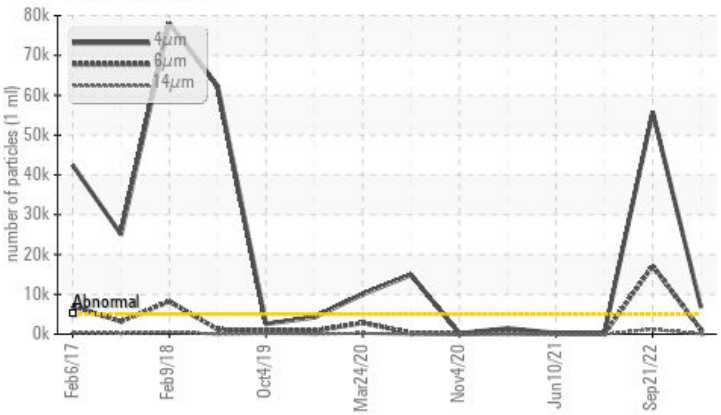
Machine Id
## IMM #27 (S/N H43A0400020)
Component
**Hydraulic System**
Fluid
**PETRO CANADA HYDREX AW 46 (1000 LTR)**

## COMPONENT CONDITION SUMMARY

Varnish Potential




Particle Trend




## RECOMMENDATION

We recommend you service the filters on this component. We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition.

## PROBLEMATIC TEST RESULTS

| | | | | | | |
|---|---|---|---|---|---|---|
| Sample Status | | | | **SEVERE** | SEVERE | SEVERE |
| Particles >4µm | | ASTM D7647 | >5000 | ▲ **6714** | ⬢ 55795 | 172 |
| Oil Cleanliness | | ISO 4406 (c) | >19/17/14 | ▲ **20/17/13** | ⬢ 23/21/17 | 15/13/10 |
| MPC Varnish Potential | Scale | ASTM D7843(m)* | >15 | ⬢ **58** | ⬢ 64 | ⬢ 54 |

**Customer Id:** ROPOAK
**Sample No.:** PC0076978
**Lab Number:** 02571233
**Test Package:** IND 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 Filter | --- | --- | ? | We recommend you service the filters on this component. |
| Resample | --- | --- | ? | We recommend an early resample to monitor this condition. |
| Filter Fluid | --- | --- | ? | We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. |

## HISTORICAL DIAGNOSIS

ISO

**21 Sep 2022 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. We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. Resample in 30-45 days to monitor this situation.All component wear rates are normal. Particles >6µm are severely high. Particles >4µm are severely high. Oil Cleanliness are severely high. MPC Varnish Potential contamination levels are severely high. Particles >14µm are abnormally high. Particles >21µm are abnormally high. MPC (Membrane Patch Colorimetry) test indicates a high concentration of varnish present. 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

INSOLUBLES

**28 Oct 2021 Diag: Kevin Marson**

We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition.All component wear rates are normal. MPC (Membrane Patch Colorimetry) test indicates a high concentration of varnish present. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The AN level is acceptable for this fluid.

view report

NORMAL

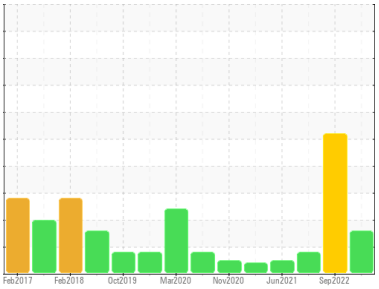
**10 Jun 2021 Diag: Wes Davis**

Resample at the next service interval to monitor.All component wear rates are normal. MPC (Membrane Patch Colorimetry) test indicates acceptable levels of varnish present. 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

# OIL ANALYSIS REPORT

Sample Rating Trend




**INSOLUBLES**

Machine Id
## IMM #27 (S/N H43A0400020)
Component
**Hydraulic System**
Fluid
**PETRO CANADA HYDREX AW 46 (1000 LTR)**

## DIAGNOSIS

**Recommendation**

We recommend you service the filters on this component. We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition.

**Wear**

All component wear rates are normal.

**Contamination**

There is a light amount of silt (particulates < 14 microns in size) present in the oil. MPC (Membrane Patch Colorimetry) test indicates a high concentration of varnish present.

**Fluid Condition**

The AN level is acceptable for this fluid.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **PC0076978** | PC0062149 | PC0052951 |
| Sample Date | | Client Info | | **11 Jul 2023** | 21 Sep 2022 | 28 Oct 2021 |
| Machine Age | mths | Client Info | | **0** | 0 | 0 |
| Oil Age | mths | Client Info | | **0** | 72 | 0 |
| Oil Changed | | Client Info | | **N/A** | Not Changd | N/A |
| Sample Status | | | | **SEVERE** | SEVERE | SEVERE |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Iron | ppm | ASTM D5185(m) | >20 | **<1** | 2 | 1 |
| Chromium | ppm | ASTM D5185(m) | >20 | **0** | 0 | 0 |
| Nickel | ppm | ASTM D5185(m) | >20 | **<1** | 0 | <1 |
| Titanium | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Silver | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Aluminum | ppm | ASTM D5185(m) | >20 | **0** | 0 | 0 |
| Lead | ppm | ASTM D5185(m) | >20 | **0** | <1 | <1 |
| Copper | ppm | ASTM D5185(m) | >20 | **1** | <1 | 1 |
| Tin | ppm | ASTM D5185(m) | >20 | **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 |

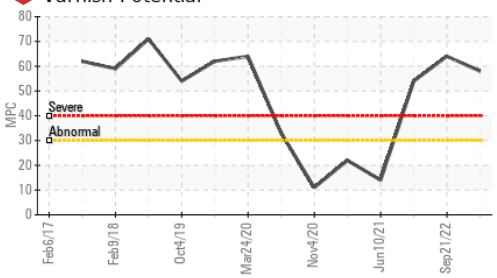
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185(m) | 0 | **0** | <1 | <1 |
| Barium | ppm | ASTM D5185(m) | 0 | **0** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | 0 | **0** | 0 | 0 |
| Manganese | ppm | ASTM D5185(m) | 0 | **0** | 0 | 0 |
| Magnesium | ppm | ASTM D5185(m) | 0 | **1** | 0 | <1 |
| Calcium | ppm | ASTM D5185(m) | 50 | **19** | 22 | 34 |
| Phosphorus | ppm | ASTM D5185(m) | 330 | **334** | 333 | 357 |
| Zinc | ppm | ASTM D5185(m) | 430 | **259** | 269 | 343 |
| Sulfur | ppm | ASTM D5185(m) | 760 | **612** | 645 | 702 |
| Lithium | ppm | ASTM D5185(m) | | **<1** | <1 | <1 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185(m) | >15 | **<1** | 0 | <1 |
| Sodium | ppm | ASTM D5185(m) | | **<1** | <1 | 0 |
| Potassium | ppm | ASTM D5185(m) | >20 | **<1** | <1 | <1 |

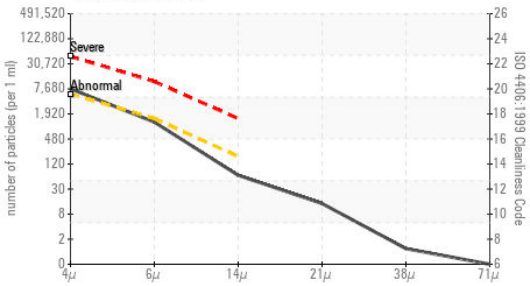
| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | >5000 | ▲ **6714** | ⬢ 55795 | 172 |
| Particles >6µm | | ASTM D7647 | >1300 | **1070** | ⬢ 17141 | 55 |
| Particles >14µm | | ASTM D7647 | >160 | **57** | ▲ 1232 | 5 |
| Particles >21µm | | ASTM D7647 | >40 | **12** | ▲ 296 | 2 |
| Particles >38µm | | ASTM D7647 | >10 | **1** | 4 | 0 |
| Particles >71µm | | ASTM D7647 | >3 | **0** | 0 | 0 |
| Oil Cleanliness | | ISO 4406 (c) | >19/17/14 | ▲ **20/17/13** | ⬢ 23/21/17 | 15/13/10 |

# OIL ANALYSIS REPORT

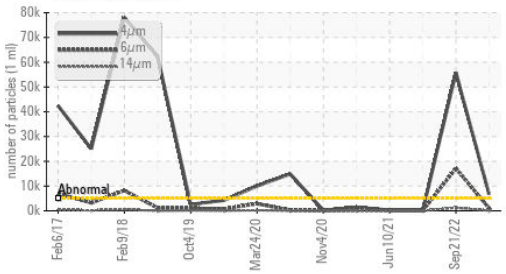
Varnish Potential



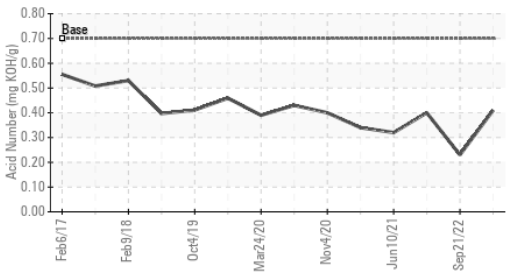

Particle Count



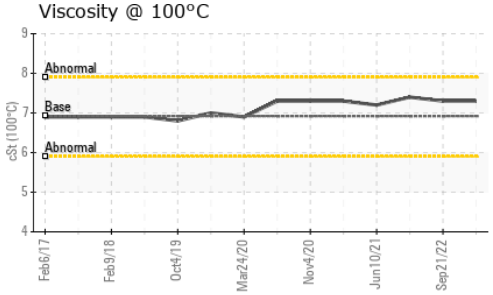

Particle Trend




Acid Number



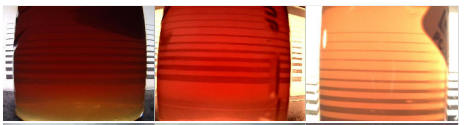
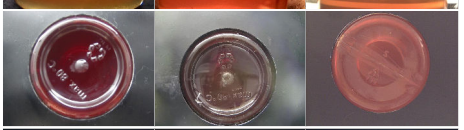
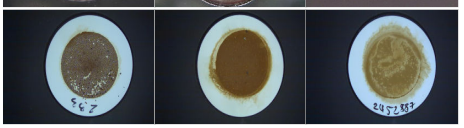

Viscosity @ 100°C




| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Acid Number (AN) | mg KOH/g | ASTM D974* | 0.70 | **0.41** | 0.23 | 0.40 |
| MPC Varnish Potential | Scale | ASTM D7843(m)* | >15 | **58** | 64 | 54 |

| 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** | VLITE | NONE |
| Sand/Dirt | scalar | Visual* | NONE | **NONE** | NONE | NONE |
| Appearance | scalar | Visual* | NORML | **NORML** | NORML | NORML |
| Odor | scalar | Visual* | NORML | **NORML** | NORML | NORML |
| Emulsified Water | scalar | Visual* | >0.05 | **NEG** | NEG | NEG |
| Free Water | scalar | Visual* | | **NEG** | NEG | NEG |

| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 40°C | cSt | ASTM D7279(m) | 46.4 | **45.1** | 45.6 | 45.7 |
| Visc @ 100°C | cSt | ASTM D7279(m) | 6.92 | **7.3** | 7.3 | 7.4 |
| Viscosity Index (VI) | Scale | ASTM D2270* | 104 | **124** | 122 | 125 |

| SAMPLE IMAGES | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|
| Color | | |  | | |
| Bottom | | |  | | |
| MPC | | |  | | |

ISO 17025:2017 Accredited Laboratory

**Laboratory** : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
**Sample No.** : PC0076978 **Received** : 20 Jul 2023
**Lab Number** : 02571233 **Diagnosed** : 21 Jul 2023
**Unique Number** : 5616284 **Diagnostician** : Kevin Marson
**Test Package** : IND 2 ( Additional Tests: KV100, MPC, TAN Man, VI )

*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.*

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MPC (Varnish Test)


Sample Color & Clarity

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