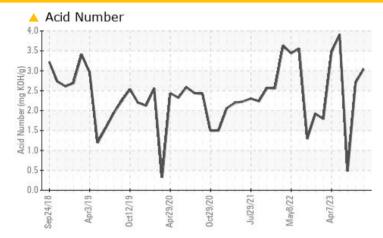
PROBLEM SUMMARY

E 2610 E 2610

Hilcorp Alaska, LLC

Component Natural Gas Engine Fluid MOBIL PEGASUS 89 (--- GAL)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

The oil is near the end of it's useful service life, recommend schedule an oil change. Resample at the next service interval to monitor.

| PROBLEMATIC TEST RESULTS | | | | | | |
|--------------------------|----------|------------|--|---------------|--------|--------|
| Sample Status | | | | ABNORMAL | NORMAL | NORMAL |
| Acid Number (AN) | mg KOH/g | ASTM D8045 | | A 3.04 | 2.71 | 0.48 |

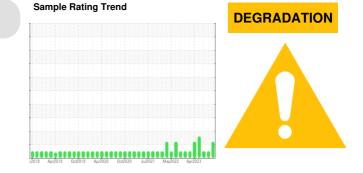
Customer Id: BPEMPU Sample No.: HLC0001494 Lab Number: 05979081 Test Package: IND 2



To manage this report scan the QR code

To discuss the diagnosis or test data: Don Baldridge +1 <u>don.b505@comcast.net</u>

To change component or sample information: Customer Service +1 1-800-237-1369 <u>customerservice@wearcheck.com</u>



| RECOMMENDED A | CTIONS | | | |
|----------------------|--------|------|---------|------------|
| Action | Status | Date | Done By | Des |
| Service/change Fluid | | | ? | The cha |

05 Sep 2023 Diag: Jonathan Hester

Description

The oil is near the end of it's useful service life, recommend schedule an oil change.

HISTORICAL DIAGNOSIS

NORMAL



Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.



view report

06 Aug 2023 Diag: Wes Davis





Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.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.

DEGRADATION





09 Jun 2023 Diag: Jonathan Hester

We recommend that you drain the oil from the component if this has not already been done. We recommend an early resample to monitor this condition.All component wear rates are normal. There is no indication of any contamination in the oil. The oil viscosity is higher than normal. The AN level is at the top-end of the recommended limit.



OIL ANALYSIS REPORT

Sample Rating Trend

DEGRADATION

E 2610 E 2610 Component

Natural Gas Engine Fluid MOBIL PEGASUS 89 (--- GAL)

DIAGNOSIS

A Recommendation

The oil is near the end of it's useful service life, recommend schedule an oil change. Resample at the next service interval to monitor.

Wear

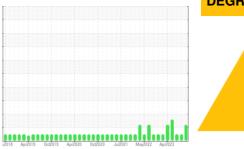
All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

Fluid Condition

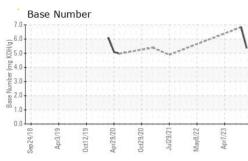
The AN level is above the recommended limit.

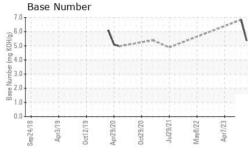


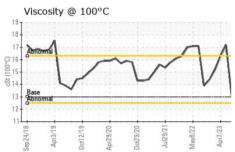
| Sample Date Info 03 Oct 2023 05 Sep 2023 06 Aug 2023 Machine Age hrs Client Info 0 0 0 Oil Age hrs Client Info 0 0 0 Oil Changed Client Info N/A N/A N/A Sample Status Imit Date current history1 history2 Iron ppm ASTM D5185m >50 8 8 2 Chromium ppm ASTM D5185m >2 <1 0 0 Nickel ppm ASTM D5185m >2 <1 0 0 Sliver ppm ASTM D5185m >3 0 0 0 Copper ppm ASTM D5185m >3 1 2 2 Tianium ppm ASTM D5185m >4 <1 <1 0 Copper ppm ASTM D5185m <4 <1 <1 0 Admanum pm ASTM D5185m | | | 52018 Apr20 | 19 Oct2019 Apr2020 | Oct2020 Jul2021 May2022 / | Apr2023 | |
|--|------------------|----------|-------------|--------------------|---------------------------|-------------|-------------|
| Sample Date Client Info 03 Oct 2023 05 Sep 2023 06 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 Imation N/A N/A N/A WEAR METALS method Imit/base current history1 history2 Iron ppm ASTM D5185m >50 8 8 2 Chromium ppm ASTM D5185m >4 <1 | SAMPLE INFORM | ATION | method | limit/base | current | history1 | history2 |
| Machine Age OI AgehrsClient Info000OI Age OI ClengedClient InfoN/AN/AN/AN/ASample StatusIImit/DaseABNORMALNORMALWEAR METALSmethodImit/DaseCurrenthistory1history2IronppmASTM D5185m>50882ChromiumppmASTM D5185m>2<1 | Sample Number | | Client Info | | HLC0001494 | HLC0002652 | HLC0002618 |
| Oil AgehrsClient Info000Oil ChangedClient InfoN/AN/AN/AN/ASample StatusImathematic Client InfoN/AN/AN/AWEAR METALSmethodlimit/basecurrenthistory1history2IronppmASTM D5165m>50882ChromiumppmASTM D5165m>2<1 | Sample Date | | Client Info | | 03 Oct 2023 | 05 Sep 2023 | 06 Aug 2023 |
| Oil Changed Sample Status Client Info N/A N/A N/A N/A WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 8 8 2 Chromium ppm ASTM D5185m >2 <1 | Machine Age | hrs | Client Info | | 0 | | 0 |
| Sample Status Image of the status Method Imit/base current NORMAL NORMAL WEAR METALS method limit/base current history1 history2 Iron ppm ASTM 05185m >50 8 8 2 Chromium ppm ASTM 05185m >2 <1 | Oil Age | hrs | Client Info | | 0 | 0 | 0 |
| WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 8 8 2 Chromium ppm ASTM D5185m >2 <1 | Oil Changed | | Client Info | | | | |
| Iron ppm ASTM D5185m >50 8 8 2 Chromium ppm ASTM D5185m >4 <1 | Sample Status | | | | ABNORMAL | NORMAL | NORMAL |
| Chromium ppm ASTM D5185m >4 <1 | WEAR METALS | | method | limit/base | current | history1 | history2 |
| Nickel ppm ASTM D5185m >2 <1 0 0 Titanium ppm ASTM D5185m >3 0 0 0 Sliver ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >9 1 <1 | Iron | ppm | ASTM D5185m | >50 | 8 | 8 | 2 |
| Titanium ppm ASTM D5185m >3 0 0 0 Silver ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >9 1 <1 | Chromium | ppm | ASTM D5185m | >4 | <1 | 0 | 0 |
| Silver ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >9 1 <1 | Nickel | ppm | ASTM D5185m | >2 | <1 | 0 | 0 |
| Aluminum ppm ASTM D5185m >9 1 <1 1 Lead ppm ASTM D5185m >30 <1 | Titanium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Lead ppm ASTM D5185m >30 <1 1 0 Copper ppm ASTM D5185m >35 1 2 2 Tin ppm ASTM D5185m >4 <1 | Silver | ppm | ASTM D5185m | >3 | 0 | 0 | 0 |
| Copper ppm ASTM D5185m >355 1 2 2 Tin ppm ASTM D5185m >4 <1 | Aluminum | ppm | ASTM D5185m | >9 | | <1 | 1 |
| TinppmASTM D5185m>4<1<1<1VanadiumppmASTM D5185m0<1 | Lead | ppm | ASTM D5185m | >30 | | | |
| Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m <1 | Copper | ppm | | | | | |
| CadmiumppmASTM D5185m<1<10ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185m000BariumppmASTM D5185m000MolybdenumppmASTM D5185m<1 | Tin | ppm | | >4 | | | |
| ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185m000BariumppmASTM D5185m000MolybdenumppmASTM D5185m<1 | | ppm | | | | | |
| Boron ppm ASTM D5185m 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m <1 | Cadmium | ppm | ASTM D5185m | | <1 | <1 | 0 |
| Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m <1 <1 0 Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m 279 293 234 Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7644 20 | ADDITIVES | | method | limit/base | current | history1 | history2 |
| Molybdenum ppm ASTM D5185m <1 <1 0 Manganese ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m 3251 3521 2516 Phosphorus ppm ASTM D5185m 279 293 234 Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7844 0.1 0.1 0 15.5 FLUID DEGRADATION Method | Boron | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Maganese ppm ASTM D5185m <1 <1 <1 <1 Magnesium ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m 3251 3521 2516 Phosphorus ppm ASTM D5185m 279 293 234 Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/:nm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation | Barium | ppm | ASTM D5185m | | 0 | 0 | 0 |
| Magnesium ppm ASTM D5185m 11 10 9 Calcium ppm ASTM D5185m Image in the image in th | Molybdenum | ppm | ASTM D5185m | | <1 | <1 | 0 |
| Calcium ppm ASTM D5185m 3251 3521 2516 Phosphorus ppm ASTM D5185m 279 293 234 Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 0 11 Potassium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 22.1 20.3 4.0 <t< td=""><td>Manganese</td><td>ppm</td><td>ASTM D5185m</td><td></td><td><1</td><td><1</td><td><1</td></t<> | Manganese | ppm | ASTM D5185m | | <1 | <1 | <1 |
| Phosphorus ppm ASTM D5185m 279 293 234 Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7624 >20 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 | - | ppm | ASTM D5185m | | | | 9 |
| Zinc ppm ASTM D5185m 357 345 247 Sulfur ppm ASTM D5185m 5824 5556 4999 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7645 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 < | Calcium | ppm | ASTM D5185m | | 3251 | 3521 | |
| SulfurppmASTM D5185m582455564999CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>+1001588SodiumppmASTM D5185m0<1 | Phosphorus | ppm | ASTM D5185m | | | 293 | 234 |
| CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>+1001588SodiumppmASTM D5185m0<1 | Zinc | ppm | | | 357 | | |
| Silicon ppm ASTM D5185m >+100 15 8 8 Sodium ppm ASTM D5185m 0 <1 1 Potassium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7615 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 \blacktriangle 3.04 2.71 0.48 | Sulfur | ppm | ASTM D5185m | | 5824 | 5556 | 4999 |
| Sodium ppm ASTM D5185m 0 <1 1 Potassium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D845 3.04 2.71 0.48 | CONTAMINANTS | | method | limit/base | current | history1 | history2 |
| Potassium ppm ASTM D5185m >20 18 15 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 3.04 2.71 0.48 | Silicon | ppm | ASTM D5185m | >+100 | 15 | 8 | 8 |
| INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 3.04 2.71 0.48 | Sodium | ppm | ASTM D5185m | | 0 | <1 | 1 |
| Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7624 >20 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 | Potassium | ppm | ASTM D5185m | >20 | 18 | 15 | 0 |
| Nitration Abs/cm *ASTM D7624 >20 22.1 20.3 4.0 Sulfation Abs/.1mm *ASTM D7624 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 3.04 2.71 0.48 | INFRA-RED | | method | limit/base | current | history1 | history2 |
| Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.1 15.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 Action and action action and action act | Soot % | % | *ASTM D7844 | | 0.1 | 0.1 | 0 |
| FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 ▲ 3.04 2.71 0.48 | Nitration | Abs/cm | *ASTM D7624 | >20 | 22.1 | 20.3 | 4.0 |
| Oxidation Abs/.1mm *ASTM D7414 >25 35.8 32.5 6.3 Acid Number (AN) mg KOH/g ASTM D8045 ▲ 3.04 2.71 0.48 | Sulfation | Abs/.1mm | *ASTM D7415 | >30 | 29.6 | 28.1 | 15.5 |
| Acid Number (AN) mg KOH/g ASTM D8045 🔺 3.04 2.71 0.48 | FLUID DEGRADA | TION | method | limit/base | current | history1 | history2 |
| Acid Number (AN) mg KOH/g ASTM D8045 🔺 3.04 2.71 0.48 | Oxidation | Abs/.1mm | *ASTM D7414 | >25 | 35.8 | 32.5 | 6.3 |
| | Acid Number (AN) | mg KOH/g | ASTM D8045 | | | 2.71 | |
| | Base Number (BN) | mg KOH/g | ASTM D2896 | | 5.36 | | |



OIL ANALYSIS REPORT







| 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 | 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 | >0.1 | NEG | NEG | NEG |
| Free Water | scalar | *Visual | | NEG | NEG | NEG |
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
| Visc @ 100°C | cSt | ASTM D445 | 13.0 | 16.6 | 16.3 | 13.04 |
| GRAPHS | | | | | | |

Ferrous Alloys

Non-ferrous Metals

(0°01) 12 14

13

12

11

Unique Number : 10696376

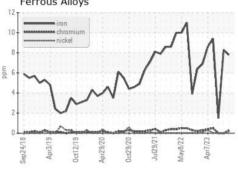
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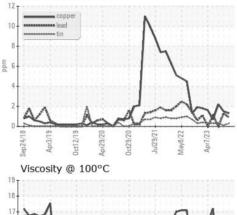
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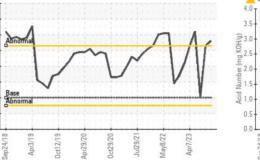
Laboratory

Sample No.

Lab Number







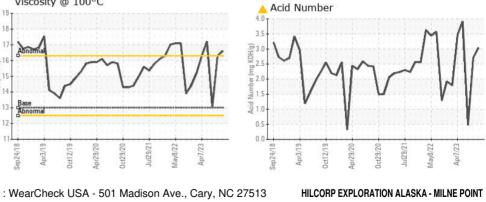
Received

Diagnosed

: 13 Oct 2023

: 17 Oct 2023

Diagnostician : Don Baldridge



1000 MILNE POINT RD PRUDOE BAY, AK US 99734 Contact: Evan Reilly evan.reilly@hilcorp.com T: (907)670-3231 F: x:



Test Package : IND 2 (Additional Tests: FT-IR) Certificate L2367 To discuss this sample report, contact Customer Service at 1-800-237-1369. * - Denotes test methods that are outside of the ISO 17025 scope of accreditation. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

Contact/Location: Evan Reilly - BPEMPU