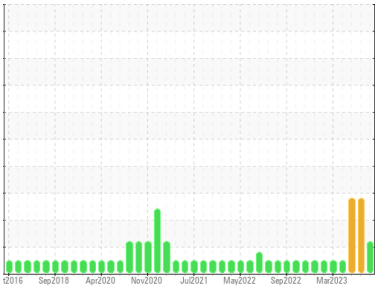
Hilcorp Alaska, LLC

# PROBLEM SUMMARY

Sample Rating Trend

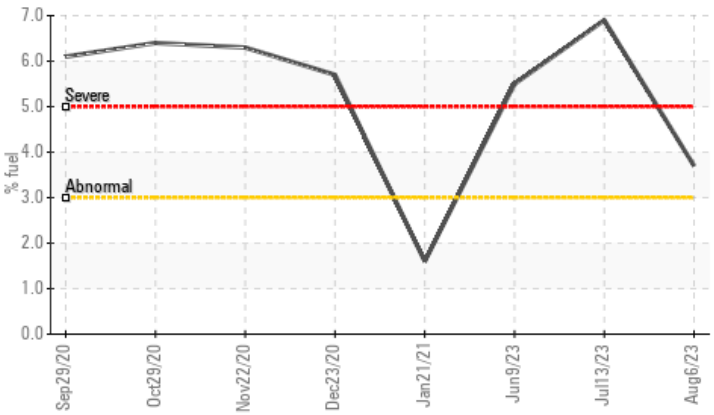


**FUEL**

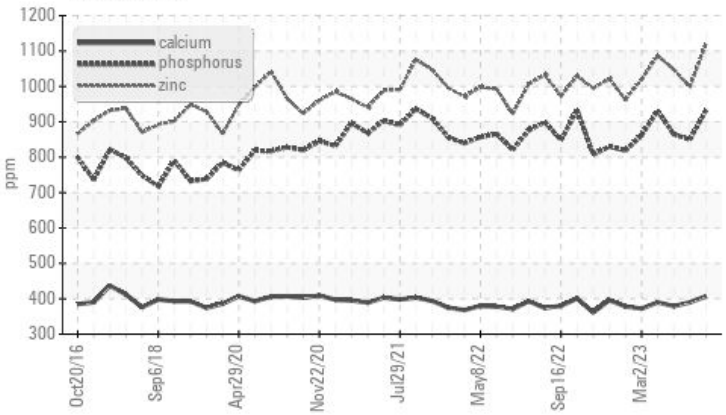
Machine Id
## E 0101B E 0101B
Component
**Diesel Engine**
Fluid
**DIESEL ENGINE OIL SAE 15W40 (--- GAL)**

## COMPONENT CONDITION SUMMARY

▲ Fuel Dilution




▲ Additives




## RECOMMENDATION

The oil is near the end of it's useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. Please specify the brand, type, and viscosity of the oil on your next sample.

## PROBLEMATIC TEST RESULTS

| Sample Status | | | | ABNORMAL | SEVERE | SEVERE |
|---|---|---|---|---|---|---|
| Calcium | ppm | ASTM D5185m | 3000 | ▲ **407** | ▲ 390 | ▲ 379 |
| Fuel | % | ASTM D3524 | >3.0 | ▲ **3.7** | ⬢ 6.9 | ⬢ 5.5 |

**Customer Id:** BPEMPU
**Sample No.:** HLC0002608
**Lab Number:** 05924489
**Test Package:** IND 2

*To manage this report scan the QR code*

*To discuss the diagnosis or test data:*
Wes Davis +1 905-569-8600 x223
wesd@wearcheck.ca

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

## RECOMMENDED ACTIONS

| Action | Status | Date | Done By | Description |
|---|---|---|---|---|
| Service/change Fluid | --- | --- | ? | The oil is near the end of it's useful service life, recommend schedule an oil change. |
| Resample | --- | --- | ? | We recommend an early resample to monitor this condition. |
| Information Required | --- | --- | ? | Please specify the brand, type, and viscosity of the oil on your next sample. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. |

## HISTORICAL DIAGNOSIS

**13 Jul 2023 Diag: Wes Davis**

FUEL

We advise that you check the fuel injection system. The oil is near the end of it's useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. Please specify the brand, type, and viscosity of the oil on your next sample.All component wear rates are normal. There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. Calcium ppm levels are abnormally low. Visc @ 100°C is abnormal. The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.

view report

**09 Jun 2023 Diag: Wes Davis**

FUEL

We advise that you check the fuel injection system. The oil is near the end of it's useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. Please specify the brand, type, and viscosity of the oil on your next sample.All component wear rates are normal. There is a high amount of fuel present in the oil. Tests confirm the presence of fuel in the oil. Calcium ppm levels are abnormally low. Visc @ 100°C is abnormally low. The BN result indicates that there is suitable alkalinity remaining in the oil. Fuel is present in the oil and is lowering the viscosity. The oil is no longer serviceable due to the presence of contaminants.

view report

**07 Apr 2023 Diag: Don Baldridge**

NORMAL

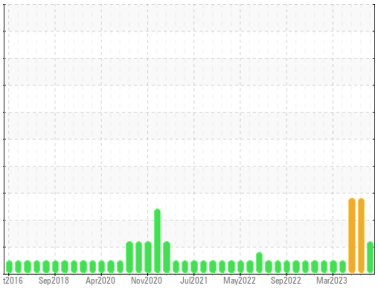
Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

view report

Hilcorp Alaska, LLC

# OIL ANALYSIS REPORT

Sample Rating Trend




**FUEL**

Machine Id
## E 0101B E 0101B
Component
**Diesel Engine**
Fluid
**DIESEL ENGINE OIL SAE 15W40 (--- GAL)**

## DIAGNOSIS

**▲ Recommendation**

The oil is near the end of it's useful service life, recommend schedule an oil change. We recommend an early resample to monitor this condition. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample. Please specify the brand, type, and viscosity of the oil on your next sample.

**Wear**

All component wear rates are normal.

**▲ Contamination**

There is a moderate amount of fuel present in the oil. Tests confirm the presence of fuel in the oil.

**▲ Fluid Condition**

Calcium ppm levels are abnormally low. The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **HLC0002608** | HLC0002573 | HLC0002574 |
| Sample Date | | Client Info | | **06 Aug 2023** | 13 Jul 2023 | 09 Jun 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 | | | | **ABNORMAL** | SEVERE | SEVERE |

| CONTAMINATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Glycol | | WC Method | | **NEG** | NEG | NEG |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Iron | ppm | ASTM D5185m | >200 | **3** | 4 | 4 |
| Chromium | ppm | ASTM D5185m | >20 | **0** | 0 | <1 |
| Nickel | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Titanium | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Silver | ppm | ASTM D5185m | >2 | **0** | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >30 | **<1** | <1 | <1 |
| Lead | ppm | ASTM D5185m | >30 | **0** | 0 | <1 |
| Copper | ppm | ASTM D5185m | >30 | **<1** | 1 | <1 |
| Tin | ppm | ASTM D5185m | >15 | **0** | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | | **0** | <1 | 0 |
| Cadmium | ppm | ASTM D5185m | | **<1** | 0 | 0 |

| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | 250 | **220** | 163 | 179 |
| Barium | ppm | ASTM D5185m | 10 | **0** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m | 100 | **112** | 108 | 107 |
| Manganese | ppm | ASTM D5185m | | **<1** | <1 | <1 |
| Magnesium | ppm | ASTM D5185m | 450 | **1119** | 1046 | 1021 |
| Calcium | ppm | ASTM D5185m | 3000 | ▲ **407** | ▲ 390 | ▲ 379 |
| Phosphorus | ppm | ASTM D5185m | 1150 | **932** | 850 | 865 |
| Zinc | ppm | ASTM D5185m | 1350 | **1120** | 998 | 1048 |
| Sulfur | ppm | ASTM D5185m | 4250 | **3963** | 3778 | 4044 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >30 | **4** | 4 | 4 |
| Sodium | ppm | ASTM D5185m | >158 | **1** | 1 | <1 |
| Potassium | ppm | ASTM D5185m | >20 | **2** | 0 | <1 |
| Fuel | % | ASTM D3524 | >3.0 | ▲ **3.7** | ⬢ 6.9 | ⬢ 5.5 |

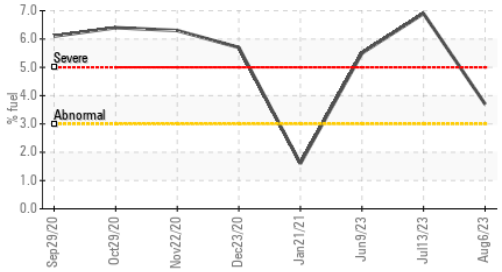
| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | *ASTM D7844 | >3 | **0.1** | 0.1 | 0.1 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | **4.0** | 4.2 | 4.3 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | **12.8** | 12.9 | 13.3 |

| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | **7.9** | 8.1 | 8.3 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | 8.5 | **8.09** | 7.62 | 7.20 |

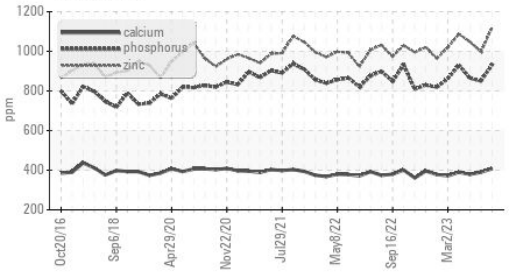
# OIL ANALYSIS REPORT

Hilcorp Alaska, LLC

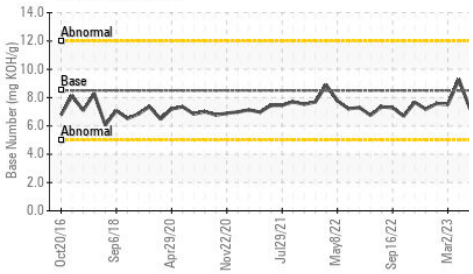
Fuel Dilution



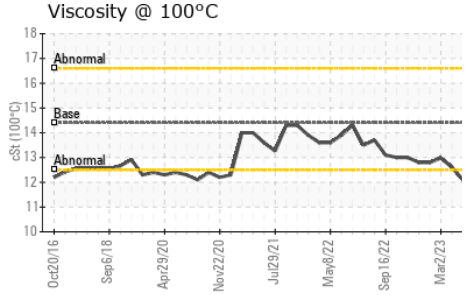

Additives




Base Number




Viscosity @ 100°C

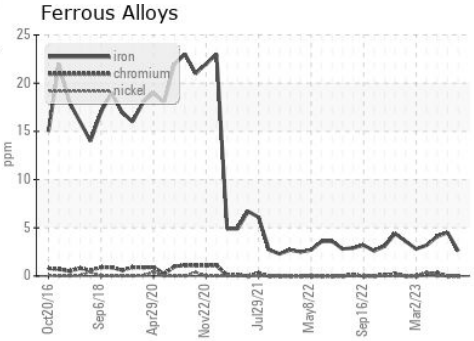



| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Precipitate | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| 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 | >0.2 | **NEG** | NEG | NEG |
| Free Water | scalar | *Visual | | **NEG** | NEG | NEG |

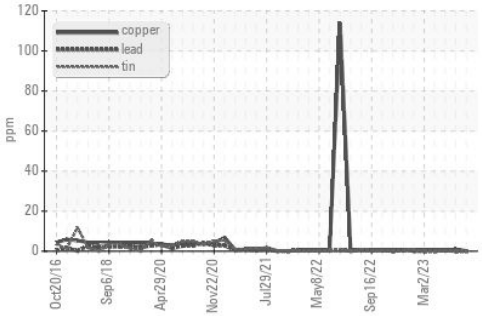
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 100°C | cSt | ASTM D445 | 14.4 | **13.1** | ▲ 11.9 | ▲ 12.1 |

GRAPHS

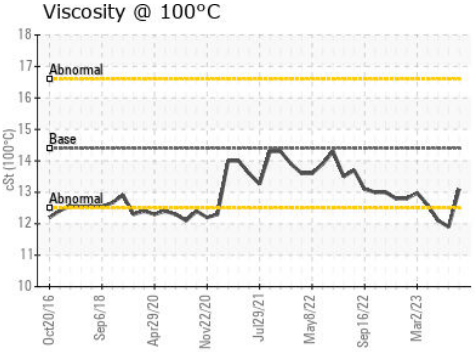
Ferrous Alloys



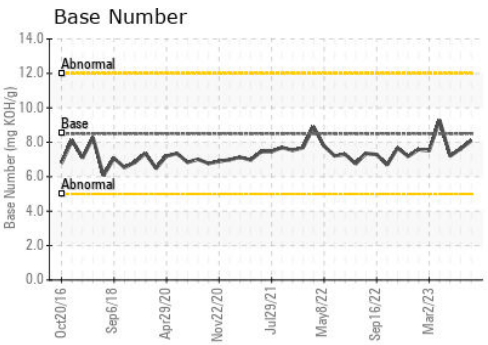

Non-ferrous Metals




Viscosity @ 100°C




Base Number




Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : HLC0002608 **Received** : 14 Aug 2023
**Lab Number** : 05924489 **Diagnosed** : 16 Aug 2023
**Unique Number** : 10604436 **Diagnostician** : Wes Davis
**Test Package** : IND 2 ( Additional Tests: PercentFuel )

*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)*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