

# **OIL ANALYSIS REPORT**

### Sample Rating Trend

# NORMAL



# BRCM02BE (S/N GZJ00659)

Component
Biogas Engine

CHEVRON HDAX 6500 LFG GAS ENGINE OIL (--- GAL)





#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Moor

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil

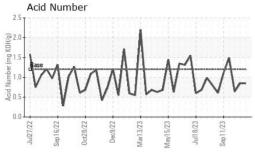
#### Fluid Condition

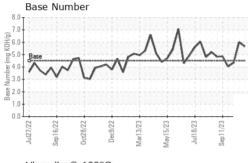
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

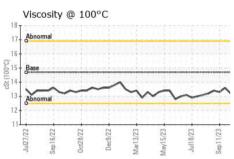
| Sample Date   |  |          | 12022 Sep20 | 22 Oct2022 Dec2022 | Mar2023 May2023 Jul2023 : | Sep2023     |             |   |
|---|--|----------|-------------|--------------------|---------------------------|-------------|-------------|---|
| Client Info   | SAMPLE INFORM  | MATION   | method      | limit/base         | current                   | history1    | history2    |   |
| Machine Age   | Sample Number  |          | Client Info |                    | WC0760816                 | WC0760961   | WC0760969   |   |
| Oil Age         hrs         Client Info         350         275         163           Oil Changed         Client Info         Not Changd         N/A         N/A         N/A         N/A           Sample Status         NoRMAL         NORMAL         ABNORMAL         ABNORMAL         ABNORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         24.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0         <1.0                                      | Sample Date  |          | Client Info |                    | 11 Oct 2023               | 02 Oct 2023 | 27 Sep 2023 |   |
| Coli  | Machine Age  | hrs      | Client Info |                    | 70823                     | 70748       | 70636       |   |
| NORMAL   NORMAL   ABNORMAL   CONTAMINATION   method   imit/base   current   history1   history2   | Oil Age  | hrs      | Client Info |                    | 350                       | 275         | 163         |   |
| Fuel  | Oil Changed  |          | Client Info |                    | Not Changd                | N/A         | N/A         |   |
| Fuel  | Sample Status  |          |             |                    | NORMAL                    | NORMAL      | ABNORMAL    |   |
| WEAR METALS   | CONTAMINATION  | V        | method      | limit/base         | current                   | history1    | history2    |   |
| Iron  | Fuel   |          | WC Method   | >4.0               | <1.0                      | <1.0        | <1.0        |   |
| Iron  | Glycol   |          | WC Method   |                    | NEG                       | NEG         | NEG         |   |
| Chromium         ppm         ASTM D5185m         >4         0         0         0           Nickel         ppm         ASTM D5185m         >2         0         0         0           Titanium         ppm         ASTM D5185m         >5         0         0         0           Silver         ppm         ASTM D5185m         >5         0         0         0           Aluminum         ppm         ASTM D5185m         >6         2         1         4         6           Lead         ppm         ASTM D5185m         >9         <1  | WEAR METALS  |          | method      | limit/base         | current                   | history1    | history2    |   |
| Nickel  | Iron   | ppm      | ASTM D5185m | >15                | <1                        | 0           | 1           |   |
| Titanium  | Chromium   | ppm      | ASTM D5185m | >4                 | 0                         | 0           | 0           |   |
| Silver  | Nickel   | ppm      | ASTM D5185m | >2                 | 0                         | 0           | 0           |   |
| Silver  | Titanium   |          | ASTM D5185m |                    | 0                         | 0           | 0           |   |
| Aluminum  | Silver   |          | ASTM D5185m | >5                 | 0                         | 0           | 0           |   |
| Lead  | Aluminum   |          |             | >6                 | 2                         |             | <u>^</u> 6  |   |
| Copper         ppm         ASTM D5185m         >6         0         <1         <1           Tin         ppm         ASTM D5185m         >4         3         3         1           Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         9         8         11           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         4         3         6           Manganese         ppm         ASTM D5185m         4         3         6           Manganesium         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         1973         1973         1954<  | Lead   |          | ASTM D5185m | >9                 | <1                        | 1           | 2           |   |
| Tin   | Copper   |          | ASTM D5185m | >6                 | 0                         | <1          | <1          |   |
| Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         9         8         11           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         4         3         6           Manganese         ppm         ASTM D5185m         -1         -1         0           Magnesium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1 <td>Tin</td> <td></td> <td></td> <td></td> <th>3</th> <td></td> <td></td>                          | Tin  |          |             |                    | 3                         |             |             |   |
| Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         9         8         11           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         4         3         6           Manganese         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         199         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1 </td <td>Vanadium</td> <td></td> <td></td> <td></td> <th></th> <td></td> <td>0</td>              | Vanadium   |          |             |                    |                           |             | 0           |   |
| Boron   | Cadmium  |          |             |                    | -                         |             | 0           |   |
| Boron   | ADDITIVES  |          | method      | limit/base         | current                   | history1    | history2    |   |
| Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         4         3         6           Manganese         ppm         ASTM D5185m         -1         -1         0           Magnesium         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1  | Boron  | ppm      | ASTM D5185m |                    | 9                         |             |             |   |
| Molybdenum         ppm         ASTM D5185m         4         3         6           Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1         0         <1           Potassium         ppm         ASTM D5185m         >20         <1         0         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7844  | Barium   |          | ASTM D5185m |                    |                           | 0           | 0           |   |
| Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1         0         <1           Potassium         ppm         ASTM D5185m         >20         <1         0         <0           INFRA-RED         method         limit/base         current         history1         history2           Soot % <t< td=""><td>Molvbdenum</td><td></td><td>ASTM D5185m</td><td></td><th></th><td>3</td><td>6</td></t<> | Molvbdenum   |          | ASTM D5185m |                    |                           | 3           | 6           |   |
| Magnesium         ppm         ASTM D5185m         19         28         29           Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         <1  | <td></td> <td></td> <td>ASTM D5185m</td> <td></td> <th>&lt;1</th> <td></td> <td>0</td> |          |             | ASTM D5185m        |                           | <1          |             | 0 |
| Calcium         ppm         ASTM D5185m         1892         1836         1861           Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >20         <1  | -  |          |             |                    |                           |             | 29          |   |
| Phosphorus         ppm         ASTM D5185m         275         293         338           Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Solicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         >1         1         0         <1   | Calcium  |          | ASTM D5185m |                    | -                         | 1836        | 1861        |   |
| Zinc         ppm         ASTM D5185m         383         393         393           Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         <1   |  |          |             |                    |                           |             |             |   |
| Sulfur         ppm         ASTM D5185m         1973         1973         1954           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         <1  |  |          |             |                    |                           |             |             |   |
| Silicon         ppm         ASTM D5185m         >181         145         134         97           Sodium         ppm         ASTM D5185m         <1         0         <1           Potassium         ppm         ASTM D5185m         >20         <1         0         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         >20         5.9         6.0         5.4           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.3         17.4         15.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64   | Sulfur   |          |             |                    |                           |             |             |   |
| Sodium         ppm         ASTM D5185m         <1   | CONTAMINANTS   | ;        | method      | limit/base         | current                   | history1    | history2    |   |
| Potassium         ppm         ASTM D5185m         >20         <1         0         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         >20         5.9         6.0         5.4           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.3         17.4         15.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64  | Silicon  | ppm      | ASTM D5185m | >181               | 145                       | 134         | 97          |   |
| INFRA-RED   | Sodium   |          | ASTM D5185m |                    | <1                        | 0           | <1          |   |
| Soot %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         >20         5.9         6.0         5.4           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.3         17.4         15.6           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64   | Potassium  | ppm      | ASTM D5185m | >20                | <1                        | 0           | 0           |   |
| Nitration         Abs/cm         *ASTM D7624         >20         5.9         6.0         5.4           Sulfation         Abs/.1mm         *ASTM D7415         >30         17.3         17.4         15.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64  | INFRA-RED  |          | method      | limit/base         | current                   | history1    | history2    |   |
| Sulfation         Abs/.1mm         *ASTM D7415         >30         17.3         17.4         15.6           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64   | Soot %   | %        | *ASTM D7844 |                    | 0                         | 0           | 0           |   |
| FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64   | Nitration  | Abs/cm   | *ASTM D7624 | >20                | 5.9                       | 6.0         | 5.4         |   |
| Oxidation         Abs/.1mm         *ASTM D7414         >25         10.4         10.8         8.9           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64   | Sulfation  | Abs/.1mm | *ASTM D7415 | >30                | 17.3                      | 17.4        | 15.6        |   |
| Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         0.85         0.850         0.64  | FLUID DEGRADA  | TION     | method      | limit/base         | current                   | history1    | history2    |   |
|   |  |          |             |                    |                           |             |             |   |
|   | Oxidation  | Abs/.1mm | *ASTM D7414 | >25                | 10.4                      | 10.8        | 8.9         |   |
|   | Oxidation<br>Acid Number (AN)  |          |             |                    |                           |             |             |   |



## **OIL ANALYSIS REPORT**





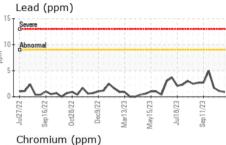


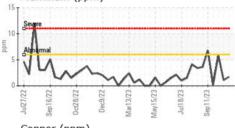
| VISUAL                  |        | method  |       |       |       | history2 |
|-------------------------|--------|---------|-------|-------|-------|----------|
| White Metal             | scalar | *Visual | NONE  | NONE  | NONE  | NONE     |
| Yellow Metal            | scalar | *Visual | NONE  | 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    |
| <b>Emulsified Water</b> | scalar | *Visual | >0.1  | NEG   | NEG   | NEG      |
| Free Water              | scalar | *Visual |       | NEG   | NEG   | NEG      |

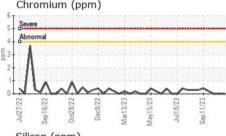
| FLUID PROPER | HES | method    |      |      | history1 | history2 |
|--------------|-----|-----------|------|------|----------|----------|
| Visc @ 100°C | cSt | ASTM D445 | 14.7 | 13.3 | 13.3     | 13.2     |

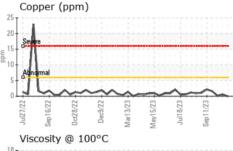
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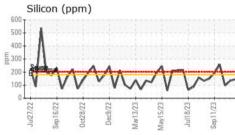
**GRAPHS** 

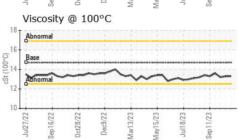


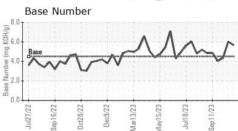
















Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** Test Package : MOB 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0760816 : 05979915 : 10697210

Received Diagnosed Diagnostician

: 16 Oct 2023 : 17 Oct 2023 : Sean Felton

**EDL NA Recips-Brown County** BROWN COUNTY POWER STATION, 9427 BEYERS RD

GEORGETOWN, OH US 45121

Contact: MITCHELL BUTLER Mitchell.Butler@edlenergy.com

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)

T:

F: