

### **OIL ANALYSIS REPORT**

Sample Rating Trend

#### NORMAL



HANM04BE (S/N 4EK00413)

**Biogas Engine** 

CHEVRON HDAX LFG SAE 40 (--- GAL)





### AE 40 (--- GAL)

Sample Number     Client Info     WC0802712     WC0802708     WC0802689       Sample Date     Client Info     22 Aug 2023     15 Aug 2023     6606     68490       Machine Age     hrs     Client Info     88778     68606     68490       Oil Age     Client Info     811     639     523       Oil Changed     Client Info     Not Changd     Not Changd     Not Changd       Sample Status     Immethod     Immit/base     current     history1     history2       Fuel     WC Method     >4.0     <1.0     <1.0     <1.0       Glycol     WC Method     NEG     NEG     NEG       VEAR METALS     method     Immit/base     current     history1     history2       fro     ppm     ASTM 05165m     >5     0     0     0       framium     ppm     ASTM 05165m     >6     0     0     0       framium     ppm     ASTM 05165m     >6     0     0     0       framium     ppm     ASTM 05165m	a SAE 40 ( GAL)						
Sample Date     Client Info     22 Aug 2023     15 Aug 2023     10 Aug 2023       Machine Age     hrs     Client Info     68778     68606     68490       Oil Age     hrs     Client Info     811     639     523     00       Oil Changed     Client Info     Not Changd     Not Not Shangd     Sitty     Not Shangd     Sity     Sitty     Sitty	SAMPLE INFORM	NATION	method	limit/base	current	history1	history2
Sample Date     Client Info     22 Aug 2023     15 Aug 2023     10 Aug 2023       Machine Age     hrs     Client Info     68778     68606     68490       Oil Age     hrs     Client Info     811     639     523       Oil Changed     Client Info     Not Changd     Not Changd     Not Changd     Not Changd       Sample Status     Imit/base     current     history1     history2       Fuel     WC Method     >4.0     <1.0     <1.0     <1.0       Gycol     WC Method     >4.0     <1.0     <1.0     <1.0       Ker     WC Method     >4.0     <1.0     <1.0     <1.0       Kromium     ppm     ASTM 05185m     >15     3     4     6       Chromium     ppm     ASTM 05185m     >4     0     <1     <1     <1       Nickel     ppm     ASTM 05185m     >2     0     0     0     0       Astmostistm     >5     0     0     0     0     0     0     0	Sample Number		Client Info		WC0802712	WC0802708	WC0802689
Machine Age     hrs     Client Info     68778     68606     68490       Oil Age     hrs     Client Info     811     639     523       Oil Changed     Client Info     Not Changd     Not Changd     Not Changd     Not Changd       Sample Status     Info     NoRMAL     NoRMAL     NoRMAL     NoRMAL       CONTAMINATION     method     Imit/base     current     history1     history2       Fuel     WC Method     >4.0     <1.0			Client Info		22 Aug 2023	15 Aug 2023	10 Aug 2023
Oil Age     hrs     Client Info     811     639     523       Oil Changed     Client Info     Not Changd     Not Changd     Not Changd     Not Changd       Sample Status     Imit Date     Imit Date     Nor RMAL     Nor RMAL     Nor RMAL       CONTAMINATION     method     Imit Date     current     history1     history2       Fuel     WC Method     >4.0     <1.0	•	hrs			-	-	-
Oil Changed Sample Status     Client Info     Not Changd NORMAL     Not Changd NORMAL     Not Changd NORMAL     Not Changd NORMAL       CONTAMINATION     method     imit/base     current     history1     history2       Fuel     WC Method     >4.0     <1.0     <1.0     <1.0     <1.0       Glycol     WC Method     >4.0     <1.0     <1.0     <1.0     <1.0       WeAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >15     3     4     6       Nickel     ppm     ASTM D5185m     >5     0     0     0       Silver     ppm     ASTM D5185m     >5     0     0     0       Agrim D5185m     >14     7     6     8     7       Copper     ppm     ASTM D5185m     2     2     2     2       Glodenum     ppm     ASTM D5185m     14     7     6     8       Tin     ppm     ASTM D5185m     2	•				811		
Sample Status     NORMAL     NORMAL     NORMAL     NORMAL       CONTAMINATION     method     imit/base     current     history1     history2       Fuel     WC Method     >4.0     <1.0	-						
Fuel     WC Method     >4.0     <1.0     <1.0     <1.0     <1.0       Glycol     WC Method     NEG     NEG     NEG     NEG       WEAR METALS     method     linib/base     current     history1     history2       Iron     ppm     ASTM D5185m     >15     3     4     6       Chromium     ppm     ASTM D5185m     >2     0     0     0       Silver     ppm     ASTM D5185m     >2     0     0     0       Silver     ppm     ASTM D5185m     >5     0     0     0     0       Aluminum     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >6     1     3     2       Copper     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     2     1     0     0     0       Addminum     ppm     ASTM D5185m     2     2	Sample Status				-		Ũ
Glycol     WC Method     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >15     3     4     6       Chromium     ppm     ASTM D5185m     >2     0     0     0       Nickel     ppm     ASTM D5185m     >2     0     0     0       Silver     ppm     ASTM D5185m     >5     0     0     0       Aluminum     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >6     1     0     0       Copper     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     <1	CONTAMINATIO	N	method	limit/base	current	history1	history2
Glycol     WC Method     NEG     NEG     NEG       WEAR METALS     method     limit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >15     3     4     6       Chromium     ppm     ASTM D5185m     >2     0     0     0       Nickel     ppm     ASTM D5185m     >2     0     0     0       Silver     ppm     ASTM D5185m     >5     0     0     0       Aluminum     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >6     1     0     0       Copper     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     <1	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron     ppm     ASTM D5185m     >15     3     4     6       Chromium     ppm     ASTM D5185m     >4     0     <1	Glycol		WC Method				NEG
Chromium     ppm     ASTM D5185m     >4     0     <1     <1       Nickel     ppm     ASTM D5185m     >2     0     0     0       Titanium     ppm     ASTM D5185m     >2     0     0     0       Silver     ppm     ASTM D5185m     >5     0     0     0       Auminum     ppm     ASTM D5185m     >5     0     0     0       Lead     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >6     1     3     2       Copper     ppm     ASTM D5185m     >14     7     6     8       Tin     ppm     ASTM D5185m     <1	WEAR METALS		method	limit/base	current	history1	history2
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     1     3     2     2       Lead     ppm     ASTM D5185m     >9     2     2     2     11       Copper     ppm     ASTM D5185m     >14     7     6     8     7       Copper     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     <1	Iron	ppm	ASTM D5185m	>15	3	4	6
Titanium     ppm     ASTM D5185m     0     0     0     0       Silver     ppm     ASTM D5185m<>5     0     0     0       Aluminum     ppm     ASTM D5185m<>6     1     3     2       Lead     ppm     ASTM D5185m<>9     2     2     <1	Chromium	ppm	ASTM D5185m	>4	0	<1	<1
Silver     ppm     ASTM D5185m     >5     0     0     0       Aluminum     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >9     2     2     <1	Nickel	ppm	ASTM D5185m	>2	0	0	0
Silver     ppm     ASTM D5185m     >5     0     0     0       Aluminum     ppm     ASTM D5185m     >6     1     3     2       Lead     ppm     ASTM D5185m     >9     2     2     <1       Copper     ppm     ASTM D5185m     >14     7     6     8       Tin     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     >4     5     5     5       Cadmium     ppm     ASTM D5185m     <1     0     0     0       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     0       Magnese     ppm     ASTM D5185m     2     <1     1       Magnesium     ppm     ASTM D5185m     2166     2063     2182       Phosphorus     ppm     ASTM D5185m     2181     152     128     141  Solic	Titanium	ppm	ASTM D5185m		0	0	0
Lead     ppm     ASTM D5185m     >9     2     2     <1       Copper     ppm     ASTM D5185m     >14     7     6     8       Tin     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m     <4	Silver	ppm	ASTM D5185m	>5	0	0	0
Copper     ppm     ASTM D5185m     >14     7     6     8       Tin     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m      0     0     0       Cadmium     ppm     ASTM D5185m     0     0     0     0       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     2     <1	Aluminum	ppm	ASTM D5185m	>6	1	3	2
Tin     ppm     ASTM D5185m     >4     5     5       Vanadium     ppm     ASTM D5185m     <1	Lead	ppm	ASTM D5185m	>9	2	2	<1
Tin     ppm     ASTM D5185m     >4     5     5     5       Vanadium     ppm     ASTM D5185m      <1	Copper	ppm	ASTM D5185m	>14	7	6	8
Vanadium     ppm     ASTM D5185m     <1     0     0       Cadmium     ppm     ASTM D5185m     0     0     0     0       ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     <1		ppm	ASTM D5185m	>4	5	5	5
ADDITIVES     method     limit/base     current     history1     history2       Boron     ppm     ASTM D5185m     <1	Vanadium		ASTM D5185m		<1	0	0
Boron     ppm     ASTM D5185m     <1     2     2       Barium     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     2     <1	Cadmium		ASTM D5185m			0	0
Barium     ppm     ASTM D5185m     0     0     0     0       Molybdenum     ppm     ASTM D5185m     2     <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum     ppm     ASTM D5185m     2     <1     1       Manganese     ppm     ASTM D5185m     <1	Boron	ppm	ASTM D5185m		<1	2	2
Manganese     ppm     ASTM D5185m     <1     <1     <1       Magnesium     ppm     ASTM D5185m     11     15     16       Calcium     ppm     ASTM D5185m     2166     2063     2182       Phosphorus     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     2814     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >20     0     0     <1	Barium	ppm	ASTM D5185m		0	0	0
Magnesium     ppm     ASTM D5185m     11     15     16       Calcium     ppm     ASTM D5185m     2166     2063     2182       Phosphorus     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     2814     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >20     0     0     <1	Molybdenum	ppm	ASTM D5185m		2	<1	1
Calcium     ppm     ASTM D5185m     2166     2063     2182       Phosphorus     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     2814     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >20     0     0     <1	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus     ppm     ASTM D5185m     270     323     298     325       Zinc     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     2814     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >20     0     0     <1	Magnesium	ppm	ASTM D5185m		11	15	16
Zinc     ppm     ASTM D5185m     310     387     376     406       Sulfur     ppm     ASTM D5185m     310     387     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >181     152     0     1       Potassium     ppm     ASTM D5185m     >20     0     0     <1	Calcium	ppm	ASTM D5185m		2166	2063	2182
Sulfur     ppm     ASTM D5185m     2814     2718     2936       CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >20     0     0     1       Potassium     ppm     ASTM D5185m     >20     0     0     <1       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     0.1     0.1     0.1       Nitration     Abs/cm     *ASTM D7624     >20     7.6     7.5     7.3       Sulfation     Abs/.1mm     *ASTM D7415     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     <	Phosphorus	ppm	ASTM D5185m	270	323	298	325
CONTAMINANTS     method     limit/base     current     history1     history2       Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     >181     152     0     1       Potassium     ppm     ASTM D5185m     >20     0     0     <1	Zinc	ppm	ASTM D5185m	310	387	376	406
Silicon     ppm     ASTM D5185m     >181     152     128     141       Sodium     ppm     ASTM D5185m     2     0     1       Potassium     ppm     ASTM D5185m     >20     0     0     <1	Sulfur	ppm	ASTM D5185m		2814	2718	2936
Sodium     ppm     ASTM D5185m     2     0     1       Potassium     ppm     ASTM D5185m     >20     0     0     <1	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium     ppm     ASTM D5185m     >20     0     0     <1       INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     0.1     0.1     0.1     0.1       Nitration     Abs/cm     *ASTM D7624     >20     7.6     7.5     7.3       Sulfation     Abs/.1mm     *ASTM D7415     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	Silicon	ppm	ASTM D5185m	>181	152	128	141
INFRA-RED     method     limit/base     current     history1     history2       Soot %     %     *ASTM D7844     0.1     0.1     0.1       Nitration     Abs/cm     *ASTM D7624     >20     7.6     7.5     7.3       Sulfation     Abs/.1mm     *ASTM D7415     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	Sodium	ppm	ASTM D5185m		2	0	1
Soot %     %     *ASTM D7844     0.1     0.1     0.1       Nitration     Abs/cm     *ASTM D7624     >20     7.6     7.5     7.3       Sulfation     Abs/.1mm     *ASTM D7615     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	Potassium	ppm	ASTM D5185m	>20	0	0	<1
Nitration     Abs/cm     *ASTM D7624     >20     7.6     7.5     7.3       Sulfation     Abs/.tmm     *ASTM D7415     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.tmm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	INFRA-RED		method	limit/base	current	history1	history2
Sulfation     Abs/.1mm     *ASTM D7415     >30     21.2     20.8     20.2       FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	Soot %	%	*ASTM D7844		0.1	0.1	0.1
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     18.6     18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8     1.81     1.78     1.63	Nitration	Abs/cm	*ASTM D7624	>20	7.6	7.5	7.3
Oxidation     Abs/.1mm     *ASTM D7414     >25 <b>18.6</b> 18.1     17.1       Acid Number (AN)     mg KOH/g     ASTM D8045     1.8 <b>1.81</b> 1.78     1.63	Sulfation	Abs/.1mm	*ASTM D7415	>30	21.2	20.8	20.2
Acid Number (AN) mg KOH/g ASTM D8045 1.8 1.81 1.78 1.63	FLUID DEGRADA		method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	18.6	18.1	17.1
Base Number (BN)     mg KOH/g     ASTM D2896     6.0     5.82     5.47     4.19	Acid Number (AN)	mg KOH/g	ASTM D8045	1.8	1.81	1.78	1.63
	Base Number (BN)	mg KOH/g	ASTM D2896	6.0	5.82	5.47	4.19

#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

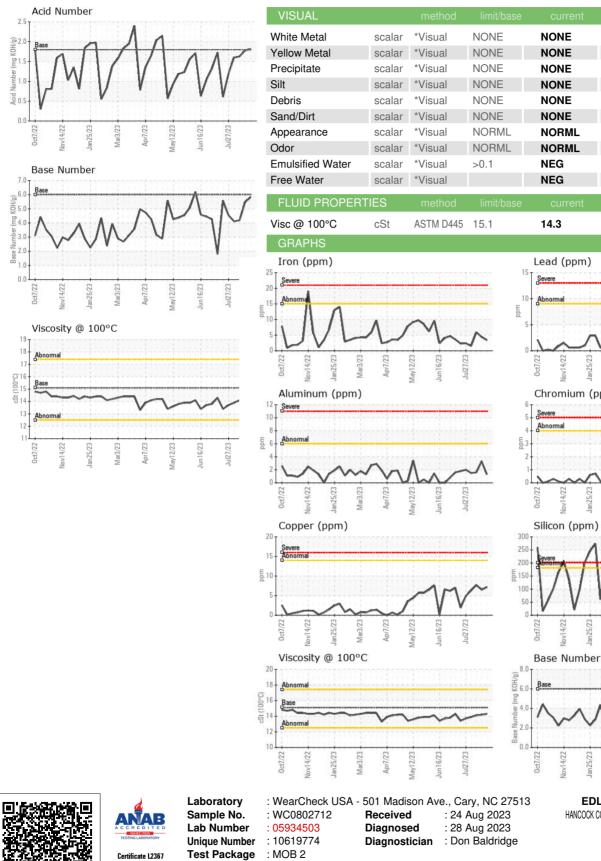
There is no indication of any contamination in the oil.

#### Fluid Condition

The 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.



## **OIL ANALYSIS REPORT**



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)

/lav12/23 Apr7//23 Aar3/73 un16/23

NONE

NONE

NONE

NONE

NONE

NONE

NORML

NORML

NEG

NEG

14.2

NONE

NONE

NONE

NONE

NONE

NONE

NORML

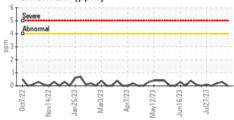
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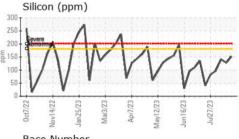
NEG

NEG

14.1

Chromium (ppm)





# Apr7/23 Jun 16/23 Aar3/73 May12/23

**EDL NA Recips-Hancock County** HANCOCK COUNTY POWER STATION, 3574 TOWNSHIP ROAD 142 FINDLAY, OH US 45840 Contact: TIM CUSICK tim.cusick@energydevelopments.com T: F:

Submitted By: TIM CUSICK