

## **OIL ANALYSIS REPORT**

Sample Rating Trend

#### NORMAL



HANM04BE (S/N 4EK00413) Component

**Biogas Engine** 

CHEVRON HDAX LFG SAE 40 (95 GAL)





y 2023 Jul2023 Aug2023 Ox2023 Nov2023 Dx2023 Jun2024 Feb2024										
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2				
Sample Number		Client Info		WC0898125	WC0898135	WC0898151				
Sample Date		Client Info		19 Mar 2024	13 Mar 2024	07 Mar 2024				
Machine Age	hrs	Client Info		73704	73560	73421				
Oil Age	hrs	Client Info		282	139	1016				
Oil Changed		Client Info		Not Changd	Not Changd	Changed				
Sample Status				NORMAL	NORMAL	NORMAL				
CONTAMINATIO	N	method	limit/base	current	history1	history2				
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0				
Water		WC Method	>0.1	NEG	NEG	NEG				
Glycol		WC Method		NEG	NEG	NEG				
WEAR METALS		method	limit/base	ourront	history1	history2				
				current						
Iron	ppm	ASTM D5185m	>15	4	3	<1				
Chromium	ppm	ASTM D5185m		<1	<1	<1				
Nickel	ppm	ASTM D5185m	>2	0	0	0				
Titanium	ppm	ASTM D5185m		<1	0	0				
Silver	ppm	ASTM D5185m	>5	0	0	0				
Aluminum	ppm	ASTM D5185m	>6	3	2	2				
Lead	ppm	ASTM D5185m	>9	1	<1	2				
Copper	ppm	ASTM D5185m	>14	2	1	1				
Tin	ppm	ASTM D5185m	>4	4	3	5				
Vanadium	ppm	ASTM D5185m		<1	0	0				
Cadmium	nom			-		â				
Caumum	ppm	ASTM D5185m		0	0	0				
ADDITIVES	ррп	method	limit/base	0 current	0 history1	-				
	ppm		limit/base	-	-	-				
ADDITIVES		method	limit/base	current	history1	history2				
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 6	history1 6	history2 11				
ADDITIVES Boron Barium	ppm ppm	method ASTM D5185m ASTM D5185m	limit/base	current 6 1	history1 6 0	history2 11 0				
ADDITIVES Boron Barium Molybdenum	ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	current 6 1 2	history1 6 0 2	history2 11 0 4				
ADDITIVES Boron Barium Molybdenum Manganese	ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	current 6 1 2 <1	history1 6 0 2 0	history2 11 0 4 0				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m		current     6     1     2     <1     11     1932	history1 6 0 2 0 11 1687	history2 11 0 4 0 21 2022				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	270	current     6     1     2     <1     11     1932     278	history1 6 0 2 0 11 1687 269	history2 11 0 4 0 21 2022 319				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m		current     6     1     2     <1     11     1932	history1 6 0 2 0 11 1687	history2 11 0 4 0 21 2022				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	270	current     6     1     2     <1     11     1932     278     366	history1 6 0 2 0 11 1687 269 333	history2 11 0 4 0 21 2022 319 419 2580				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	270 310 limit/base	current     6     1     2     <1     11     1932     278     366     2510     current	history1 6 0 2 0 11 1687 269 333 2183 history1	history2 11 0 4 0 21 2022 319 419 2580 history2				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	270 310 limit/base	current     6     1     2     <1     1932     278     366     2510     current     100	history1     6     0     2     0     11     1687     269     333     2183     history1     75	history2 11 0 4 0 21 2022 319 419 2580 history2 172				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	270 310 limit/base >181	current     6     1     2     <1     11     1932     278     366     2510     current	history1 6 0 2 0 11 1687 269 333 2183 history1	history2 11 0 4 0 21 2022 319 419 2580 history2				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m	270 310 limit/base >181 >20	current     6     1     2     <1     1932     278     366     2510     current     100     0     3	history1     6     0     2     0     11     1687     269     333     2183     history1     75     0     1	history2 11 0 4 0 21 2022 319 419 2580 history2 172 0 2				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m	270 310 limit/base >181	current     6     1     2     <1     1932     278     366     2510     current     100     0     3     current	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   75   0   1   history1	history2 11 0 4 0 21 2022 319 419 2580 history2 172 0 2 history2				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m	270 310 limit/base >181 >20 limit/base	current     6     1     2     <1     1932     278     366     2510     ourrent     100     0     3     current     0.1	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   75   0   1   bistory1   0   0   0   0	history2   11   0   4   0   21   2022   319   419   2580   history2   172   0   2   history2   0   2   0.1				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m     ASTM D5185m	270 310 limit/base >181 >20 limit/base	current     6     1     2     <1     1932     278     366     2510     current     100     0     3     current     0.1     6.9	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   history1   0   6   0   6.4	history2     11     0     4     0     21     2022     319     419     2580     history2     172     0     2     history2     172     0     2     0.1     8.3				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m     ASTM D5185m	270 310 >181 >20 limit/base >20 limit/base	current     6     1     2     <1     1932     278     366     2510     current     100     0     3     current     0.1     6.9     20.0	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   history1   0   6.4   18.0	history2   11   0   4   0   21   2022   319   419   2580   history2   172   0   2   history2   0.1   8.3   23.9				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m     ASTM D78144     *ASTM D7624     *ASTM D7415     method	270 310 210 270 310 20 20 20 20 20 20 20 20 20 20 20 20 20	current   6   1   2   <1   1932   278   366   2510   current   100   0   3   current   0.1   6.9   20.0   current	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   history1   0   6.4   18.0   history1	history2   11   0   4   0   21   2022   319   419   2580   history2   172   0   2   history2   0.1   8.3   23.9   history2				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRAD/ Oxidation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m     ASTM D78148     *ASTM D7624     *ASTM D7414	270 310 210 310 >181 >20 imit/base >20 >30 imit/base >25	current     6     1     2     <1     1932     278     366     2510     current     100     0     3     current     0.1     6.9     20.0     current     15.0	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   history1   75   0   1   history1   0   6.4   18.0   history1   11.9	history2   11   0   4   0   21   2022   319   419   2580   history2   172   0   2   history2   0.1   8.3   23.9   history2   21.7				
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method     ASTM D5185m     ASTM D78144     *ASTM D7624     *ASTM D7415     method	270 310 210 270 310 20 20 20 20 20 20 20 20 20 20 20 20 20	current   6   1   2   <1   1932   278   366   2510   current   100   0   3   current   0.1   6.9   20.0   current	history1   6   0   2   0   11   1687   269   333   2183   history1   75   0   1   history1   0   6.4   18.0   history1	history2 11 0 4 0 21 2022 319 419 2580 history2 172 0 2 history2 0.1 8.3 23.9 history2				

### All component wear rates are normal.

Recommendation

#### Contamination

Wear

There is no indication of any contamination in the oil.

Resample at the next service interval to monitor.

#### Fluid Condition

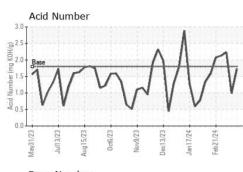
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is acceptable for the time in service.

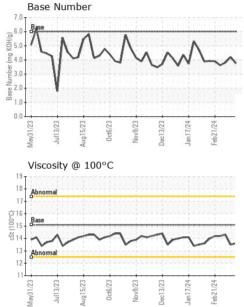
Submitted By: TIM CUSICK

Page 1 of 2



# **OIL ANALYSIS REPORT**





Jul13/23

ø

Aug 15/23

	VISUAL		method				history2
	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
AAA	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
11111	Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
NIVI	Silt	scalar	*Visual	NONE	NONE	NONE	NONE
V V V	Debris	scalar	*Visual	NONE	NONE	NONE	NONE
	Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Nov9/23 Dec13/23 Jan 17/24 Feb21/24	Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Nov9/23 Dec13/23 Jan17/24 Feb21/24	Odor	scalar	*Visual	NORML	NORML	NORML	NORML
	Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
	Free Water	scalar	*Visual		NEG	NEG	NEG
	FLUID PROPERT		method	limit/booo			
A AAA				limit/base	current	history1	history2
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Visc @ 100°C	cSt	ASTM D445	15.1	13.6	13.5	14.3
	GRAPHS						
	Iron (ppm)			15	Lead (ppm)		
23 - 24 - 24 - 24 - 24 - 24 - 24 - 24 -	20 - Severe				Severe		
Nov9/23 Dec13/23 Jan 17/24 Feb21/24	Abaramat	100 100		10	Abnormal	ndecedenti	
				mdd			
	5 1- A-	٨		5	\		
	- my	h	m	$\sim$	have	· lan	$\sim$
		Nov9/23 -	3/23 -	67/1	Aay31/23 Jul13/23 Nug15/23	Oct6/23 - Nov9/23 -	7/24
	May31/23 Jul13/23 Aug15/23 Oct6/23	Nov	Dec13/23 Jan17/24	reo z 1/24	May31/23 Jul13/23 Aug15/23	0ct6/23 Nov9/23 Dec13/23	Jan 17/24 Feb 21/24
	Aluminum (ppm)				_ Chromium (pj	om)	
ma	12 Severe		12000000000	6	T 3 3 3 3 3 5 5 5 5 7 7		
	10-			5	Abnormal		
	E 6 Abnormal			4 Ed 3	<b>T</b>		
Nov9/23 Dec13/23 Jan 17/24 Feb21/24				문 3 2			
Jan Feb		~	m	-			
		~		0	$\square$	$\sim$	ميميد
	May31/23 Jul13/23 Aug15/23 Oct6/23	Nov9/23	Dec13/23 Jan17/24	,7/170	May31/23 Jul13/23 Aug15/23	0ct6/23 Nov9/23 Dec13/23	Jan 17/24 Feb 21/24
		Nc	Jan	8		Nc 0	Jan Feb
	Copper (ppm)			250	Silicon (ppm)		
	20 Severe			250	Severe		1001000100
	15 - Abnormal			200	91	1 A	- 1
	툡 10			툴 <sup>150</sup> 100	IAM	1/1	NA
	5 1mm						
		$\sim$	m_	50	• • • •		·····
	23 23 23 23 23 23 23 23 23 23	123	124	++ 0	/23	/23 /23	/24 - /24 -
	May31/23 Jul13/23 Aug15/23 Oct6/23	Nov9/23	Dec13/23 Jan 17/24	Feb 2 1/ 24	May31/23 Jul13/23 Aug15/23	0ct6/23 Nov9/23 Dec13/23	Jan 17/24 Feb 21/24
	≥			-	≥		¬ ≝
	20 T	i Manganas			-		
	18 - Abnormal			(D)HOJ G.O. Bays Number (D)HOJ Bays Number (D)HOJ B	Base		
				y Bu	LVV	<u>^</u>	
	51/ -	~~	200	10 te 4.0	1 7 .		~~~~
	Abnormal			N 2.0	• • • • • • • • • • • • • • • •		
	10			+ 0.0	· · · · · · · · · · · · · · · · · · ·		
	May31/23 Jul13/23 Aug15/23 Oct6/23	Nov9/23	Dec13/23 Jan17/24	1/17	May31/23 Jul13/23 Aug15/23	0ct6/23 Nov9/23 Dec13/23	Jan 17/24 Feb 21/24
	Mayî Juli Aug1	Nov	Deci Jan1	1007	May: Jult Aug1	0c Nov Dec1	Jan 1 Feb 2
1 I.L ·		( NA <sup>11</sup>	A	NO 07510			
Laboratory	: WearCheck USA - 501 : WC0898125				EDL NA Recips-Hancock Count HANCOCK COUNTY POWER STATION, 3574 TOWNSHIP ROAD 1		
- Comple Ne		eived : 21 Mar 2024 HAN ed : 25 Mar 2024			JUNIT FUWER STATION, 3	FINDLAY, O	
Sample No.							
Lab Number		Diaor	10sed : 25	5 Mar 2024 - Se	an Felton		US 4584
	: 10939272	Diagr	nosed : 25	5 Mar 2024 - Se	an Felton	Contac	US 4584 t: TIM CUSIC
Lab Number Unique Number	: 10939272 : MOB 2 <i>contact Customer Servi</i>	ce at 1-8	300-237-136	9.	an Felton		