

## **OIL ANALYSIS REPORT**

# Sample Rating Trend



NORMAL

**Biogas Engine** 

Component

CHEVRON HDAX 9500 GAS ENGINE OIL 40 (95 GAL)

HANM01BE (S/N 4EK00133)

SAMPLE INFORM Sample Number Sample Date Machine Age Oil Age Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium Silver	hrs hrs N	method Client Info Client Info Client Info Client Info Client Info WC Method WC Method WC Method WC Method	limit/base limit/base >4.0 >0.1	current WC0898139 29 Jan 2024 68426 466 Not Changd NORMAL current <1.0	history1 WC0851248 25 Jan 2024 68330 370 Not Changd NORMAL history1	history2 WC0851252 17 Jan 2024 68150 190 Not Changd NORMAL history2
Sample Date Machine Age Oil Age Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	hrs N ppm ppm	Client Info Client Info Client Info Client Info WC Method WC Method WC Method	>4.0	29 Jan 2024 68426 466 Not Changd NORMAL current	25 Jan 2024 68330 370 Not Changd NORMAL history1	17 Jan 2024 68150 190 Not Changd NORMAL
Machine Age Oil Age Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	hrs N ppm ppm	Client Info Client Info Client Info method WC Method WC Method	>4.0	68426 466 Not Changd NORMAL current	68330 370 Not Changd NORMAL history1	68150 190 Not Changd NORMAL
Oil Age Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	hrs N ppm ppm	Client Info Client Info method WC Method WC Method WC Method	>4.0	466 Not Changd NORMAL current	370 Not Changd NORMAL history1	190 Not Chango NORMAL
Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	N ppm ppm	Client Info method WC Method WC Method WC Method	>4.0	Not Changd NORMAL current	Not Changd NORMAL history1	Not Chango NORMAL
Oil Changed Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm ppm	method WC Method WC Method WC Method	>4.0	NORMAL	NORMAL history1	NORMAL
Sample Status CONTAMINATION Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm ppm	method WC Method WC Method WC Method	>4.0	NORMAL	NORMAL history1	NORMAL
Fuel Water Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm ppm	WC Method WC Method WC Method	>4.0			history
Water Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm	WC Method WC Method		<1.0	1.0	
Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm	WC Method	>0.1		<1.0	<1.0
Glycol WEAR METALS Iron Chromium Nickel Titanium	ppm	WC Method		NEG	NEG	NEG
Iron Chromium Nickel Titanium	ppm	method		NEG	NEG	NEG
Chromium Nickel Titanium	ppm		limit/base	current	history1	history2
Nickel Titanium		ASTM D5185m	>15	4	3	1
Titanium		ASTM D5185m	>4	<1	0	0
	ppm	ASTM D5185m		<1	0	0
	ppm	ASTM D5185m		<1	<1	0
	ppm	ASTM D5185m	>5	0	0	0
Aluminum	ppm	ASTM D5185m		2	2	1
Lead	ppm	ASTM D5185m	>9	- <1	<1	0
		ASTM D5185m		2	0	1
Copper Tin	ppm	ASTM D5185m		6	5	3
	ppm		>4			
Vanadium	ppm	ASTM D5185m		0	0	<1
	ppm	ASTM D5185m		0	0	0
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		12	6	4
Barium	ppm	ASTM D5185m		<1	0	0
Molybdenum	ppm	ASTM D5185m		6	2	3
Manganese	ppm	ASTM D5185m		<1	<1	<1
Magnesium	ppm	ASTM D5185m		30	20	17
Calcium	ppm	ASTM D5185m		2175	1933	1843
Phosphorus	ppm	ASTM D5185m		351	312	309
Zinc	ppm	ASTM D5185m		487	382	369
Sulfur	ppm	ASTM D5185m		2583	2057	2116
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>181	147	116	78
Sodium	ppm	ASTM D5185m		0	<1	0
Potassium	ppm	ASTM D5185m	>20	3	2	0
INFRA-RED		method	limit/base	current	history1	history2
	%	*ASTM D7844		0.1	0.1	0
Soot %	Abs/cm	*ASTM D7624	>20	6.9	6.8	6.2
Soot % Nitration		*ASTM D7415	>30	20.0	19.5	17.7
	Abs/.1mm					
Nitration		method	limit/base	current	history1	history2
Nitration Sulfation		method *ASTM D7414	limit/base	current 14.8	history1 14.1	history2 11.7
Nitration Sulfation FLUID DEGRADA	TION					history2 11.7 0.74

### 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

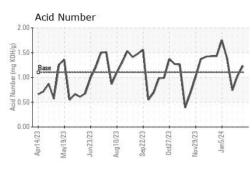
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

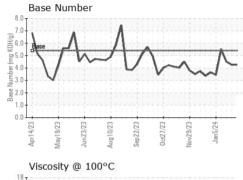
Submitted By: TIM CUSICK

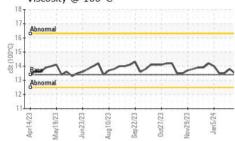
Page 1 of 2



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	VISUAL		method	limit/base	current	history1	history
٨	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
. 7.	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
++++	Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
V	Silt	scalar	*Visual	NONE	NONE	NONE	NONE
۷	Debris	scalar	*Visual	NONE	NONE	NONE	NONE
na han baar	Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Nov29/23 Jan5/24	Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Nov	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	IES	method	limit/base	current	history1	history
1.1	Visc @ 100°C	cSt	ASTM D445	13.4	13.5	13.8	13.5
~~~	GRAPHS						
	Iron (ppm)				Lead (ppm)		
m 4	25 Severe			15	Severe		
Nov29/23 Jan5/24	20			1(	- Abnormal		
N N	15 - Abnormal			띮			
	5				5		
		~	mr	$\checkmark$		m	~~~
	Apr14/23	Sep22/23	0ct27/23		Apr14/23	Aug 10/23	lov29/23
	Apr14/23 May19/23 Jun23/23 Aug10/23	Sep 2	Oct27/23 Nov29/23 .lan5/24	0	Apr14/23 May19/23 Jun23/23	Aug1 Sep2 Oct2	Nov29/23 Jan5/24
1-	Aluminum (ppm)				Chromium (pp	om)	
~ ~	12 Severe				6T		
	10-				Abnormal		
23	E 6- Abnormal			u d	3		
Nov29/23 - Jan5/24 -	4			2			
2		11-	$\sim$	~	1		
		123	//23 -	L (		123	123
	Apr14/23 May19/23 Jun23/23 -	Sep22/23	Oct27/23 Nov29/23 .lan5/24	200	Apr14/23 May19/23 Jun23/23	Aug 10/23 - Sep 22/23 0ct27/23	Nov29/23 Jan5/24
	Copper (ppm)	-00065			Silicon (ppm)		_
	20			250	0 <sub>1</sub> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	117111111111	0000000000
	15 - Abnormal			200	0		
	Ē_10-			ي الم	$\Lambda$	100	1/1
	5-			₽ 100	1 h/	VV	VL
			~ ~	50		· · · ·	
		23	23		23	23 - 23 -	24 -
	Apr14/23 May19/23 Jun23/23 Aug10/23	Sep 22/23	0ct27/23 Nov29/23 .lan5/24	/clipn	Apr14/23 May19/23 Jun23/23	Aug 10/23 Sep 22/23 0ct27/23	Vov29/23 Jan5/24
	⊲		2 2		⊲	A S O	Z
	<sup>18</sup> T	s nanapasar	12000020020		0 -		00000000000000
	16 - Abnormal			(B)H0, 6.( Base Number (mg KOH/g) 2.(	hase A	Λ	
	0.0014			Bm)	Th	11	~ 1
	(D-001) 14 Base Abnormal	~		han the factor	V	vv	-m
	12-			₩ 2.0 ase	D +		
				0.0	0+++++++-+		4 N
	Apr14/23 May19/23 Jun23/23	Sep22/23	Oct27/23 Nov29/23 .lan5/24	7/0110	Apr14/23 May19/23 Jun23/23	Aug 10/23 Sep 22/23 0ct27/23	Nov29/23 Jan5/24
	Ap Mar Jur Aug	Se	Nor	2	Ap Mar	Sel	No
Laboratory	: WearCheck USA - 50	1 Madisc	on Ave., Carv	. NC 27513	FDI	NA Recips-Ha	ncock Cou
	: WC0898139	Rece		1 Jan 2024		DUNTY POWER STATION, 3	
Sample No.		Teste		1 Feb 2024			FINDLAY,
Sample No. Lab Number	. 00070017						
Lab Number Unique Number	: 10858108		nosed : 01	Feb 2024 - Se	ean Felton		
Lab Number Unique Number Test Package	: 10858108	Diagr			ean Felton	Contac @tim.cusick	US 458 t: TIM CUSI

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