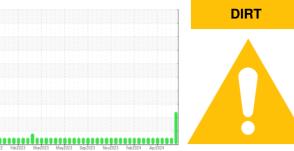


# **OIL ANALYSIS REPORT**

## Sample Rating Trend





Pinconning CAT 1 PINM01BE Biogas Engine

CHEVRON HDAX 9500 GAS ENGINE OIL 40 (--- GAL)

## **DIAGNOSIS**

### Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor.

The tin level is abnormal. All other component wear rates are normal.

## Contamination

Elemental level of silicon (Si) above normal.

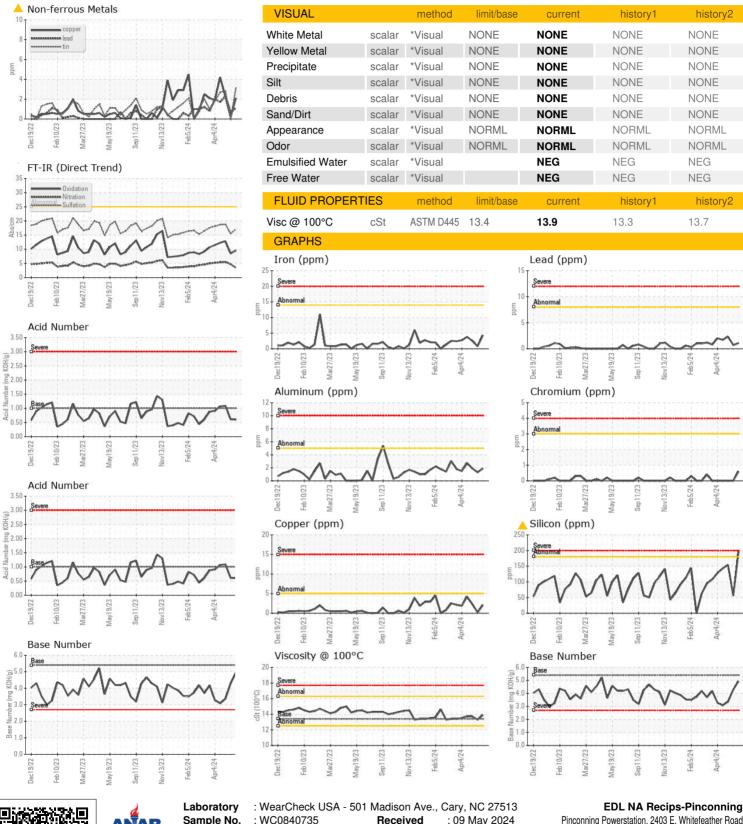
### **Fluid Condition**

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.

Sample Number         Client Info         WC0840735         WC0840763         WC0840765           Sample Date         Client Info         07 May 2024         26 Apr 2024         17 Apr 2024           Machine Age         hrs         Client Info         66775         66512         66329           Oil Age         hrs         Client Info         446         183         1096           Oil Changed         Client Info         Not Changd         Nor Changd         Changed         Changed         NoRMAL         NORMAL <th>SAMPLE INFORM</th> <th>MATION</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Client Info							
Machine Age   hrs							
Dil Changed	•	hro			-		
Cilient Info							
ABNORMAL   NORMAL   NORMAL   CONTAMINATION   method   limit/base   current   history1   history2   history2   Fuel   WC Method   VC Method   NEG   NEG		nrs			-		
Fuel	-		Client into			_	
Fuel	Sample Status				ABNORMAL	NORMAL	NORMAL
Water         WC Method         NEG         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Idron         ppm         ASTM D5185m         >14         4         <1         2           Chromium         ppm         ASTM D5185m         >3         <1         0         0           Nickel         ppm         ASTM D5185m         <1         0         0         0           Titanium         ppm         ASTM D5185m         <1         0         0         0           Silver         ppm         ASTM D5185m         >5         2         1         <1         2           Copper         ppm         ASTM D5185m         >5         2         1         <1         2           Copper         ppm         ASTM D5185m         >5         2         <1         2           Copper         ppm         ASTM D5185m         >3         3         0         3           Vanadium         ppm         ASTM D5185m         <1         0         <1 <td>CONTAMINATION</td> <td>V</td> <td>method</td> <td>limit/base</td> <td>current</td> <td>history1</td> <td>history2</td>	CONTAMINATION	V	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >14         4         <1	Water		WC Method		NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >3         <1         0         0           Nickel         ppm         ASTM D5185m         <1         0         0           Silver         ppm         ASTM D5185m         <1         0         0           Selver         ppm         ASTM D5185m         <5         2         1         2           Lead         ppm         ASTM D5185m         >5         2         <1         2           Lead         ppm         ASTM D5185m         >5         2         <1         2           Lead         ppm         ASTM D5185m         >3         3         0         3           Vanadium         ppm         ASTM D5185m         <1         0         0           Calcium         ppm         ASTM D5185m         9         4         2           Magnesium         ppm         ASTM D5185m <td>WEAR METALS</td> <td></td> <td>method</td> <td>limit/base</td> <td>current</td> <td>history1</td> <td>history2</td>	WEAR METALS		method	limit/base	current	history1	history2
Nickel	ron	ppm	ASTM D5185m	>14	4	<1	2
Silver	Chromium	ppm	ASTM D5185m	>3	<1	0	0
Silver	Nickel	ppm	ASTM D5185m		<1	0	0
Silver	Titanium		ASTM D5185m		<1	0	0
Aluminum	Silver				0		0
Lead         ppm         ASTM D5185m         >8         1         <1         2           Copper         ppm         ASTM D5185m         >5         2         <1         2           Tin         ppm         ASTM D5185m         >5         2         <1         2           Vanadium         ppm         ASTM D5185m         >3         3         0         3           Vanadium         ppm         ASTM D5185m         <1         0         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         75         19         5           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m	Aluminum		ASTM D5185m	>5	2	1	2
Copper         ppm         ASTM D5185m         >5         2         <1         2           Tin         ppm         ASTM D5185m         >3         A         3         0         3           Vanadium         ppm         ASTM D5185m         <1						<1	
Tin							
Vanadium         ppm         ASTM D5185m         <1         0         <1           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         75         19         5           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         59         22         15           Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         0         <1 <td>• •</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	• •						
Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         75         19         5           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         59         22         15           Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         0         <1							
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         75         19         5           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         <1							
Boron		рріп		11			
Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         <1	ADDITIVES		method	ilmit/base	current		
Molybdenum         ppm         ASTM D5185m         9         4         2           Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         59         22         15           Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1         2           Potassium         ppm         ASTM D5185m         >20         2         <1         0           INFRA-RED         method         limit/base         current         history1         history2           Sout %         *ASTM D7844	Boron	ppm	ASTM D5185m			19	
Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         59         22         15           Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Barium	ppm	ASTM D5185m		0	0	0
Magnesium         ppm         ASTM D5185m         59         22         15           Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Molybdenum	ppm	ASTM D5185m		9	4	2
Calcium         ppm         ASTM D5185m         1501         1618         1733           Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Manganese	ppm	ASTM D5185m		<1	0	0
Phosphorus         ppm         ASTM D5185m         422         295         282           Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Magnesium	ppm	ASTM D5185m		59	22	15
Zinc         ppm         ASTM D5185m         577         358         327           Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Calcium						
Sulfur         ppm         ASTM D5185m         3721         2406         2473           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1		ppm	ASTM D5185m		1501	1618	1733
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >180         ▲ 196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1	Phosphorus						
Silicon         ppm         ASTM D5185m         >180         ▲ 196         56         154           Sodium         ppm         ASTM D5185m         >20         0         <1         2           Potassium         ppm         ASTM D5185m         >20         2         <1         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	<u>'</u>	ppm	ASTM D5185m		422	295	282
Sodium	Zinc	ppm	ASTM D5185m ASTM D5185m		422 577	295 358	282 327
Potassium         ppm         ASTM D5185m         >20         2         <1         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	422 577 3721	295 358 2406	282 327 2473
Potassium         ppm         ASTM D5185m         >20         2         <1         0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method		422 577 3721 current	295 358 2406 history1	282 327 2473 history2
Soot %         *ASTM D7844         0         0         0           Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	>180	422 577 3721 current	295 358 2406 history1 56	282 327 2473 history2
Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m	>180 >20	422 577 3721 current 196 0	295 358 2406 history1 56 <1	282 327 2473 history2 154 2
Nitration         Abs/cm         *ASTM D7624         3.4         4.7         5.5           Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m	>180 >20 >20	422 577 3721 current 196 0 2	295 358 2406 history1 56 <1 <1	282 327 2473 history2 154 2
Sulfation         Abs/.1mm         *ASTM D7415         17.1         15.5         18.8           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>180 >20 >20	422 577 3721 current ▲ 196 0 2	295 358 2406 history1 56 <1 <1	282 327 2473 history2 154 2 0
Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844	>180 >20 >20	422 577 3721 current ▲ 196 0 2 current 0	295 358 2406 history1 56 <1 <1 history1 0	282 327 2473 history2 154 2 0 history2
Oxidation         Abs/.1mm         *ASTM D7414         9.5         8.5         12.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624	>180 >20 >20	422 577 3721  current  196 0 2  current 0 3.4	295 358 2406 history1 56 <1 <1 history1 0 4.7	282 327 2473 history2 154 2 0 history2 0 5.5
Acid Number (AN)         mg KOH/g         ASTM D8045         1.0         0.60         0.61         1.09	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm Abs/cm	ASTM D5185m ASTM D5185m ASTM D5185m  method  ASTM D5185m ASTM D5185m ASTM D5185m  ASTM D5185m  method  *ASTM D7844  *ASTM D7624  *ASTM D7415	>180 >20 >20 >20 limit/base	422 577 3721  current  196 0 2  current 0 3.4 17.1	295 358 2406 history1 56 <1 <1 history1 0 4.7 15.5	282 327 2473 history2 154 2 0 history2 0 5.5 18.8
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm Abs/cm	ASTM D5185m ASTM D5185m ASTM D5185m  method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m  method *ASTM D7844 *ASTM D7624 *ASTM D7415  method	>180 >20 >20 >20 limit/base	422 577 3721  current  196 0 2  current 0 3.4 17.1  current	295 358 2406 history1 56 <1 <1 history1 0 4.7 15.5 history1	282 327 2473 history2 154 2 0 history2 0 5.5 18.8
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA Oxidation	ppm ppm ppm ppm ppm ppm ppm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m  method  ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m  *ASTM D7844  *ASTM D7624  *ASTM D7415  method  *ASTM D7414	>180 >20 >20 limit/base	422 577 3721 current ▲ 196 0 2 current 0 3.4 17.1 current 9.5	295 358 2406 history1 56 <1 <1 history1 0 4.7 15.5 history1 8.5	282 327 2473 history2 154 2 0 history2 0 5.5 18.8 history2



# **OIL ANALYSIS REPORT**







Certificate 12367

Sample No. Lab Number : 06174035 Unique Number : 11020088

: WC0840735 Test Package : MOB 2

Received **Tested** Diagnosed

: 09 May 2024 : 10 May 2024 : 12 May 2024 - Don Baldridge

Pinconning Powerstation, 2403 E. Whitefeather Road Pinconning, MI

US 48650 Contact: DOUG HINE doug.hine@edlenergy.com

To discuss this sample report, contact Customer Service at 1-800-237-1369.  $^st$  - 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)

Report Id: EDLPIN [WUSCAR] 06174035 (Generated: 05/12/2024 10:07:27) Rev: 1

Submitted By: Kevin Ackerman

T:

F: