

# **OIL ANALYSIS REPORT**

## Sample Rating Trend







# CATERPILLAR D6N 317 (S/N GHS00934)

Component
Diesel Engine

DIESEL ENGINE OIL SAE 15W40 (5 GAL)

#### 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

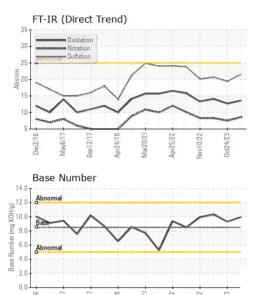
### **Fluid Condition**

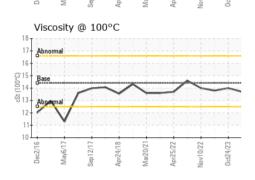
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

Sample Number   Client Info   RW0004731   RW0004580   RW0004393   Rample Date   Client Info   27 Apr 2024   24 Oct 2023   27 May 2023   27 May 2023   27 May 2023   27 May 2023   28	CAMPLE INFORM	IATION	method	limit/base	OLLEKO D‡	historya	history?	
Sample Date   Client Info   27 Apr 2024   24 Oct 2023   27 May 2023   27 May 2023   20 Machine Age   hrs   Client Info   10005   9721   9479		IATION		imivoase	current	history1	history2	
Machine Age   hrs   Client Info   10005   9721   9479	·							
Oil Age         hrs         Client Info         284         242         278           Oil Changed         Client Info         Changed         Changed         Changed         Changed           Sample Status         Client Info         Changed         Changed         Changed         Changed         Changed           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0	•				•		,	
Client Info   Changed   Changed   NORMAL   NORMAL   NORMAL								
CONTAMINATION	-	hrs			-			
Fuel	-		Client Info			_	Ü	
Fuel	Sample Status				NORMAL	NORMAL	NORMAL	
Water Glycol         WC Method WC Method         >0.2         NEG NEG         NEG NEG         NEG NEG           WEAR METALS         method limil/base current         history1         history2           Iron         ppm ASTM D5185m         >100         17         12         19           Chromium         ppm ASTM D5185m         >20         0         <1	<th>CONTAMINATION</th> <th>J</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	CONTAMINATION	J	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>5	<1.0	<1.0	<1.0	
WEAR METALS	Water		WC Method	>0.2	NEG	NEG	NEG	
Iron	Glycol		WC Method		NEG	NEG	NEG	
Chromium         ppm         ASTM D5185m         >20         0         <1	WEAR METALS		method	limit/base	current	history1	history2	
Nickel	Iron	ppm			17	12	19	
Titanium         ppm         ASTM D5185m         >2         0         0         0           Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >25         1         1         2           Lead         ppm         ASTM D5185m         >40         0         0         0           Copper         ppm         ASTM D5185m         >330         0         <1	Chromium	ppm	ASTM D5185m	>20	0	<1	<1	
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	0	
Aluminum         ppm         ASTM D5185m         >25         1         1         2           Lead         ppm         ASTM D5185m         >40         0         0         0           Copper         ppm         ASTM D5185m         >330         0         <1         1           Tin         ppm         ASTM D5185m         >15         <1         <1         0           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         6         7         6           Barium         ppm         ASTM D5185m         10         1         0         0           Molybdenum         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         3000         1103         969 </th <th>Titanium</th> <th>ppm</th> <th>ASTM D5185m</th> <th>&gt;2</th> <th>0</th> <th>0</th> <th>0</th>	Titanium	ppm	ASTM D5185m	>2	0	0	0	
Lead         ppm         ASTM D5185m         >40         0         0         0           Copper         ppm         ASTM D5185m         >330         0         <1         1           Tin         ppm         ASTM D5185m         >15         <1         <1         0           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         6         7         6           Barium         ppm         ASTM D5185m         10         1         0         0           Molybdenum         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         100         58         52         64           Manganesium         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         150         1021	Silver	ppm	ASTM D5185m	>2	0	0	0	
Copper         ppm         ASTM D5185m         >330         0         <1	Aluminum	ppm	ASTM D5185m	>25	1	1	2	
Tin	Lead	ppm	ASTM D5185m	>40	0	0	0	
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         250         6         7         6           Barium         ppm         ASTM D5185m         10         1         0         0           Molybdenum         ppm         ASTM D5185m         100         58         52         64           Mangaese         ppm         ASTM D5185m         100         58         52         64           Magnesium         ppm         ASTM D5185m         100         58         52         64           Magnesium         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         4250         3377         2871         <	Copper	ppm	ASTM D5185m	>330	0	<1	1	
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         6         7         6           Barium         ppm         ASTM D5185m         10         1         0         0           Molybdenum         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         100         58         52         64           Magnesium         ppm         ASTM D5185m         100         58         52         64           Magnesium         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         3000         1103         969         1172           Phosphorus         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         25         3         3         3           CONTAMINANTS         method         limit/base         current         hi	Tin	ppm	ASTM D5185m	>15	<1	<1	0	
ADDITIVES	Vanadium	ppm	ASTM D5185m		0	0	0	
Boron	Cadmium	ppm	ASTM D5185m		0	0	0	
Barium         ppm         ASTM D5185m         10         1         0         0           Molybdenum         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         100         851         832         967           Calcium         ppm         ASTM D5185m         3000         1103         969         1172           Phosphorus         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         1         history1         history2           Soot %         %	ADDITIVES		method	limit/base	current	history1	history2	
Molybdenum         ppm         ASTM D5185m         100         58         52         64           Manganese         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         3000         1103         969         1172           Phosphorus         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >25         3         3         3           Potassium         ppm         ASTM D5185m         >20         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7624         >20         8.6	Boron	ppm	ASTM D5185m	250	6	7	6	
Manganese         ppm         ASTM D5185m         <1	Barium	ppm	ASTM D5185m	10	1	0	0	
Magnesium         ppm         ASTM D5185m         450         851         832         967           Calcium         ppm         ASTM D5185m         3000         1103         969         1172           Phosphorus         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         % ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/:mm         *ASTM D7415         >30	Molybdenum	ppm	ASTM D5185m	100	58	52	64	
Calcium         ppm         ASTM D5185m         3000         1103         969         1172           Phosphorus         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/	Manganese	ppm	ASTM D5185m		<1	<1	<1	
Phosphorus         ppm         ASTM D5185m         1150         1021         911         1091           Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/:nm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/:nm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         meth	Magnesium	ppm	ASTM D5185m	450	851	832	967	
Zinc         ppm         ASTM D5185m         1350         1188         1118         1323           Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm	Calcium	ppm	ASTM D5185m	3000	1103	969	1172	
Sulfur         ppm         ASTM D5185m         4250         3377         2871         3865           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Phosphorus	ppm	ASTM D5185m	1150	1021	911	1091	
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Zinc	ppm	ASTM D5185m	1350	1188	1118	1323	
Silicon         ppm         ASTM D5185m         >25         3         3         3           Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Sulfur	ppm	ASTM D5185m	4250	3377	2871	3865	
Sodium         ppm         ASTM D5185m         >158         2         0         1           Potassium         ppm         ASTM D5185m         >20         0         0         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	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         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Silicon	ppm	ASTM D5185m	>25	3	3	3	
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Sodium	ppm	ASTM D5185m	>158	2	0	1	
Soot %         %         *ASTM D7844 >3         2.2         1.7         1.5           Nitration         Abs/cm         *ASTM D7624 >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7415 >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         13.6         12.7         14.1	Potassium	ppm	ASTM D5185m	>20	0	0	1	
Nitration         Abs/cm         *ASTM D7624         >20         8.6         7.5         8.3           Sulfation         Abs/.1mm         *ASTM D7615         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	INFRA-RED		method	limit/base	current	history1	history2	
Sulfation         Abs/.1mm         *ASTM D7415         >30         21.5         19.4         20.7           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         13.6         12.7         14.1	Soot %	%	*ASTM D7844	>3	2.2	1.7	1.5	
FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     13.6     12.7     14.1	Nitration	Abs/cm	*ASTM D7624	>20	8.6	7.5	8.3	
Oxidation Abs/.1mm *ASTM D7414 >25 <b>13.6</b> 12.7 14.1	Sulfation	Abs/.1mm	*ASTM D7415	>30	21.5	19.4	20.7	
	FLUID DEGRADA	TION	method	limit/base	current	history1	history2	
	Oxidation	Abs/.1mm	*ASTM D7414	>25	13.6	12.7	14.1	
	Base Number (BN)	mg KOH/g	ASTM D2896	8.5	9.95	9.31	10.32	



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VISUAL		method	limit/base	current	history1	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	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	TIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	14.4	13.7	14.0	13.8

	APHS							
Iror	n (ppi	m)						Lead (ppm)
Abno								80 - Asere  60 Abnomal 20
Dec2/16 +	May6/17	Sep12/17-	Apr24/18	Mar20/21-	Apr25/22	Nov10/22 +	Oct24/23	Dec2/16
Alu	minur	n (pp	m)					Chromium (ppm)
Abno								40 - dSevere  20 - dbnomal
Dec2/16	May6/17	Sep12/17	Apr24/18	Mar20/21	Apr25/22	Nov10/22	0ct24/23	Dec2/16 May6/17
Ser.		(ppm)						Silicon (ppm)  80 T Severe  60 Abrornal
Dec2/16	May6/17	Sep12/17	Apr24/18	Mar20/21-	Apr25/22 -	Nov10/22	0ct24/23	Dec2/16
Viso	cosity	@ 10						Base Number
Abno	ormal							Abnomal
Base	emal		$\rightarrow$					Abnormal Base Abnormal 5.0 Abnormal
Dec2/16 +	May6/17	Sep12/17	Apr24/18	Mar20/21+	Apr25/22 -	Nov10/22 -	0ct24/23	Dec2/16 - May6/17 - Sep12/17 - Apr24/18 - Apr25/22 - Nov10/22 -





**Sample No.** : RW0004731 Lab Number : 06176215

Unique Number : 11022268

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received Tested

: 10 May 2024 : 13 May 2024 Diagnosed : 13 May 2024 - Wes Davis HALLACK CONTRACTING, INC. 4223 W POLK

HART, MI US 49420 Contact: DAN HALLACK KARL BUTCHER

Test Package : MOB 2 Certificate 12367 To discuss this sample report, contact Customer Service at 1-800-237-1369.

shop@hallackcontracting.com T: (231)873-5081

\* - 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) F: (231)873-2889

Contact/Location: DAN HALLACK KARL BUTCHER - HALHAR