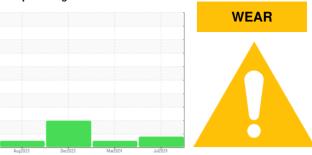


## **OIL ANALYSIS REPORT**

Sample Rating Trend



Machine Id

# **PETERBILT 433000**

Component
Natural Gas Engine

{not provided} (--- GAL)

### DIAGNOSIS

#### Recommendation

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

#### Wear

The aluminum level is abnormal. All other 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 Date         Client Info         12 Jul 2024         06 Mar 2024         18 Dec 2023           Machine Age         hrs         Client Info         708         319         220           Oil Age         hrs         Client Info         488         99         220           Oil Changed         Client Info         N/A         Not Changed         Changed           Sample Status         ABNORMAL         NORMAL         ABNORMAL           CONTAMINATION         method         limit/base         current         history1         history2           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Nickel         ppm         ASTM D5185m         >50         7         6         51           Nickel         ppm         ASTM D5185m         >20         0         <1         1           Jaluminum         ppm         ASTM D5185m         >3         <1         0         <0           Lead         ppm         ASTM D5185m         >30         0         0         <2           Copper			Aug202	3 Dec2023	Mar2024 Ji	12024	
Sample Date         Client Info         12 Jul 2024         06 Mar 2024         18 Dec 2023           Machine Age         hrs         Client Info         708         319         220           Oil Age         hrs         Client Info         488         99         220           Oil Changed         Client Info         N/A         Not Changed         Changed           Sample Status         Method         Image: Client Info         N/A         Not Changed         Changed           CONTAMINATION         method         limit/base         current         history1         history2           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Klore         ppm         ASTM D5185m         >4         1         <1         2           Nickel         ppm         ASTM D5185m         >2         0         0         <1           Titanium         ppm         ASTM D5185m         >3         <1         0         0           Silver         ppm         ASTM D5185m         >3         1         <1         0	SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         708         319         220           Oil Age         hrs         Client Info         488         99         220           Oil Changed         Client Info         N/A         Not Changed         Changed           Sample Status         method         limit/base         current         history1         history2           Water         WC Method         >0.1         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >2         0         0         <1	Sample Number		Client Info		GFL0109616	GFL0087484	GFL0087499
Oil Age         hrs         Client Info         488         99         220           Oil Changed         Client Info         N/A         Not Changed         Changed Changed           Sample Status         Method         Imitibase         current         history1         history2           Water         WC Method         >0.1         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >2         0         0         <1           Silver         ppm         ASTM D5185m         >3         <1         0         <1           Aluminum         ppm         ASTM D5185m         >9         14         2         2           Lead         ppm         ASTM D5185m         >30         0         0         2           Copper         ppm         ASTM D5185m         >33         1         <1         0         1 </td <td>Sample Date</td> <td></td> <td>Client Info</td> <td></td> <th>12 Jul 2024</th> <td>06 Mar 2024</td> <td>18 Dec 2023</td>	Sample Date		Client Info		12 Jul 2024	06 Mar 2024	18 Dec 2023
Contamped   Client Info	Machine Age	hrs	Client Info		708	319	220
ABNORMAL   NORMAL   ABNORMAL   CONTAMINATION   method   limit/base   current   history1   history2	Oil Age	hrs	Client Info		488	99	220
CONTAMINATION         method         limit/base         current         history1         history2           Water         WC Method         >0.1         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >4         1         <1	Oil Changed		Client Info		N/A	Not Changd	Changed
Water         WC Method         >0.1         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >4         1         <1         21         2           Nickel         ppm         ASTM D5185m         >2         0         0         <1           Silver         ppm         ASTM D5185m         >3         <1         0         0           Aluminum         ppm         ASTM D5185m         >3         <1         0         0           Aluminum         ppm         ASTM D5185m         >30         0         0         2           Lead         ppm         ASTM D5185m         >35         1         <1         9           Tin         ppm         ASTM D5185m         >41         <1         0         <1           Cadium         ppm         ASTM D5185m         <1         <1         0         <1           Mondardium         ppm         ASTM D5185m         41         51         30	Sample Status				ABNORMAL	NORMAL	ABNORMAL
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         7         6         51           Chromium         ppm         ASTM D5185m         >4         1         <1	CONTAMINATIO	NC	method	limit/base	current	history1	history2
Iron	Water		WC Method	>0.1	NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >4         1         <1         2           Nickel         ppm         ASTM D5185m         >2         0         0         <1           Titanium         ppm         ASTM D5185m         >2         0         0         <1           Silver         ppm         ASTM D5185m         >3         <1         0         0           Aluminum         ppm         ASTM D5185m         >3         <1         0         0           Lead         ppm         ASTM D5185m         >30         0         0         2           Copper         ppm         ASTM D5185m         >35         1         <1         9           Tin         ppm         ASTM D5185m         >4         <1         0         <1           Vanadium         ppm         ASTM D5185m         <4         <1         0         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         41         51         30           Barium         ppm         ASTM D5185m         47         48         51	WEAR METALS	3	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>50	7	6	51
Titanium         ppm         ASTM D5185m         <1         0         <1           Silver         ppm         ASTM D5185m         >3         <1	Chromium	ppm	ASTM D5185m	>4	1	<1	2
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	<1
Aluminum         ppm         ASTM D5185m         >9         ▲ 14         2         ▲ 21           Lead         ppm         ASTM D5185m         >30         0         0         2           Copper         ppm         ASTM D5185m         >35         1         <1	Titanium	ppm	ASTM D5185m		<1	0	<1
Lead         ppm         ASTM D5185m         >30         0         0         2           Copper         ppm         ASTM D5185m         >35         1         <1         9           Tin         ppm         ASTM D5185m         >4         <1         0         <1           Vanadium         ppm         ASTM D5185m         <1         <1         0         <0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         41         51         30           Barium         ppm         ASTM D5185m         47         48         51           Barium         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         47         48         51           Manganesium         ppm         ASTM D5185m         562         762         731         1099           Phosphorus         ppm         ASTM D5185m         763         703         715         21         21         4         4         4         4         4         4         4         4         6         8	Silver	ppm	ASTM D5185m	>3	<1	0	0
Copper         ppm         ASTM D5185m         >35         1         <1         9           Tin         ppm         ASTM D5185m         >4         <1	Aluminum	ppm	ASTM D5185m	>9	<u> </u>	2	<u>^</u> 21
Tin	Lead	ppm	ASTM D5185m	>30	0	0	2
Vanadium         ppm         ASTM D5185m         <1         <1         0           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         41         51         30           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         41         <1         4           Manganesium         ppm         ASTM D5185m         562         762         731           Calcium         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         905         872         836           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         39         4 <td>Copper</td> <td>ppm</td> <td>ASTM D5185m</td> <td>&gt;35</td> <th>1</th> <td>&lt;1</td> <td>9</td>	Copper	ppm	ASTM D5185m	>35	1	<1	9
Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         41         51         30           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         <1	Tin	ppm	ASTM D5185m	>4	<1	0	<1
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         41         51         30           Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         <1	Vanadium	ppm	ASTM D5185m		<1	<1	0
Boron	Cadmium	ppm	ASTM D5185m		<1	0	0
Barium         ppm         ASTM D5185m         0         0         0           Molybdenum         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         <1         <1         4           Magnesium         ppm         ASTM D5185m         562         762         731           Calcium         ppm         ASTM D5185m         1473         1234         1099           Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536            ppm         ASTM D5185m         >+100         8         8         96           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         6         85           I	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         47         48         51           Manganese         ppm         ASTM D5185m         <1         <1         4           Magnesium         ppm         ASTM D5185m         562         762         731           Calcium         ppm         ASTM D5185m         1473         1234         1099           Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         6           Soot %         %         *	Boron	ppm	ASTM D5185m		41	51	30
Manganese         ppm         ASTM D5185m         <1         <1         4           Magnesium         ppm         ASTM D5185m         562         762         731           Calcium         ppm         ASTM D5185m         1473         1234         1099           Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         ▲ 6           Potassium         ppm         ASTM D5185m         >20         39         4         ▲ 6           Soot %         %         *ASTM D7844         0         0         0         0           Nitration         Abs	Barium	ppm	ASTM D5185m		0	0	0
Magnesium         ppm         ASTM D5185m         562         762         731           Calcium         ppm         ASTM D5185m         1473         1234         1099           Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         7.3         6.2         9.6	Molybdenum	ppm	ASTM D5185m		47	48	51
Calcium         ppm         ASTM D5185m         1473         1234         1099           Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Potassium         ppm         ASTM D5185m         >20         39         4         6         85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0	Manganese	ppm	ASTM D5185m		<1	<1	4
Phosphorus         ppm         ASTM D5185m         763         703         715           Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         *ASTM D7414         >25         16.0         16.1	Magnesium	ppm	ASTM D5185m		562	762	731
Zinc         ppm         ASTM D5185m         905         872         836           Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         >20         39         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         ▲ 85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1 <t< td=""><td>Calcium</td><td>ppm</td><td>ASTM D5185m</td><td></td><th>1473</th><td>1234</td><td>1099</td></t<>	Calcium	ppm	ASTM D5185m		1473	1234	1099
Sulfur         ppm         ASTM D5185m         2395         2434         2536           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         <1	Phosphorus	ppm	ASTM D5185m		763	703	715
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         <1	Zinc	ppm	ASTM D5185m		905	872	836
Silicon         ppm         ASTM D5185m         >+100         8         8         96           Sodium         ppm         ASTM D5185m         <1         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         6           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	Sulfur	ppm	ASTM D5185m		2395	2434	2536
Sodium         ppm         ASTM D5185m         <1         4         6           Potassium         ppm         ASTM D5185m         >20         39         4         ▲85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	CONTAMINANT	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         39         4         ▲ 85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	Silicon	ppm	ASTM D5185m	>+100	8	8	96
Potassium         ppm         ASTM D5185m         >20         39         4         ▲ 85           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	Sodium	ppm	ASTM D5185m		<1	4	6
Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	Potassium	ppm	ASTM D5185m	>20	39	4	<b>▲</b> 85
Nitration         Abs/cm         *ASTM D7624         >20         7.3         6.2         9.6           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         19.1         20.0         20.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.0         16.1         17.4	Soot %	%	*ASTM D7844		0	0	0.1
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.0 16.1 17.4	Nitration	Abs/cm	*ASTM D7624	>20	7.3	6.2	9.6
Oxidation Abs/.1mm *ASTM D7414 >25 <b>16.0</b> 16.1 17.4	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.1		
	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	16.0	16.1	17.4
		mg KOH/g	ASTM D2896		8.2	9.3	7.5



### **OIL ANALYSIS REPORT**







Sample No.

Laboratory Lab Number : 06239858

: GFL0109616

Unique Number : 11128692

Test Package : FLEET

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 18 Jul 2024

**Tested** : 18 Jul 2024 Diagnosed : 19 Jul 2024 - Don Baldridge

GFL Environmental - 331 - Columbus

180 Ada Moore Rd Columbus, NC US 28722

Contact: Matt Segars matt.segars@gflenv.com T: (800)207-6618

Certificate 12367 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)

F: (252)617-2494