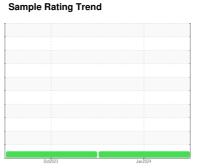


# **OIL ANALYSIS REPORT**



**NORMAL** 



Machine Id 308 Component

**Diesel Engine** 

RED GIANT LOCOMOTIVE EO 20W40 (--- G

# DIAGNOSIS

## Recommendation

Resample at the next service interval to monitor. Please specify the component make and model with your next sample.

All component wear rates are normal.

## Contamination

There is no indication of any contamination in the oil.

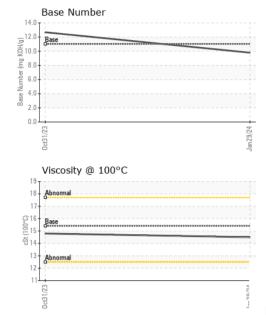
## **Fluid Condition**

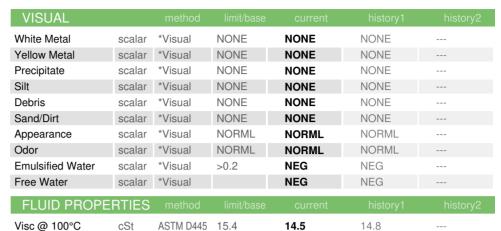
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION   method   limit/base   current   history1   history1   Sample Number   Client Info   PCA0092729   PCA05995909	AL)			0ct2023	Jan2024		
Sample Number   Client Info   PCA0092729   PCA05995909     Sample Date   Client Info   29 Jan 2024   31 Oct 2023     Machine Age   hrs   Client Info   0	SAMPLE INFOR	MATION	method			history1	history2
Sample Date   Client Info   29 Jan 2024   31 Oct 2023     Machine Age   hrs   Client Info   0	Sample Number		Client Info		PCA0092729		
Dil Age			Client Info		29 Jan 2024	31 Oct 2023	
Cilient Info	Machine Age	hrs	Client Info		0	0	
Contample   Cont	•	hrs	Client Info		0	0	
CONTAMINATION	-		Client Info		N/A	N/A	
Vicine   V					NORMAL	NORMAL	
Wear   Wc Method   Wc Method   Wc Method   Wc Method   NEG   NEG   Wc Method   Wc Method   NEG   NEG   Neg   Neg   Wc Method   Neg   Neg	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS	-uel		WC Method	>5	<1.0	<1.0	
WEAR METALS         method         limit/base         current         history1         history1           ron         ppm         ASTM D5185m         >100         27         28            Chromium         ppm         ASTM D5185m         >20         1         1            Nickel         ppm         ASTM D5185m         >4         0         <1	Nater		WC Method	>0.2	NEG	NEG	
Chromium	Glycol		WC Method		NEG	NEG	
ASTM D5185m	WEAR METAL	S	method	limit/base	current	history1	history2
ASTM D5185m	ron	ppm	ASTM D5185m	>100	27	28	
Silver	Chromium	ppm	ASTM D5185m	>20	1	1	
Saliver	Nickel	ppm	ASTM D5185m	>4	0	<1	
Addition   Part   ASTM D5185m   Part   Par	- itanium	ppm	ASTM D5185m		0	<1	
December   December	Silver	ppm	ASTM D5185m	>3	0	0	
Description	Aluminum	ppm	ASTM D5185m	>20	2	3	
Sin	ead	ppm	ASTM D5185m	>40	4	4	
Academium	Copper	ppm	ASTM D5185m	>330	11	13	
ADDITIVES		ppm	ASTM D5185m	>15	5	6	
ADDITIVES	/anadium	ppm	ASTM D5185m		<1	<1	
Soron   ppm   ASTM D5185m   33   31       Sarium   ppm   ASTM D5185m   0   <1       Molybdenum   ppm   ASTM D5185m   41   40       Manganese   ppm   ASTM D5185m   <1   <1       Manganesium   ppm   ASTM D5185m   12   10       Magnesium   ppm   ASTM D5185m   12   10       Calcium   ppm   ASTM D5185m   3144   3301       Chosphorus   ppm   ASTM D5185m   0   0   0   0       Cinc   ppm   ASTM D5185m   0   0   0   0       Sulfur   ppm   ASTM D5185m   1900   2780   3574       CONTAMINANTS   method   limit/base   current   history1   history1     Contassium   ppm   ASTM D5185m   >25   6   5       Cotassium   ppm   ASTM D5185m   7   7   7       Cotassium   ppm   ASTM D5185m   >20   3   2       INFRA-RED   method   limit/base   current   history1   history1     Altiration   Abs/cm   *ASTM D7624   >20   8.5   8.7       Sulfation   Abs/cm   *ASTM D7415   >30   16.3   16.4       FLUID DEGRADATION   method   limit/base   current   history1   history1     Contaction   Abs/.1mm   *ASTM D7414   >25   7.7   8.3	Cadmium	ppm	ASTM D5185m		0	<1	
Description	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         41         40            Manganese         ppm         ASTM D5185m         <1	Boron	ppm	ASTM D5185m		33	31	
Manganese         ppm         ASTM D5185m         <1         <1            Magnesium         ppm         ASTM D5185m         12         10            Calcium         ppm         ASTM D5185m         3144         3301            Phosphorus         ppm         ASTM D5185m         0         0         0            Zinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         5            Potassium         ppm         ASTM D5185m         >20         3         2            Potassium         ppm         ASTM D5185m         >20         3         2            Potassium         ppm         ASTM D5185m         >20         3         2            Potassium         ppm         ASTM D5185m         >20         3         2 </td <td>Barium</td> <td>ppm</td> <td>ASTM D5185m</td> <td></td> <td>0</td> <td>&lt;1</td> <td></td>	Barium	ppm	ASTM D5185m		0	<1	
Manganese         ppm         ASTM D5185m         <1         <1            Magnesium         ppm         ASTM D5185m         12         10            Calcium         ppm         ASTM D5185m         0         0         0            Phosphorus         ppm         ASTM D5185m         0         0         0            Zinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         histor           Silicon         ppm         ASTM D5185m         >25         6         5            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         histor           Soot %         *ASTM D7624         >20         8.5         8.7            Gulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4	Nolybdenum	ppm	ASTM D5185m		41	40	
Magnesium         ppm         ASTM D5185m         12         10            Calcium         ppm         ASTM D5185m         3144         3301            Phosphorus         ppm         ASTM D5185m         0         0         0            Zinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1         history1           Solicon         ppm         ASTM D5185m         >25         6         5            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1           Soot %         %         *ASTM D7844         >3         1.1         1            Sulfation         Abs/cm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current <td>-</td> <td></td> <td>ASTM D5185m</td> <td></td> <td>&lt;1</td> <td>&lt;1</td> <td></td>	-		ASTM D5185m		<1	<1	
Calcium         ppm         ASTM D5185m         3144         3301            Phosphorus         ppm         ASTM D5185m         0         0         0            Pinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1         history1           Solicon         ppm         ASTM D5185m         >25         6         5          5           Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1         history1           Solfation         Abs/cm         *ASTM D7624         >20         8.5         8.7            FLUID DEGRADATION         method         limit/base         current         history1         history1           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	/lagnesium		ASTM D5185m			10	
Phosphorus         ppm         ASTM D5185m         0         0         0            Zinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1           Solicon         ppm         ASTM D5185m         >25         6         5            Solicon         ppm         ASTM D5185m         7         7         7            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1         history1           Solfation         Abs/cm         *ASTM D7624         >20         8.5         8.7            FLUID DEGRADATION         method         limit/base         current         history1         history1         history1           Distoration         Abs/:mm         *ASTM D7414         >25         7.7         8.3	-		ASTM D5185m		3144	3301	
Zinc         ppm         ASTM D5185m         0         0         0            Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >25         6         5            Sodium         ppm         ASTM D5185m         7         7             Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1           Soot %         %         *ASTM D7844         >3         1.1         1            Sulfation         Abs/cm         *ASTM D7624         >20         8.5         8.7            FLUID DEGRADATION         method         limit/base         current         history1         history1           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	Phosphorus		ASTM D5185m	0	0	0	
Sulfur         ppm         ASTM D5185m         1900         2780         3574            CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >25         6         5            Sodium         ppm         ASTM D5185m         >20         3         2            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1         history1           Soot %         %         *ASTM D7624         >20         8.5         8.7            Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history1           Distory1         history2         7.7         8.3			ASTM D5185m	0	0	0	
Solition   ppm   ASTM D5185m   >25   6   5       Solition   ppm   ASTM D5185m   7   7   7       Potassium   ppm   ASTM D5185m   >20   3   2       INFRA-RED   method   limit/base   current   history1   history1     Solitation   Abs/cm   *ASTM D7844   >3   1.1   1       Sulfation   Abs/cm   *ASTM D7624   >20   8.5   8.7       Sulfation   Abs/.1mm   *ASTM D7415   >30   16.3   16.4       FLUID DEGRADATION   method   limit/base   current   history1   history1     Distortion   Abs/.1mm   *ASTM D7414   >25   7.7   8.3	Sulfur		ASTM D5185m	1900	2780	3574	
Sodium         ppm         ASTM D5185m         7         7            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history2         Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Rodium         ppm         ASTM D5185m         7         7            Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history2         history2         history3         history3         history3         history3         history3         history3         history3         history4         history3         history4         histo	Silicon	ppm	ASTM D5185m	>25	6	5	
Potassium         ppm         ASTM D5185m         >20         3         2            INFRA-RED         method         limit/base         current         history1         history1           Soot %         %         *ASTM D7844         >3         1.1         1            Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.7            Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history1         history2           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	Sodium		ASTM D5185m			7	
Goot %         %         *ASTM D7844         >3         1.1         1            Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.7            Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history1           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	Potassium			>20		2	
Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.7            Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history1           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	Soot %	%	*ASTM D7844	>3	1.1	1	
Sulfation         Abs/.1mm         *ASTM D7415         >30         16.3         16.4            FLUID DEGRADATION         method         limit/base         current         history1         history1           Dxidation         Abs/.1mm         *ASTM D7414         >25         7.7         8.3	Nitration	Abs/cm	*ASTM D7624	>20	8.5	8.7	
Oxidation Abs/.1mm *ASTM D7414 >25 <b>7.7</b> 8.3	Sulfation	Abs/.1mm	*ASTM D7415	>30			
	FLUID DEGRAI	DATION	method	limit/base	current	history1	history2
N. I. (DN) KOW ACTA POSSO 44	Oxidation	Abs/.1mm	*ASTM D7414	>25	7.7	8.3	
Base Number (BN)   mg KUH/g   ASTM D2896   11   9.79   12.68	Base Number (BN)	mg KOH/g	ASTM D2896	11	9.79	12.68	



# **OIL ANALYSIS REPORT**





VISC @ TOU'C	CSI	ASTIVI D445	15.4	14.5	14.0	
GRAPHS						
Iron (ppm)				Lead (ppm)		
Severe				Severe		
150 100 Abnormal				Abnormal		
!		***************************************		40 7		-
50				20		
0ct31/23			Jan29/24	0ct31/23		Jan29/24
			Jar		·	Jar
Aluminum (ppm)				Chromium (	.ppm)	
40 Severe				40 - Severe		
Abnormal				Abnormal		
10				10		
		_	- FZ	23 0		24
0ct31/23			Jan29/24	0ct31/23		Jan29/24
Copper (ppm)				Silicon (ppm	1)	
Severe Abnormal				80 Severe		
<u>200</u>				60 Ed 40		
100				Abnormal		
0				0		
0ct31/23			Jan29/24 -	0ct31/23		Jan29/24 -
			Jan			Jan
Viscosity @ 100°C				Base Number	er	
18 Abnormal				Base		
Base Abnormal				Base Number (ing KOH40)		
Abnormal				5.0		
10 12 23			24	0.0		
0c31/23			Jan29/24	0ct31/23		Jan29/24





Certificate L2367

Laboratory Sample No. Lab Number Unique Number Test Package : MOB 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : 06081507 : 10863598

: PCA0092729

Recieved Diagnosed Diagnostician

: 06 Feb 2024 : 07 Feb 2024 : Wes Davis

1731 S W.C. OWEN AVENUE

CLEWISTON, FL US 33440-3032 Contact: MAT RUDD

**U.S. SUGAR CORP** 

mrudd@ussugar.com T:

To discuss this sample report, contact Customer Service at 1-800-237-1369. \* - 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: