

OIL ANALYSIS REPORT

Sample Rating Trend





Machine Id 413033

Fluid

Component **Diesel Engine**

DIESEL ENGINE OIL SAE 15W40 (--- LTR)

Sample Number Client Info GFL0106110 GFL0106098 GFL007 Sample Date hrs Client Info 05 Mar 2024 04 Jan 2024 16 Oct 2 Machine Age hrs Client Info 3765 3207 2683 Oil Age hrs Client Info 600 600 593 Oil Changed Client Info Changed Sha	AE 15W40 (L	11)	Dec2022	Feb2023 Apr2023	Jul2023 Oct2023 Jan2024	Mar2024	
Sample Date Client Info 05 Mar 2024 04 Jan 2024 16 Oct 2 Machine Age hrs Client Info 3765 3207 2683 Oil Age hrs Client Info 600 600 593 Oil Changed Client Info Changed Changed<	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 3765 3207 2683 Oil Age hrs Client Info 600 600 593 Oil Changed Client Info Changed Changed Changed Changed Sample Status Imit Descent NORMAL NORMAR NORMAR NORMAR Fuel WC Method >3.0 <1.0	Sample Number		Client Info		GFL0106110	GFL0106098	GFL007863
Oil Age hrs Client Info 600 600 593 Oil Changed Client Info Changed Chand Chand Chand	Sample Date		Client Info		05 Mar 2024	04 Jan 2024	16 Oct 2023
Oil Changed Sample Status Client Info Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL NORMAL NORMAL CONTAMINATION method imit/base current history1 history1 history1 Fuel WC Method >0.0 NEG NEG NEG Water WC Method >0.2 NEG NEG NEG Chromium ppm ASIM D5165m >120 6 9 10 Chromium ppm ASIM D5165m >20 <1	Machine Age	hrs	Client Info		3765	3207	2683
Sample Status NORMAL NORMAL NORMAL NORMAL NORMAL CONTAMINATION method imil/base current history1 history1 Fuel WC Method >3.0 <1.0	Oil Age	hrs	Client Info		600	600	593
CONTAMINATION method limit/base current history1 hist Fuel WC Method >3.0 <1.0	Oil Changed		Client Info		Changed	Changed	Changed
Fuel WC Method >3.0 <1.0 <1.0 <1.0 <1.0 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	Sample Status				NORMAL	NORMAL	NORMAL
Water WC Method >0.2 NEG NEG NEG NEG Glycol WC Method WE Method Imit/base current history1 history1 Iron ppm ASTM D5185m >20 <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 hist Iron ppm ASTM D5185m >120 6 9 10 Chromium ppm ASTM D5185m >20 <1	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
WEAR METALS method limit/base current history1 history1 Iron ppm ASTM D5185m >120 6 9 10 Chromium ppm ASTM D5185m >20 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron ppm ASTM D5185m >120 6 9 10 Chromium ppm ASTM D5185m >20 <1	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1 <1 <1 Nickel ppm ASTM D5185m >5 4 2 1 Titanium ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >2 <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel ppm ASTM D5185m >5 4 2 1 Titanium ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >2 <1	Iron	ppm	ASTM D5185m	>120	6	9	10
Titanium ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >2 <1	Chromium	ppm	ASTM D5185m	>20	<1	<1	<1
Silver ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >20 3 2 3 Lead ppm ASTM D5185m >330 <1	Nickel	ppm	ASTM D5185m	>5	4	2	1
Aluminum ppm ASTM D5185m >20 3 2 3 Lead ppm ASTM D5185m >40 0 0 0 0 Copper ppm ASTM D5185m >330 <1	Titanium	ppm	ASTM D5185m	>2	0	0	0
Lead ppm ASTM D5185m >40 0 0 0 Copper ppm ASTM D5185m >330 <1	Silver	ppm	ASTM D5185m	>2	<1	0	0
Copper ppm ASTM D5185m >330 <1 1 5 Tin ppm ASTM D5185m >15 <1	Aluminum	ppm	ASTM D5185m	>20	3	2	3
Tin ppm ASTM D5185m >15 <1 0 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 hist Boron ppm ASTM D5185m 250 5 3 5 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 1042 1096 Phosphorus ppm ASTM D5185m 3000 1005 1042 1008 Zinc ppm ASTM D5185m 150 1268 1188 1235 Sulfur ppm ASTM D5185m >25 4 3	Lead	ppm	ASTM D5185m	>40	0	0	0
Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 hist Boron ppm ASTM D5185m 250 5 3 5 Barium ppm ASTM D5185m 10 0 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >20	Copper	ppm	ASTM D5185m	>330	<1	1	5
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history1 Boron ppm ASTM D5185m 250 5 3 5 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 58 59 64 Manganesium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2	Tin	ppm	ASTM D5185m	>15	<1	0	<1
ADDITIVES method limit/base current history1 history1 Boron ppm ASTM D5185m 250 5 3 5 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 3000 1005 1042 1096 Phosphorus ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base	Vanadium	ppm	ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 250 5 3 5 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 58 59 64 Magnesium ppm ASTM D5185m 100 58 59 64 Calcium ppm ASTM D5185m 100 58 931 934 Calcium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 3000 1005 1042 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 history1 Solicon ppm ASTM D5185m 2	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m 100 58 59 64 Magnesium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 3000 1005 1042 1096 Phosphorus ppm ASTM D5185m 1150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 history1 Solium ppm ASTM D5185m<	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 100 58 59 64 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m	250	5	3	5
Marganese ppm ASTM D5185m <1 0 0 Magnesium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 3000 1005 1042 1096 Phosphorus ppm ASTM D5185m 1150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 histor Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.Imm *ASTM D7624 >20	Barium	ppm	ASTM D5185m	10	0	0	0
Magnesium ppm ASTM D5185m 450 938 931 934 Calcium ppm ASTM D5185m 3000 1005 1042 1096 Phosphorus ppm ASTM D5185m 1150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 hist Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D7845 >20 4 4 8 INFRA-RED method limit/base current history1 history1 Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7415	Molybdenum	ppm	ASTM D5185m	100	58	59	64
Calcium ppm ASTM D5185m 3000 1005 1042 1096 Phosphorus ppm ASTM D5185m 1150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 hist Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >158 2 3 2 Nitration Abs/cm *ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 <	Manganese	ppm	ASTM D5185m		<1	0	0
Phosphorus ppm ASTM D5185m 1150 1029 1024 1008 Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 hist Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/cm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base	Magnesium	ppm	ASTM D5185m	450	938	931	934
Zinc ppm ASTM D5185m 1350 1268 1188 1235 Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 hist Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >158 2 3 2 Sootium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/cm *ASTM D7414 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base	Calcium	ppm	ASTM D5185m	3000	1005	1042	1096
Sulfur ppm ASTM D5185m 4250 3044 3318 3210 CONTAMINANTS method limit/base current history1 histor Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1		ppm	ASTM D5185m	1150			
CONTAMINANTS method limit/base current history1 history1 Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1		ppm	ASTM D5185m	1350	1268	1188	
Silicon ppm ASTM D5185m >25 4 3 4 Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >158 2 3 2 INFRA-RED method limit/base current history1 hist Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7615 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1			ASTM D5185m	4250	3044	3318	3210
Sodium ppm ASTM D5185m >158 2 3 2 Potassium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 history1 Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 4 4 8 INFRA-RED method limit/base current history1 history1 Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1		ppm					
INFRA-RED method limit/base current history1 history1 Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1		ppm	ASTM D5185m	>158			
Soot % % *ASTM D7844 >4 0.3 0.3 0.3 Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 histor Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1		ppm	ASTM D5185m	>20	4	4	8
Nitration Abs/cm *ASTM D7624 >20 7.6 8.1 7.4 Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1			method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 18.6 19.0 18.7 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1							
FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1					7.6	8.1	7.4
Oxidation Abs/.1mm *ASTM D7414 >25 15.2 15.7 15.1	Sulfation	Abs/.1mm	*ASTM D7415	>30	18.6	19.0	18.7
	FLUID DEGRAI		method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 8.5 7.9 7.5 7.6	Oxidation	Abs/.1mm	*ASTM D7414	>25	15.2	15.7	
	Base Number (BN)	mg KOH/g	ASTM D2896	8.5	7.9	7.5	7.6

DIAGNOSIS

Recommendation

Resample at the next service interval to monit Please specify the brand, type, and viscosity of oil on your next sample.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in oil.

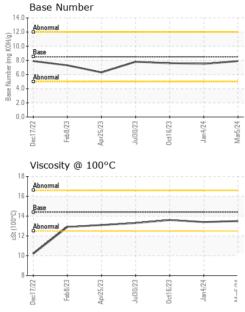
Fluid Condition

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



OIL ANALYSIS REPORT

VISUAL



Laboratory Sample No. Lab Number Unique Number Test Package To discuss this sample report,		: GFL01061 : <mark>06112640</mark>	Rece Test	Received: 08 Mar 2024Tested: 11 Mar 2024Diagnosed: 11 Mar 2024 - Wes Davis				FL Environmental - 152 - Jacksonvil 7580 PHILIPS HW Jacksonville, F US 3225 Contact: GRANVILLE CARROL gcarroll@gflenv.col						
			12 11 10 9	Feb8/23	Jul30/23 -	Oct16/23	Jan4/24	Base Number (mg KOH/g)	Abnormal	Apr25/23	Jul30/23	0ct16/23	Jan4/24	Marc/74
			16- 15- 000014- 13- 13- Abnormal					12.0	Abnormal Base					
			18 17 Abnormal					^{14.0}	Base Num	ber				
			50 0 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Feb8/23 Apr25/23 ty @ 100°C	Jul30/23	0ct16/23	Jan4/24 4			han				
			200											
			250	copper lead	ls									
			0 Dec17/22	Feb 8/23	Jul30/23	0ct16/23	Jan 4/24							
			톱 20	<u> </u>	<u> </u>									
Jul30/23 +	Jan4/24	VC/ J~~ VV	30 - 25	• iron • chromium • nickel										
			GRAF Ferrou		001	ASTM D	445 14.4		13.5		15.4		13.0	
			FLUID Visc @ 1		CSt		od limit. 445 14.4	/base	current		history1 13.4		histor 13.6	у2
	·		Free Wa	ter	scalar				NEG		NEG		NEG	
. 0		_	Odor Emulsifie	ed Water	scalar scalar		NORI >0.2		NORML NEG		NORML NEG		NORMI NEG	_
Jul30/23 Oct16/23	Jan4/24	Mar5/24	Appeara	nce	scalar		NOR		NORML		NORML		NORM	
			Sand/Dir	t	scalar		NON		NONE		NONE		NONE	
			Silt Debris		scalar scalar		NON		NONE NONE		NONE NONE		NONE NONE	
			Precipita	te	scalar		NON		NONE		NONE		NONE	
			Yellow M	letal	scalar	*Visual	NON	=	NONE		NONE		NONE	

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Submitted By: WITH iNDIANA GFL - Chris Smith