

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL

ADV MIX 181

Component Diesel Engine DIESEL ENGINE OIL SAE 15W40 (--- GAL)

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.

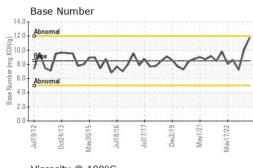


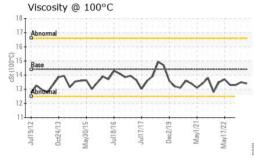


SAMPLE INFORM	1ATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0721066	WC0661737	WC0661451
Sample Date		Client Info		10 Jul 2023	04 May 2023	23 Dec 2022
Machine Age	hrs	Client Info		40000	40000	8814
Oil Age	hrs	Client Info		500	500	500
Oil Changed		Client Info		Changed	Changed	Changed
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	١	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	<1.0
Glycol		WC Method		NEG	NEG	NEG
	_	_	11 11 11			
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	39	67	60
Chromium	ppm	ASTM D5185m	>20	1	2	2
Nickel	ppm	ASTM D5185m	>2	<1	<1	<1
Titanium	ppm	ASTM D5185m		0	0	<1
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>25	2	3	<1
Lead	ppm	ASTM D5185m	>40	<1	0	<1
Copper	ppm	ASTM D5185m		2	3	4
Tin	ppm	ASTM D5185m	>15	<1	1	<1
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	method ASTM D5185m	limit/base 250	current	history1 11	history2 7
	ppm ppm					
Boron		ASTM D5185m	250	12	11	7
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	12 0	11 0	7 12
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	12 0 67	11 0 68	7 12 55
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	12 0 67 <1	11 0 68 <1 971 1256	7 12 55 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	12 0 67 <1 647	11 0 68 <1 971	7 12 55 <1 806
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	12 0 67 <1 647 1331	11 0 68 <1 971 1256	7 12 55 <1 806 1011
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350	12 0 67 <1 647 1331 1002	11 0 68 <1 971 1256 1131	7 12 55 <1 806 1011 891
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350	12 0 67 <1 647 1331 1002 1205	11 0 68 <1 971 1256 1131 1467	7 12 55 <1 806 1011 891 1096
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base	12 0 67 <1 647 1331 1002 1205 3250	11 0 68 <1 971 1256 1131 1467 4373	7 12 55 <1 806 1011 891 1096 2836
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base	12 0 67 <1 647 1331 1002 1205 3250 current	11 0 68 <1 971 1256 1131 1467 4373 history1	7 12 55 <1 806 1011 891 1096 2836 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25	12 0 67 <1 647 1331 1002 1205 3250 current 5	11 0 68 <1 971 1256 1131 1467 4373 history1 9	7 12 55 <1 806 1011 891 1096 2836 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158	12 0 67 <1 647 1331 1002 1205 3250 Current 5 <	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2	7 12 55 <1 806 1011 891 1096 2836 history2 4 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20	12 0 67 <1 647 1331 1002 1205 3250 current 5 <1 <1	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 imit/base >25 >158 >20 imit/base	12 0 67 <1 647 1331 1002 1205 3250 current 5 <1 <1 <1	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2 history1	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 2 0 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 Imit/base >25 >158 >20 Imit/base >3	12 0 67 <1 647 1331 1002 1205 3250 <u>current</u> 5 <1 <1 <1 <1 0.7	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2 history1 0.8	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 2 0 history2 0.7
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 Iimit/base >25 >158 >20 Iimit/base >3 >20	12 0 67 <1 647 1331 1002 1205 3250 current 5 <1 <1 <1 <1 current 0.7 8.5	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2 history1 0.8 9.3	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 2 0 history2 0.7 9.4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 imit/base >25 >158 >20 imit/base >3 >20 >3	12 0 67 <1 647 1331 1002 1205 3250 current 5 <1 <1 <1 <1 0.7 8.5 20.3	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2 history1 0.8 9.3 20.7	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 0 history2 0.7 9.4 20.5
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844 *ASTM D7844	250 10 100 450 3000 1150 1350 4250 imit/base >25 >158 >20 imit/base >3 >20 >30 imit/base	12 0 67 <1 647 1331 1002 1205 3250 Current 5 <1 <1 <1 <1 0.7 8.5 20.3 Current	11 0 68 <1 971 1256 1131 1467 4373 history1 9 2 2 2 history1 0.8 9.3 20.7 history1	7 12 55 <1 806 1011 891 1096 2836 history2 4 2 0 history2 0.7 9.4 20.5 history2



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	VISUAL		method	limit/base	current	history1	histor
	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
A	Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
	Silt	scalar	*Visual	NONE	NONE	NONE	NONE
	Debris	scalar	*Visual	NONE	NONE	NONE	NONE
	Sand/Dirt		*Visual	NONE	NONE	NONE	NONE
1/21	-						NORMI
May May 1					-	NORML	NORMI
							NEG
199900199900199990055999000199999	Free Water	scalar	*Visual	20.2	NEG	NEG	NEG
	FLUID PROPER	TIES	method	limit/base	current	history1	histor
	Visc @ 100°C	cSt	ASTM D445	14.4	13.4	13.5	13.3
$\sim\sim\sim$	GRAPHS						
	Iron (ppm)				Lead (ppm)		
2	Severe				Sama		
lay1/2 y17/2	200 - 0	1.111.111	0.001000		U + D		
N Mar	Abnormal						
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		h	-m				~
	/12 - 1 /13 - 1 /16 - 1	- 11/	- 12/I			/116	/19 1/21
	Juli 9 Oct24 Juli 8	Jult7	Dec2 May1		Jul19 Oct24 Aay30	Jul18 Jul17	Dec2/19 May1/21 May17/22
			2	:	2		2
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	40 T G						
				E 20	Abnormal		
		\sim	\sim				
	9/12 4/13 8/16	71/1	2/19			8/16 -	Dec2/19 - May1/21 - Iay17/22 -
	Jull 0ct2 Jull	Jult	May Mav1		Jull Oct2 May3	Jult	Dec2/19 May1/21 May17/22
	Copper (ppm)				Silicon (ppm)		
	600 T 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			8	⁰ Severe	100000000000000000000000000000000000000	
				61	0		
				E 4	n		
					Abnormal		
	100			2			٨
				(6 22 2
	rt 9/1 119/1 v/30/1 v/30/1	1/71ln	ec2/1 lay1/2		vi19/1 st24/1 v/30/1	1/8/1L	Dec2/19 May1//21 May17/22
	<			3	2	17 T	Na Na
	Viscosity @ 100°	3		15.0	0		
	Abnormal			(B/HC	Abnormal		Leens and
	16			g10.0	Base		
	Base	~					
	Base Base		tw	mber -	Abnormal		
	Base Monoamal	\checkmark		5.1	0 - Abnormal	~~~	~~~~
			Dec2/19 May1/21	Base 0.1	Aphorana (10,12,113) Aphorana (10,12,113) (10,12,113) (10,12,113) (10,12,113) (10,12,113) (10,113)	Jui18/16	Dec2/19 May/1/21 May/17/22
	May/121	Debris Sand/Dirt Appearance Odor Emulsified Water Free Water Free Water Conce Usc @ 100°C GRAPHS Iron (ppm) Copper (ppm) Copper (ppm) Uscosity @ 100°C	Debris scalar Sand/Dirt scalar Appearance scalar Odor scalar Emulsified Water scalar Free Water scalar Free Water scalar Free Water scalar Free Water scalar Free Water scalar Iron (ppm) Aluminum (ppm) Optime Copper (ppm) Optime Viscosity @ 100°C	Debris scalar *Visual Sand/Dirt scalar *Visual Appearance scalar *Visual Ddor scalar *Visual Emulsified Water scalar *Visual Free Water scalar *Visual Codor cst ASTM D445 CRAPHS Iron (ppm) Aluminum (ppm) Aluminum (ppm) Copper (ppm) C	Debris scalar *Visual NONE Sand/Dirt scalar *Visual NONE Appearance scalar *Visual NORML Odor scalar *Visual NORML Odor scalar *Visual NORML Emulsified Water scalar *Visual >0.2 Free Water scalar *Visual Visual FLUID PROPERTIES method limit/base Visc @ 100°C cSt ASTM D445 14.4 GRAPHS Iron (ppm) Copper	Debris scalar *Visual NONE NONE Sand/Dirt scalar *Visual NONE NONE Appearance scalar *Visual NORML NORML Odor scalar *Visual NORML NORML Emulsified Water scalar *Visual >0.2 NEG Free Water scalar *Visual >0.2 NEG Free Water scalar *Visual NORML NORML Visc @ 100°C cSt ASTM D445 14.4 13.4 GRAPHS Iron (ppm) Aluminum (ppm) Aluminum (ppm) Aluminum (ppm) Copper (ppm) Copper (ppm) Viscoslty @ 100°C Base Number	Debris scalar *Visual NONE NONE NONE NONE Sand/Dirt scalar *Visual NONE NONE NONE NONE Appearance scalar *Visual NORML NORML NORML NORML NORML Emulsified Water scalar *Visual NORML NORML NORML NORML Emulsified Water scalar *Visual NORML NORML NORML NORML Free Water scalar *Visual NORML NORML NORML NORML Visc @ 100°C cst ASTM D445 14.4 13.4 13.5 GRAPHS Tron (ppm)

Submitted By: JOHN HATZISTEFANOU