

# **OIL ANALYSIS REPORT**

#### Sample Rating Trend



## Machine Id HITACHI ZX135LC-6N HCMDAT60J00200241 - EVAL

## **Diesel Engine**

Fluid JOHN DEERE ENGINE OIL PLUS 50 II 15W40 (--- 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

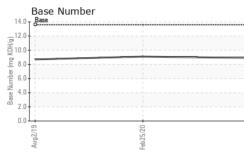
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

		Auş		Feb2020 Sep20		
SAMPLE INFORM	ΛΑΤΙΟΝ	method	limit/base	current	history1	history2
Sample Number		Client Info		JR0180134	JR0034757	JR0015895
Sample Date		Client Info		28 Sep 2023	25 Feb 2020	02 Aug 2019
Machine Age	hrs	Client Info		3056	988	453
Oil Age	hrs	Client Info		500	988	453
Oil Changed		Client Info		Changed	N/A	Changed
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATIO	N	method	limit/base	current	history1	history2
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	13	6	10
Chromium	ppm	ASTM D5185m	>20	0	<1	<1
Nickel	ppm	ASTM D5185m	>4	0	<1	<1
Titanium	ppm	ASTM D5185m		<1	<1	0
Silver	ppm	ASTM D5185m	>3	0	0	<1
Aluminum	ppm		>20	8	7	2
Lead	ppm	ASTM D5185m	>40	0	0	0
Copper	ppm		>330	3	7	13
Tin	ppm	ASTM D5185m	>15	<1	0	<1
Antimony	ppm	ASTM D5185m	210		9	0
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
	66.0			•	Ũ	Ū
			11 1.0			
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	ASTM D5185m	limit/base	204	233	122
	ppm ppm		limit/base	204 0	233 <1	122 2
Boron		ASTM D5185m	limit/base	204	233	122
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	204 0	233 <1	122 2
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	204 0 238	233 <1 235	122 2 7
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	204 0 238 <1	233 <1 235 <1	122 2 7 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	204 0 238 <1 807	233 <1 235 <1 798	122 2 7 <1 100
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	204 0 238 <1 807 1347	233 <1 235 <1 798 1605	122 2 7 <1 100 1969
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 ASTM D5185m	limit/base	204 0 238 <1 807 1347 922	233 <1 235 <1 798 1605 925	122 2 7 <1 100 1969 898
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 ASTM D5185m ASTM D5185m	limit/base	204 0 238 <1 807 1347 922 1102	233 <1 235 <1 798 1605 925 1083	122 2 7 <1 100 1969 898 989
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	limit/base	204 0 238 <1 807 1347 922 1102 3373	233 <1 235 <1 798 1605 925 1083 2523	122 2 7 <1 100 1969 898 989 3337
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	limit/base	204 0 238 <1 807 1347 922 1102 3373	233 <1 235 <1 798 1605 925 1083 2523 history1	122 2 7 <1 100 1969 898 989 3337 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 <b>method</b> ASTM D5185m	limit/base	204 0 238 <1 807 1347 922 1102 3373 current 8	233 <1 235 <1 798 1605 925 1083 2523 history1 10	122 2 7 <1 100 1969 898 989 3337 history2 18
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 <b>method</b> ASTM D5185m ASTM D5185m	limit/base >25 >20	204 0 238 <1 807 1347 922 1102 3373 current 8 0	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1	122 2 7 <1 100 1969 898 989 3337 history2 18 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2	233 <1 235 <1 798 1605 925 1083 2523 history1 10 10 1 8	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20 >5	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2 <1.0 current	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 8 <<1.0	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1 18 2 1 1 <1.0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20 >5 limit/base >3	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2 <1.0 current 0.1	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 8 <<1.0 history1 0.1	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1 1 <1.0 history2 0.1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D3524 <b>method</b> *ASTM D7844 *ASTM D7844	limit/base >25 >20 >5 limit/base >3 >20	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2 <1.0 current 0.1 8.0	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 8 <1.0 history1 0.1 7.8	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1 <1.0 +istory2 0.1 6.7
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20 >5 limit/base >3 >20 >3 >3	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2 <1.0 current 0.1 8.0 21.2	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 8 <1.0 history1 0.1 7.8 21.5	122 2 7 <1 100 1969 898 989 3337 <b>history2</b> 18 2 1 <1.0 <b>history2</b> 0.1 6.7 17.1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20 >20 >5 limit/base >3 >20 >30	204 0 238 <1 807 1347 922 1102 3373 Current 8 0 2 <1.0 current 0.1 8.0 2 1.2	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 10 1 8 <1.0 history1 0.1 7.8 21.5 history1	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1 <1.0 history2 0.1 6.7 17.1 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >25 >20 >5 limit/base >3 >20 >30 >30 limit/base >25	204 0 238 <1 807 1347 922 1102 3373 current 8 0 2 <1.0 current 0.1 8.0 21.2	233 <1 235 <1 798 1605 925 1083 2523 history1 10 1 8 <1.0 history1 0.1 7.8 21.5	122 2 7 <1 100 1969 898 989 3337 history2 18 2 1 <1.0 <1.0 history2 0.1 6.7 17.1



# **OIL ANALYSIS REPORT**

VISUAL



Feb.25,220	White Metal Yellow Metal Precipitate Silt Debris	scalar scalar scalar scalar	*Visual *Visual *Visual	NONE NONE NONE	NONE NONE NONE	NONE NONE NONE	NONE NONE NONE
5/20	Yellow Metal Precipitate Silt	scalar	*Visual	NONE NONE	NONE	NONE	NONE
5/20	Precipitate Silt	scalar	*Visual	NONE			
5/20	Silt						
5/20 +			*Visual	NONE	NONE	NONE	NONE
02/5		scalar	*Visual	NONE	NONE	NONE	NONE
- 5/20	Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
LD		scalar	*Visual	NORML	NORML	NORML	NORML
Eeb 2	Appearance Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Line (	Emulsified Water						
		scalar	*Visual	>0.2	NEG	NEG	NEG
	Free Water	scalar	*Visual		NEG	NEG	NEG
	FLUID PROPER		method	limit/base	current	history1	history2
	Visc @ 100°C	cSt	ASTM D445	15.4	12.7	13.4	12.2
	GRAPHS						
	Ferrous Alloys						
	iron						
	12 - chromium		/				
	10 -		/				
	E 8-		/				
		$\sim$					
	4						
	2						
	2	1					
	0 <b></b>	20+		23			
	Aug2/19	Feb25/20		Sep 28/23			
				ŏ			
20	Non-ferrous Met	als					
Feb 25/20	copper						
Ξ.	12 - necessarie lead						
	10						
	8- 4						
	ä 6-						
	4						
	2						
	0 <del>- p</del>	/20		/23			
	Aug2/19	Feb25/20		Sep 28/23			
	Viscosity @ 100			~			
	<sup>19</sup>			14.0	Base Number		
	18 - Abnormal			12.0			
	17-			( <sup>®</sup> ¥100-			
	⊋ <sup>16</sup> Base						
	016 Base 115 83			<u>Ε</u> δ.Ο·			
				( <sup>D</sup> HO) Bu 8.0 Bu 9.0 Particular (10.0 Bu 9.0 Bu 9.			
	13 - Abnormal			88 4.0·			
	12-			2.0	1		
	11						
	2/19	5/20 -			2/19	5/20	
	Aug2/19	Feb25/20		Sep 28/23	Aug2/19	Feb 25/20	
Laboratory		- 501 Madis Received Diagnos	d : 29 S	ry, NC 27513 Sep 2023 Oct 2023			<b>RE - ASHLAI</b> ADBETTER F ASHLAND, Y

Viscosity @ 100°C 19. Ab 18. 17 Base Abnorma 13 12 11 Feb25/20 -Aug2/19

> Laboratory Sample No. Lab Numbe

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Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

Contact/Location: DAVID ZIEG - JAMASH

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