BLACKSTONE LABORATORIES

OIL REPORT

LAB NUMBER: N14468
REPORT DATE: 2/23/2021
CODE: 63/75

UNIT ID: 06 MAINSHIP 34
CLIENT ID: 38191
PAYMENT: CC: Visa (Bulk)

UNIT

MAKE/MODEL: Yanmar 6LYAM-STP
FUEL TYPE: Diesel
ADDITIONAL INFO: FB Trawler

OIL TYPE & GRADE: Diesel Engine Oil
OIL USE INTERVAL: 25 Hours

CLIENT

RVEYING
PUNTA GORDA, FL 33950

PHONE:
FAX:
ALT PHONE:
EMAIL:

COMMENTS

The wear metals all tested within range of the universal averages for this type of Yanmar engine. Do note, though, that the averages are based on nearly 100 hours of oil use and this oil was in place just a fraction as long, so metals are a smidge elevated on a ppm/hour basis. That being said, there's nothing reading high enough or out of balance enough to suggest an obvious problem. No contamination was found and the viscosity tested within the 15W/40 range.

ELEMENTS IN PARTS PER MILLION

		UNIT / LOCATION AVERAGES						UNIVERSAL AVERAGES
MI/HR on Oil	26							
MI/HR on Unit	864							
Sample Date	2/16/2021							
Make Up Oil Added								
ALUMINUM	2	2						3
CHROMIUM	1	1						1
IRON	19	19						19
COPPER	11	11						15
LEAD	0	0						1
TIN	0	0						1
MOLYBDENUM	1	1						4
NICKEL	0	0						0
MANGANESE	0	0						1
SILVER	0	0						0
TITANIUM	0	0						0
POTASSIUM	9	9						7
BORON	191	191						154
SILICON	3	3						6
SODIUM	3	3						5
CALCIUM	2208	2208						2277
MAGNESIUM	12	12						109
PHOSPHORUS	1069	1069						1107
ZINC	1180	1180						1241
BARIUM	0	0						0

PROPERTIES

		Values Should Be*					
SUS Viscosity @ 210°F	73.7						
cSt Viscosity @ 100°C	13.91						
Flashpoint in °F	450	>415					
Fuel %	<0.5	<2.5					
Antifreeze %	0.0	0.0					
Water %	0.0	0.0					
Insolubles %	0.3	<0.6					
TBN							
TAN							
ISO Code							

* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806 (260) 744-2380 www.blackstone-labs.com

BLACKSTONE LABORATORIES

OIL REPORT

LAB NUMBER: N14469
REPORT DATE: 2/23/2021
CODE: 63/75

UNIT ID: 06 MAINSHIP 34-T
CLIENT ID: 38191
PAYMENT: CC: Visa (Bulk)

UNIT

MAKE/MODEL: Transmission ZF 80
FUEL TYPE:
ADDITIONAL INFO: FB Trawler

OIL TYPE & GRADE: ATF
OIL USE INTERVAL: 100 Hours

CLIENT

- MARINE SURVEYING
PUNTA GORDA, FL 33950

PHONE:
FAX:
ALT PHONE:
EMAIL: jgu

COMMENTS

This transmission is leaving more copper and lead behind than we typically find from these units, but when it comes to marine transmission, both metals could be from a harmless source instead of showing excess wear. Both metals often come from the heat exchanger or oil cooler, and that's what we suspect for this unit. They could show excess brass/bronze and bearing wear, but we aren't sure that's the case, especially if all is well on your end. Nickel is typically a coating or alloying element, and it's just something to note. The oil's physical properties are fine for ATF.

ELEMENTS IN PARTS PER MILLION

MI/HR on Oil	100	UNIT / LOCATION AVERAGES						UNIVERSAL AVERAGES
MI/HR on Unit	664							
Sample Date	2/16/2021							
Make Up Oil Added								
ALUMINUM	3	3						1
CHROMIUM	0	0						0
IRON	70	70						38
COPPER	**180**	180						34
LEAD	**410**	410						12
TIN	3	3						1
MOLYBDENUM	0	0						10
NICKEL	**10**	10						0
MANGANESE	3	3						0
SILVER	1	1						0
TITANIUM	0	0						0
POTASSIUM	5	5						1
BORON	55	55						93
SILICON	5	5						6
SODIUM	3	3						4
CALCIUM	56	56						329
MAGNESIUM	5	5						7
PHOSPHORUS	264	264						284
ZINC	124	124						116
BARIUM	389	389						2

PROPERTIES

		Values Should Be*					
SUS Viscosity @ 210°F	42.1	42-51					
cSt Viscosity @ 100°C	4.81	4.8-7.9					
Flashpoint in °F	430	>335					
Fuel %	-						
Antifreeze %	0.0	0.0					
Water %	0.0	0.0					
Insolubles %	TR	<0.1					
TBN							
TAN							
ISO Code							

* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

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BLACKSTONE LABORATORIES

OIL REPORT

LAB NUMBER: N14470
REPORT DATE: 2/23/2021
CODE: 63/75

UNIT ID: 06 MAINSHIP 34-G
CLIENT ID: 38191
PAYMENT: CC: Visa (Bulk)

UNIT

MAKE/MODEL: Kohler 8E0Z
FUEL TYPE: Diesel
ADDITIONAL INFO: FB Trawler

OIL TYPE & GRADE: Diesel Engine Oil
OIL USE INTERVAL: 6 Hours

CLIENT

MARINE SURVEYING
PUNTA GORDA, FL 33950

PHONE:
FAX:
ALT PHONE:
EMAIL:

COMMENTS

This sample from the generator shows more metal than we'd expect after just 6 hours of oil use. Universal averages for this type of engine show typical wear after ~60 hours on the oil. Aluminum is from the pistons and iron is from steel parts like cylinders and rotating shafts. Silicon could be contributing if it's dirt, but it might be a harmless sealer/lube if this unit was recently opened for service. Sodium is a marker for coolant and sea water. We're leaning toward sea water because potassium (another marker) isn't too high. Inspect the cooling and air filtration systems.

ELEMENTS IN PARTS PER MILLION

		UNIT / LOCATION AVERAGES						UNIVERSAL AVERAGES
MI/HR on Oil	6							
MI/HR on Unit	545							
Sample Date	2/16/2021							
Make Up Oil Added								
ALUMINUM	**8**							2
CHROMIUM	1							1
IRON	**22**							12
COPPER	2							3
LEAD	1							1
TIN	1							0
MOLYBDENUM	0							16
NICKEL	0							0
MANGANESE	0							0
SILVER	0							0
TITANIUM	0							0
POTASSIUM	9							4
BORON	188							69
SILICON	**16**							9
SODIUM	**44**							9
CALCIUM	2143							2156
MAGNESIUM	17							196
PHOSPHORUS	991							1062
ZINC	1093							1196
BARIUM	1							0

PROPERTIES

		Values Should Be*					
SUS Viscosity @ 210°F	73.9						
cSt Viscosity @ 100°C	13.97						
Flashpoint in °F	445	>415					
Fuel %	<0.5	<2.0					
Antifreeze %	**POS**	0.0					
Water %	0.0	0.0					
Insolubles %	0.1	<0.6					
TBN							
TAN							
ISO Code							

*** THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE**

416 E. PETTIT AVE. FORT WAYNE, IN 46806 (260) 744-2380 www.blackstone-labs.com

BLACKSTONE LABORATORIES — GAS/DIESEL REPORT

LAB NUMBER: D95618 **UNIT ID:** 05 F250
REPORT DATE: 7/25/2018 **CLIENT ID:** 28751
CODE: 22/16 **PAYMENT:** CC: Visa

You'll need your client ID if you want to log on to www.blackstone-labs.net and view your reports.

This is a good place to identify things like bypass filtration, mods, etc.

UNIT

EQUIP. MAKE/MODEL: Navistar 6.0L Power Stroke
FUEL TYPE: Diesel
ADDITIONAL INFO: This vehicle is the love of my life. I will never sell it.
OIL TYPE & GRADE: Shell Rotella T 15W/40
OIL USE INTERVAL: 4,907 Miles

CLIENT

OSCAR HUFF
OSCAR'S WORKSHOP
132 PERIWINKLE RD
STE. 102
SWANNANOA, NC 18752
PHONE: (828) 123-5897
FAX: (828) 123-1547
ALT PHONE: (828) 123-1564
EMAIL: oscar@bellsouth.com

COMMENTS

OSCAR: The fuel we spoke of last time improved to 0.5% in this sample. Iron took a big step in the right direction, too. All wear now re d in the proper balance to indicate your engine is free of any obvi ity is common to the 6.0L but the fuel may have lowered it as well. No coolant or moisture was found. Both silicon and insolubles read normally showing good air and oil filtration. At 47,356 total miles your PSD is wearing well. We think you could run the oil a little longer, if you're interested.

Sample report

The amount of oil you added between oil changes.

This is the average wear for this particular type of engine for you or your business.

This column shows average wear for all the samples we've seen from this type of engine.

The additives in this column are a mix of all different types of oil, so you can't compare them to your sample.

ELEMENTS IN PARTS PER MILLION

	MI/HR on Oil	4,907	UNIT / LOCATION AVERAGES	5,134	5,012	4,832	3,715	UNIVERSAL AVERAGES
	MI/HR on Unit	47,356		42,449	37,315	32,303	27,471	
	Sample Date	12/02/16		10/06/16	07/12/16	05/21/16	04/16/16	
	Made Up Oil	0 qts		0 qts	0 qts	2 qts	5 qts	
	ALUMINUM	4	4	4	3	4	**6**	8
	CHROMIUM	2	2	1	1	1	2	1
	IRON	30	31	**44**	24	23	33	29
	COPPER	2	4	3	2	2	3	3
	LEAD	2	3	3	4	5	5	3
	TIN	0	1	0	1	2	2	1
	MOLYBDENUM	4	4	5	5	4	4	29
	NICKEL	1	1	1	1	0	1	0
	MANGANESE	0	0	0	0	0	1	0
	SILVER	0	0	0	0	0	0	0
	TITANIUM	0	0	0	0	0	0	0
	POTASSIUM	3	3	2	1	2	2	4
	BORON	0	2	1	2	0	1	32
	SILICON	9	14	**1**	8	9	13	11
	SODIUM	4	3	3	3	3	4	8
	CALCIUM	3430	3437	3970	3632	3525	3015	3142
	MAGNESIUM	10	11	11	9	10	11	38
	PHOSPHORUS	1204	1190	1289	1274	1212	1246	1116
	ZINC	1345	1325	1508	1381	1392	1387	1279
	BARIUM	0	0	0	0	0	1	2

The tests in the Properties box look at the physical condition of the oil.

PROPERTIES

	Values Should Be*	From left to right, these are your past samples.			
SUS Viscosity @ 210°F	**65.5**	69-80	**65.9**	**65.7**	**63.4**	**60.3**
cSt Viscosity @ 100°C	**11.74**	12.7-16.5	**11.85**	**11.79**	**11.16**	**10.29**
Flashpoint in °F	**405**	>410	**390**	430	**390**	**400**
Fuel %	0.5	<2.0	**2.0**	<0.5	<0.5	1.0
Antifreeze %	0.0	0.0	0.0	0.0	0.0	0.0
Water %	0.0	0.0	0.0	0.0	0.0	0.0
Insolubles %	0.3	<0.6	**0.3**	0.2	0.3	0.3
TBN	6.3		8.4	9.5	6.6	12.5
TAN						
ISO Code						

*** THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE**

BLACKSTONE LABORATORIES

Gas/Diesel Engine Report Explanation

Averages: Both the universal and unit averages are running averages and change with the number of samples we analyze.

Elements: Elements are quantified in the oil at parts per million levels (PPM). This list shows the most common sources of the elements in gasoline or diesel engine oil. Following each element is a description of where it comes from. They are grouped by category.

Wear Metals
Aluminum: Pistons, bearings, cases (heads & blocks). Clutch assembly and transmission components in motorcycles
Chromium: Rings, a trace element in steel
Iron: Cylinders, rotating shafts, the valve train, and any steel part sharing the oil. Transmission shafts/gears and bearings in motorcycles
Copper: Brass or bronze parts, copper bushings, bearings, oil coolers
Lead: Bearings, leaded gas, fuel additives
Tin: Bearings, bronze parts, piston coating (rare)
Nickel: Trace element in steel, platings on some cylinder types
Silver: Bearings
Titanium: Some intake valves and connecting rods, aftermarket parts, oil additive

Contaminants
Potassium: Antifreeze, additive in some oil types
Sodium: Antifreeze (ethylene glycol), additive in some gasoline engine oils. Sea water in marine engines
Silicon: Airborne dirt escaping air filtration, sealers, gaskets, sand-casted parts, and spray lubricants, antifreeze inhibitor, oil additive

Additives
Molybdenum: Anti-wear additive, some types of rings
Manganese: Trace element, additive in some gasoline
Boron: Detergent/dispersant additive, antifreeze inhibitors
Calcium: Detergent/dispersant additive
Magnesium: Detergent/dispersant additive
Phosphorus: Anti-wear additive
Zinc: Anti-wear additive
Barium: Detergent/dispersant additive used in some synthetics

Physical properties
Viscosity/Flashpoint: If fuel is present in the oil, the Viscosity and Flashpoint will often be lower than stated in the "Values Should Be" line. A high viscosity may show oil oxidation or high levels of soot. It can also show an oil additive in use.
Fuel %: Indicates the amount of volatile fuel dilution found in the oil.
Antifreeze %: Indicates the amount of antifreeze found in the oil. A question mark means we found possible traces of coolant, but not enough to definitively say it's there.
Water %: Indicates the amount of water found in the oil.
Insolubles %: Insolubles are solid materials present in the oil. They are typically free carbon

from the oxidation of the oil itself, along with blow-by past the rings.