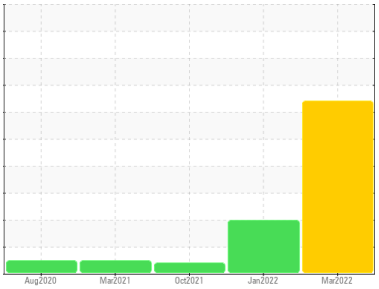
OIL ANALYSIS REPORT

Area
GUAY SON [CONHER]
Machine Id
CATERPILLAR NAUTICO 5
Component
Auxilary Power Unit Auxiliary Engine
Fluid
Xtra Rev 15W40 (8 LTR)

Sample Rating Trend



DIRT

DIAGNOSIS

Recommendation

We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. Patch analysis: there is mild to moderate wear debris present, consistent with the wear metals analysis of elevated wear in the cylinder region. Presence of dirt is not readily evident, however, a visual review of dirt in a diesel engine is generally not possible due to the dark staining of non-metallic debris making dirt appear similar to soot. Please note that this is a corrected copy for diagnostic comment updates.

Wear

The tin level is abnormal. Ring and cylinder wear is indicated.

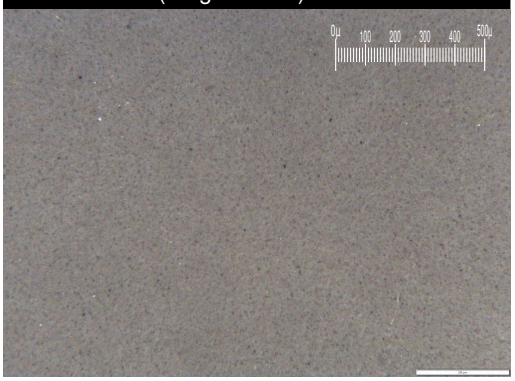
Contamination

There is a moderate amount of particulates present in the oil. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.

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.

Particle Filter (Magn: 100 x)



SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**KL0009184**	KL0007679	KL0006832
Sample Date		Client Info		**20 Mar 2022**	28 Jan 2022	28 Oct 2021
Machine Age	hrs	Client Info		**11217**	10095	8151
Oil Age	hrs	Client Info		**408**	984	336
Oil Changed		Client Info		**Changed**	Not Changd	Not Changd
Sample Status				**ABNORMAL**	ABNORMAL	MARGINAL

CONTAMINATION		method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	**<1.0**	<1.0	<1.0
Glycol		WC Method		**NEG**	NEG	NEG

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	▲ **120**	22	24
Chromium	ppm	ASTM D5185m	>20	▲ **23**	2	1
Nickel	ppm	ASTM D5185m	>2	**0**	<1	<1
Titanium	ppm	ASTM D5185m	>2	**<1**	<1	<1
Silver	ppm	ASTM D5185m	>2	**1**	<1	0
Aluminum	ppm	ASTM D5185m	>20	▲ **21**	5	3
Lead	ppm	ASTM D5185m	>40	**20**	2	2
Copper	ppm	ASTM D5185m	>330	**7**	1	2
Tin	ppm	ASTM D5185m	>15	▲ **21**	<1	<1
Antimony	ppm	ASTM D5185m		**---**	<1	<1
Vanadium	ppm	ASTM D5185m		**0**	<1	<1
Cadmium	ppm	ASTM D5185m		**0**	<1	<1

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		**286**	229	192
Barium	ppm	ASTM D5185m		**0**	0	0
Molybdenum	ppm	ASTM D5185m		**107**	119	100
Manganese	ppm	ASTM D5185m		**4**	<1	<1
Magnesium	ppm	ASTM D5185m		**639**	599	550
Calcium	ppm	ASTM D5185m		**1677**	1890	2251
Phosphorus	ppm	ASTM D5185m		**897**	1038	1058
Zinc	ppm	ASTM D5185m		**1103**	1262	1387
Sulfur	ppm	ASTM D5185m		**2642**	2800	3081

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>25	▲ **47**	11	14
Sodium	ppm	ASTM D5185m		**22**	16	3
Potassium	ppm	ASTM D5185m	>20	**2**	2	<1

INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844		**0.7**	0.2	0.2
Nitration	Abs/cm	*ASTM D7624	>20	**10.2**	11.8	12.3
Sulfation	Abs/.1mm	*ASTM D7415	>30	**25.2**	26.3	25.7

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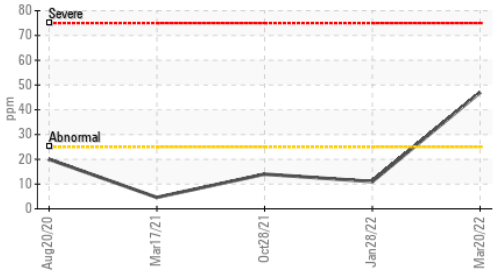
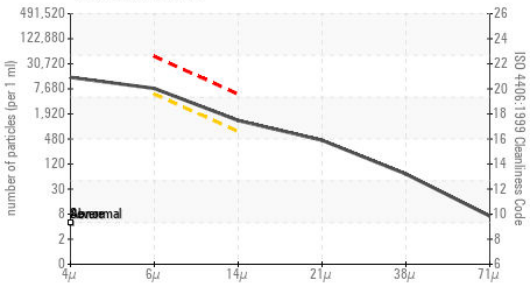
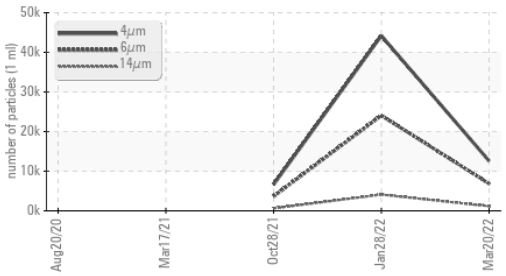
Silicon (ppm)



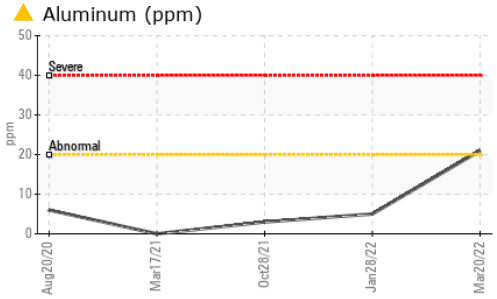
Particle Count



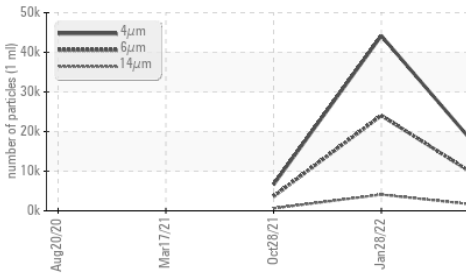
Particle Trend



Aluminum (ppm)



Particle Trend



FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		**12578**	44183	6618
Particles >6µm		ASTM D7647	>5000	▲ **6852**	▲ 24069	3605
Particles >14µm		ASTM D7647	>640	▲ **1166**	▲ 4096	614
Particles >21µm		ASTM D7647	>160	▲ **393**	▲ 1380	207
Particles >38µm		ASTM D7647	>40	▲ **61**	▲ 213	32
Particles >71µm		ASTM D7647	>10	**6**	▲ 22	3
Oil Cleanliness		ISO 4406 (c)	>19/16	▲ **20/17**	▲ 22/19	19/16

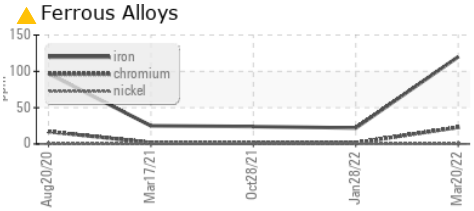
FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414	>25	**22.4**	25.6	24.9
Base Number (BN)	mg KOH/g	ASTM D2896		**8.67**	9.18	9.34

VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Precipitate	scalar	*Visual	NONE	**NONE**	NONE	NONE
Silt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Debris	scalar	*Visual	NONE	**NONE**	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Appearance	scalar	*Visual	NORML	**NORML**	NORML	NORML
Odor	scalar	*Visual	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	**NEG**	NEG	NEG
Free Water	scalar	*Visual		**NEG**	NEG	NEG

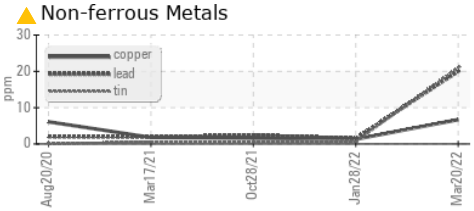
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445		**15.7**	16.3	▲ 16.8

GRAPHS

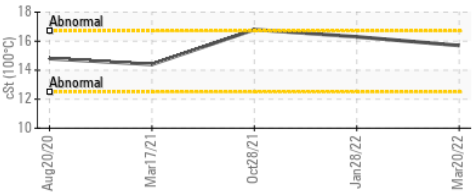
Ferrous Alloys



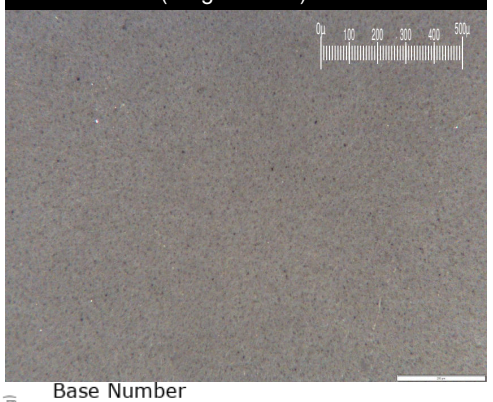
Non-ferrous Metals



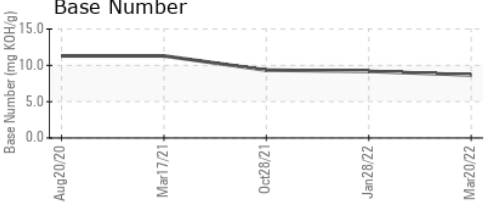
Viscosity @ 100°C



Particle Filter (Magn: 100 x)



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : KL0009184 **Received** : 30 Mar 2022
Lab Number : 05505931 **Diagnosed** : 02 May 2022
Unique Number : 9915205 **Diagnostician** : Aaron Black
Test Package : MOB 2 (Additional Tests: BOTTOM, BottomAnalysis, FILTERPATCH, PrtCount)

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)

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