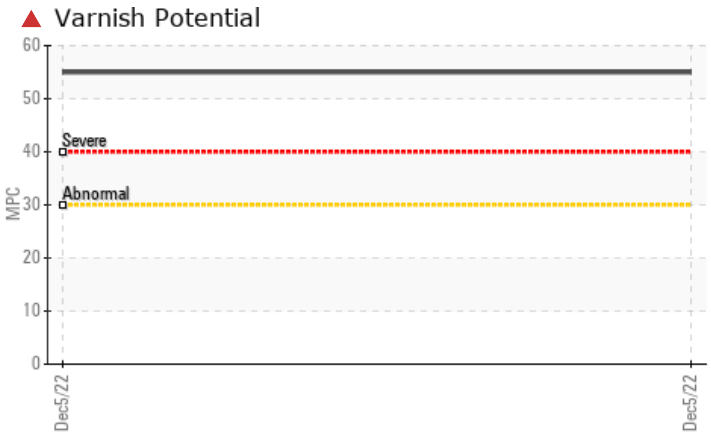
PROBLEM SUMMARY

Sample Rating Trend

INSOLUBLES

Machine Id
VACUUM DEGASSER PUMP
Component
Hydraulic System
Fluid
SHELL TELLUS S2 MX 46 (15000 GAL)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

We recommend that you use depth filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition. Additional phone discussion regarding this analysis included information that the spot test for varnish on the MPC indicated that not all of the varnish components are purely varnish. Pure varnish will react to the test chemical and this MPC did not react as typical for varnish, suggesting there is a secondary process happening in the lubricant creating solids such as ash or a chemical conversion to another chemical or polymer that is insoluble. This may be a result of mixing lubricant with incompatible additives, or may be a result of a combustion process such as filtration static arcing or microdieseling. Please note that this is a corrected copy of this report to include additional commentary to document phone conversation points.

PROBLEMATIC TEST RESULTS

Sample Status				**SEVERE**	---	---
MPC Varnish Potential	Scale	ASTM D7843	>15	▲ **55**	---	---

Customer Id: GENWAR
Sample No.: WC0766768
Lab Number: 05716377
Test Package: AOM 1

To manage this report scan the QR code

To discuss the diagnosis or test data:
Aaron Black +1
aaron.black@wearcheck.com

To change component or sample information:
Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Resample	MISSED	Jan 30 2023	?	We recommend an early resample to monitor this condition.
Filter Fluid	MISSED	Jan 30 2023	?	We recommend that you use electrostatic filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level.

HISTORICAL DIAGNOSIS

OIL ANALYSIS REPORT

Sample Rating Trend

INSOLUBLES

Machine Id
VACUUM DEGASSER PUMP
Component
Hydraulic System
Fluid
SHELL TELLUS S2 MX 46 (15000 GAL)

DIAGNOSIS

Recommendation

We recommend that you use depth filtration to remove insolubles from the oil and to reduce the levels of varnish in the system. Alternatively draining a percentage of the oil and topping up with fresh oil (sweetening the oil) may provide a reduction in the varnish potential level. We recommend an early resample to monitor this condition. Additional phone discussion regarding this analysis included information that the spot test for varnish on the MPC indicated that not all of the varnish components are purely varnish. Pure varnish will react to the test chemical and this MPC did not react as typical for varnish, suggesting there is a secondary process happening in the lubricant creating solids such as ash or a chemical conversion to another chemical or polymer that is insoluble. This may be a result of mixing lubricant with incompatible additives, or may be a result of a combustion process such as filtration static arcing or microdieseling. Please note that this is a corrected copy of this report to include additional commentary to document phone conversation points.

Wear

All component wear rates are normal.

Contamination

MPC (Membrane Patch Colorimetry) test indicates a high concentration of varnish present. The amount and size of particulates present in the system are acceptable.

Fluid Condition

The AN level is acceptable for this fluid. Linear Sweep Voltammetry (RULER – ASTM D6971) testing indicates normal levels of anti-oxidants present in the oil.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0766768**	---	---
Sample Date		Client Info		**05 Dec 2022**	---	---
Machine Age	hrs	Client Info		**0**	---	---
Oil Age	hrs	Client Info		**0**	---	---
Oil Changed		Client Info		**N/A**	---	---
Sample Status				**SEVERE**	---	---

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>20	**0**	---	---
Chromium	ppm	ASTM D5185m	>20	**0**	---	---
Nickel	ppm	ASTM D5185m	>20	**0**	---	---
Titanium	ppm	ASTM D5185m		**0**	---	---
Silver	ppm	ASTM D5185m		**0**	---	---
Aluminum	ppm	ASTM D5185m	>20	**0**	---	---
Lead	ppm	ASTM D5185m	>20	**0**	---	---
Copper	ppm	ASTM D5185m	>20	**<1**	---	---
Tin	ppm	ASTM D5185m	>20	**0**	---	---
Vanadium	ppm	ASTM D5185m		**0**	---	---
Cadmium	ppm	ASTM D5185m		**0**	---	---

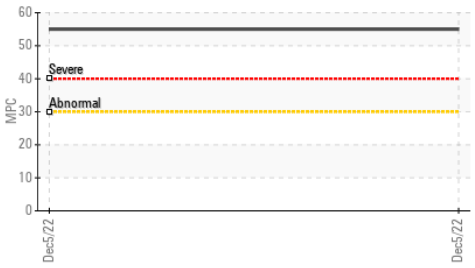
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		**0**	---	---
Barium	ppm	ASTM D5185m		**0**	---	---
Molybdenum	ppm	ASTM D5185m		**0**	---	---
Manganese	ppm	ASTM D5185m		**0**	---	---
Magnesium	ppm	ASTM D5185m		**2**	---	---
Calcium	ppm	ASTM D5185m		**28**	---	---
Phosphorus	ppm	ASTM D5185m		**278**	---	---
Zinc	ppm	ASTM D5185m		**320**	---	---
Sulfur	ppm	ASTM D5185m		**867**	---	---

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>15	**0**	---	---
Sodium	ppm	ASTM D5185m		**0**	---	---
Potassium	ppm	ASTM D5185m	>20	**1**	---	---
Water	%	ASTM D6304	>0.05	**0.003**	---	---
ppm Water	ppm	ASTM D6304	>500	**39.7**	---	---

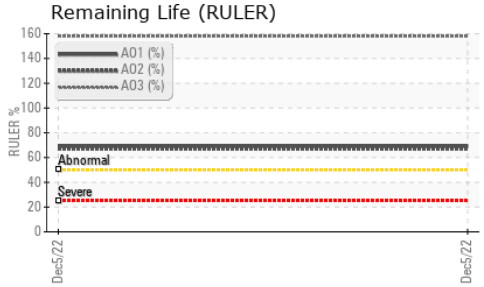
FLUID CLEANLINESS	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647	>5000	**106**	---	---
Particles >6µm	ASTM D7647	>1300	**36**	---	---
Particles >14µm	ASTM D7647	>160	**4**	---	---
Particles >21µm	ASTM D7647	>40	**2**	---	---
Particles >38µm	ASTM D7647	>10	**0**	---	---
Particles >71µm	ASTM D7647	>3	**0**	---	---
Oil Cleanliness	ISO 4406 (c)	>19/17/14	**14/12/9**	---	---

OIL ANALYSIS REPORT

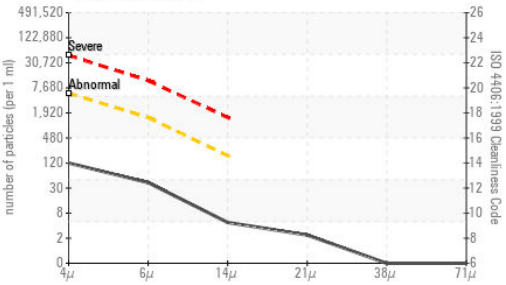
Varnish Potential



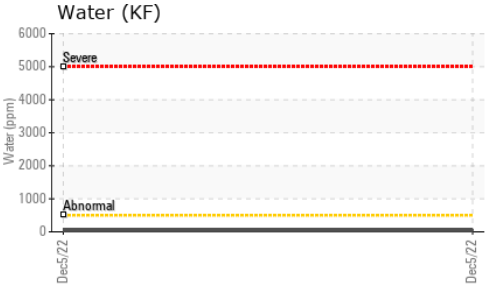
Remaining Life (RULER)



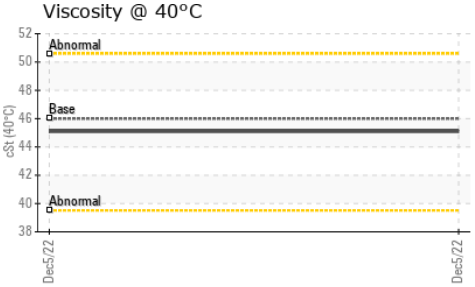
Particle Count



Water (KF)



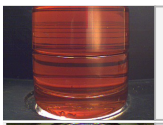
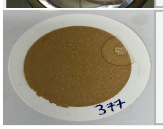
Viscosity @ 40°C



FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045		**0.33**	---	---
Anti-Oxidant 1	%	ASTM D6971	<25	**69**	---	---
Anti-Oxidant 2	%	ASTM D6971	<25	**67**	---	---
Anti-Oxidant 3	%	ASTM D6971	<25	**158**	---	---
MPC Varnish Potential	Scale	ASTM D7843	>15	▲ **55**	---	---

VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	---	---
Yellow Metal	scalar	*Visual	NONE	**NONE**	---	---
Precipitate	scalar	*Visual	NONE	**NONE**	---	---
Silt	scalar	*Visual	NONE	**NONE**	---	---
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	>0.05	**NEG**	---	---
Free Water	scalar	*Visual		**NEG**	---	---

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	46.0	**45.1**	---	---

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color				*no image*	*no image*
Bottom				*no image*	*no image*
MPC				*no image*	*no image*

Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0766768
Lab Number : 05716377
Unique Number : 10255953
Test Package : AOM 1 (Additional Tests: KF)

Received : 13 Dec 2022
Tested : 20 Dec 2022
Diagnosed : 18 Jan 2023 - Aaron Black

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)

GENERAL MOTORS VPC BUILDING
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US 48090
Contact: DANIEL BARKUME
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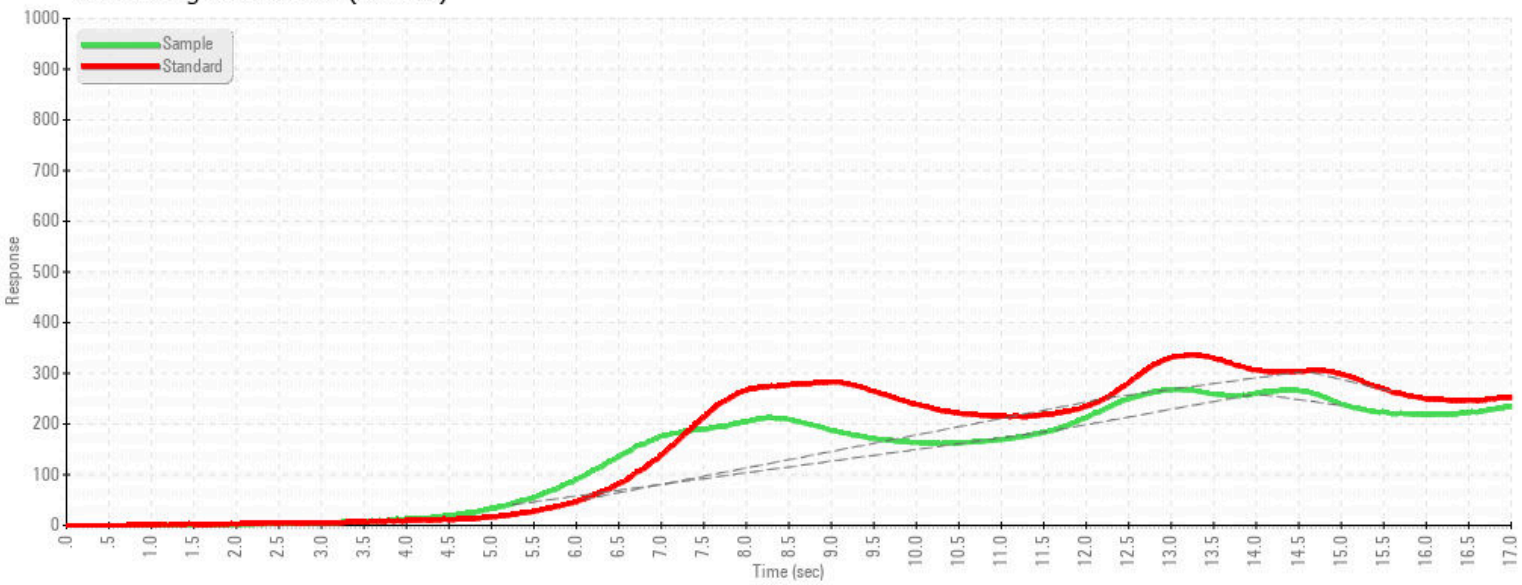
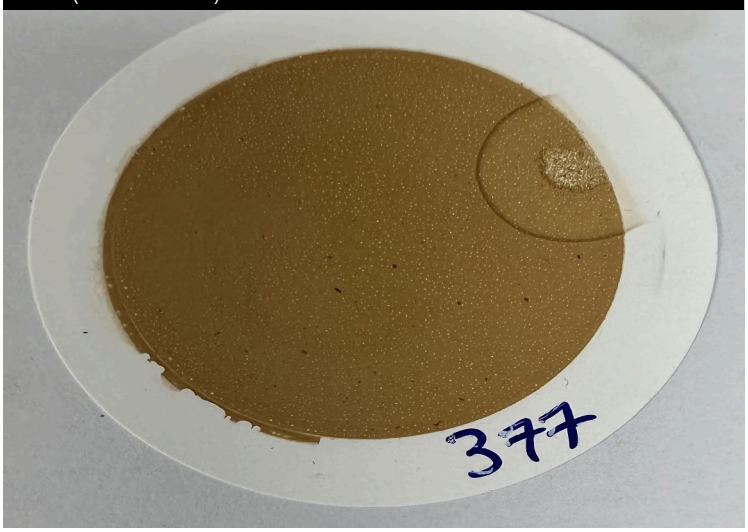
F: (586)575-1675

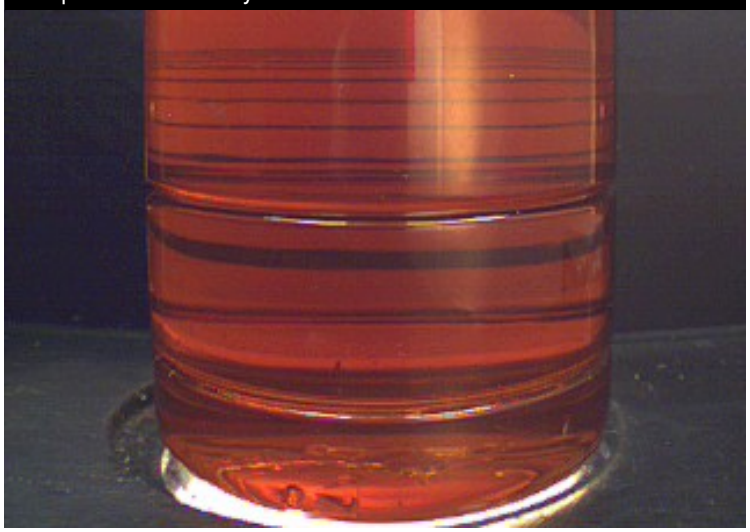
Remaining Useful Life (RULER)



MPC (Varnish Test)



Sample Color & Clarity



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