

ZIEGLER**ZIEGLER S-O-S ANALYSIS LAB**

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S.O.SSM Services

Sample For: USED AGCHEM PRIME
PAT MCCAULLEY
INTERNAL ACCOUNT

Serial #: AGCA1100CDNSL1117
Compartment: Right Rear Planetary
Unit #: 1100RG
Model #: RG1100
WO #: WN30266

Sample #: 160203410
Date Received: 2/10/16
Oil Brand: Pennzoil
Oil Blend:
Oil Weight 75W140

USED AGCHEM PRIME

CURRENT SAMPLE INFORMATION						WEAR METALS ANALYSIS									PARTICLE COUNT				PHYSICAL TESTS			
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	CU Copper PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	NA Sodium PPM	MO Molybdenum PPM	SN Tin PPM	ISO Code	µm 5	µm 15	µm 20	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Water
	Oil	Fltr																				
2/02/16	U			1214	708	8	43	0	0	1	0	3	2	0	23/17	51846	700	84	16	23.4	N	N

Interpretation

Results of latest sample indicate elements tested didn't exceed normal specifications for this compartment. No excessive wear is indicated at this time.

Recommendation

Continue sampling at recommended intervals.

TRENDING SAMPLE INFORMATION						WEAR METALS ANALYSIS									PARTICLE COUNT				PHYSICAL TESTS			
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	CU Copper PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	NA Sodium PPM	MO Molybdenum PPM	SN Tin PPM	ISO Code	µm 5	µm 15	µm 20	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Water
	Oil	Fltr																				
2/02/16	U			1214	708	8	43	0	0	1	0	3	2	0	23/17	51846	700	84	16	23.4	N	N
3/10/14	U			506		64	181	3	1	8	0	29	1	2	23/21	61776	14035	2460	55	20.5	N	N
5/08/13	U			50		12	83	4	0	2	1	39	3	1	24/24	99999	99999	99999	113	22.3	N	N
3/01/13	Y			495		18	78	1	1	3	0	12	1	1	23/21	55004	10234	1978	28	25.6	N	N
CURRENT SAMPLE IS INCLUDED IN TRENDING											SEE REVERSE SIDE FOR TEST EXPLANATIONS											

To realize the full benefits of the diagnostic capabilities of the oil analysis program, the user should do the following:

1. Provide complete and accurate information on the sample label.
2. Adhere to proper sampling procedures.
3. Be on a regular and continuous sampling program.
4. Cut oil filters open and inspect (particles in the oil large enough to be seen by the naked eye are too large for analysis and may indicate imminent failure).

Metals are shown in parts per million (PPM) and are evaluated according to hours or miles the oil has been in use, amount of oil added, recent component repairs, type of operation and other conditions that might affect the concentration.

Caterpillar Inc. has established "normal" wear rates for their products. Interpretation of oil samples from other brands of machines is based on other manufacturer recommendations or general guidelines established for similar components. Elevated readings indicate excessive wear and shortened component life, but may not indicate an imminent failure.

TEST EXPLANATION

WEAR METALS		Possible sources of high readings in Caterpillar product.
COPPER:	Air compressor bushings; oil cooler tubes; thrust washers; wrist pin bushings; oil pump bushings; anti-seize compounds after a repair; additives in the new oil; condensation (water). In transmissions, discs and thrust plates.	
IRON:	Cylinder walls; oil pump; crankshafts, gear teeth.	
CHROMIUM:	Piston rings, valve stems, new engine break-in, ball and roller bearings.	
ALUMINUM:	Main and rod bearings; pistons; rocker shaft in some engines. Transmission pump bushings, torque converter impeller or turbine.	
SILICON:	Dirt; anti-foam additives in new oil. (Dirt is an abrasive and normally elevates all readings to indicate excessive wear and shortened component life).	
LEAD:	Overlay on main and rod bearings; fuel contaminated with gasoline (tetraethyl lead).	
SODIUM:	Produced when engine coolant contacts a hot surface and the water evaporates leaving a residue; oil additive.	
POTASSIUM:	Element used to detect coolant.	
TIN:	Piston plate coating; overlay on main and rod bearings.	

PHYSICAL TEST	
PQ	Measurement of ferrous debris.
VISCOSITY:	A bath viscometer is used to measure viscosity at 100 C., and readings are reported in centistokes. Viscosity results are used to detect possible fuel dilution; oil thickening from high soot and /or oxidation or use of the wrong oil, and in some cases, oil transfer. Viscosity should trend within 2 centistokes.
ANTIFREEZE:	Water pump seal; oil coolers; liner seals; head gaskets. Test for more than .1% by volume ethylene glycol antifreeze in engine oil. Ethylene glycol causes serious sludge and varnish formation.
FUEL DILUTION:	Failed nozzles; fuel transfer pump seals; under valve cover fuel lines. Test for more than .4% diesel fuel in engine oil. (Invalid test results can be produced by volatile liquids if used to clean sample gun or container).
WATER:	Coolant leaks; condensation (due to low operation temp.); contaminated new oil. Test for more than .1% by volume. Can rust components, promote oil oxidation and forms acid with combustion products.

PARTICLE COUNT	A method of reporting the number and size (in microns) of particles in a volume of fluid. Cannot be performed if water is present or if oil is too dark in color.
INFRARED ANALYSIS	
SOOT:	Indication of lugging; over fueling; air inlet restriction; filter plugging. Reported in terms of absorbance X 100 (The maximum normally allowed is 60).
OXIDATION:	Oxidation occurs in all compartments. It is accelerated by heat and contaminants such as water. Oxidized oil allows a buildup of sludge and varnish. Reported in terms of absorbance X 100 (The maximum normally allowed is 34 for engine and 17 for non-engine).
SULFATION:	Sulfur products caused by combustion of diesel fuel which contains sulphur. Sulphur products cause corrosion and may lead to piston ring sticking. Reported in terms of absorbance X 100 (The maximum normally allowed is 34).
NITRATION:	Nitrogen products resulting from the combustion process occur in all engines but only reach problem levels in natural gas engines. Nitrogen compounds cause the oil to thicken, lose it lubricating capabilities, and leads to filter plugging, heavy deposits and lacquering. Reported in terms of absorbance X 100 (The maximum normally allowed is 16).

NOTE: Prior to performing any major repairs based solely on SOS test results, consult your Caterpillar SOS Supervisor.