What is lurking in your engine oil?

A small sample at every oil change could prevent a small problem from becoming !!! A CATASTROPHY !!!

Elements detected (ppm) in engine oil, their origin & meaning

Si (Silicon)
Dirty-Broken Air Filter, Intake Vacuum Leak, Silicon Gasket Sealers

Al (Aluminum)
Wear from: Pistons, Cylinders, Bearings

Fe (Iron)
Wear from: Cylinders, Piston Rings, Crankshaft Camshaft, Valves

Cu (Copper)
Wear from: Bearings, Thrust Washers, Oil Coolers, Friction Disks (Auto-Transmissions)

Pb (Lead)
Wear from: Bearings (Main, Connecting Rod, Turbo)

Na (Sodium)
Indication: Leak indicator from antifreeze into oil, Oil Additive

Cr (Chromium)
Wear from: Roller Bearings, Piston Rings Crankshafts, Camshafts, Valves, Lifters

Mo (Molybdenum)
Wear from: Piston Rings, Oil Additive.

Ni (Nickel)
Wear from: Piston Rings, Cylinders Crankshafts, Camshafts, Valves, Lifters

Sn (Tin)
Wear from: Babbitt Bearings

H_2O (Water in the Oil)
Wear: Engine Loss

Sb (Antimony)
Wear: Bearings (Babbitt)

B (Boron)
Indication: Antifreeze Leak In the Oil.

Mg (Manganese)
Wear from: Piston Rings, Bearings, Thrust Washers.

Ba (Barium)
Indication: Oil Detergent, Smoke Suppressant (Diesel).

A Drop of your Oil contains an Ocean of Prevention

Periodic Fluid Analysis of your Machinery adds to your bottom line since it offers:

- **Equipment Life Extension**
- **Lower Overall Operating Cost**
- **Prevention of much Larger Damages**
- **Knowledge of your Equipment's Condition**

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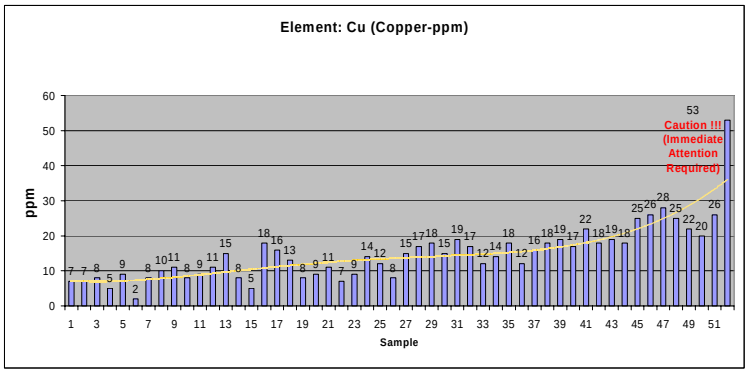
Fluids Analysis, What it is and How it is Practiced

At every oil change a small sample of 3 to 4 oz of oil is drawn usually from the dip stick tube directly into the sample bottle. The oil should be at operating temperature, and should not become contaminated with anything foreign, like diesel fuel, other oil, or dirt.

The recommended way to sample is with the sampling pump (see picture left) but it can be done midstream as the oil flows out of the sump. The special label that contains all the pertinent information of the vehicle and the miles or hours on the oil is affixed on the sample bottle, which is placed in the mailer tube and sent to our lab. A single sample can only be compared against our database of similar types of engines, transmissions or other types of equipment. The value of oil analysis is in the systematic and continuous sampling which can show the gradual rise of wear in the engine or the sudden and very serious rise of an element or group of elements indicating the eminent breakdown of the engine. Statistical significant samples come for the same engine since its operating conditions and characteristics are unique. The Graph below shows the variation from sample to sample in an engine. The overall wear trend is evident by the gradual rise of the yellow line, however the last sample clearly indicates a problem because it is twice as high as the previous four samples.



Looking at the history of the samples from this engine we can easily spot the problem. Correlating with other wear elements in the oil we can determine where the problem is coming from and devise a course of action. This type of information can save a small business from financial ruin since a seized bearing can destroy an engine, usually at the worst moment. Looking simultaneously at all the elements in the oil a better picture can be seen at the internal condition. Similarly Gear boxes, Transfer cases, Differentials, Final Drives and Cooling systems should be appropriately sampled and tracked for wear condition and prediction of condition.

Naturally what is sampled and monitored depends on its value not only as a piece of equipment but as a strategic asset in the business model. The attention a piece of machinery or a vehicle should get is proportional to this value. Vehicle Fleets, Trucking companies, Rail Roads, Ocean Liners, and many stationary applications use this invaluable tool to help them stay ahead of failures.

Fluids analysis is a very sophisticated process. Oil, grease or coolant is analyzed with atomic absorption or emission with infrared light as well as other chemical and physical techniques in order to determine the viscosity, acidity, alkalinity, water content and other properties as needed. PlantScan makes it easy to start and use this service, from the way to sample to the interpretation of the results to correlation of the data with ultrasonic readings, vibration, temperature & thermography.
Our reports are easy to read and interpret. Anyone can see and understand instantly the results, from the mechanic, the driver/user, the maintenance supervisor to the president of the company as you can see below.

Current Sample 15/12/2005			✓	
Overall Sample Condition	**Normal**	**High**	**Resample in 1% from the usual miles or km**	**Stop the Engine**
Required Action			**Take Immediate Action**	

Element	Si	Al	Fe	Cu	Pb	Cr	Mo	Ni	Sb	Mg	Ba	B	Sn	Na	H_2O
Current Sample	29	25	13	53	22	6	121	11	33	242	5	143	7	159	1%
Previous 1	8	5	8	26	10	1	130	1	45	294	3	128	4	119	0
Previous 2	9	3	9	20	12	1	5	0	44	315	5	133	5	116	0
Previous 3	7	3	11	22	10	1	5	0	35	288	4	125	3	189	0

Trust your property, reputation and name in the world to PlantScan, your partner in predictive maintenance.

(*) The time required for analyzing a sample is one to two days from the time it is received in the lab. If you need an expedited analysis we can provide it for an extra fee.

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