

Report of the Month

Something is amiss in this IO-540. Can you tell what it is?

To learn more about where the elements are coming from, [click here](#).

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	25	UNIT/ LOCATION AVERAGES	32	38	26	39	UNIVERSAL AVERAGES
	MI/HR on Unit	1,321		1,392	1,265	3,226	3,201	
	Sample Date	08/24/13		06/03/13	02/06/13	12/12/12	09/10/12	
ALUMINUM	37	44	46	46	37	39	11	
CHROME	3	4	3	3	3	4	6	
IRON	41	65	50	47	44	62	51	
COPPER	6	10	6	7	6	13	5	
LEAD	4141	4630	4064	4649	4182	4506	4049	
TIN	5	2	0	0	0	1	1	
MOLYBDENUM	1	1	1	1	1	2	1	
NICKEL	2	4	3	3	2	4	5	
PO TASSIUM	2	1	0	2	3	0	1	
BORON	1	1	1	1	1	4	1	
SILICON	6	5	5	6	3	5	5	
SODIUM	1	3	1	1	1	15	1	
CALCIUM	1	9	1	1	1	51	19	
MAGNESIUM	4	5	6	4	5	4	10	
PHOSPHORUS	1186	1081	1202	1144	1178	962	366	
ZINC	2	10	3	2	2	39	6	
BARIUM	0	0	0	0	0	0	0	

Values
Should Be*

PROPERTIES	SUS Viscosity @210°F	89.8	86-105	87.7	91.7	91.3	90.7
	cSt Viscosity @ 100°C	17.94	17.0-21.8	17.42	18.38	18.30	18.16
	Flashpoint in °F	495	>460	485	505	505	475
	Fuel %	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5
	Antifreeze %	-	-	-	-	-	-
	Water %	0.0	0.1	0.0	0.0	0.0	0.0
	Insolubles %	0.3	<0.6	0.4	0.3	0.5	0.3
	TBN						
	TAN						
ISO Code							

*THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

We saw aluminum for so long in this Lycoming that we started thinking it was normal. It wasn't. In September, at the end of a long flight, oil consumption suddenly doubled while in flight. The owner felt a vibration and landed (he was close to the airport). The engine was producing power and was smooth at idle and full power, but mid-power he could feel the vibration, and it deteriorated rapidly to the point where it wasn't running right at any power setting. A mechanic on site found one zero-compression cylinder. The valve wasn't stuck, and from the borescope it appeared the cylinder should be okay. So where was the compression going? Turns out the aluminum in his reports was showing us a long, slow process of shaving down the piston pin plug, and when they pulled the cylinder what was left of that plug was a molten blob of aluminum. The piston pin plug on the other side was fine, but on the bad side it had moved to one side and slowly deteriorated. Once the aluminum was all but gone, that cylinder had steel-on-steel contact and the heat generated by the problem melted the piston. The moral of the story is: if something doesn't look right in analysis, even if it's been ongoing for years, it probably isn't right!