

Report of the Month

Something went wrong in this F150's 5.4L V-8 engine. Can you figure out what?

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

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	10,000	UNIT/ LOCATION AVERAGES	7,000	6,000	6,000		UNIVERSAL AVERAGES
	MI/HR on Unit	133,000		123,000	100,000	67,000	19,000	
	Sample Date	12/01/13		04/07/13	11/16/11	04/04/09	12/24/05	
ALUMINUM	48	4	5	4	4	3	6	
CHROME	2	1	1	0	1	0	2	
IRON	39	14	19	11	20	12	34	
COPPER	6	4	4	9	2	2	11	
LEAD	1	1	1	1	0	0	12	
TIN	1	1	2	0	1	0	2	
MOLYBDENUM	26	61	81	71	41	37	56	
NICKEL	2	1	1	1	1	0	1	
POTASSIUM	2	1	0	3	1	0	9	
BORON	30	75	42	42	42	52	44	
SILICON	23	12	12	12	15	14	21	
SODIUM	6	5	9	7	6	3	38	
CALCIUM	2290	2078	2255	2122	2287	1887	1999	
MAGNESIUM	23	17	23	17	18	13	218	
PHOSPHORUS	680	660	694	704	670	637	790	
ZINC	724	756	753	731	753	800	944	
BARIUM	0	4	0	0	0	0	1	

Values
Should Be*

ES	SUS Viscosity @210°F	50.2	46-57	49.8	51.5	50.2	51.4
	cSt Viscosity @ 100°C	7.32	6.0-9.7	7.20	7.73	7.32	7.70
	Flashpoint in °F	365	>355	375	375	360	365
	Fuel %	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5



Broken timing chain tensioner



Tensioner, removed



The worn timing chain cover

Although the engine had a slight rattle dating back to 37,000 miles, his wear numbers were okay for years before things went south. The noise progressed to an occasionally much longer rattle just before the December oil change, and when wear shot up in analysis the owner decided to take a closer look. Less than three hours after taking it into a shop, he got a call from the mechanic, who couldn't believe how lucky the guy was. "Half of the tensioner assembly broke and fell down into the oil pan. This allowed a significant amount of slip in the timing chain, which allowed the chain to "machine" the inside of the timing cover. He was surprised the chain was still on the sprockets. Had it fallen off, the pistons on that side would have made sweet, sweet love to the valves in that head, leaving me with four operable cylinders until the loose chain worked its way into the operating chain, to finish off the whole mess in a bang. All related timing chain parts for both banks are being replaced now. Without the oil test in December 2013, I would have just kept on driving until something catastrophic happened. Thanks for your help!"