Report of the Month

Lots of metal showed up in this 1994 F150's oil. What's going on?

To learn more about where the elements are coming from, click here.

UNIT

MAKE/MODEL: Ford 5.8L 351 CID V-8
FUEL TYPE: Gasoline (Unleaded)
ADDITIONAL INFO:

OIL TYPE & GRADE: Gasoline Engine Oil
OIL USE INTERVAL: Miles

COMMENTS

This engine looks rough. Universal averages for the 351 CID show typical wear after about 2,800 miles of oil use, and all of the metals here are high in comparison. Lead stands out the most, and unless most of it is leaded fuel blow by, this is a cautionary amount of bearing wear. Iron shows excess steel wear. The oil is contaminated too, with fuel dilution at an elevated 2.5%. Silicon could be from dirt or sealers, and sodium may be from coolant. The TBN's okay at 2.1. The viscosity is fairly thick, reading like a 10W/60. A closer look is warranted before using this V-8.

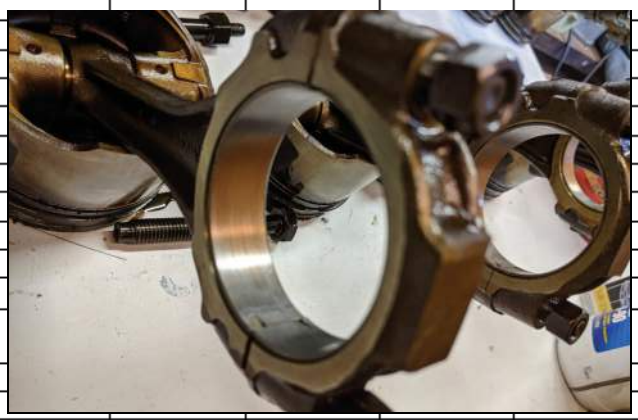
ELEMENTS IN PARTS PER MILLION

		UNIT / LOCATION AVERAGES	UNIVERSAL AVERAGES
MI/HR on Oil			
MI/HR on Unit	116,000		
Sample Date	1/1/2020		
Make Up Oil Added			
ALUMINUM	**18**	12	4
CHROMIUM	**10**	6	1
IRON	**173**	114	22
COPPER	**99**	61	7
LEAD	**750**	387	11
TIN	**18**	11	1
MOLYBDENUM	33	80	53
NICKEL	**6**	4	1
MANGANESE	2	2	1
SILVER	0	0	0
TITANIUM	1	1	0
POTASSIUM	10	9	4
BORON	33	35	46
SILICON	**54**	33	13
SODIUM	**152**	95	62
CALCIUM	2023	2130	1832
MAGNESIUM	227	122	236
PHOSPHORUS	845	805	806
ZINC	1085	969	964
BARIUM	0	0	1

PROPERTIES

		Values Should Be*
SUS Viscosity @ 210°	89.2	
cSt Viscosity @ 100°C	17.78	
Flashpoint in °F	**325**	>375
Fuel %	**2.5**	<2.0
Antifreeze %	0.0	0.0
Water %	0.0	0.0
Insolubles %	0.4	<0.6
TBN	2.1	>1.0
TAN		
ISO Code		

*** THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE**



Bearings are made up of layers of metal. Often the outer layer is lead babbit, with a bronze layer beneath that. In these three pictures you can see how the bearings have worn through the first layer and into the bronze underneath.

The owner of this F150 wanted to put this engine into an older vehicle -- it ran smooth and was quiet -- but reconsidered after seeing the analysis. Oil pressure was okay but after pulling a couple of bearing caps, they decided the engine needed to be rebuilt. Although aluminum and chrome are elevated, the cylinder walls and pistons looked okay. But the main and rod bearings had major wear (lead, copper, and tin). Iron is probably largely from the crankshaft.