

The eBay Oils, Part 2

by Kristin Huff

Welcome back to the eBay oils! If you missed the first installment of this article, you can read it [here](#).

True to his word, Ryan listened to his Passat (if you'll recall, it was making a noise that sounded like "Sell Me" in German) and got his wife a new Hyundai Elantra this month. Free oil changes were not included as part of the deal, so Ryan will be changing his Elantra's oil himself. And while he's willing to [experiment with his 1984 ½-ton Chevy pickup truck](#), it's doubtful (for now, at least), that he'll be using any of the eBay oil in his new car.



Wolf's Head SD 10W/40

Wolf's Head Motor Oil Company was originally founded in Pennsylvania in 1879 as "Pennsylvania Crude." (The source of this is Wikipedia, so take this information with a grain of salt.) I'd place the can from the late-1970s or early 1980s. It is "Formulated from Finest Quality Base Stocks and Superior Motor Oil Additives" and back then, like today, the container gives no actual clue as to what the additives are. That's where we come in. The report is an interesting one (Figure 1). Note the lack of calcium, which is used in almost all engine oil nowadays as a detergent/dispersant additive. Instead of calcium, it contains a lot of copper as an additive. This is a trend we were glad to see die. All that copper in the oil masks bronze wear.

Wolf's Head ATF

Wolf's Head also makes an ATF, though the only selling point on this old can is that it's "Refinery Sealed." Maybe they couldn't think of anything interesting to say about it, because honestly it looks just like a lot of ATFs we see today: mostly phosphorus and zinc, with a smattering of other additives thrown in for good measure (Figure 2).

Fox Head 40W

Oil marketing has come a long way since the days of yore. Today when you want to buy a high-dollar oil you'll find it has a name that conjures up something special: speed (Red Line), richness (Royal Purple), slickness (Amsoil), racing (Mobil 1), space-age (Quantum Blue), etc. I'm not sure what "Elf" is meant to conjure up, but they follow it up with "Excellium" so you know it's Excellent oil. Contrast those names with our next contender, Fox Head, which just makes me think of...well, a fox's

Wolf's Head SD 10W/40

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	1
	COPPER	84
	LEAD	1
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	2
	BORON	104
	SILICON	2
	SODIUM	0
	CALCIUM	12
	MAGNESIUM	722
	PHOSPHORUS	848
ZINC	927	
BARIUM	0	

Wolf's Head ATF

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	4
	COPPER	1
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	0
	BORON	15
	SILICON	2
	SODIUM	2
	CALCIUM	7
	MAGNESIUM	56
	PHOSPHORUS	336
ZINC	256	
BARIUM	0	

PROPERTIES	SUS Visc @210°F	72.1
	cSt Visc @ 100°C	13.51
	Flashpoint in °F	415
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	6.6
	TAN	6.8
	cSt Visc @ 40°C	92.64

PROPERTIES	SUS Visc @210°F	49.7
	cSt Visc @ 100°C	7.17
	Flashpoint in °F	365
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	TR
	TBN	1.3
	TAN	1.6
	cSt Visc @ 40°C	41.90

Figure 1

Figure 2



head. In my oil. Fortunately, that's not what analysis turned up. (Although...we don't test specifically for fox heads, so we could be missing something here.) The Fox Head can is red, white, and blue, so you can feel patriotic when you buy it (unless you're in Canada. Then you can indulge in justified rage about Americans and how we think we're the center of the world). Fox Head oil was made by the Tritex Petroleum company out of Brooklyn, NY, and my extensive research (aka first-page Google results) tells me the company still exists and is presently located in Tulsa, Oklahoma. The logo, a sly-looking fox, has nothing on today's slick oil packages. And the oil itself also has nothing on today's oils: the oil itself is nearly bereft of additives. Basically a mineral oil, it has a little magnesium, phosphorus, and zinc in it, and not a lot else (Figure 3). This is not necessarily a problem, however. As you'll recall in the article about his truck, when Ryan used 30W aircraft oil in the engine, wear went up a little but nothing drastic happened. Still, I won't be putting it in my Outback anytime soon.

Shell Rotella S 10W

Shell Rotella has been around for a long time. It's good oil, and since they've been making it for decades, they've pretty much got the routine down and haven't messed with it a lot over the years. Unlike now, when you can actually [follow Shell Rotella on Twitter](#) (who knew Rotella had so much to say?), back in the day Rotella had to get by just on traditional advertising and word of mouth. We called Shell to see how long they've been making this oil and the guy not only could not tell me, but he was unable to tell me who might know. Surely someone at that company has a historical file? If so, they're not sharing that info with plebeians like us. He did mention that Rotella really made its name in the '70s, though I'm guessing this can of SF, SE, SC oil was made in the late '80s. He also said the "S" versions of Rotella were sold internationally, and indeed, this can came from our friendly neighbors to the north (*waves hi to Canada). Suffice it to say that the oil has changed very little over the years. Its main additives



are the same as what we see today, but the interesting part of this oil is that it's a 10W (Figure 4). We often see heavy-duty thin-grade additive packages in tractor-hydraulic fluids, which are used in systems like transmissions and hydraulic systems in off-highway equipment like bulldozers and backhoes. Note the TBN of this oil read higher than most of the others we're talking about. That's because of the high calcium level--the TBN is based on the level of calcium sulfinate and/or magnesium sulfinate. When those compounds aren't present, you get a low TBN.

Fox Head 40W

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	0
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	1
	NICKEL	0
	POTASSIUM	2
	BORON	2
	SILICON	4
	SODIUM	0
	CALCIUM	3
	MAGNESIUM	17
	PHOSPHORUS	20
ZINC	16	
BARIUM	1	

Shell Rotella S 10W

ELEMENTS IN PARTS PER MILLION	ALUMINUM	1
	CHROME	0
	IRON	2
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	3
	BORON	2
	SILICON	2
	SODIUM	1
	CALCIUM	2863
	MAGNESIUM	13
	PHOSPHORUS	1370
ZINC	1361	
BARIUM	0	

PROPERTIES	SUS Visc @210°F	67.0
	cSt Visc @ 100°C	12.16
	Flashpoint in °F	455
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	0.2
	TAN	0.4
	cSt Visc @ 40°C	149.6

PROPERTIES	SUS Visc @210°F	50.3
	cSt Visc @ 100°C	7.37
	Flashpoint in °F	430
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	8.6
	TAN	4.5
	cSt Visc @ 40°C	49.77

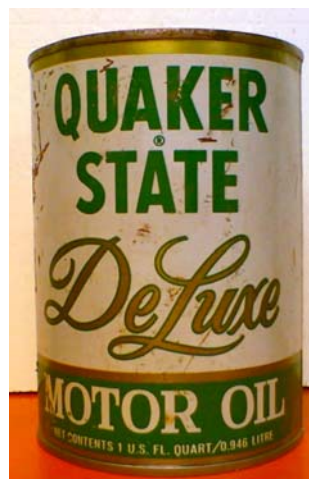
Figure 3

Figure 4

Quaker State 30W and 10W

Next up is another oil familiar to today's buyers: Quaker State. This HDX oil is a straight 30W, and Quaker State was ahead of the marketing game on this one. The can's copy touts their "high quality," "modern refineries," and "quality control laboratories," and this was about as scientific as it got 30 or 40 years ago. The additive package is fairly stout, though like Wolf's Head oil, calcium is in short supply (Figure 5). We also bought a can of Quaker State 10W oil (the banged-up can in the picture), and when we looked at the report we had to go back and double-check the can to make sure this wasn't actually ATF. It's not: it's labeled as an SAE 10W oil, though the additive package looks an awful lot like what we see of out transmission oils today. Interestingly, there's a lot of barium in it (Figure 6). Barium must be expensive, or else it doesn't do much, because we rarely see it in oil samples of any type nowadays. This is engine oil, but it might work in transmissions too.

Quaker State Deluxe 10W/40, Sterling 10W/40
Apparently we are fans of Quaker State, because we also tested a couple more varieties: Quaker State Deluxe, and



Quaker State Sterling. As you know, modern oil companies generally have a lot of different brands under the same name (for example, Valvoline has NextGen, MaxLife, and DuraBlend, among others). For the most part, these oils are mostly the same; they'll throw in a few slight differences in additives and call it good. These cans of Quaker State, however, were mostly pretty different. The Deluxe version looked a lot like their 30W oil (but more calcium--Figure 7). Quaker State Sterling HD 10W/40, on the other hand, went out on a limb with almost 800 ppm sodium, almost no magnesium, and then levels of calcium, phosphorus, and zinc that are comparable with today's oils (Figure 8). Touted as "Energy Saving Motor Oil," Quaker State was getting its game on in pushing the Sterling brand: it mentions "special friction modifying additives," the longevity of the company (over 60 years when the can was made), and its suitability for those wishing to follow extended drain intervals. Heck, I'm sold, and I see this stuff all the time.

Quaker State 30W

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	2
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	1
	BORON	132
	SILICON	3
	SODIUM	3
	CALCIUM	12
	MAGNESIUM	1411
	PHOSPHORUS	1034
	ZINC	1073
BARIUM	0	

Quaker State 10W

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	3
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	0
	BORON	0
	SILICON	0
	SODIUM	3
	CALCIUM	3
	MAGNESIUM	1
	PHOSPHORUS	260
	ZINC	5
BARIUM	122	

Quaker State Deluxe HD

ELEMENTS IN PARTS PER MILLION	ALUMINUM	1
	CHROME	0
	IRON	3
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	3
	BORON	90
	SILICON	4
	SODIUM	8
	CALCIUM	738
	MAGNESIUM	1082
	PHOSPHORUS	1278
	ZINC	1366
BARIUM	0	

Quaker State Sterling HD

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	2
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	4
	BORON	9
	SILICON	1
	SODIUM	785
	CALCIUM	1183
	MAGNESIUM	8
	PHOSPHORUS	1070
	ZINC	1081
BARIUM	1	

PROPERTIES	SUS Visc @210°F	64.9
	cSt Visc @ 100°C	11.57
	Flashpoint in °F	460
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	7.1
	TAN	4.1
	cSt Visc @ 40°C	113.1

PROPERTIES	SUS Visc @210°F	45.8
	cSt Visc @ 100°C	5.98
	Flashpoint in °F	420
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	0.0
	TAN	0.2
	cSt Visc @ 40°C	35.36

PROPERTIES	SUS Visc @210°F	75.7
	cSt Visc @ 100°C	14.43
	Flashpoint in °F	410
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	8.5
	TAN	4.0
	cSt Visc @ 40°C	71.62

PROPERTIES	SUS Visc @210°F	75.4
	cSt Visc @ 100°C	14.37
	Flashpoint in °F	405
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	7.6
	TAN	2.8
	cSt Visc @ 40°C	83.55

Figure 5

Figure 6

Figure 7

Figure 8

Mobil Special 10W/30 and Artic 20-20W
 Mobil is no slouch in the marketing department, but they really outdid themselves with the can we tested, "Mobil Special." The name alone tells you all you need to know about why to buy this particular oil. All oil companies like to mess with their additive packages, and Mobil, like the others, changes their oil up fairly frequently. That was the case back in the day too, because the additive package in this "Special" oil is different from what we



typically see in today's oil. Apparently Mobil was an early rider on the ZDDP train, because this oil is chock-full of both phosphorus and zinc. Calcium and magnesium are present too, but at lower levels (Figure 9). We also tested a sample of Mobil Artic oil (Figure 10). The Artic can is clearly older than the other Mobil can--the logo is older, and there's no zip code listed with the address, so it's pre-1963. A straight 20W, it's labeled as HD oil, meeting "Car Builders' Most Severe Service Tests." While it's "Artic" and not "Arctic," we can't help thinking this oil is meant for cold-weather operation. The can even looks like it's ready for winter: all white, but with a little color on it so you don't lose it in the snow when you're out in the tundra changing your oil. This one definitely has an unusual additive package, relying heavily on barium (maybe it's got a purpose after all!). Interestingly, less zinc is present than phosphorus. Nowadays it's the other way around.



Phillips 66 Trop-Artic 10W/40

We were going to stop with Mobil Artic, but we can't resist comparing that one with Phillips Trop-Artic. We're not exactly sure what Trop-Artic means, but since the can is selling itself as All-Season

we're guessing it's something along the lines of "use it in the tropics, use it in the arctic." A 10W/40 in viscosity, this oil looks a lot like what we see out of modern 15W/40s--a stout additive package and a relatively thick viscosity (Figure 11). In other words, even though this oil is several decades old, it would be fine to use in your F150 tomorrow.

Mobil Special 10W/30

ELEMENTS IN PARTS PER MILLION	ALUMINUM	1
	CHROME	0
	IRON	3
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	0
	BORON	58
	SILICON	4
	SODIUM	1
	CALCIUM	664
	MAGNESIUM	765
	PHOSPHORUS	1129
	ZINC	1262
BARIUM	0	

Mobil Artic 20-20W

ELEMENTS IN PARTS PER MILLION	ALUMINUM	0
	CHROME	0
	IRON	1
	COPPER	0
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	0
	BORON	1
	SILICON	0
	SODIUM	0
	CALCIUM	26
	MAGNESIUM	1
	PHOSPHORUS	890
	ZINC	546
BARIUM	3099	

Phillips Trop-Artic 10W/40

ELEMENTS IN PARTS PER MILLION	ALUMINUM	2
	CHROME	0
	IRON	3
	COPPER	1
	LEAD	0
	TIN	0
	MO LYBDENUM	0
	NICKEL	0
	POTASSIUM	1
	BORON	0
	SILICON	10
	SODIUM	7
	CALCIUM	4512
	MAGNESIUM	11
	PHOSPHORUS	1519
	ZINC	1551
BARIUM	0	

PROPERTIES	SUS Visc @210°F	60.6
	cSt Visc @ 100°C	10.39
	Flashpoint in °F	380
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	7.5
	TAN	4.5
	cSt Visc @ 40°C	66.79

PROPERTIES	SUS Visc @210°F	53.5
	cSt Visc @ 100°C	8.33
	Flashpoint in °F	430
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	2.5
	TAN	0.0
	cSt Visc @ 40°C	67.13

PROPERTIES	SUS Visc @210°F	70.5
	cSt Visc @ 100°C	13.09
	Flashpoint in °F	395
	Fuel %	-
	Antifreeze %	-
	Water %	0.0
	Insolubles %	0.0
	TBN	10.2
	TAN	6.4
	cSt Visc @ 40°C	74.84

Figure 9

Figure 10

Figure 11

Report of the Month

Ever wondered what your oil would look like if you never changed it?
Here's the perfect example. The miles on the oil are correct.

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

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	122,635	UNIT/ LOCATION AVERAGES					UNIVERSAL AVERAGES
	MI/HR on Unit	122,635						
	Sample Date	03/17/12						
	ALUMINUM	24	24					3
	CHROME	3	3					0
	IRON	510	510					9
	COPPER	30	30					4
	LEAD	295	295					6
	TIN	10	10					0
	MO LYBDENUM	43	43					74
	NICKEL	2	2					1
	POTASSIUM	4	4					2
	BORON	2	2					42
	SILICON	33	33					15
	SODIUM	124	124					41
CALCIUM	1760	1760					2232	
MAGNESIUM	152	152					85	
PHOSPHORUS	788	788					693	
ZINC	862	862					848	
BARIUM	1	1					0	

PROPERTIES	SUS Viscosity @210°F	71.9	58-65				
	cSt Viscosity @ 100°C	13.46	9.7-11.9				
	Flashpoint in °F	295	>360				
	Fuel %	3.3	<2.0				
	Antifreeze %	0.0	0.0				
	Water %	0.0	0.0				
	Insolubles %	0.4	0.6				
	TBN						
	TAN						
	ISO Code						

We're anonymous here, so we'll call the characters in this true story "Dad" and "Sonny." Dad doesn't believe in oil changes, so Sonny "borrowed" the truck one day and got us a sample. Sonny told his dad the truck was leaking oil in his driveway while he was unloading stuff from Home Depot (it wasn't), so while he had it he "fixed" the leak and changed the oil. Dad grumbled and said he should have left it alone, but agreed it was time. This is factory oil in Dad's 1997 Nissan pickup truck with 122,635 miles on it. And you know, for an oil that's been in place as long as this one has, the oil doesn't look half bad. It was thick, like a 15W/40. Fuel was present, though without trends we don't know if that's a temporary thing or if it's always present. Bearing wear (copper, lead, and tin) is heavy, as is upper-end wear (aluminum and iron), but the rings (chrome) are wearing well. Sonny says the engine starts easier now and it isn't as labored as it was when it runs. We're not sure if these results are a testament to Nissan's engineering or Dad's good driving, but either way, next time you get worried that it's been six months since you changed your oil, you can remember Sonny and Dad and breathe a little easier!