



## Washington Bans Copper Brakes

By Edward Niedermeyer on April 20, 2010



When friends of the [automobile](#) think about environmental regulation, our minds tend to tend to leap towards emissions. Between energy independence, air quality and the specter of global warming, a number of political agendas focus auto regulations on the tailpipe and drivetrain, driving a number of [changes](#) in the industry. But, as [the AP](#) reports, engines aren't the only automotive components that impact the [environment](#). The state of Washington has voted to ban brake pads with more than five percent copper content by 2021, making it the first state in the union to address the accumulation of heavy metals in groundwater through automotive regulation.

Brake pads are typically made of metal and composite compounds which are selected for their ability to dissipate kinetic energy as heat. Copper replaced asbestos as a major brake pad component element in the early 90s (typically composing up to one quarter of the brake pad compound by volume), when the carcinogenic insulating material was banned as a health hazard. The problem with copper is that the friction caused by braking causes tiny shavings of copper to separate from the brake pad, scattering trace amounts of the heavy metal across the landscape. This, say scientists, causes copper to accumulate in rivers and streams, where it wreaks havoc with the ecosystem.

Biologists are especially concerned about two specific copper-related toxicity problems. First, even small amounts of copper can interfere with salmon's ability to smell, a crucial tool for survival. When young salmon are exposed to even moderate amounts of copper pollution, their sense of smell can be permanently harmed, making them more vulnerable to predators. Given the important role salmon plays in the economy of the Pacific Northwest, this is a risk that scientists and the business community are equally concerned about. Furthermore, copper is known to be toxic to plankton, which form the base of the marine ecosystem. Were copper levels to climb to a point where plankton started dying off, the impact could easily ripple through the entire coastal

ecosystem, and permanently damage West Coast fisheries.

But to what extent are auto brakes responsible for copper accumulation in waterways? After all, brakes only release tiny amounts of copper over long periods of time, while copper remains a common element in pipes, paint and numerous other [construction materials](#). Washington's lawmakers cite a study by the nonprofit organization Sustainable Conservation, which found that up to a third of all copper pollution in the San Francisco Bay could be traced to copper from automotive brakes. Washington officials figure that about the same proportion of the 70,000 to 318,000 pounds of copper released into Puget Sound each year comes from brakes, meaning the law could eliminate between 25,000 and 105,000 pounds of copper pollution each year.

Best of all, the industry isn't fighting the new Washington law. Unlike CAFE increases or other [environmental](#) regulations, this new law hasn't been accompanied by wailing and gnashing of teeth from auto OEMs or brake supplier firms. Instead, at least one industry source has made peace with the new law:

The industry believes it can produce a safe and reasonably priced brake pad without copper, said Terry Heffelfinger, director of product engineering for Affinia Global Brake & Chassis, a major brake maker. One alternative may be ceramic brake pads, which have grown in popularity in recent years.

Let's just hope these new compounds don't raise costs the way a set of ceramic stoppers can send a Porsche's price soaring. A reasonable ramp-up of copper-content standards will help the industry adapt, as it has until 2021 to cut copper down to five percent of brake pad content, a standard that many [cars](#) already meet. The law is supposed to ban all but trace amounts of copper from brake pads by 2023, but only if the industry is able to prove that it's possible.

Though some decry regulation in all forms, this example seems to prove that common-sense regulation of the automobile's environmental impact is possible when goals are reasonable, analysis is well-grounded in hard science, and the approach is cooperative. And if this law hastens the day when ceramic brake pads are no longer a ten-grand-plus option on only a few high-end [performance cars](#), it will have spurred industry innovation as well. Plus, salmon is delicious. Win-win is never easy, but this law gets close.

Posted in [Government](#), [Green](#), [News Blog](#)

Tagged as [Brakes](#), [Copper Law](#), [Green](#), [Pollution](#), [Regulation](#)

## 29 Comments on "Washington Bans Copper Brakes..."

[Back to Top](#)

[End of Comments](#)



**srogers**

April 20th, 2010 at 3:28 pm

They're taking away our right to pollute the planet! And so our freedom continues to erode, blah, blah, blah.

There you go – the first of many.



**Dr. Nguyen Van Falk**

April 20th, 2010 at 3:33 pm

I HAVE EVERY RIGHT TO CONTAMINATE EVERYONE ELSE'S GROUND WATER! IT'S IN THE CONSTITUTION!

**Dr. Kenneth Noisewater**

April 20th, 2010 at 3:41 pm

When brake pads are outlawed, only outlaws will be able to stop..

But seriously, maybe WA can subsidize ceramic brake pad replacements? (or carbon? woo woo!)

**chuckR**

April 20th, 2010 at 3:46 pm

Most people see the need for government to act as rulesmaker and referee for essential issues. Today's problems come when government is a player as well as rulesmaker and referee – like when they take over financial or industrial companies with any goal other than shutting them down. Amendment 10 reserves the right of the states or the people to pass such a law/regulation, so it sort of is in the Constitution.

**porschesspeed**

April 20th, 2010 at 3:48 pm

Cue Hannity on how reducing copper content in brake pads is going to kill your grandma and your children. It's all a socialist Obama plot, designed to control (and Muslimize) the freedom-loving American people.

There. I think that covers all the bases...

**ClutchCarGo**

April 20th, 2010 at 3:53 pm

You missed how Hitler did the same thing as a means to take over Germany in the '30s.

**Bancho**

April 20th, 2010 at 4:12 pm

Great porschespeed, now this thread will show up over on littlegreenfootballs... :p



**jmo**

April 20th, 2010 at 3:57 pm

Any idea why they use copper to begin with? Squeel reduction, durability, heat transfer, etc?



**Wagen**

April 20th, 2010 at 4:07 pm

“Brake pads are typically made of metal and composite compounds which are selected for their ability to dissipate kinetic energy as heat.”



**bill h.**

April 20th, 2010 at 4:06 pm

Nowadays, aftermarket ceramic pads for street use are not really very expensive at all, plus some brands reduce dusting issues quite noticeably.



**Paul Niedermeyer**

April 20th, 2010 at 4:27 pm

There's a confusion here about ceramics in brakes. The expensive ceramic brakes on Porsches means that the actual disc rotors are ceramic, not the brake pads. Ceramic pads for conventional discs already are common, and price isn't much of a factor with them.



**tracepac**

April 20th, 2010 at 4:37 pm

Edward Niedermeyer , please research the Ceramic brakes a LOT more. I see that Paul Niedermeyer just posted the proper answer to an erroneous assumption. Ceramic brake pads are extremely common as OE equipment on today's vehicles. Many manufacturers are trending towards ceramic only especially as OEM equipment. A quick look at any internet based parts peddler will show ceramic aftermarket pads at a comparable if not lesser price to semi-mettalic pads.

I believe that by the time the WA State law goes nto effect it will be needless. But I have already done my part and converted all my vehicles to ceramic pads :)



### Bertel Schmitt

April 20th, 2010 at 4:44 pm

Sorry, this brings out the brake pad nerd in me.

Brake pads come in various types

Semi-Metallic.- Contains 30-65 percent metal (steel, iron, copper, brass etc.) mixed with graphite, fillers and held together by a bonding agent. Main market North America

Organic – made mainly from fibers derived from rubber, glass, carbon, KEVLAR etc. and held together by a bonding agent. Main markets Japan and USA

Low-Metallic – as Organic, but with a metal content of 10 – 30 percent, mostly copper or steel. Main market Europe.

Ceramic – doesn't count as a brake pad category in the industry, but is used in marketing as such. Friction material is made from fibers, fillers, often small amounts of metal (copper, steel etc.) and held together by a bonding agent. Any brake pad that uses some ceramic ingredients can be called "ceramic." Some brake pads that are sold as "low metallic" in Europe are marketed as "ceramic" in the USA. Main markets Japan and USA.

The composition of a friction material is a closely guarded trade secret of the manufacturer. It can contain exotic materials such as the resin of the cashew nut, KEVLAR, or TWARON.

While it seems easy to replace copper with another metal (steel, iron, brass etc.) any change in the composition of the friction material changes its braking characteristics. A change in the composition requires a retest. The rules for brake pads in the USA are pretty lax. In the ECE countries that subscribe to the ECE R-90 standard for brake pads, replacement pads may not deviate more than 15% plus or minus from the performance of the OEM pad. This guarantees that a pad is not too weak, but also not too aggressive. Changing for instance the front pads for more aggressive pads while keeping the rear pads, can lead to a spin-out when braking. The ECE rule protects the consumer from this danger.

The unintended consequence of the Washington rule can be changes to the friction material that alter the braking characteristics. However, it is more likely that pads containing copper will be replaced in the market by readily available pads that do not contain copper. See above.

**Morea**

April 20th, 2010 at 5:47 pm

'Brass' is any one of a series of alloys composed of copper and zinc. (D'Oh!)

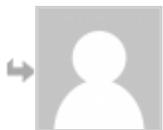
Face it, most, if not all, metals are toxic. It only depends on concentration and chemical form (soluble ion, organometallic compound, oxide, etc). Ceramics are just metal oxides and may, or may not, have the same intrinsic toxicity as the pure metal.

As always, what we lack is data. In what form is all the copper in the SF Bay? And is it a form (and concentration) that is toxic to plants, animals and humans? Basically, without extensive study we're all just pissing in the wind. I'm not saying it ain't true, I'm saying neither side has enough facts to make a case. Were all just "arguing on the internet."

**Slow\_Joe\_Crow**

April 20th, 2010 at 5:50 pm

What about sintered metal brake pads? These are fairly common in motorcycle and mountain bike applications and appear to be mostly bronze.

**Morea**

April 20th, 2010 at 5:53 pm

"Bronze" is any one of a series of alloys composed of copper and tin. (D'Oh!)

(Tin organometallic compounds are particularly toxic.)

**JK43123**

April 20th, 2010 at 5:03 pm

So THIS is why Toyotas won't stop!

John

**DC Bruce**

April 20th, 2010 at 5:04 pm

I think this falls under the category of "Who knew?"

It's probably worth point out that, until 15 or less years ago, copper was the active ingredient ("biocide") in antifouling paints applied to the submerged portions of hulls of ships and boats. The historically-minded will recall that 18th and 19th century sailing ships had the submerged portion of their hulls covered with sheets of copper — for the same reason.

As a former owner of a 36 foot sailboat, I know. Most of these paints ("ablative") were/are designed to slowly dissolve in water, with obvious consequences for the water in marinas and similar places where boats are stored "wet." Copper-based antifouling paints were banned some years ago; since I have been out of the boat-owning business since 1996, I don't know what has replaced copper, other than tin. The other active biocide in these paints is tin.

I have no idea how one produces an anti-fouling paint without a biocide; nor how a biocide that is effective in retarding the growth of slime and mollusks on the hull will not have a similar effect wherever it is in the aquatic environment.

This is not an argument against eliminating copper from brake pads, especially when acceptable non-toxic substitutes appear to be readily available. But just an observation.

**Peugeot505**

April 20th, 2010 at 7:27 pm

DC Bruce – interestingly enough, it is actually the other way around: tin, specifically TBT, was the active ingredient in antifouling paints that was banned by the United States in the 1990s. Copper is what is most commonly used today as a replacement.

**snabster**

April 20th, 2010 at 9:36 pm

you can still buy bottom paints that have biocide; even more important these days with zebra mussels and other nasties in the wild.

My (basic) understanding of the newer biocides is they degrade quicker than the copper and don't stay in the aquatic system. Is that effective? Again, who knows. From my personal experience, they seem more effective than the older copper paint against mussels, less against slime.

**Robbie**

April 21st, 2010 at 9:04 am

When I was a young kid, my dad liked to buy (under the table, since it was illegal even back then) a type of boat hull paint that had a small quantity of mercury in it. That stuff worked really well!

**dswilly**

April 20th, 2010 at 5:28 pm

cool fish

**obbop**

April 20th, 2010 at 5:51 pm

To appease the PETA people please refer to fish as "sea kittens."

Even as you fry or bake them and stuff the protein-laden critters into your gaping maw.

Thank you.

**flomulgator**

April 20th, 2010 at 7:15 pm

I've always loved those flood-time photos of the Snoqualmie River Valley.

Q: Why did the salmon swim across the road?

A: .....

**Lumbergh21**

April 20th, 2010 at 8:39 pm

I'd like to know what levels of copper in the water have been shown to affect the salmon's sense

of smell. I can tell you that it takes quite a bit of copper to kill algae in fresh water and I imagine similar levels for plankton. I seriously doubt that brake pads or all human activities taken together produce enough copper to have any significant impact on the plankton in the oceans. Just because some politicians in Washington say that copper is killing the salmon doesn't make it true.



**ihatetrees**

April 20th, 2010 at 9:40 pm

*I seriously doubt that brake pads or all human activities taken together produce enough copper to have any significant impact on the plankton in the oceans.*

+1. I can see local concentrations causing problems, but the oceans are a stretch.



**ihatetrees**

April 20th, 2010 at 9:31 pm

*The problem with copper is that the friction caused by braking causes tiny shavings of copper to separate from the brake pad, scattering trace amounts of the heavy metal across the landscape. This, say scientists, causes copper to accumulate in rivers and streams, where it wreaks havoc with the ecosystem.*

I can understand this and it seems reasonable.

It would be interesting to see a comparison of stream/groundwater contaminants near roadways/urban areas and unpopulated areas (with similar geology).



**tigeraid**

April 21st, 2010 at 9:33 am

I'm an [auto](#) parts specialist. What Bertel says is essentially correct, a ceramic brake pad still contains plenty of metals, it just features a ceramic "filler" as the sort of main pad body. Ceramics from different manufacturers can vary wildly in composition...

OEM ceramics are often far more metallic than aftermarket ones, because OE manufacturers want the pads and rotors to wear out more severely to increase brake service returns.

The ceramic pads we sell exceed OE specifications and are lifetime warrantied against dust (of course, they still create dust, but it tends to be much lighter and less likely to cake on the wheels.)

Ceramic pads are pretty much the AFTERMARKET industry standard, at least here in Canada. Organic pads are very soft but also very dusty and don't last long at all. Metallics have the best grip and last the longest, but make a lot of dust and eat the rotor quicker. Ceramics are between the two, and I would estimate about 80-85% of our brake pad sales are ceramic—in part because they're the better choice for a street car, and in part because they're often the same price or CHEAPER than the metallic (but more expensive than the organic.)

What worries me about this lefty legislation isn't how it will affect the general public—ceramics are a good thing and the more cars with them the better. The problem is how it will affect the medium-to-heavy duty market, and people who tow heavy loads—metallic is the only way to go when you're dealing with huge weight. If the government is smart they'll exempt anything classified as a truck.

Of course, this is also potentially bad for the enthusiast, as most performance brake pads are metallic... :(



**martin schwoerer**

April 23rd, 2010 at 6:09 pm

Nobody else did, so please allow me:

When you have regenerative braking, as is the case in [electric cars](#) or numerous hybrids, you reduce the need for abrasive braking.

Thus, regen braking = much less brake dust.

Brake dust will continue to be a problem even when copper is substituted by kevlar, goretex, teflon or confetti. Because it turns into the stuff we inhale, and our bodies tend to not like it.

As sensible as Washington's measure might be, the only real solution is to reduce brake dust as such, by going regenerative.

[Leave a Reply](#)

[Back to Top](#)

You must be [logged in](#) to post a comment.

You can also login using **Facebook Connect**.

[Connect with Facebook](#)

**Subscribe without commenting**

E-Mail: