

B. 12) Lead Ammunition



Source: <https://www.usgs.gov/media/images/copper-and-lead-ammunition-comparison>

No measures to reduce lead exposure can be complete without addressing lead ammunition.

Since July 1 2019, nonlead ammunition is required when taking any wildlife with a firearm anywhere in California [20].

Also, proposed restrictions in the EU by ECHA (which will hopefully move to ratification by the EU parliament in a few months) are as follows [19]:

“1. Lead in hunting, sports shooting and other outdoor shooting:

- *sale and use of lead gunshot: ban after a five-year transition period. As current rules of international competitions specify the use of lead ammunition for certain disciplines, ECHA presents - as an option for the decision maker - a derogation for use of lead gunshot for sports shooting by licensed individuals only under strict conditions, i.e. when releases to the environment are minimised; and*

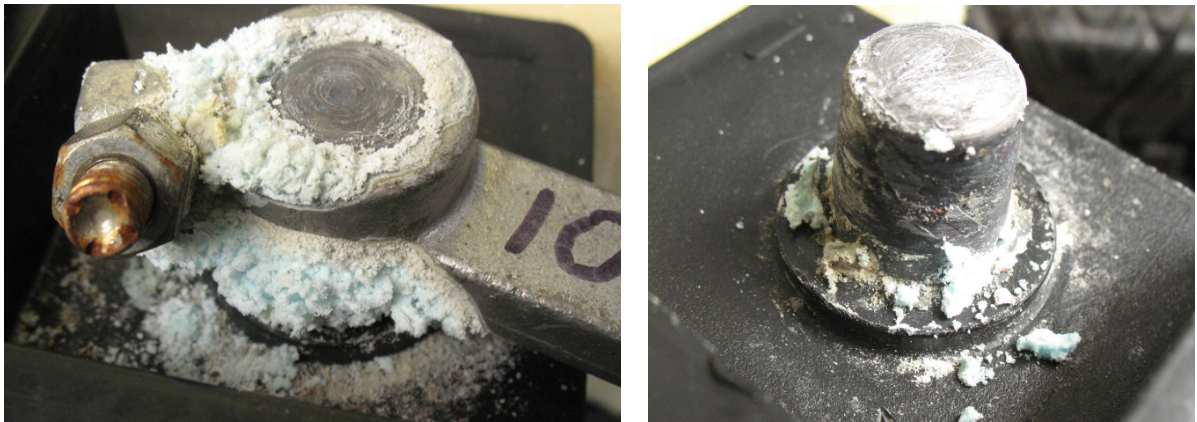
- *use of lead in bullets and other projectiles:*
 - *for hunting: ban after a five-year transition period for small calibre bullets and 18 months for large calibre bullets. The technical feasibility of alternatives to small calibre lead bullets should be reviewed before the ban enters into force.*
 - *for sports shooting: use can continue if releases to the environment are minimised within a five-year transition period. This means that sports shooting ranges are equipped either with trap chambers or 'best practice' sand traps."*

I strongly urge the reader to review both [19], particularly the excellent Q & A sections. These can both serve as a very useful roadmaps for work by Ecology Washington.

B. 13) Lead-Acid Batteries

When people think of lead, one of the most common applications noted is lead-acid batteries. These are ‘sealed’ and recycled (almost to 99% by most reports), so what’s the problem?

First, while the batteries are generally sealed, the battery posts that stick out of them (where the positive and negative battery terminals and wires are attached) are not and they are usually solid lead (typically around 97%). The terminals that attach the wires to the posts are often made from solid lead as well. Over time you are likely to get corrosion on the posts of these batteries. The hydrogen gas or sulfuric acid vapors can escape from the battery and chemical react with the posts (differently, as one post is an anode and the other is a cathode). The white powder you see on these lead posts is generally lead sulfate while the blue powder is hydrated copper sulfate.



Source: <https://mechanics.stackexchange.com/questions/51885/what-is-battery-corrosion-material>



Source: <https://anewwayforward.org/battery-terminal-corrosion>

Workers and home auto maintainers are exposed to this lead dust, which can be quite substantial, as shown in the preceding photos. Most people I've mentioned this to are surprised that the white powder is a lead compound - they believe the lead is safely 'sealed' in the battery. You regularly can see people carrying these heavily contaminated batteries into auto parts stores and around car repair shops. And how much lead is chewed off when people attach jumpstart cables with those strong alligator clips to the battery?

Beyond the exposure to lead from the battery posts, there is very simple and powerful reason to move away from lead acid batteries – the much touted recycling of these batteries overlooks the fact that this recycling is often done by companies located in poor areas of the United States or developing countries where lax enforcement of environmental rules leads to significant exposure to under-privileged workers, and nearby residents, including children.



Source: <https://e360.yale.edu/features/getting-the-lead-out-why-battery-recycling-is-a-global-health-hazard>

As noted in [21]:

“From Vietnamese villages to the backstreets of Chinese megacities, from Roma camps in Kosovo to workshops in the shantytowns of Africa, from forest clearings in Bangladesh to giant smelters in India, the unsafe recycling of lead batteries, mostly from automobiles, is a lethal and growing scar on the planet. Perry Gottesfeld of

Occupational Knowledge International, a San Francisco-based organization that campaigns worldwide against industrial pollution, calls it “the most serious environmental health threat to children.

But somehow the epidemic of poisoning from this hugely profitable business is rarely seen as a global scandal. Most people have never heard of it.

The automobile industry had appeared to have purged lead from its environmental CV with the almost-total elimination in recent decades of lead additives in gasoline. In the aftermath, blood-lead levels in hundreds of millions of people across the world fell, often dramatically.

But now, those levels are rising again, says Richard Fuller, CEO of Pure Earth, a New York-based nonprofit, in large part because nobody thought about lead in automobile batteries, even though they start almost all of the 1.4 billion vehicles on the road today.”

Even in the United States, there are repeated stories of lead recycling and lead smelting plants contaminating their workers and surrounding communities. For example:

1. A now closed battery recycling plant near Vernon, CA contaminated nearby homes, schools, child-care centers, and parks, about 7,800 in total within 1.7 miles of the plant. In [22] they state that “*Among the most troubling findings, according to the auditor’s office, was Toxic Substances Control’s failure to remove lead-tainted soil from most of the 50 properties, including child-care centers, schools and parks, that it identified in the early stages of the cleanup as posing a particularly high risk to children.*” Exide, who operated the plant, is now bankrupt. This is now apparently one of the most expensive toxic chemical cleanups in California history.
2. Also in California, in the town of Watts, “*The owners of a metal recycling plant operating next to a south LA high school campus have been hit with 22 felony charges, after decades of complaints that the facility was contaminating school grounds with lead and other toxic waste*” [23]. The article also notes that “*Watts is chequered with recycling plants, lumber yards and fabricators. Noxious pollution also emanates from a freight expressway east of the high school. The life expectancy here is about a decade lower than in wealthier parts of LA.*”
3. A report in [24] details (with excellent graphics) how a lead smelter in Tampa Bay exposed hundreds of workers, mostly Black and immigrant, to dangerous levels of lead.

I strongly urge the reader to read these well researched and very disturbing reports.

One can argue that these companies need to follow the laws but there simply are too many cases of violations, both inside the United States and in foreign countries.

Finally, an opportunity presents itself to move away from these toxic lead-acid batteries.

There are now, finally, viable lithium-ion auxiliary batteries, that can be used in all kinds of EVs (including full EVs, plug-in, and hybrid) and even ICE (Internal Combustion Engine) vehicles.

For example, Antigravity batteries (<https://antigravitybatteries.com>) makes a wide range of lithium-ion 12 volt batteries, including those for conventional gasoline ICE vehicles, power storage and backup, motorcycles, and more. Although their batteries are about 2X to 3X more expensive to similar high performance lead acid batteries, they claim these lithium ion batteries last 2X to 3X as long. Additionally the batteries save weight (which reduces fuel or electricity usage by the vehicle) and have innovative features, like wireless remote jump start (so if your battery is nearing discharge, it shuts itself off to maintain enough power to still start your vehicle. You then press a button on your phone, and it jump-starts your vehicle without needing any jumper cables).

The lead-acid battery industry has been working hard to try to keep their ancient 19th century batteries relevant for the upcoming shift to EVs, by coming out with new versions. But despite the fancy new marketing, the same toxic lead problems remain.

Hyundai and Kia are also now equipping their hybrid vehicles with 12 volt lithium-ion batteries instead of lead-acid ones, starting in 2017 with the Hyundai Ioniq Hybrid, as noted in [25] and [26]. They also have a handy feature that if the 12 volt lithium-ion battery is low, it can draw power from the vehicles main lithium-ion batteries to recharge itself.

In 2021, Tesla announced that the 2022 Model X and Model S will switch from a 12 volt lead-acid auxiliary battery to a 12 volt lithium-ion auxiliary battery. [27]

Tesla in particular noted it made this shift as lead-acid batteries didn't last long and required more frequent replacement. And anyway, who wants a 21st century

electric vehicle filled with 20 lb of lead – it goes completely against the environmental marketing and ‘coolness factor’ of EVs.

Now is the perfect opportunity to make the move to lithium ion batteries and leave lead-acid batteries to history. Timetables need to be set to prod lagging automakers to make to switch. As demand for 12V or 48 V lithium-ion auxiliary batteries further increases, their costs will further decrease (as we’ve seen in the steep price drops for the main lithium-ions battery packs for EVs). Additionally, these 12 V or 48 V lithium-ion auxiliary batteries can be used un ICE (Internal Combustion Engine) vehicles and a timeline needs to be set to promote that switch as well.

B. 14) Leaded Gasoline

I expect this section in particular will raise some eyebrows. Wasn’t lead gasoline banned decades ago? Yes, but surprisingly some leaded gasoline is still used.

In particular, general aviation (piston engine) aircraft still use leaded gasoline, called ‘avgas’. The FAA has finally begun to work on mandating a change to unleaded gasoline, but close attention needs to be paid to this process to ensure it happens and in an expeditious manner (<https://www.faa.gov/about/initiatives/avgas>). Additional attention on this process from Ecology Washington could bring more light to this issue in order to motivate the participants to work towards a faster phase-out.

Additionally, dozens of car racetracks around the United States continue to use leaded gasoline and “*new research has revealed the extent to which lead emissions from automobile racing impairs the cognitive development of children living nearby*” [28]. I’m not certain whether any racetracks in Washington state use leaded gasoline, but clearly this should be investigated and banned if it is occurring; and even if it is not, it would draw attention to this flagrant use of leaded gasoline in other states and prevent any racetracks from starting to use leaded gasoline in Washington state.

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