Lead helps to guard your health

YOU wouldn't live today in a house without an adequate plumbing system. For without modern plumbing, sickness might endanger your life.

Lead concealed in the walls and under the floors of many modern buildings helps to give the best sanitation.

Lead pipe centuries old

Lead, therefore, is contributing to the health, comfort, and convenience of people today as it did when Rome was a center of civilization. Lead water and drainage pipes more than 1800 years old have been found in exactly the condition they were in when laid.

In some cities today the law specifies that lead pipe alone may be used to bring water from street mains into the building.

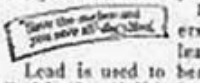
In drainage systems are lead traps made of lead pipe bent into the shape of the letter S, so that a little water will stay in the bend and prevent gases which collect in the pipe from getting out through the house.

The malleability of lead also makes it easy to change the direction of any pipe through the use of lead bends.

Joining the pipes

A plumber easily "wipes" a joint or repairs a pipe leak with lead and tin solder. Because this alloy melts at the low temperature of 558 degrees it can be applied without melting the lead pipe, which melts at 620 degrees.

Lead is also poured into the flanges of pipe-joints to make them absolutely tight. Pipe threads are painted with white-lead or red-lead to make a tight connection. Where vibration or movement of pipes may loosen a poured joint, lead wool is used; lead shredded into threads is packed into the joint in a dense, compact mass.



Rubber gaskets and ball washers containing lead prevent leaking at joints and faucets.

Lead is used to beautify the modern bathroom. Red-lead and litharge, both lead oxides, are important ingredients in making the glossy white enamel covering the iron bodies of tub and basin and the glazed tile walls.

Lead in paint

While lead is invaluable in assuring comfort and proper sanitation, its best-known and most widespread use is as white-lead in paint. Such materials as wood would soon deteriorate unless protected with paint. And the paints that give the most thorough protection against the weather are based on white-lead.

The loss of invested capital through failure to protect the surface of property adequately has led property owners to paint frequently and well. As days and months go by, more and more of them are learning the wisdom of the phrase, "Save the surface and you save all." And they are using white-lead paint to prolong the lives of their houses.

Look for the Dutch Boy

NATIONAL LEAD COMPANY makes white-lead and sells it mixed with pure linseed oil, under the name and trade-mark of *Dutch Boy white-lead*. The figure of the Dutch Boy is reproduced on every keg and is a guarantee of exceptional purity.

Dutch Boy products also include red-lead, linseed oil, flatting oil, babbitt metals and solder.

More about lead

If you use lead, or think you might use it in any form, write to us for specific information.

NATIONAL LEAD COMPANY

New York, 111 Broadway; Boston, 131 State St.; Buffalo, 116 Oak St.; Chicago, 900 West 18th St.; Cincinnati, 659 Freeman Ave.; Cleveland, 820 West Superior Ave.; St. Louis, 722 Chestnut St.; San Francisco, 485 California St.; Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Ave.; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut St.

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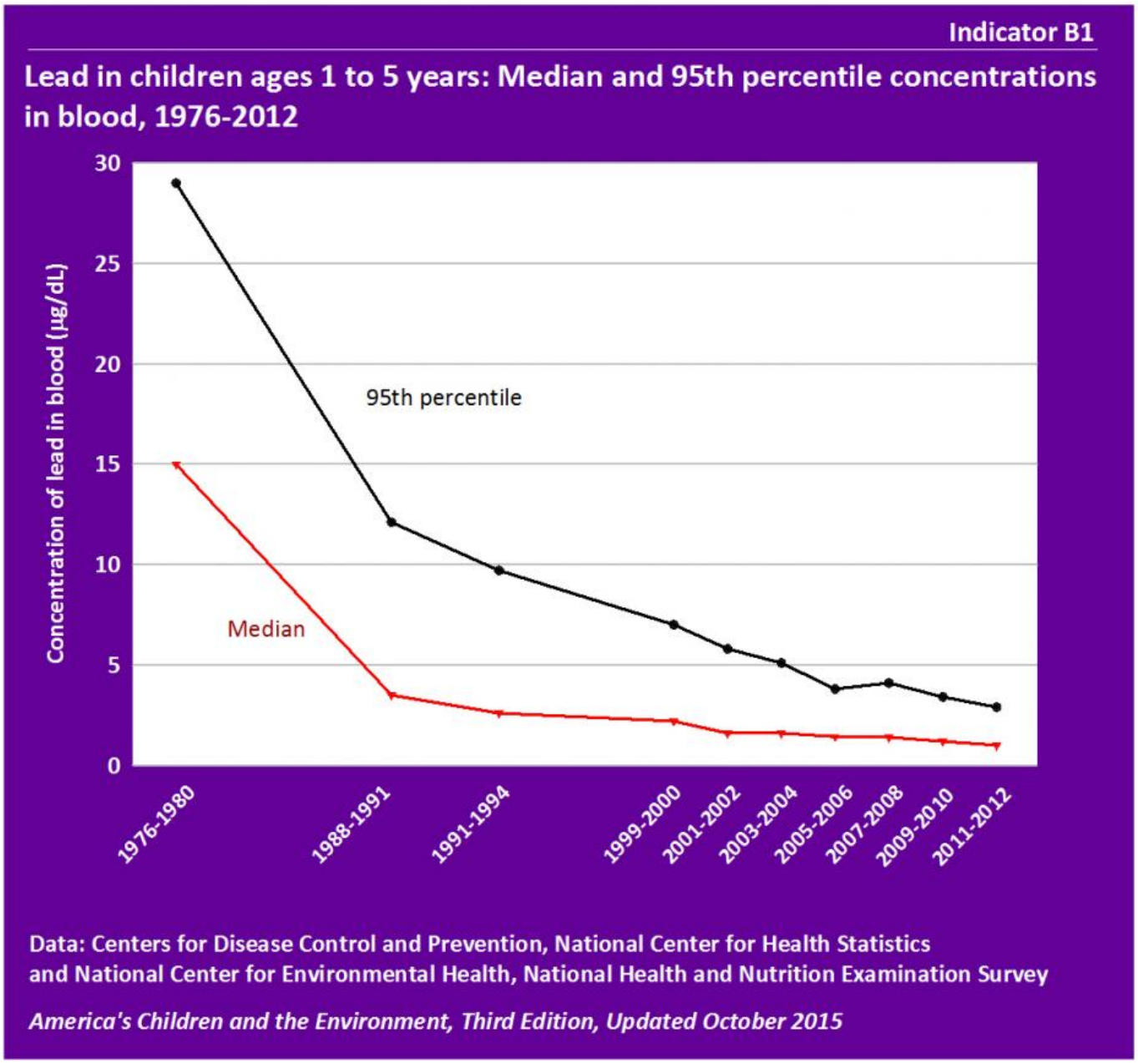
At this point, you would need to be a hermit to have missed the news coverage of elevated levels of lead in the drinking water in Flint, MI. (Although even that might not be a valid excuse given an ancient, anonymous Roman hermit described lead poisoning).

The short version is: in April 2014 a cash strapped Flint switched from using Detroit's water to piping water from the Flint River. The water from the Flint River was highly corrosive, wasn't treated properly, and as it traveled from the treatment plant to homes and businesses in Flint it corroded lead pipes and carried that lead through the taps of Flint's residents. An astute pediatrician began noticing higher levels of lead in children, and eventually the city, state and federal governments began to acknowledge there was a problem. Reporting has turned to questions of accountability.

Let's be clear, it is bad that people in Flint, especially children, were exposed to lead. It is fair to ask why this happened in a predominantly African American community. It is reasonable to expect accountability from the regulators who are tasked with preventing this kind of exposure from happening. There are environmental justice organizations and media outlets pushing those issues forward.

Instead, I think its interesting to focus on three issues that highlight our successes and failures in environmental regulation, the first two of which are seemingly contradictory:

1. The fact that these lead levels make national news is an environmental health victory. Despite this crisis, there is still far less lead exposure than there was just a few decades ago. In fact, you, dear reader, likely had a blood lead content higher than most of the children in Flint when you were a child.



Courtesy EPA. Available at http://www.epa.gov/ace/biomonitoring-lead

(For those reading this in email, you can see the relevant graph of childhood blood lead levels here). In 1976-1980, **88%** of children aged 1-5 had blood lead levels above 10 ug/dL–twice the current level of concern that is being applied to the Flint crisis. While the issue is complicated, we can assume an decrease of about 1.22 IQ points for every 1 ug/dL increase in blood lead levels. (If you're feeling masochistic, go ahead and take a second to calculate roughly what your estimated decrease in IQ is assuming median exposure for your

childhood using the graph.)

The current level of concern is 5 ug/dL, and only about 2.5% of American children reach that level. In fact, based on the numbers crunched by the Detroit Free Press, even with the elevated levels from the water switch, the 2014-2015 levels are still lower than the 2010-2012 levels:

% of Kids (< 16) with blood lead levels greater than 5 ug/dL

May 2010-April 2011: 4.38%

May 2011-April 2012: 3.61%

May 2012-April 2013: 2.84%

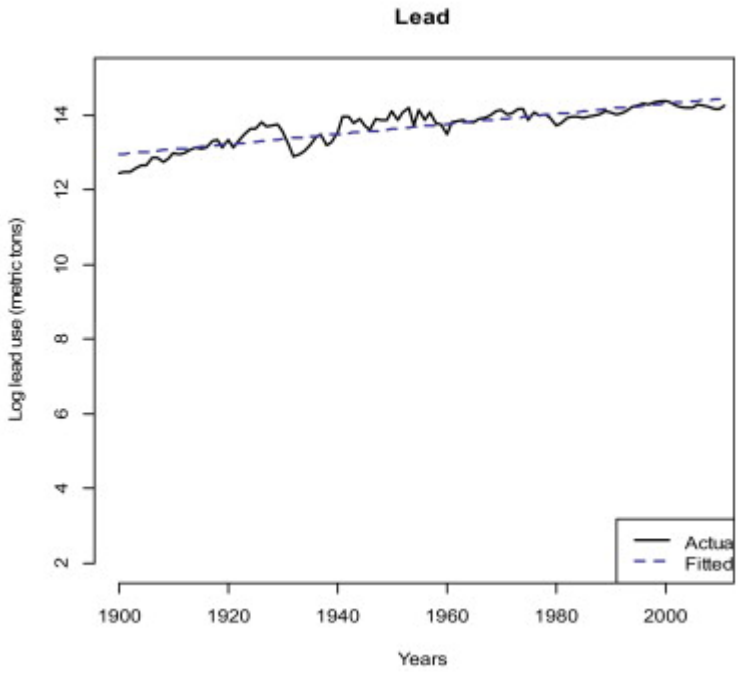
May 2013-April 2014: 2.37%

May 2014-April 2015: 3.21%

This is not to say it shouldn't make news, it should, in particular since CDC statistics show that African American children have higher blood lead levels than their white and Hispanic peers. There is no known safe level of lead for children.

Still, the fact that lead levels are so much lower for everyone is an environmental and public health victory worth savoring. There was an environmental health problem, and the EPA was able to drastically improve it by regulating lead air levels under the Clean Air Act. That's not to say it was easy to do; when have more stringent environmental regulations been universally welcomed? But in the end, the science about the detrimental effects of lead prevailed, and as a result almost all kids today are exposed to less lead than their parents. Experts believe this resulted in enormous societal benefits.

2. Lead use in the U.S. has actually gone up during most of the period when blood lead concentrations were dropping. Yes, we've gotten lead out of gas, paint, and pipes, but it turns out we've still been using a lot of it for lead acid batteries. The USGS data for lead use only goes until 2003, but it shows that lead use for batteries had been outstripping lead use for gasoline by an order of magnitude long before the gas lead ban took affect. This paper labels lead as a "growth" chemical, and provides this handy graph to prove it:



From Regulatory effectiveness and the long-run policy horizon: The case of U.S. toxic chemical use, Lily Hsueh, Environmental Science & Policy, v52, pp. 6-22 (2015).

As someone who generally favors selecting safer alternatives rather than controlling exposure to toxic ones, I must admit we seem to be doing a decent job of controlling exposure to the lead in all those lead acid batteries. However, the locations that manufacture and recycle those batteries still bear an enormous environmental burden, just ask the residents around the Exide factory in Vernon.

3. Everyone struggles to reduce lead exposure. The treatments of different products containing lead is a study in how economic and political considerations impact regulation, even when we know the substance at issue is really bad for us. Comparing European and U.S. efforts illustrates this.

Lead has been used in many products over the millennia, and the first recorded human use of lead corresponds closely with the first recorded incidence of lead poisoning. The point is, there's no notice problem here, although our understanding of the deleterious health effects of lead have deepened over the centuries. We've known for millennia that lead is a human health hazard. It turns out, we've known for just as long that it's a pretty useful substance, and we've had a hard time letting it go. Here are the big lead abatement efforts of the last

century:

Paint: point for Europe. Childhood lead poisoning was linked to lead paints in 1904. France, Belgium and Austria banned white-lead paint in 1909. The National Lead Company admitted lead was a poison in 1921. The League of Nations banned white-lead interior paint in 1922 (you know an environmental regulation is old if it was issued by the League of Nations), but the U.S. declined to implement the ban. Instead, the U.S. waited nearly half a century (1971) to pass the Lead Poisoning Prevention Act (42 U.S.C. 4822), although some local jurisdictions started banning it as early as the 1950s. The ban on lead paint was fully implemented in the U.S. 1978, 74 years after childhood lead poisoning was linked to lead paints.

Gasoline additive: point for the U.S., but only begrudgingly. Putting lead in gasoline was a public health failure. In 1921 Thomas Midgley discovered that tetraethyl lead (TEL) reduced engine knock (and in 1923 he became extremely ill from lead poisoning). In 1923 (i.e. a year *after* the League of Nations lead paint ban), DuPont started making TEL on an industrial scale, and in 1924 five workers died from lead poisoning at DuPont's New Jersey TEL manufacturing facility. In 1925, sales of TEL were suspended while the Surgeon General reviewed its safety (hint: it's not safe), but the following year an industry-dominated committee approved its use and sales immediately resumed. It wasn't until nearly 40 years later that any regulatory headway was made. In 1973 the EPA released a report that found lead from automobile exhaust was causing a direct threat to public health, and shortly thereafter released regulations calling for the gradual reduction of lead in fuel under the 1970 Clean Air Act Amendments. This met with some hurdles. This Rolling Stone article from 1984 summarizes how the Reagan administration tried to avoid stricter regulations on lead in gasoline at the request of industry. But the primary phase out was completed in 1986, and by 1991 the ban was complete. In 2008, the EPA reduced the lead air standard by another order of magnitude.

The European Union, meanwhile, didn't succeed in banning lead in gasoline until 2000. Their delay stemmed largely from objections from Mediterranean countries whose outdated refineries weren't equipped for reformulation. In other words financial interests expressed through a political process trumped public health concerns.

Pipes: The word plumbing is derived from the Latin word for lead because it was used in pipes even in ancient times. Much of the U.S. water infrastructure includes lead pipes. In 1986 Congress enacted the Safe Drinking Water Act Amendments (PL 99-339), which banned the use of lead in pipe or solder in public drinking systems and VA or HUD insured or assisted property. The ban also applied to plumbing installation or repair that connected

to public water systems. Some homes from before this time have lead pipes or lead solder connecting copper pipes. Because of it's ubiquity, protection from lead in water relies on frequent testing and management, mostly through the use of anti-corrosive chemicals. The EPA estimates it will take over $275 billion to upgrade all American plumbing systems to make them lead-free.

Europe is also a mixed bag. In 1980 the EU's Drinking Water Directive set the maximum level of lead in drinking water at 50ug/L; in 1998 voted to decrease that to 10ug/L, although compliance was delayed until late 2013. Germany provides an instructive example. Most areas of southern Germany banned the use of lead in pipes over a century ago, but northern locales didn't do so until the 1970s.

In this sense, the efforts to control lead exposure are a microcosm of environmental regulation generally. We struggle to regulate chemicals and actions that are harmful to human health and/or the environment, but are useful. The situation in Flint is giving us a highly local insight on the cost of failure.