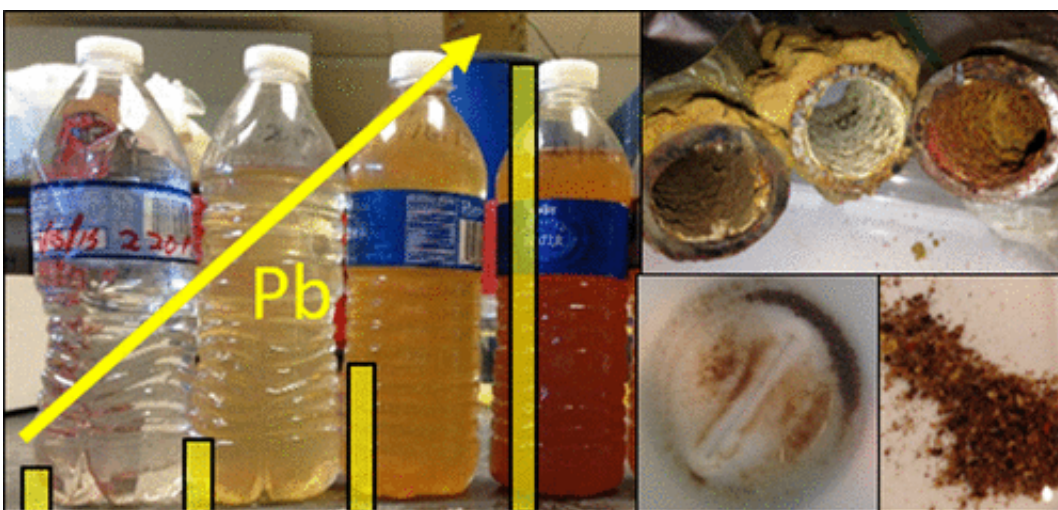


A closer look at what caused the Flint water crisis

February 1 2017



Flint Water Crisis “Ground Zero”

Credit: American Chemical Society

Flint, Michigan, continues to grapple with the public health crisis that unfolded as lead levels in its tap water spiked to alarming levels. Now the scientists who helped uncover the crisis have tested galvanized iron pipes extracted from the "ground zero" house. They confirm in the ACS journal *Environmental Science & Technology* that the lead that had accumulated on the interior surface of the pipes was the most likely source of the lead contamination.

Flint's tap [water](#) became contaminated with high [lead levels](#) after the city

turned to the Flint River to supply its water in April 2014. When they switched, officials didn't use a corrosion-control treatment to maintain the stability of rust layers (containing lead) inside service lines. Within a month of the switch, residents started to report smell and color changes to their water. After her family started getting sick, Flint resident LeeAnne Walters contacted Virginia Tech engineer Marc Edwards and asked him to test her water. All 32 samples from the Walters' home contained lead concentrations above the U.S. Environmental Protection Agency action level of 15 micrograms per liter. Four samples were above 5,000 micrograms per liter, the threshold for hazardous waste. And one sample contained 13,200 micrograms per liter.

Kelsey Pieper and other colleagues on Edwards' Flint water study team have now analyzed the galvanized iron pipes that originally ran from the lead service lines to the Walters' ground zero house in which the first child with elevated [blood lead levels](#) from water was identified. In the [tap water](#), the high lead concentrations strongly correlated with the levels of cadmium, zinc and tin, which were also components of the pipe's original internal coating. According to the researchers, these results suggest that, without corrosion inhibitors, the Flint River water caused the rust layers (with attached lead) to release from the interior of the iron pipe. The combination of lead pipe followed by galvanized iron pipe, is likely to be a health concern in other cities where this configuration is found. They explain that replacing lead service lines is a good step, but the accumulation of lead on old galvanized iron pipes, is also a potential long and short-term problem.

More information: Flint Water Crisis Caused By Interrupted Corrosion Control: Investigating "Ground Zero" Home, *Environ. Sci. Technol.*, Article ASAP, [DOI: 10.1021/acs.est.6b04034](https://doi.org/10.1021/acs.est.6b04034)

Abstract

Flint, Michigan switched to the Flint River as a temporary drinking

water source without implementing corrosion control in April 2014. Ten months later, water samples collected from a Flint residence revealed progressively rising water lead levels (104, 397, and 707 $\mu\text{g/L}$) coinciding with increasing water discoloration. An intensive follow-up monitoring event at this home investigated patterns of lead release by flow rate—all water samples contained lead above 15 $\mu\text{g/L}$ and several exceeded hazardous waste levels ($>5000 \mu\text{g/L}$). Forensic evaluation of exhumed service line pipes compared to water contamination "fingerprint" analysis of trace elements, revealed that the immediate cause of the high water lead levels was the destabilization of lead-bearing corrosion rust layers that accumulated over decades on a galvanized iron pipe downstream of a lead pipe. After analysis of blood lead data revealed spiking lead in blood of Flint children in September 2015, a state of emergency was declared and public health interventions (distribution of filters and bottled water) likely averted an even worse exposure event due to rising water lead levels.

Provided by American Chemical Society

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