

October 2016

HOT TOPIC ALERT

Lead Pipes and the REALTOR®



We need water to live. Making sure we have an adequate supply of water is a problem that has confronted us for a long time—the first municipal water systems were established in Persia some 2,800 years ago.

There are many competing demands made of any water system. It must be reliable, economical, and safe. For many years, the preferred delivery system for water involved pipes made of lead. While lead pipes are reliable and economical, they are also unsafe. Lead is a deadly poison linked to severe health effects in children and adults. The use of lead for new water pipes has been banned in the United States, and efforts are also underway to replace lead pipes where they now exist.

FACTORS ABOUT LEAD

The dangers of lead have been known for centuries. The Greek physician Hippocrates [described the symptoms of lead poisoning](#) in the 4th Century BCE. Some European countries began [banning lead-based paint](#) in 1909. Twelve years later, the National Lead Company admitted that lead is a poison.

Lead affects many different bodily functions. It is often hard to detect lead poisoning, because [symptoms](#) may not show up until dangerous amounts of lead have accumulated in the body. Young children are especially at risk for lead poisoning. Even small amounts of lead in a child's system can cause developmental delays, learning disabilities, behavioral problems, and hearing loss. Exposure to lead at a young age has been [linked](#) to behavioral issues in children, teenage aggression, and criminal behavior in young adults. In fact, some experts credit the reduction in violent crime since 1992 [to lower levels of exposure to lead](#).

While children under six face the greatest danger from lead exposure, there are adverse effects on the health of people of all ages. Adults may suffer anemia, high blood pressure, and declines in mental function. Lead poisoning may also cause miscarriages or premature births, and lead has been linked to reduced sperm counts or abnormal sperm. At very high levels, lead poisoning can cause seizures or unconsciousness, and can be [fatal](#).



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Even though the hazards of lead had been known for centuries, all lead was not banned from water systems in the U.S. until 1986, when the Safe Drinking Water Act went into effect. The use of lead pipes in household water systems [began to decline in the 1950s](#), but it was still used often in systems delivering water to the home. In homes without lead pipes, [lead may still be present](#) in brass or chrome-plated brass faucets, and in fixtures installed or repaired with lead solder.

Lead offers [several advantages](#) as a material for pipes. It is soft and easy to work, with a low melting point. Lead pipes also [resist pinhole leaks, and last longer](#) than pipes made of iron (35 years for lead pipes, versus 16 years for iron pipes). Lead pipes could be easily manufactured by rolling a lead plate into a cylinder, and fusion welded down the seam.

Lead was the standard material for urban water systems for many years (in fact, the word “plumbing” comes from “plumbum,” the Latin word for lead). Although it was known that lead was dangerous, city planners thought that [the advantages of the material outweighed the risks](#), and that lead was a “necessary evil” for a working system. In the early 20th Century, as the use of lead pipes began to decline, the Lead Industries Association conducted an extensive campaign to promote the use of lead pipes. As a part of this campaign, industry representatives met with city officials, master plumbers, and plumbing associations. This campaign continued until at least 1972. In some cities, such as Chicago, building codes into the 1980s required lead pipes.

The disadvantage of lead pipes (and the reason they pose such a health hazard), is that they [corrode](#). Corrosion releases lead in to the water. The extent of this corrosion depends on a number of factors, including water chemistry and the types of minerals in the water, the temperature of the water, and the length of time water stays in the pipe (pipes that get a lot of use and that move a lot of water are less likely to corrode).

Lead in water continues to be a problem. It is hard to know how much of a problem it will continue to be, since it is [not known how much](#) lead pipe remains in use. The need for replacement is urgent, but the task of replacement is huge.

Would you like copper or plastic?

Lead has not been used for new water pipe installations in the US for over 40 years. Water pipes are now usually made of either copper or, increasingly, some type of plastic.

Copper pipes are more expensive than other types. The installation also takes more time. Copper in drinking water can be a health hazard, even if those hazards are not as serious as the ones posed by lead. If water is allowed to accumulate in the pipes, copper can leach into the water.

The two most commonly used plastics for water pipes are PVC (polyvinyl chloride) and PEX (cross-linked polyethylene). There are reports of contaminants from both types of pipes getting into water, but it is not yet clear whether those contaminants pose a health hazard.

WHAT HAPPENED IN FLINT?

Since 2014, much of the discussion of water quality in the United States has focused on the water supply of [Flint, Michigan](#). The story has turned into a political scandal, and the fallout has resulted in resignations of government employees. There have even been criminal charges related to an alleged cover-up.

Beginning in the 1960s, Flint received its water from the Detroit Water and Sewerage Department. In 2013, the city decided to connect to the Karegnondi Water Authority. Switching water suppliers was projected to save the city \$200 million over 25 years. That connection would entail building a new pipeline, so in the interim, the city turned to the [Flint River as its water source](#). The Flint River had been the city’s water source before it switched to Detroit Water and Sewerage.

Problems with the new water supply started soon after the switch was made. Residents [complained](#) about the smell and the color of the new water. E. coli and total coliform bacteria were detected, and users were advised to boil water before using it.

In 2015, tests started showing elevated levels of lead in the water. Authorities repeatedly denied any problems with lead, but it was also noted that the proper corrosion controls were not in place. In September 2015, a team from Virginia Tech found

[“very serious” levels of lead in the water](#). Michigan officials dismissed these findings, saying that the Virginia Tech team had “only just arrived in town and quickly proven the theory they set out to prove, and . . . offering broad, dire public health advice based on some quick testing could be seen as fanning political flames irresponsibly.”

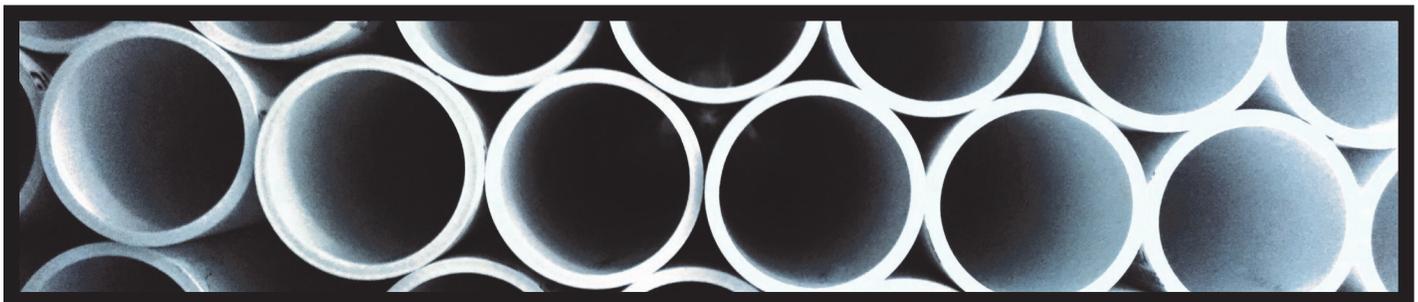
A few days after the Virginia Tech study was released, the Hurley Medical Center in Flint released a study that showed that, after the city switched its water source to the Flint River, 4% of the children in Flint five years of age or younger had elevated blood lead levels. This compared with 2.1% before the switch. The study noted that the children with elevated blood levels were at an increased risk of developing ADHD, delinquent behaviors, and arrests as they grew older. State officials claimed that the elevated lead levels were due to seasonal fluctuations.

On September 25, the day after the release of the Hurley Medical Center study, the City of Flint issued a “lead advisory.” The City stated that it was issuing the advisory “despite the City having performed two rounds of sampling over the past year and finding levels to be well below the U.S. Environmental Protection Agency’s and the Michigan Department of Environmental Quality’s required action level.” The advisory listed precautions residents could take to reduce lead in their water (run the water to flush the pipes before using water for drinking or cooking, and use only cold water).

On October 16, 2015, Flint resumed getting its water from Detroit. On December 14, the new Mayor of Flint, Karen Weaver, declared a state of emergency. In January, Governor Snyder of Michigan and President Obama both also declared states of emergency in Flint. Later that month, the EPA issued an emergency order to take action on the Flint water crisis. The EPA said that it had determined “that the City of Flint’s and the State of Michigan’s responses to the drinking water crisis in Flint have been inadequate and that these failures continue.”

The story is far from over. Congress has investigated the situation, lawsuits have been filed, and criminal charges for conspiracy and tampering with evidence have been brought. On June 23, 2016, the EPA [announced](#) that filtered Flint water is safe to drink but that additional work remains to be done: “The city, state, and federal governments are committed to working together to meet the overall goal of building a lasting, sustainable water system, one that has the capacity to provide clean drinking water to all residents.” Dr. Peter Muennig, Associate Professor at the Mailman School of Public Health at Columbia University, [estimates](#) that Flint’s efforts to save money will end up eventually costing around \$400 million in “lower economic productivity, higher welfare use, and additional criminal justice system costs.”

What went wrong in Flint? The technological answer is that lead entered the water due to corrosion in the pipes. The proper protocol for adding anti-corrosion chemicals to the water [was not followed](#). What was done to prevent corrosion was just not enough.



The political and legal ramifications are still being sorted out. A study commissioned by the State of Michigan [concluded](#) that the crisis “is a story of government failure, intransigence, unpreparedness, delay, inaction and environmental injustice.”

EXPOSURE BEYOND FLINT

Most know of the Flint Crisis, which first made national news in 2014. But Flint is not the only city affected. In Ithaca, NY, water testing recently unearthed high lead levels in the drinking water in [11 of the Ithaca City School District’s 13 schools](#). Testing in [Chicago, IL](#), showed that 99 schools tested positive for levels of lead in drinking fountains above the federal mandated maximum levels.

According to a [USA Today report](#), hundreds of schools across the nation have lead-tainted water. The report relied on an analysis of EPA data which showed that “about 350 schools and day-care centers failed lead tests a total of about 470 times from 2012 through 2015[.] . . . That represents nearly 20% of the water systems nationally testing above the agency’s [EPA] ‘action level’ of 15 parts per billion.”

The USA Today report also found that [three of every four water systems](#) that exceeded the lead standard from 2012 to 2015 served 500 people or less, likely because these small systems often lack the resources and staff expertise of larger systems. But nearly 70 of the systems with excessive lead provide water to at least 10,000 people.

REGULATION OF LEAD IN WATER

When regulations establish how much lead can be in water, the figure given is expressed as a number of “parts per billion,” or ppb. This is a common way of measuring the concentration of one substance in another.

One part per billion is [one microgram \(millionth of a gram\) per liter](#). It is hard to conceive of something so small, but you can get a sense of it by analogy. One part per billion is the same as one second in 31.7 years. It is also the same as one sheet of toilet paper in a roll that stretches from New York to London. To put that number in context, the [EPA sets the maximum](#)

[level of lead](#) in drinking water at 15 ppb. [The National Primary Drinking Water Regulations establishes the same maximum level](#) of lead at 0.015mg/L or 15ppb. Moreover, the EPA has set the maximum contaminant level goal for lead at zero, showing there is no safe level of exposure to lead. This low level underlines lead’s very real toxicity.

State regulations enforce the 15ppb federal maximum level of lead in drinking water, but many [have instituted strict policies](#) intended to reduce the presence of toxic levels of lead in water used for human consumption. These state regulations are supported by the EPA and the Safe Drinking Water Act (SDWA) through the development of basic testing standards, as well as financial support for implementation. The SWDA applies to every public water system in the United States (any water system with at least 15 service connections or serving at least 25 people per day for 60 days of the year).

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the EPA for “primacy,” or the authority to implement SWDA within their jurisdictions. Primacy is granted if states can show they will adopt standards at least as stringent as the EPA standards, and ensure that their water systems will meet these standards. All states and territories [other than Wyoming and the District of Columbia](#) have received primacy. Once approved for primacy, states are tasked with the role of ensuring water systems test for contaminants, review plans for water system improvements, conduct on-site inspections and sanitary surveys, provide training and technical assistance, and take action against water systems not meeting standards.

REPLACE ALL LEAD PIPES?

Many have said lead contamination is a problem with an obvious solution: just replace all the lead water pipes with a safe alternative. We know how to do it, so let’s just do it! Problem solved!

It is a simple solution, but putting that solution into effect is not so simple. Measuring the scope of the problem is *itself* a problem. There is no accurate count

of the number of systems that still use lead pipes. The American Water Works Association has [estimated](#) that there are 6.1 million lead-containing service* lines in use in approximately 11,200 community water systems in the United States. These community water systems provide water to 15 to 22 million people.

Replacing all lead water pipes would be an immense job. It would also be an expensive one. One [estimate](#) puts the average cost of replacing one lead service line at \$5,000. That figure would put the total bill for nationwide replacement of all lead service lines at around \$30 billion. The \$30 billion figure is in addition to the other [costs of upgrading](#) the aging drinking water infrastructure just to the point that it will function reliably and efficiently.



At present, there is no federal law or regulation mandating the replacement of all existing lead pipes (although the installation of new ones is banned). In 1991, the U.S. Environmental Protection Agency (EPA) first adopted the [Lead and Copper Rule](#) as a part of its enforcement of the Safe Drinking Water Act ([42 U.S.C. § 300f, et seq.](#)).

The Lead and Copper Rule has been revised several times since its original adoption, and the EPA is studying additional possibilities for [long-term revisions](#) to the rule. The current version of the rule requires water systems to take actions to minimize the amount of lead and copper in drinking water. If the actions taken are not sufficient to reduce lead, additional water treatment and monitoring will be required. A system may be [ordered to replace lead pipes](#) if the additional monitoring and treatment are ineffective.

Unfortunately, the replacement program has not solved the problem. Shortly after the Lead and Copper Rule was adopted, a federal court [ruled](#) that the EPA did not follow the proper procedures when it

adopted the part of the rule that would have required utilities to replace pipes on private property.

The EPA then amended the rule to say that utilities would be required to replace only those parts of the water lines that ran from the water main to the property line. Individual property owners would be responsible for the replacement of pipes on their property. This scheme is referred to as “Partial Lead Service Line Replacement.”

Partial lead service line replacement has [not been a success](#). Few homeowners bothered to replace their pipes, which reduced the overall effectiveness of the scheme. This may be understandable, given that the cost of replacement can [average \\$3000 to \\$4000](#). In addition, partial replacement may have been counterproductive. A number of [studies](#) have found that partial replacement can substantially increase lead levels in water.

This may be due to the fact that replacement work disturbs the pipes that are not being replaced, and dislodges lead that has built up in the pipes. Connection to copper pipes can also dislodge lead, through galvanic corrosion (a chemical reaction that happens when one metal comes in contact with a dissimilar metal in an electrolyte such as water). Water treatment may also trigger galvanic corrosion. [Elevated lead levels](#) showed up immediately after the partial replacement, and continued for four to six months. In fact, increased lead exposure may continue for up to [fourteen months](#) following replacement.

In March of 2014, a National Drinking Water Council Advisory Council working group was convened. The EPA convened the group to advise on issues such as test sampling, public education, corrosion control treatment, and replacement of lead service lines. The working group presented its [recommendations](#) to the EPA in December of 2015.

One of those recommendations was to enhance the existing lead pipe replacement requirements. The EPA would require all public water systems “to establish a [lead service line] replacement program

*Service lines connect the water main to individual properties.

that effectively informs and engages customers to share appropriately in fully removing [lead service lines], unless they can demonstrate that [lead service lines] are not present in their system.” This requirement would apply to all water systems, not just those that have been found to have dangerous levels of lead. Property owners would still not be required to replace lead pipes on their property, but there would be information about replacement programs, and “encouragement” to participate.

A federal mandate from the EPA requires sellers to disclose if their home has any lead-based paint, but there is no national regulation requiring homeowners to tell prospective buyers or renters if they have lead pipes or related drinking-water issues.

Accordingly, property owner participation in replacement programs tends to be low. Most states, however, require sellers to disclose if something is unsafe with the water supply.

- In [Michigan](#), sellers are required to fill out a standard disclosure form including whether the home’s water has been tested, and the results of any testing.
- In [Massachusetts](#), a REALTOR® who has actual knowledge of water quality problems in a home must disclose that information to prospective buyers.
- In [Wisconsin](#), sellers are required to disclose whether they are aware of any defect caused by unsafe concentrations of lead in water supplies or the plumbing system.

The EPA has not officially adopted the National Drinking Water Council Advisory Council working group’s recommendations. Some water systems may find that replacing all lead pipes in their systems may be too costly. On the other hand, given the serious health hazards of lead in water, it may be too costly not to replace.

IF REPLACEMENT IS NEEDED, WHERE IS THE MONEY?

States and agencies charged with enforcing federal drinking water standards are increasing the number of programs available to cover lead testing costs. Federal

and state-funded programs also exist to help municipalities replace lead service lines. Usually, a municipal water service line has two segments: one belonging to the water utility and the other belonging to the property owner. As a result, replacement of pipes is not simultaneous.

The [Wisconsin Department of Natural Resources](#) recently announced an \$11.8 million program to help municipalities replace lead service lines. But the Wisconsin Public Service Commission does not allow utilities to spend taxpayer revenues on infrastructure improvements to private property. Unless property owners kick in for their own pipes, the program can only provide partial replacements. To address this problem, the state Department of Natural Resources earmarked funds for replacing the private segments of lead service lines. These funds are considered loans that the state will forgive.

Segmented replacement is not unique to Wisconsin. The [Massachusetts Water Resources Authority](#) launched a \$100 million interest-free program to help cities and towns cover the cost of replacing lead service lines. The communities will have 10 years at zero interest to repay the loans. Communities may develop their own programs for replacing lines, so it is possible that some may request private property owners contribute to their portion of the costs.

Other cities are opting for alternative water service line replacement programs. The [District of Columbia](#) developed a program that provides funding to low-income homeowners. These homeowners can replace lead service pipes on their property when the District is swapping out the service line. ■



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State Issues Tracker: Database with over thirty real estate related issues and state laws. Examples include: Transfer Taxes, Seller Disclosures, Broker Lien Laws, Foreclosure Procedures, Sales Tax on Services, Licensing Requirements and Maintenance, etc.

White Papers: Comprehensive reports prepared for NAR on issues directly impacting the real estate industry. Examples include: Rental Restrictions, Land Banks, Sales Tax on Services, State and Local Taxation, Building Codes, Hydraulic Fracturing, Foreclosure Property Maintenance, Climate Change, Private Transfer Fees.

Growth Management Fact Book: Analysis of issues related to land use and modern growth management topics include: density—rate of growth, public facilities and infrastructure, protection of natural resources, preservation of community character, and affordable housing.

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