

Regulatory requirements for lead in public water systems

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The recent drinking water crisis in Flint, Michigan, and the hardship facing the Village of Sebring in Mahoning County, Ohio, serve as reminders of the challenges that public water systems face when attempting to implement complex regulations to protect public health and service the needs of the communities they serve, while balancing cost considerations and aging infrastructure. This article highlights the manner in which the Safe Drinking Water Act regulates contaminants, particularly lead, and briefly summarizes Ohio's regulation of lead in drinking water.

Lead is undeniably a contaminant of great concern that presents a challenge for many operators of public water systems. According to the U.S. Environmental Protection Agency (EPA), many factors influence the manner and extent to which lead contaminates drinking water. These factors include the chemistry of the source water, the amount of lead the water comes into contact with, the temperature of the water, the amount of wear in the pipes transporting the water, the amount of time the water spends in the pipes, and the presence of protective scales or coatings inside the plumbing materials. [1]

In most cases, treatment options are available to prevent the corrosion of lead into drinking water and avoid replacement of all service lines containing lead.

Regulation of contaminants under the Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) authorizes the EPA to set national health-based standards for drinking water. The agency has set standards for more than 90 contaminants, including lead. The SDWA standards apply to all public water systems (PWS). A PWS is any system that supplies water for human consumption through constructed conveyances (such as a pipe, ditch or hose) to at least 15 service connections or regularly serves at least 25 individuals.

For each contaminant, the EPA first sets a maximum contaminant level goal (MCLG). These are non-enforceable public health goals that represent the acceptable level of a contaminant. At or below this goal level, there would be no known or expected risk to human health. The EPA then sets an enforceable standard for each contaminant through either a numeric maximum contaminant level (MCL) or a treatment technique. An MCL is the highest level of a contaminant that is permitted in drinking water. A treatment technique is developed when it is not economically or technologically feasible to set a numeric standard. A treatment technique requires adherence to a process rather than a number.

The EPA's MCLG for lead is zero, as there is no safe exposure level for humans to lead. Rather than setting a numeric MCL for lead, the EPA set a treatment technique that requires PWSs to control the corrosiveness of the water. To implement the treatment technique, the EPA set an action level for lead of 0.015 mg/L. The action level is the concentration of lead in water that determines the treatment requirements that a PWS must complete.

Ohio's lead rules

The EPA has delegated primary implementation authority of the SDWA in Ohio to the Ohio EPA. Ohio's lead rules apply to all PWSs

that serve at least 25 of the same residents either year-round (classified as “community water systems”) or for at least six months of the year (classified as “non-transient non-community water systems”). [2] These types of PWSs include cities, mobile home parks, nursing homes, schools, hospitals or factories. In Ohio, a PWS exceeds the lead action level if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period exceeds 0.015 mg/L.

Monitoring and public notice requirements

The first step in complying with Ohio’s lead rules is to sample for lead. Then, the PWS must use the sampling results to calculate whether the samples are below the lead action level. Every PWS in Ohio has a monitoring schedule, which includes the contaminants a PWS must sample for and the monitoring period during which to sample. Factors such as population size of the PWS and whether previous lead samples tested above the lead action level determine the required frequency of lead monitoring and the number of required sample sites. PWSs may be eligible for reduced monitoring schedules for lead after demonstrating multiple satisfactory sampling results across monitoring periods.

Where to sample

Lead samples must be taken from single family residences or buildings that contain lead service lines, lead pipes or copper pipes with lead solder installed after 1982 and that do not utilize water softeners. Samples must be collected after the water has stood motionless in the line for at least six hours. From residences, the samples must be collected from the cold water kitchen tap or the cold water bathroom sink tap. PWSs may allow residents to collect the tap samples upon providing proper instruction. From nonresidential buildings, samples must be collected from interior taps typically used for water consumption. Samples collected from outside spigots or mop sinks are not acceptable. [3]

What to do with the results

PWSs must provide the Ohio EPA with detailed sampling information and results within ten days of the end of the monitoring period. Regardless of whether a PWS exceeds the lead action level, it must also provide a Lead Consumer Notice to all consumers from whose taps the samples were taken within 30 days of receiving the results. The Lead Consumer Notice must contain specific information, including the monitoring results, the MCL goal and lead action level, the effects of lead on human health, and the steps to take to reduce exposure to lead in drinking water. PWSs must issue the notice by mail or hand delivery. If the PWS is a school or daycare facility, parents or guardians must be notified by newsletter or email. The Ohio EPA also requires verification of the Lead Consumer Notice to be submitted to the Ohio EPA. [4]

What to do if you exceed the lead action level

If a PWS exceeds the lead action level in the tap water samples, in addition to issuing a Lead Consumer Notice, it must sample the tap water of any customer who requests it. PWSs that exceed the lead action level must also provide written public education materials to consumers within 60 days of the end of that monitoring period. Public education materials must contain specific information including the health effects of lead, the sources of lead, the steps consumers can take to reduce exposure, and what the PWS is doing to reduce lead levels in homes and buildings in the area. If the PWS is a school, day care, nursing home or correctional institution, the parent, legal guardian or power of attorney is required to be directly notified. Verification of the public education materials must also be submitted to the Ohio EPA.

PWSs with tap water samples that exceed the lead action level are also required to monitor the water for lead at the entry points to the distribution system. Large PWSs (and small and medium PWSs whose tap water samples exceed the lead action level) are required to monitor for other water quality parameters, in addition to lead, both at taps and at the entry points to the distribution system.

Corrosion control treatment

The treatment technique for lead requires PWSs to install and operate “optimal corrosion control treatment.” The goal of corrosion control treatment is to minimize lead concentrations in the water coming out of consumers’ taps, while still ensuring

that the water is in compliance with all other primary drinking water regulations. Various corrosion control treatment steps may be employed, depending on the characteristics of the water.

Not all PWSs must take additional steps, beyond monitoring, to achieve optimal corrosion control treatment. For example, small and medium PWSs are deemed to already have optimized corrosion control if the systems' samples comply with the lead action level during two consecutive six-month monitoring periods. Generally, these PWSs then only need to monitor for lead once every three calendar years. However, these PWSs must notify Ohio EPA before making any change or modification in treatment or before changing the water source.

PWSs that fail to meet the lead action level must conduct corrosion control studies and come up with a plan to provide for corrosion control. This plan must balance the effect of chemicals used for corrosion control treatment on other water quality treatment processes. Corrosion control treatments that PWSs may employ include the use of a phosphate inhibitor; the use of a silicate inhibitor; a pH and alkalinity adjustment; or a calcium hardness adjustment. The Director of Ohio EPA must approve the corrosion control plan, and follow-up monitoring is required.

Source water treatment

If a PWS has implemented optimal corrosion control treatment and still exceeds the lead action level, the Ohio EPA may require a PWS to implement source water treatment at the entry point of the water to the distribution system. Similar to the process required for corrosion control, a PWS must develop a treatment recommendation. Examples of source water treatment for lead include ion exchange, reverse osmosis, lime softening or coagulation/filtration. Following approval by the Ohio EPA and implementation of source water treatment, PWSs must comply with the maximum permissible lead concentration for the finished water entering the distribution system, as determined by the Ohio EPA.

Service line replacement

While configurations vary from system to system, water mains typically transport drinking water through the distribution system and connect to a smaller pipe. The smaller pipe transports water to the water meter at each residence or business and then through household pipes to the tap. Often, the PWS owns the distribution mains and water meter, and the property owner owns the household pipes leading from the water meter to the tap.

Generally, only if optimal corrosion control treatment and/or source water treatment prove unsuccessful is a PWS required to replace service lines that contain lead. Ohio's rules generally require a PWS in this instance to replace annually at least seven percent of the initial number of lead service lines in the distribution system. However, a PWS is only required to pay for replacement of the portions of the lead service lines that it owns. A PWS is not required to bear the cost of replacing privately-owned lead service lines.

Conclusion

Regulatory changes are anticipated in light of the concerns with lead regulation highlighted by the lead contamination in Flint, Michigan. Recently, multiple bills have been introduced in the U.S. Congress to increase funding for grants and loans for lead reduction projects, increase funding for health programs to address lead exposure, and increase requirements for the EPA to notify the public when it identifies unsafe lead levels in a community's drinking water. In Ohio, the Ohio EPA has indicated that it intends to strengthen its rules in order to drastically reduce the amount of time PWSs have when issuing Lead Consumer Notices and public education materials to consumers and when providing public notice verifications to the Ohio EPA.

Each PWS (and its source water) is unique and requires independent evaluation. PWSs experiencing issues with lead should consult with a regulatory professional who can work with the PWS and the proper regulatory authority, such as Ohio EPA, to resolve the issue. With careful attention to monitoring and treatment options and prompt notification to consumers of monitoring results and treatment steps taken, PWSs should succeed in serving healthy drinking water and maintain the public trust while doing so.

[1] Additional information about lead in drinking water can be found at the [EPA's website](#).

[2] Ohio's lead rules can be found in Ohio Administrative Code Chapter 3745-81.

[3] Detailed information on sampling requirements can be found at [Ohio Adm. Code 3745-81-86](#) or on Ohio EPA's [Lead and Copper Monitoring Instructions Form](#).

[4] For more information, see [Ohio Adm. Code 3745-81-85](#) or Ohio EPA's [Checklist for Completing Lead and Copper Sample Monitoring Requirements](#).

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