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WHITE PAPER / **LEAD AND COPPER RULE**

PROACTIVE PREPARATION FOR LEAD AND COPPER RULE COMPLIANCE

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Changes to the U.S. Environmental Protection Agency Lead and Copper Rule require water service providers to develop an effective compliance strategy to protect the public, especially children and vulnerable populations. The time is now for proactive measures that address public health protection and economic realities.

THE ORIGINAL LCR: REACTIVE AND INEFFECTIVE

There is no safe level of exposure to lead. It can bioaccumulate in the body and poses serious health risks to the brain and nervous system. Even at low exposure levels, lead is particularly dangerous and exposure to elevated levels of copper can result in nausea and potential liver and kidney issues.

Lead was widely used in plumbing materials until banned in 1986, resulting in an estimated 6.5 million to 10 million homes in the U.S. with lead service lines. The Environmental Protection Agency (EPA) introduced the original Lead and Copper Rule (LCR) in 1991 to protect public health, establishing action levels at 1.3 mg/L for copper and 0.015 mg/L for lead. These action levels remain unchanged in the revised LCR. When these action levels were exceeded in 10% or more of the tap water samples collected during any monitoring period, improvements to the water systems were required.

Unfortunately, the frequency of obtaining water samples that would trigger LCR actions was rare because of the sampling procedures in place. This step required consumer involvement to perform advanced sampling methodology and was not necessarily performed at sites representing the true level of contaminants in the community. The LCR required sampling from the tap in homes and buildings, specifying that a draw of water should come from the first liter from the tap after a minimum of six hours of no water usage. However, not all buildings and homes were sampled, and in some cases they were not sampled correctly. The first liter often filled sample bottles with water from the portion of copper or plastic pipe in the home, not the lead service lines that were the true source of the problem. As a result, the data collected was not always reflective of the actual conditions.

Some water utilities were proactive in replacing lead service lines, even when they were found to be in compliance. However, this was not always the case, as LCR loopholes allowed for many problematic lead service lines to remain in service. It was estimated that the LCR resulted in water utilities replacing only 1% of lead service lines due to LCR violations. Inadequate sampling procedures and loopholes allowed neighborhoods and communities to suffer the health consequences and financial burden, thus triggering the need for revisions to the LCR. This new rule will require many utilities to make changes to their current treatment, finished water stability and distribution systems.

THE REVISED LCR: PROACTIVE GOALS FOR CHANGE

While the LCR has undergone minor alterations since 1991, the final LCR revisions in December 2020 reflect a comprehensive set of changes. The new LCR uses enhanced testing protocols targeting lead service lines, improved tap sampling procedures, expanded testing, and closing of loopholes to speed up finding and removing materials containing lead in drinking water systems. Key LCR revisions include:

- Science-based water sampling procedures.
- Required testing in schools and childcare facilities.
- Establishment of trigger levels for earlier mitigation in more communities.
- Closing of loopholes to drive an increased number of full Lead Service Line (LSL) replacements.
- LSL inventory of location and materials.
- Communications to communities of lead service line locations and sampling results.

UNDERSTANDING THE CURRENT STATE

For water utilities, service providers and municipal authorities, the revised LCR may be daunting. The changes are sweeping and swift. All public water systems must comply with the revised LCR, with timelines dependent on system size and detected lead levels.

Revisions to the LCR start the clock for water utilities to reevaluate their existing compliance, improve sampling and collecting representative results, close loopholes that delay improvements, and protect public health for all schools and communities. As the first major change to the rule in 30 years, the revised LCR focuses on proactive measures to identify and mitigate lead materials in water service lines in homes, schools and buildings across the country.

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Water service providers must develop an effective compliance strategy that balances protecting public health while also addressing economic realities.

As a first step, water providers should undertake an honest self-assessment. Understanding where water operations are currently is a good starting point before moving forward. Water providers should explore questions such as:

- Are we sampling at the correct locations to provide meaningful and accurate data that represents actual conditions?
- Do we have any issues or violations in meeting current LCR compliance?
- What are the maximum lead concentrations in our system and where are they located?
- What treatment strategies are in place for finished water stability?
- Do we have a program for replacing lead service lines?

This self-assessment provides a quick idea of where issues might exist, what information is unknown and what areas of focus are needed. With just five years to comply with the LCR, it is essential to prioritize actions. Assessing existing operations and infrastructure helps identify potential low-cost improvements that can be promptly addressed. It also helps with planning for infrastructure and capital programs.

PREPARING NOW FOR SUCCESSFUL COMPLIANCE

Once service providers have a good understanding of the current state of operations, there are systematic actions that can identify and prioritize improvement opportunities within a water system to achieve LCR requirements and optimize cost.

PROCESS EVALUATION

Evaluation of water treatment processes can identify problem areas that need attention and improvements that may be required. Finished water stability analysis helps to understand the different parameters at play and determine if water quality is precipitating, dissolving, corroding or causing distributed water to be at risk.

PROACTIVE LEAD SERVICE LINE REPLACEMENT PLANNING

While many low-cost adjustments can be identified and implemented quickly to support safe drinking water and compliance, many water services will need to plan for lead service line replacement programs. Actions to begin thinking about now include:

- **Assisting property owners and consumers with proactive information.**
- **Evaluating other upcoming planned utility projects to coordinate scheduling.**
- **Identifying exact lead service line locations in communities.**
- **Identifying sampling sites based on new rule requirements.**
- **Formulating strategic capital improvement funding options.**

A process evaluation can also help systems get the appropriate use of existing infrastructure and identify any needed adjustments to improve treatment and achieve water quality goals.

CORROSION TESTING

Understanding finished water stability is essential for producing high-quality water, from treatment facilities to the customers. The correct corrosion testing protocol, analysis of stability indices, and evaluation and adjustment of pH, alkalinity, hardness, buffering capacity and other water quality parameters see that finished water is within the acceptable water quality standards. To target necessary adjustments that can be implemented quickly, water providers should strive to improve the testing protocol, identify who is doing the testing, consider whether testing is done correctly and analyze trending results.

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FACILITY IMPROVEMENTS

Evaluating a water treatment system with the LCR objectives in mind can help identify improvements or alternatives to achieve compliance. Because of recent advances in best practice procedures, operational enhancements can be achieved without requiring capital investment. For some water treatment facilities, new technology may be required to improve existing water quality requirements.

A comprehensive and current inventory of water treatment facility assets and operational procedures provides direction for developing an LCR compliance strategy while optimizing existing processes.

CONCLUSION

Antiquated distribution and plumbing systems throughout the country will result in the ongoing deterioration of an extensive network of lead service lines requiring attention. While the original LCR may have had good intentions, it was not adequate to protect public health or to address the problem of lead and copper leaching into drinking water supplies.

The revised LCR introduces considerable changes to address the risk of lead in drinking water proactively. Water service suppliers must act now to better understand their assets, operations and lead service line infrastructure to develop plans and achieve compliance. This will ultimately help communities reduce the risk of toxic drinking water contaminants. The challenge resides in developing a strategy to achieve these public health goals both effectively and cost-efficiently.

BIOGRAPHY

NATHAN DUNAHEE, PE, is a lead process engineer with Burns & McDonnell in its Water Technology Group. Nathan has 18 years of experience in drinking water evaluation, optimization and design. Nathan currently serves on two of the American Water Works Association's technical committees that focus on emerging water quality concerns, taste and odor, and optimization. He graduated from the University of Illinois with a bachelor's in civil engineering and master's in environmental engineering as a graduate research fellow. Nathan then attended the University of Michigan, where he conducted three years of post-graduate research through the EPA's fellowship program.

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