LEAD IN TAP WATER:

ASSESSING CONSUMER EXPOSURE AND IDENTIFYING CORRECTIVE ACTIONS

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KEY MESSAGES FOR DECISION MAKERS

- Children in households with a lead service line (LSL) have higher blood lead levels (BLLs) than children in households without a LSL.
- Partial lead service line replacements (PLSLR) will reduce lead levels at the tap, but can also result in highly variable and sometimes acute lead release. Corrosion control cannot mitigate the undesirable impacts of PLSLRs.
- Acute concentrations of lead should be detected in large buildings and corrective measures implemented.
- Lead particles in tap water contribute to lead exposure and should be monitored and controlled.
- Best management actions include corrosion control, full LSL replacements, and point-of-use filtration.

WHO IS THIS INFORMATION RELEVANT FOR?

- Water utilities
- Consulting engineers
- Public health authorities
- Government regulators
- Large building managers
- Manufacturers of filters and plumbing materials

WHAT WAS THE RESEARCH FOCUS?

Lead service lines (LSLs) and on-site plumbing contribute to elevated lead levels in tap water. Recent research has demonstrated that exposure to lead has a negative impact on children's neurodevelopment, even at low BLL. Municipalities must take actions to detect problematic sites for lead in tap water and implement corrective measures to prevent exposure. This research investigated key aspects of managing lead in tap water: identifying high risk sites, evaluating water lead levels and exposure in children, and investigating the best corrective actions.

WHAT WAS THE RESEARCH METHOD?

A unique approach was adopted, combining data mining, bench-scale investigation, long-term pilot studies using field-collected material, and extensive full-scale confirmation of the laboratory observations.

WHAT WERE THE RESEARCH RESULTS?

Single-family homes with LSLs and problematic large buildings are sites with significantly higher risk of exposure to lead in tap water for children. Corrosion control and point-of-use filtration are efficient to reduce lead in tap water of houses with full LSL and large buildings. PLSLR will generally reduce lead levels at the tap, but can also result in highly variable and sometimes acute lead release. Corrosion control cannot mitigate these undesirable impacts. However, ongoing full-scale intervention studies in households do not suggest that PLSLRs' undesirable effects are frequent.

WHAT ARE THE IMPLICATIONS FOR DECISION MAKERS?

- Different sampling protocols should be used for LSL detection and exposure assessment. Utilities can use the new low cost, on-site LSL detection sampling protocol to identify at-risk households for monitoring.
- Regulations should include mandatory detection of LSLs to identify priority sites for monitoring and corrective action.
- Changes in water treatment plant operation, such as coagulant or disinfectant type and dosage, should only be considered with full understanding of their impact on lead release.
- Systematic sampling should be conducted at every point of consumption in large buildings, with a primary focus on buildings serving young children. Corrective actions should be implemented in problematic buildings, and can include fixture replacement, reduction of the number of water consumption points, plumbing renovation, point-of-use filtration, and on site-treatment.
- In Canada, public health advisories on lead should be issued to households with LSLs each year in June, when potential exposure for children is at its highest level.
- Full LSL replacements should be supported by regulators and utilities through incentive programs.
- Overall, PLSLRs reduced or did not worsen lead at the tap in several full scale distribution systems, but efficient flushing should be mandatory to decrease transient acute lead release following replacement.
- Corrosion control can efficiently reduce water lead levels, unless PLSLR are present.

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