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Lead in Drinking Water: Washington, DC Issues and Broader Regulatory Implications

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Summary

Members of Congress have shown a continuing interest in the regulation of lead in drinking water, because lead from various sources poses a key environmental threat to children's health. Lead contamination has become a major issue in Washington, DC, where monitoring revealed large increases in the amount of lead in tap water in recent years. The local water authority's limited response to the monitoring results angered citizens and damaged public trust in the local water supply. These events have led policy makers and others to examine the adequacy of the Environmental Protection Agency's (EPA's) regulation for lead in drinking water, including the rule's monitoring and public notification requirements, and EPA's oversight and enforcement of the rule. Hearings on this issue were held by the House Government Reform Committee and the Senate Environment and Public Works Committee, and bills have been introduced. This report reviews issues surrounding the elevated lead levels in DC drinking water, the actions of federal and local officials to address this problem, requirements and issues regarding EPA's lead rule, and EPA's efforts to determine whether the situation in Washington, DC, denotes a wider problem in need of a broader response. This report will be updated.

Introduction

On January 31, 2004, the *Washington Post* reported that the DC Water and Sewer Authority (WASA) had found elevated lead levels in the drinking water of more than 4,000 homes in Washington, DC, during testing done in 2003.[1] Since then, water suppliers, local officials, and regulators have undertaken numerous actions intended to respond to citizens' concerns and anger; to abate further exposures to lead from tap water; to identify the cause of the problem; and, ultimately, to reduce the occurrence of lead in DC's drinking water and assess whether similar problems are occurring in other cities.

At the national level, EPA has reviewed lead monitoring conducted by water systems, from 2000 through 2003, to determine whether the problem in Washington, DC,

[1] "Water in D.C. Exceeds EPA Lead Limit," *Washington Post*, January 31, 2004, pp. A1, A11.

is more widespread, and to evaluate the effectiveness of the lead rule. Thus far, EPA has not found a systemic problem of increased lead levels among water systems. As of June 1, 2004, EPA had received monitoring data for 744 (89%) of the 834 systems that serve more than 50,000 people. EPA reports that 27 (3.6%) of these systems exceeded the action level of 15 parts per billion (ppb) at least once since 2000, and 12 of the systems exceeded the action level during 2003.[2] Most (66%) of the systems serving more than 50,000 people reported that the highest level observed during any monitoring period since 2000 was less than 5 ppb. EPA also received data for 6,678 (91%) of 7,833 systems that serve from 3,300 to 50,000 people. Of these systems, 237 (3.4%) had exceeded the action level at least once since 2000, and 76 systems had exceeded the level for a monitoring period ending after January 2003. In this size category, 71% of systems reported that the highest level observed since 2000 was less than 5 ppb.

Health Effects of Lead. Lead exposure is considered a major environmental health threat to young children, because lead affects their developing nervous systems and intellectual and behavioral development. Fetuses and children under six years of age are most at risk. In 1991, the Centers for Disease Control (CDC) adopted a blood lead level of concern for children of 10 micrograms per deciliter (μg/dl) in response to evidence associating adverse health effects with blood lead levels above that level.[3] Recent studies indicate that blood lead levels below 10 μg/dl also may be associated with negative effects on children's intellectual development.[4] In adults, lead may increase blood pressure.

Sources of Lead Exposure. Lead is widespread in the environment and can be found in older homes with leaded paint, and in soil, plumbing materials, pottery glazes, pewter, and elsewhere. The main source of lead exposure for children is house dust from lead-based paint; exposure to small amounts of paint dust and flakes can elevate blood lead levels. Another major source is soil contaminated by lead-based paint and past vehicle and industrial emissions.[5] EPA estimates that 10% to 20% of exposure to lead may come from drinking water, but notes that infants who consume mostly mixed formula can receive 40% to 60% of their lead from water if lead levels are elevated in tap water.[6]

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[2] EPA's 1991 lead rule required community water systems to conduct initial monitoring by December 1992. The results of the first round of monitoring for systems serving more than 50,000 persons showed that 130 of 660 systems exceeded the lead action level of 15 ppb.

[3] Centers for Disease Control and Prevention, "Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water — District of Columbia, 2004," *Morbidity and Mortality Weekly Report* 53(12), April 2, 2004, p. 268.

[4] R. Canfield et al., "Intellectual Impairment in Children with Blood Lead Concentrations below 10 μg per Deciliter," *New England Journal of Medicine*, April 17, 2003, v. 348, no. 16, p. 1517.

[5] In 1971, Congress passed the Lead-Based Paint Poisoning Prevention Act, which limited lead in interior paint starting in 1978. In 1973, EPA issued a regulation phasing out lead in gasoline. Since these actions, average blood lead levels (BLLs) in children have declined markedly. According to the CDC, for the period 1976-1980, 88% of children aged 1 through 5 were estimated to have BLLs greater than 10 μg/dl; by 1999-2000, this estimate declined to about 2%.

[6] U.S. Environmental Protection Agency, *Lead in Drinking Water*, at [http://www.epa.gov/safewater/lead/leadfacts.html#tapwater], visited April 23, 2004.

Lead is rarely present in drinking water when it leaves a treatment plant. The most common sources of lead in water are lead service lines that connect water mains to homes, lead solder and pipes in plumbing systems within homes, and brass plumbing fixtures that contain lead. Although older homes are most likely to have lead pipes, joints, and solder, new homes may also be at risk, because under the Safe Drinking Water Act (SDWA), "lead-free" pipes may contain up to 8% lead (§1417). These pipes can leach significant amounts of lead for several months following installation. The most common cause of lead in drinking water is corrosion, a reaction between the lead pipes or solder and the water, and the corrosivity of water depends on the water's characteristics (such as acidity).

EPA's 1991 Lead and Copper Rule

The Safe Drinking Water Act (SDWA) directs EPA to promulgate National Primary Drinking Water Regulations for contaminants that may pose public health risks and that are likely to be present in public water supplies. These regulations generally include an enforceable numerical standard (maximum contaminant level (MCL)) to limit the amount of a contaminant that may be present in drinking water. If it is not economically and technically feasible to determine the level of a contaminant, EPA may establish a treatment technique in lieu of an MCL (§1412(b)(7)(A)). At least once every six years, EPA must review, and revise as needed, each drinking water regulation (§1412(b)(9)).

The 1986 SDWA Amendments directed EPA to issue a new lead regulation, and in 1991, EPA issued the Lead and Copper Rule (56 *FR* 26460, June 7, 1991). This rule replaced an interim lead standard of 50 parts per billion (ppb), which was outdated and not protective of public health. Research had shown that adverse health effects from exposures to lead occur at lower levels and are worse than previously thought, particularly for infants and children. Moreover, the interim regulation did not require sampling of tap water to show compliance with the standard. Unlike most contaminants, lead is not normally present in water as it leaves the treatment plant; rather, it enters water primarily through the corrosion of plumbing materials found in distribution systems and homes.

In 1988, EPA had proposed a lead rule that would have lowered the MCL for lead to 5 ppb (applied to water leaving the plant) and also would have required a treatment technique (corrosion control) to further reduce lead in water. Many expressed concern with the proposed rule, arguing that a standard applicable at the treatment plant would not indicate the amount of lead in tap water, and that compliance at the tap was essential. EPA and utilities were concerned that an MCL applied at the tap was not workable, because lead in household plumbing could be a major cause of violations — a situation beyond the control of the water system. Some utilities also were concerned that setting an MCL for source water in addition to a treatment technique for corrosion control would result in confusion among the public and the regulated community (56 *FR* 26472).

The final 1991 Lead and Copper Rule (LCR) did not include an enforceable standard (MCL). Instead, the LCR established a treatment technique (corrosion control) to prevent lead and copper from leaching into drinking water. Other requirements include tap water monitoring, public education, source water treatment, and lead service line replacement. Some Members of Congress and environmental groups argued that, because lead is measurable, the law required EPA to establish an MCL rather than a treatment technique. However, EPA concluded that an MCL at the tap was not feasible because lead levels are often influenced by factors beyond the control of the water utility.

The rule generally required all large water systems (serving more than 50,000 people) to conduct corrosion control studies and recommend an optimal corrosion control treatment to the state or EPA. Smaller systems were required to optimize corrosion control when tap water monitoring showed that it was necessary. The state or EPA then approved or designated a treatment as optimal, and water systems were given two years to install optimal corrosion control and one year to conduct further monitoring.

The Lead and Copper Rule also established a lead "action level" of 15 ppb at the tap, based on the 90th percentile level of water samples. Water systems are required to sample tap water in locations that are at high risk of lead contamination (primarily homes with lead pipes and/or lead service lines). The number of samples a public water system must take depends on the system's size and the results of earlier testing. Large systems generally must take 100 samples in a six-month monitoring period. However, systems that meet the action level or maintain optimal corrosion control treatment for two consecutive six-month periods may reduce the number of sampling sites (to 50 sites for systems serving more than100,000 people) and reduce collection frequency to once a year.

If lead concentrations exceed the action level in more than 10% of samples, the water system has 60 days to deliver an EPA-developed public education program to customers. The education program contains information about lead's health effects and sources, and explains steps to take to reduce exposure to lead. The water system also must offer to sample the tap water of any customer who requests it. (The system is not required to pay for sample collection or analysis.) If a water system still exceeds the action level after installing optimal corrosion control treatment and source water treatment, it must replace annually 7% of the lead service lines under its ownership. The water system must offer to replace the privately owned portion of a service line (at the owner's expense).

Drinking Water Regulatory Framework for Washington, DC

Under the Safe Drinking Water Act, EPA may delegate primary enforcement authority (primacy) for the Public Water Supply Supervision Program (PWSS) to states. States that have been delegated primacy oversee water systems and their compliance with federal drinking water regulations. If primacy is not delegated, EPA is responsible for implementing the program. The District of Columbia is included in the definition of "state" under SDWA; however, the District has not been delegated primacy for the PWSS program. Therefore, EPA Region 3 directly implements the program for the District of Columbia. EPA's oversight and enforcement responsibilities include providing technical assistance to the water suppliers on how to comply with federal regulations; ensuring that the suppliers report the monitoring results to EPA by the required deadlines; taking enforcement actions if violations occur; and using those enforcement actions to return the system to compliance as quickly as possible.

The water systems for the District of Columbia that are overseen by EPA Region 3 are the Washington Aqueduct (owned by the U.S. Army Corps of Engineers), which treats the city's drinking water, and the DC Water and Sewer Authority (WASA), which buys water from the Washington Aqueduct and distributes it throughout Washington, DC. (The Aqueduct also provides water to several communities in Northern Virginia.)

Addressing Lead in DC Drinking Water

In March, EPA reported that WASA exceeded the action level at the 90th percentile for taps monitored during 6 out of 15 reporting periods since January 1992 (three times before 1994 and three times since 2002). EPA, WASA, and other local officials have worked with the Corps of Engineers to determine the cause of the elevated levels. It appears that changes in treatment processes at the Washington Aqueduct may have made the water more corrosive, causing more lead to leach from lead pipes in the distribution system and from lead plumbing inside homes. In November 2000, the Corps changed its secondary disinfection treatment from free chlorine to chloramines to comply with a new EPA regulation that placed strict limits on disinfection byproducts. Since then, more than 10% of tap water samples taken by WASA have exceeded the action level.

In recent months, the Corps of Engineers has worked with a technical work group to develop a new corrosion control treatment process for the water supply. In June, the Corps began testing a process that uses orthophosphate, and found no negative effects. This compound, which is used by many water systems, is expected to form a protective coating in pipes and reduce lead leaching. The Corps now plans to extend this treatment process throughout the Washington Aqueduct's service area starting in August.

EPA has examined WASA and the Washington Aqueduct's compliance with the lead rule. In June, EPA determined that WASA had failed to comply with numerous lead sampling, public notification, and reporting requirements. EPA and WASA reached a consent agreement that requires WASA to improve its public education program, upgrade its database management systems, and replace more than 1,600 lead service lines. (In addition to the 1,100 lead service line replacements scheduled for this year, WASA plans to replace another 500 service lines that serve homes (including home day care centers) occupied by individuals who are most at risk for lead poisoning.)

EPA is also reviewing the lead rule to determine whether changes are needed, including whether EPA should replace the action level with an enforceable standard, as some Members of Congress have urged. On June 29, EPA published a correction to the LCR, reinstating certain public notification requirements that had been inadvertently omitted from the 2001 edition of the Code of Federal Regulations (see 69 *FR* 38850).

The DC Department of Health (DOH) and the U.S. Public Health Service have offered blood testing for residents. As of May 13, 2004, 5,331 individuals had been screened for blood lead levels. Of that total, 1,954 individuals were from their target population (children under the age of six, and pregnant and nursing women). Within that population, 40 children (2.2%) had elevated lead levels (i.e., 10 μg/dl or higher); 26 lived in homes without lead service lines. All except one of the homes of the children with elevated blood lead levels were found to have dust and/or soil lead levels that exceed federal guidelines.[7] A recent CDC analysis of blood lead levels among DC residents found an overall decline in blood lead levels since 1998. Between 2000 and 2003, however, the percentage of persons with blood lead levels of 5 μg/dl or greater, living in homes with lead service lines did not drop appreciably. None of the 201 persons tested

[7] The District of Columbia, Department of Health, Blood Lead Level Screening Results. Feb. 3-May 13, 2004, at [http://www.dchealth.dc.gov/information/fact_sheets/lead.shtm].

who live in homes with the highest levels of lead in drinking water (i.e., above 300 ppb) had blood lead levels above CDC's levels of concern.[8]

Regulatory Issues and Congressional Responses

Elevated lead levels in Washington, DC, and the ineffective responses to those detections, have renewed congressional interest in examining the adequacy of the lead rule, including its monitoring and public notification requirements, the use of an action level in lieu of an MCL, and overall enforcement of, and compliance with, the lead rule. The House Government Reform Committee and the Senate Environment and Public Works Committee have held hearings on this issue, and bills (H.R. 4268/S. 2377) have been introduced to strengthen the regulation of lead in water.

The Chairman and Ranking Member of the House Government Reform Committee and Congresswoman Norton (Committee Member and Representative for the District of Columbia) wrote the EPA Administrator in March 2004 requesting that EPA review the lead rule, as required by the SDWA. These Members and other critics of the rule argue that regulatory gaps appear to be undermining the rule's effectiveness in protecting public health. Issues that have been raised include the following: (1) monitoring under the LCR may not be broad or frequent enough to indicate the level of lead exposure in a community; (2) allowing 10% of samples to exceed the action level without requiring systems to take steps to reduce lead levels allows known exposures to continue; (3) the rule does not require systems to notify homeowners of monitoring results; (4) systems are given 15 years to replace lead service lines, and once the action level is met in 90% of samples, the system may discontinue this effort; and (5) unlike an MCL, the action level is not enforceable (exceedences of the action level trigger other regulatory requirements). Critics have expressed concern that these perceived gaps in the LCR may have delayed the response to high lead levels in Washington, DC, and, generally, may allow potentially significant lead problems to go undetected or unaddressed. H.R. 4268 and S. 2377 have been introduced to strengthen the regulation of lead in drinking water; hasten lead service line replacement; increase monitoring, public notification and education requirements; remediate lead in school drinking water; and for other purposes.

For its part, EPA is reviewing the LCR to determine how well it has worked, whether it is being effectively implemented and enforced, and whether it needs revision. The development of the original lead rule was a long and laborious effort, due to the particular problems lead presents as a drinking water contaminant. Consequently, refining the rule or strengthening its enforcement might be accomplished fairly easily; however, if the agency or Congress determines that major revisions are needed, it is not likely to be an easy task for EPA to construct a new regulatory strategy. As of June 2004, EPA's review had not identified a widespread problem with elevated lead levels across the country.

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[8] Centers for Disease Control and Prevention, "Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water," pp. 268-270.