T&E COMMITTEE #2
March 24, 2016

Discussion

MEMORANDUM

March 22, 2016

TO: Transportation, Infrastructure, Energy & Environment (T&E) Committee

FROM: Keith Levchenko, Senior Legislative Analyst

SUBJECT: Discussion: Residential Lead Pipe Issues

Attachments to this memorandum include:

- Summary Information from the Department of Health and Human Services: Child and Adult Lead Exposure and Effects (©1-3)
- Washington Suburban Sanitary Commission (WSSC) Presentation Slides: A Briefing on Lead in Drinking Water (©4-17)
- Brochure from the Department of Permitting Services: Corrosive Well Water: Is Your Home Drinking Water Safe? (©18-19)
- Montgomery County Public Schools: Summary Information on Lead Testing & Remediation (©20)

The following officials and staff are expected to attend this meeting:

County Government

- Ulder J. Tillman, M.D., MPH, County Health Officer and Chief of Public Health Services, Department of Health and Human Services (HHS)
- Gene von Gunten, Manager, Well and Septic Section, Department of Permitting Services (DPS)

Washington Suburban Sanitary Commission (WSSC)

- Fausto Bayonet, Commissioner
- Howie Denis, Commissioner
- Joe Mantua, Deputy General Manager for Operations
- Tom Street, Deputy General Manager for Administration
- JC Langley, Chief of Plant Operations
- Michael Stroud, Director of the Office of Intergovernmental Relations
- Clarence Beverhoudt, Laboratory Services Group Leader
- Dr. Jin Shin, Water Quality Manager, Laboratory Services Group (presenter)

Montgomery County Public Schools (MCPS)

- Sean Gallagher, Assistant Director, Department of Facilities Management

During T&E Committee review of WSSC's FY17-22 Capital Improvements Program (CIP), Council President Floreen requested a briefing on the issue of lead in public drinking water, given the issues experienced in Flint, Michigan. WSSC staff provided a similar briefing to WSSC Commissioners at the February 16 Commission meeting.

For the T&E Committee briefing, Dr. Ulder Tillman, County Health Officer, will summarize the public health perspective on the issue (see issue summary on ©1-3).

Dr. Jin Shin, Water Quality Manager for WSSC, will provide a presentation (slides attached on ©4-17) on what happened in Flint and how these circumstances compare to conditions in the WSSC service area. For further information on this issue, please see a WSSC press release from February 19 at: https://www.wsscwater.com/contents/news/2016/wssc-details-long-standing-progr.html and a WSSC FAQ page on lead in water at: https://www.wsscwater.com/lead.

Lead is not present in the water WSSC delivers to customer residences, as WSSC does not have any known lead service lines. However, a small percentage of customers may have lead service lines on their property. Lead can also be present in drinking water from lead solder (banned in 1986 by the Environmental Protection Agency (EPA)) and from plumbing fixtures. In 2003, WSSC added orthophosphate as a corrosion inhibitor to address concerns regarding pinhole leaks in copper pipes. An additional benefit of this approach is that lead levels also declined as a result. Per Environmental Protection Agency (EPA) guidelines, WSSC conducts water tests every three years on selected homes that have a high probability of having lead soldered plumbing. None of these homes have tested above the 15 parts per billion (ppb) action level for public drinking water systems. Ninety percent of these homes tested below 1.2 ppb.

Gene von Gunten of DPS will be at the Committee meeting to answer questions regarding lead concerns with well water. DPS has been counseling well owners in Montgomery County for decades on the issues of corrosive well water and potential impacts including increased lead levels. An educational handout, utilized by DPS, summarizing these issues as well as methods to address them is attached on ©18-19.

Sean Gallagher, Assistant Director of the Department of Facilities Management for MCPS, will also be available to discuss MCPS' experience with lead testing and remediation for its faucets and drinking water fountains, which began in 2004. A summary of this effort is attached on ©20.[1]

Attachments
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[1] NOTE: The EPA action level for lead in water for schools and day care centers is 20 ppb.

Child and Adult Lead Exposure and Effects

CHILDREN:

1) **Exposure** — Since the removal of lead from gasoline, lead-based paint has become the major source of exposure for children in the U.S. Other important exposures include elevated maternal blood lead levels (BLL) during pregnancy and breastfeeding, soil, food, or water contamination and toys.
    a. **Prenatal** — In utero lead exposure is associated with impairment of postnatal neurodevelopment with an increased risk for developmental delay, lowering of IQ, and behavioral abnormalities. BLL screening is recommended for pregnant women with risk factors for lead exposure, including recent immigration, pica, occupation, and culturally specific practices. A maternal BLL over 5 mcg/dL is a marker of significant exposure. Lead crosses the placenta easily and a threshold for adverse effects to the fetus or newborn is unknown.
    b. **Breastfeeding** — Infants whose mothers have a BLL ≥40 mcg/dL should not breastfeed.
    c. **Ingestion General** — The ingestion of lead-containing dust from paint or soil is the primary source of lead exposure in children. In addition, lead dust may be carried into the child's environment on the clothing or skin of adults with exposure from hobbies or occupation. Infants and toddlers who spend much of their time on the floor are at a higher risk because of exposure to dust/soil and normal hand-to-mouth behaviors, especially when teething.
    d. **Paint** — Since the removal of lead from gasoline, lead-based paint has become the major source of exposure for children in the U.S. Before 1955, the lead content of white house paint was as high as 50%. Lead was not eliminated from paint for use on residential surfaces, toys, or furniture until 1978. In 1998, 25 percent of homes in the United States with at least one child younger than six years had significant amounts of lead-contaminated deteriorated paint, dust, or adjacent bare soil. The lead content of dust in homes is typically highest in window area because of the disruption that occurs with raising and lowering the windows.
    e. **Water** — Lead in drinking water probably is absorbed more completely than lead in food and may account for more than 50 percent of the lead that is ingested by children. Municipal water supplies are regulated to prevent contamination at the source (but not perfectly). However, once the water reaches the home, it is rarely regulated, tested, or treated. The EPA action level for lead in water is 15 parts per billion (ppb). Most contamination is caused by copper plumbing that is joined with lead solder. Lead pipes may contribute to contamination, but lead plumbing usually is old enough to have its inner surface coated with mineral deposits, which prevent leaching of lead into the water supply. Other potential sources for lead contamination include water storage devices and sources of water that are outside the municipal water districts. Acidity and elevated temperature increase the ability of the water to leach lead from the solder or pipes, as does extended water stagnation.
2) **Clinical Manifestations**: The symptoms of lead poisoning vary depending upon the exposure and age of the individual. However, some children with severely elevated BLL (greater than 250 mcg/dl) may be asymptomatic. The early symptoms of acute lead poisoning are episodic and nonspecific (anorexia, decreased activity, irritability, and insomnia). The symptoms slowly intensify over time.
    a. **Diagnosis** — Lead poisoning is diagnosed in the U.S. when the BLL is greater than 5 mcg/dL (since 2012). Early diagnosis is desirable because most of the effects of toxicity are irreversible.
    b. **Asymptomatic patients** — The diagnosis of lead toxicity usually is made through a lead screening program because most children with mild lead toxicity are asymptomatic.

c. **Symptomatic patients** — The symptoms of lead toxicity are diverse and nonspecific. They include vomiting, cognitive impairment, language delay, hearing loss, and behavior problems at low concentrations and colicky abdominal pain, anemia, intellectual disability, seizures, renal insufficiency, and encephalopathy at higher concentrations.
d. **Neurologic** — The neurologic effects of lead poisoning range from behavioral issues (emotional lability, ADD, or anxiety), pervasive developmental delay, or loss of milestones, particularly in language, to encephalopathy. Population-based studies show that lead levels greater than 10 mcg/dL affect the cognitive and behavioral development of children, but no known threshold exists. Fetal exposure to lead adversely affects infant neurodevelopment (measured at 24 months) independent of post-natal BLL. Poisoning can cause hearing loss, peripheral neuropathy, and decreased nerve conduction velocity. The hearing loss occurs primarily in the higher frequencies and may contribute to learning and behavior problems. Acute encephalopathy occurs at BLLs greater than 100 to 150 mcg/dL and is indicated by persistent vomiting, altered or fluctuating state of consciousness, ataxia, seizures, or coma.
e. **Hematologic** — Lead poisoning in children rarely results in anemia. Decreased hemoglobin synthesis has been well documented at BLLs of 40 mcg/dL and is caused by the interference of lead with several enzymatic steps in the hemoglobin pathway. With prolonged exposure to high levels red blood cell lifetime is diminished.
f. **Renal** — kidney disease is a potential complication of prolonged high-level lead exposure.
g. **Gastrointestinal** — Lead colic, which includes sporadic vomiting, intermittent abdominal pain, and constipation, may occur with a lead level as low as 60mcg/dL.
h. **Endocrine** — Blood lead levels and vitamin D levels are inversely related. Vitamin D metabolism is decreased at BLLs of 30 mcg/dL. The effects of lead toxicity on cell growth and maturation and tooth and bone development are likely mediated through vitamin D levels.
i. **Long Term** - There are few studies of the long-term consequences of childhood lead poisoning. However, in a 50-year follow-up of 35 adult survivors of childhood lead poisoning, cognitive dysfunction, hypertension, and offspring with learning disabilities were more prevalent than in matched adult controls. The adults in the study had been symptomatic in childhood and thus likely had blood lead levels exceeding 60 mcg/dL.

ADULTS:

1) **Exposure** — The majority of adult lead exposure is occupational, such as manufacturing or use of batteries, pigments, solder, ammunitions, paint, car radiators, cable and wires, some cosmetics, ceramic ware with lead glazes, and tin cans. Other exposures are similar to those of children (paint, water, other environmental).
2) **Clinical Manifestation** — Many of the toxic effects of lead are reversible if poisoning is identified early. However, high level poisoning, or moderate poisoning over long periods, can result in irreversible damage to the central and peripheral nervous systems, kidneys, and other organ systems. The manifestations of poisoning can vary from individual to individual. There is a general correlation between acute health effects and BLL. Severe poisoning is seen with BLL >80 mcg/dL.
3) **Acute poisoning** - abdominal pain ("lead colic"), constipation, joint pains, muscle aches, headache, anorexia, decreased libido, concentration and short-term memory deficits, and deficits in short-term memory, fatigue, sleep disturbance, confusion, seizures, and encephalopathy can be seen with extremely high levels of lead.
4) **Chronic poisoning** - chronic or recurrent exposures with BLL 30-70 mcg/dL may be asymptomatic or present with vague nonspecific symptoms such as myalgia (muscle pain), fatigue, irritability, insomnia, loss of appetite, impaired short-term memory, and difficulty concentrating, declines in neurocognitive functioning, psychiatric symptoms (phobic anxiety, depression, and hostility), distal sensory and motor neuropathies, electrocardiographic conduction delays, and hearing acuity.

5) **Reproduction**— Lead readily crosses the placenta. Increased number of miscarriages, stillbirths, and preterm delivery appear to be related to high lead exposures in pregnant women. Low birth weight and cognitive impairments have been reported in babies born to mothers with elevated lead in venous blood, cord blood, or bone. Bone lead levels have also been associated with higher maternal blood pressure and higher rates of third-trimester hypertension. These effects have been seen at levels as low as 10 to 15 mcg/dL. The effect of lead exposure during pregnancy on subsequent neurodevelopment of offspring is most apparent from exposure during the first trimester and heightens the importance of preventing exposure as early as possible in pregnancy. Men with chronic lead exposure (40-70 mcg/dL) have been found to have a lower sperm count and an increased percentage of dysfunctional sperm, as well as alterations of male endocrine function.
6) **Other effects** — Lead exposure may affect the cardiovascular system by causing hypertension and/or arterial stiffness, as well as accelerated aging-related diseases related to vision, hearing, and dental health.

A Briefing on Lead in Drinking Water

Montgomery County Council

Transportation, Infrastructure, Energy and Environment Committee

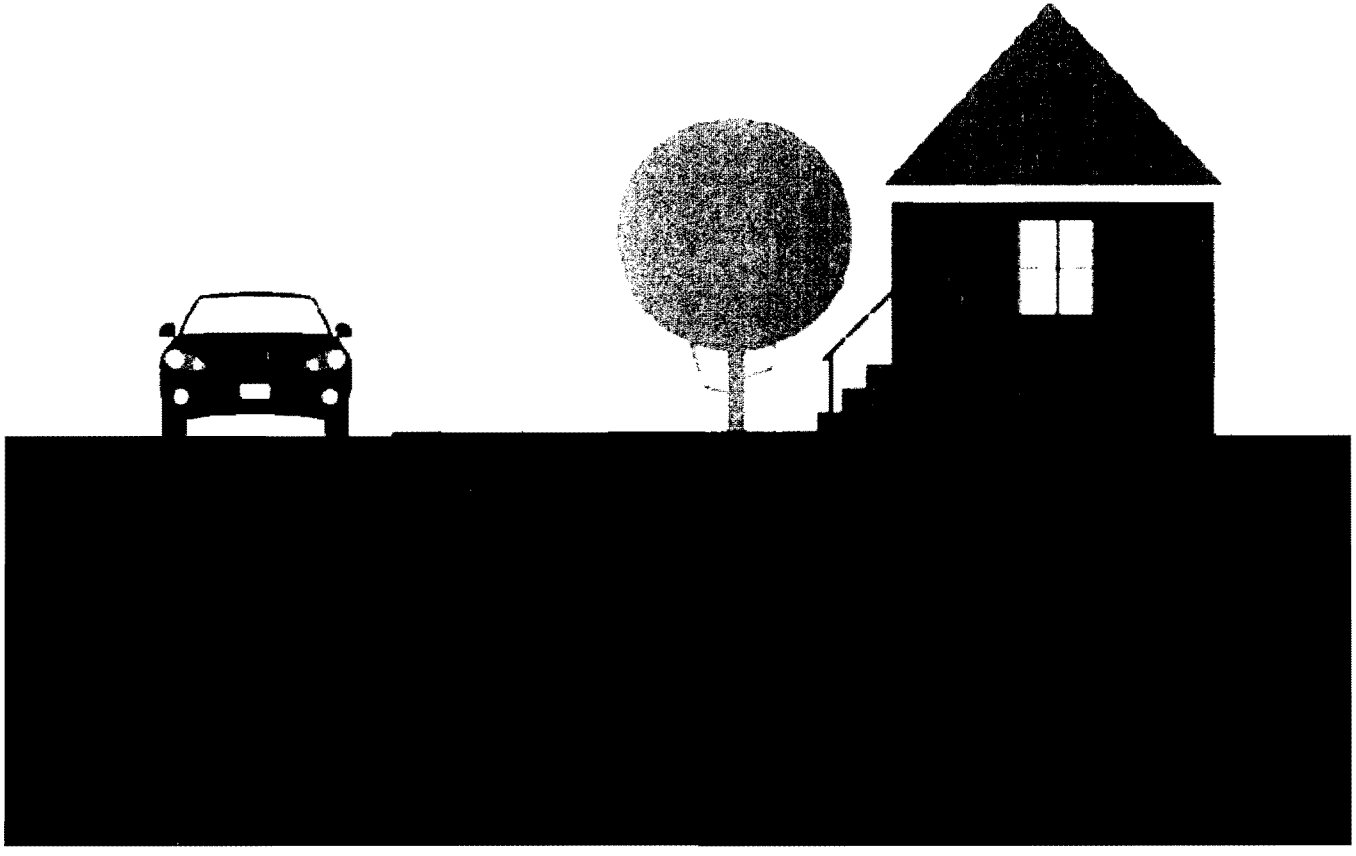
March 24, 2016

(4)

What Happened in Flint?

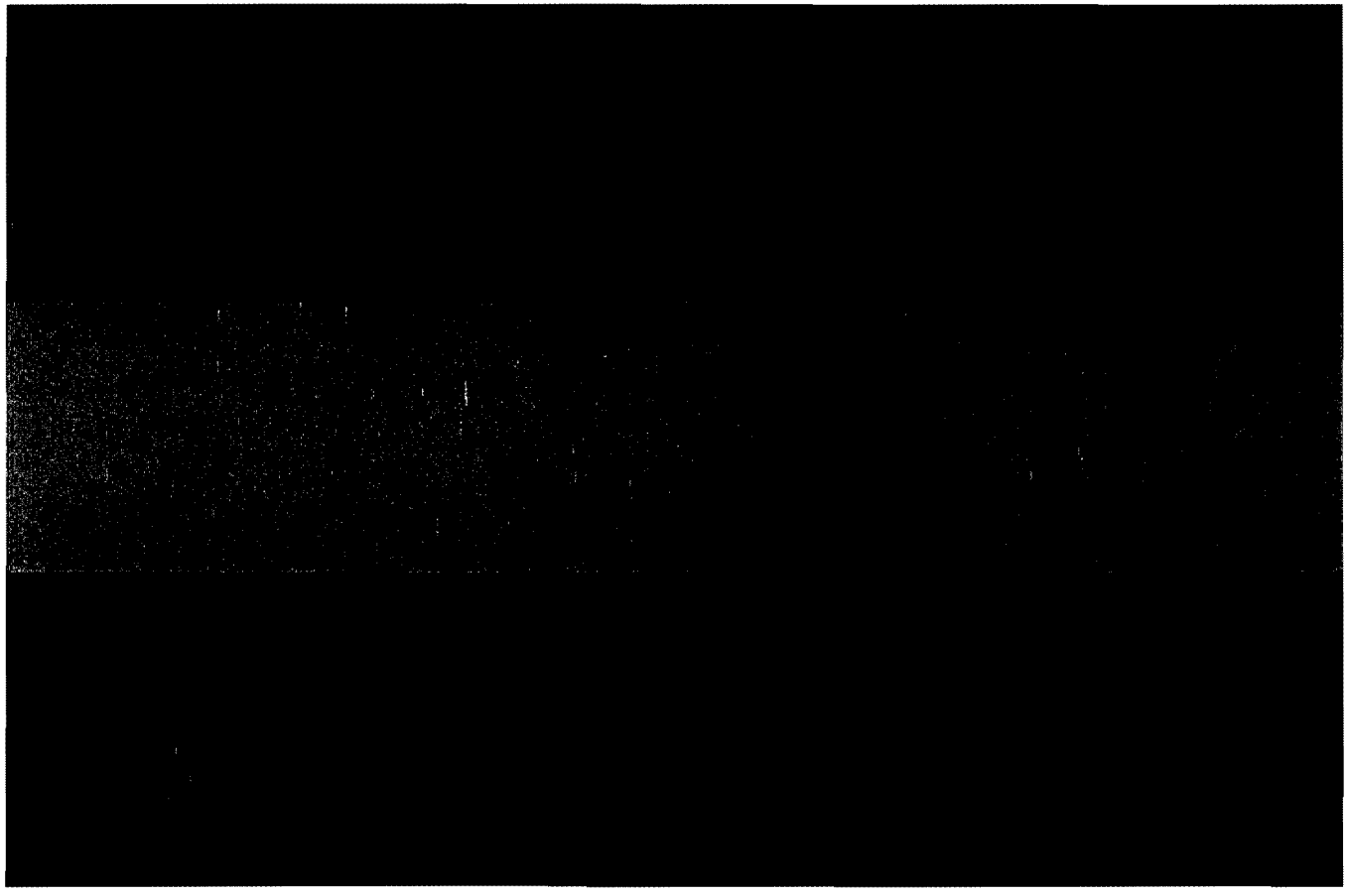
- Built in early 1900s, many cast iron water mains and lead service lines
- Flint switched from treated Detroit water to Flint River water in April 2014.
- Flint River contains high levels of highly corrosive chloride
- Flint did not add chemical to control corrosion
- This eroded coating on lead service lines to homes
- Lead leached into water

Detroit Process with Corrosion Control



Source: Time.com

Flint Process without Corrosion Control



Source: Time.com

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What Happened in Flint?

- Failed to test properly
  - Flushed before sampling: downplays lead levels
  - Removed aerator screens: downplays lead levels
- Failed to listen to customers and stakeholders
- Failed timely corrective actions
  - Ignored warning signs
  - Problem not addressed until 18 months from the onset
- Failed to communicate risks to customers

Can It Happen at WSSC?

(9)

Potential Sources within WSSC

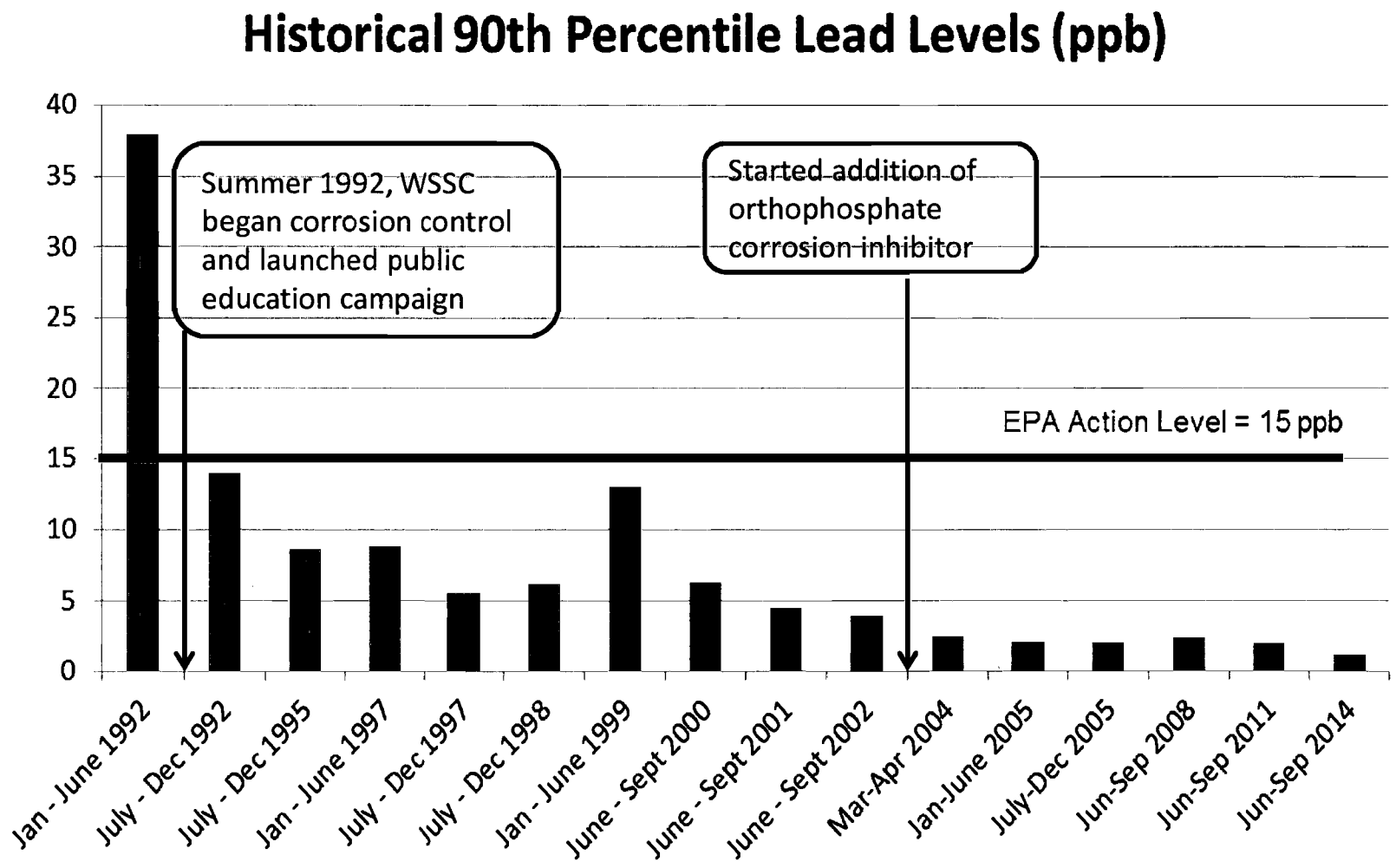
- Lead is not present in the water WSSC delivers to customer residences
- WSSC does not have any lead pipe in its system
  - However, WSSC does not maintain plumbing in private property
- In 2005, WSSC conducted aggressive search and replacement program for lead pipes
- Insignificant but remaining sources include lead solder (banned in 1986 by EPA) and plumbing fixtures

(10)

WSSC Corrosion Control Strategy

- Intent of Lead and Copper Rule is to optimize water quality to minimize corrosion
- Maintained effective corrosion control since 1992
  - Maintain pH and alkalinity
- Added orthophosphate as corrosion inhibitor since 2003
- WSSC corrosion control performance far exceeds regulatory requirements

WSSC Lead Levels



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WSSC Lead Sampling Procedures

- Customers are asked to collect first-draw samples
  - Water in contact with potential lead sources
  - Water stagnant for at least 6 hours
  - Not allowed to run water before sampling
- WSSC never asked customers to remove aerator screens before sampling
- Following EPA's 2006 clarification memo, advised customers to remove and clean aerators twice a year to reduce exposure

Can It Happen at WSSC?

Factors	Flint (2014)	WSSC (2014)
Lead pipes in system	Present	Not Present
Corrosion Control	No	Yes
Lead testing procedures	Not compliant	Compliant
90th Percentile lead levels	> 15	1.2

14

Can It Happen at WSSC?

- Operational risk is extremely small
- Transparency: WSSC reports ALL lead data to MDE
- Treatment changes that potentially impact lead corrosion must be reported to and approved by MDE
- WSSC has resources, experience, and expertise for effective and timely risk prevention and management

(51)

Can It Happen at WSSC?

- WSSC takes whatever actions are necessary to protect public health
- Customers' safety, health and well-being are WSSC's primary concern
- MDE is very vigilant in monitoring WSSC operation
- Both counties closely monitor WSSC services
- Very involved and vocal customer base
- Customers can call (301) 206-7575 for lead testing.

Questions?

(17)

CORROSIVE WELL WATER

IS YOUR HOME DRINKING WATER SAFE?

WHY WORRY ABOUT CORROSIVE WELL WATER

Corrosive water reacts with—actually eats—the metal in your plumbing. Corrosion increases when water is more acid, when there is more oxygen or carbon dioxide dissolved in the water, or with other changes in water chemistry. The metals and their by-products are then dissolved in your water.

Corrosive Water Can Be a Nuisance
If you have noticed:
—Discolored (red, brown, green,) water or fixtures;
—Cloudy or turbid looking water;
—Unpleasant tasting water;
—Corroded faucet seats and fixtures;
you may be seeing some of the effects of corrosive water.

Corrosive Water Can Cost a Lot of Money
As you may already know from experience, the replacement of corroded home plumbing is expensive.

Corrosive Water Can Cause Health Problems
Your own well water can be harmful to you and your family. Your drinking water may carry:

LEAD—used in solder. Lead is particularly dangerous to small children, below the age of five, and pregnant women; but it can affect anyone. Lead poisoning can affect the brain, red blood cells, kidneys, and other parts of the body.

CADMIUM—found in galvanized pipes. Cadmium can cause kidney disease, high blood pressure, and anemia.

COPPER—used in copper pipes. At low levels, copper is necessary for good health. But too much copper can cause intestinal disturbances.

WHAT YOU CAN DO ABOUT CORROSIVE WATER FROM YOUR WELL

METHOD	ADVANTAGES	DISADVANTAGES
FLUSH LINES—draw out one gallon before drinking or cooking with water which has been standing in pipes for more than two hours.	Inexpensive, helps limit health effects.	Does not protect pipes, valves, or fixtures.
CHEMICAL TREATMENT—continuously added to water supply through pump.		
1) LIME	Very effective	Weekly testing and maintenance. Messy. Feed pump clogs easily.
2) SODA ASH	Moderately effective	Weekly testing and maintenance; some clogging of feed pump.
3) CAUSTIC SODA	Somewhat effective	Weekly testing; caustic materials can cause burns; dangerous around children. Damage to surrounding area if spilled.
4) POLYPHOSPHATES	None	Expensive; least effective of chemical treatments.
ACID NEUTRALIZER TANK (Calcite filter)	Low maintenance	Limited effectiveness if not sized for adequate detention time.
PLASTIC PIPE	Not subject to corrosion	Restricted by local building codes. Does not protect metal valves and fixtures.
LOW LEAD SOLDER	Helps limit health effects	More expensive and time consuming to apply than traditional solder.

SOME THINGS WHICH DO NOT REDUCE CORROSION

1) Carbon filters; Sand filters; Cartridge filters—These products do filter out certain contaminants. They do not remove disolved metals such as lead and copper, and they do nothing to prevent corrosion.
2) Water softeners; Iron removal systems; Ion exchange units—Soft water may be good for your laundry, but it may not be good for your plumbing—or your health. Hard water actually helps protect metal pipes and fixtures from corrosion. Soft water usually increases corrosion.
3) Reverse osmosis—This special approach to water treatment also makes water soft. Soft water usually increases corrosion.

Summary of Testing and Remediation of Lead in Drinking Water in MCPS Schools

March 21, 2016

In 2004, a technical committee was formed to develop a program for ensuring that drinking water in MCPS schools is safely below the US Environmental Protection Agency (EPA) action level for lead content - 20 parts per billion (ppb). The technical committee was comprised of representatives from Washington Suburban Sanitary Commission (WSSC), Montgomery County Department of Health and Human Services (DHHS), the Montgomery County Department of Environmental Protection (DEP), and Montgomery County Public Schools (MCPS). Guided by the US EPA lead in drinking water protocols, the technical committee developed specific protocols for testing, flushing, replacing fixtures, and releasing schools from the interim flushing protocol. The following items provide further details regarding the testing and remediation during the 2004 to 2007 period:

- Over 35,000 tests were conducted on approximately 27,000 plumbing fixtures and approximately 1,500 plumbing fixtures were replaced.
- Specific flushing protocols were developed and implementation continue to today.
- During the testing and remediation period of 2004 to 2007, all lead in water test results were submitted to and reviewed/approved by DHHS and DEP to ensure that proper protocols and remediation were implemented.

In addition to the intensive period of testing and remediation, the following practices have been put in place for ensuring drinking water quality based on US EPA guidelines.

- For all major capital projects including additions, revitalization/expansions, and new schools, lead-free materials and components of plumbing systems and fixtures are specified to meet NSF/ANSI standards and provisions of the US Safe Drinking Water Act. Upon completion of major capital projects, tests were conducted to ensure safe drinking water.
- Following the US EPA guidelines, flushing protocols and other recommended practices are incorporated into routine operation procedures.
- Communications to school principals and building service staff, through annual memorandum, semiannual meetings with building service managers, and quarterly newsletters, emphasizes the importance of the flushing protocol on a daily basis.