What’s Happening in Flint and How is MWRA Different?

David Coppes
Director of Waterworks
What’s Happening In Flint And How Is MWRA Different?

- Press coverage raising questions about water safety around the country

- MWRA customers have questions about their water

Images from nightly news broadcasts, newspapers, the internet, blogs, and periodicals are everywhere
Indications Of Problems In Flint Went Unheeded

• Public is more sensitive than ever to changes in water quality

• Need to take complaints seriously
  – Respond quickly
  – Provide good customer service

• Maintain customer’s confidence in the safety of the water we provide
MWRA Takes Customer Concerns Seriously

- Water quality hotline: **617-242-LEAD**

- Tracks complaints received from community water departments
  - A minimum of weekly calls to each community

- Provides assistance to communities in resolution of complaints
  - Investigation support
  - Sample collection
  - Chemical/biological analysis

- Consults with regulators and public health officials
Flint Changed Source Water And Treatment

- MWRA has high quality source reservoirs
- Treatment has been stable for years
- Thorough review of any treatment changes
  - Bench and pilot testing
  - Expert panel review
- DEP and EPA involvement in review and approval

Quabbin Reservoir, above, and Wachusett Reservoir, below, have well protected watersheds and provide high quality water to MWRA treatment facilities
Flint Did Not Implement Corrosion Control Treatment

- MWRA corrosion control treatment in place since 1996
- Conducted by well-trained licensed treatment plant operators
- Sodium carbonate and carbon dioxide added to reduce corrosivity and improve stability
- State approved ‘Optimum Water Quality Parameters’ met consistently

The John J Carroll Water Treatment Plant (center) and Interim Corrosion Control Facility (foreground) provide continuous corrosion control treatment since 1996
Water Quality Data In Flint Was Not Made Public

- Lack of information undermined public confidence
- Citizen groups gathered their own data
- In contrast, MWRA publishes water quality data on mwra.com

Data that can be found on MWRA website:
- Raw water, treated water, and distribution system data
- All lead compliance sample results since 1992
- Easily understood summary charts

90% Lead Levels (ppb) in MWRA Fully Served Communities Since Lead / Copper Rule in Place 1992-2015
The Number of Communities Below The Lead Action Level Has Declined
Over Half The Homes In Flint Have Lead Service Lines

- In comparison about 5 percent of services in MWRA communities are lead.
- Important to maintain and update community inventories of lead service lines.
- Risk of lead in water remains as long as lead service lines exist.

<table>
<thead>
<tr>
<th>Community</th>
<th>September 2015</th>
<th>Number of Services</th>
<th>Estimated Lead Services</th>
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<tbody>
<tr>
<td>MWRA System</td>
<td>6.22 Ppb</td>
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<tr>
<td>Arlington</td>
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<td>Bedford</td>
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<td>7.55</td>
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<td>5,180</td>
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<td>Chelsea</td>
<td>11.6</td>
<td>13,204</td>
<td>0</td>
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<tr>
<td>Dedham/Winthrop</td>
<td>7.088</td>
<td>8,126</td>
<td>100</td>
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<td>Everett</td>
<td>2.94</td>
<td>18,147</td>
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<td>5.3</td>
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<td>Quincy</td>
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<td>Winthrop</td>
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</table>

*Most recent data as of 2/3/2015*
Corrosion Control

Betsy Reilley, Ph.D.
Director, Environmental Quality,
Water and Wastewater
There are two primary corrosion control methods (for larger systems)

- Phosphates
- pH and Alkalinity

Phosphates provides a protective film to control corrosion

pH and alkalinity controls solubility rates. May also form a film depending on water chemistry (calcium carbonate film).

MWRA performed extensive testing to determine optimal pH and alkalinity targets, while also balancing other WQ goals (iron, disinfection byproducts)
Corrosion and aggressiveness of water can be evaluated based on a variety of WQ parameters:

- Larson Index
- Langlier Index
- Aggressivity Index
- CSMR (chloride:sulfate mass ratio)
- But even with all that, you need to pilot
Flint water quality changed significantly especially in regards to the Larson Index (which is appropriate to use for Flint water, particularly due to pH range)

<table>
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<tr>
<th>Parameter</th>
<th>Flint Before</th>
<th>Flint After</th>
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<tr>
<td>pH</td>
<td>7.4</td>
<td>7.6</td>
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<tr>
<td>Hardness (as CaCO₃, mg/L)</td>
<td>101</td>
<td>183</td>
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<tr>
<td>Alkalinity (as CaCO₃, mg/L)</td>
<td>78</td>
<td>77</td>
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<tr>
<td>Chloride mg/L</td>
<td>11</td>
<td>92</td>
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<tr>
<td>Sulfate, mg/L</td>
<td>25</td>
<td>41</td>
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<tr>
<td>Inhibitor (mg/L as P)</td>
<td>0.55</td>
<td>0</td>
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<tr>
<td>Larson Ratio</td>
<td>0.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Langlier Index</td>
<td>negative value</td>
<td>negative value</td>
</tr>
</tbody>
</table>
• Discolored water was an indicator of the problem, but discolored water alone cannot be used to evaluate.

• Biofilms and corrosion products will slough when the buildup reaches certain levels or when flushing/flow reversals, etc disrupt the products.
Corrosion Control Is Complicated
Figure 1.5  Theoretical Pb(II) solubility diagram as a function of pH and DIC in absence of orthophosphate (I=0.005, T=25°C)

Source: EES 1990
Source: EES 1990

Figure 1.5 Theoretical Pb(II) solubility diagram as a function of pH and DIC in absence of orthophosphate (I=0.005, T=25°C)
Corrosion Control is Complicated

- Alkalinity
- Hardness
- Calcium
- Sulfate
- Chloride
- Lead
- Iron
- Copper
- Phosphates
- Bicarbonate
- pH
- Organics/NOM

- Particulate
- Dissolved
- Hard Scale
- Soft Scale
- Chemical composition of scale
Coatings On Lead Service Lines Can Vary

- Chemical and physical disturbances can release lead particles present on the service lines
There Are All Kinds Of Corrosion
MWRA water system has now been below the lead Action Level of 15 parts per billion 20 straight rounds.

In 1992, 24 communities were above the AL, in 2015, only 2 communities are above the AL.
• Lead is found from a variety of sources and levels have declined significantly over time:
  – Gasoline
  – Paint
  – Dust
  – Soil

• MWRA water quality is stable, as is treatment
• Being responsive to water quality complaints will build confidence in the water
• MWRA staff take a science based approach to assessing water quality, treatment, and compliance.
• So long as there is lead in contact with water, risk remains.
Public Health Implications of Lead
Effective Joint Communication

Is there lead in my drinking water, and what can I do?

Take a minute to get the lead out.

Reduce your exposure to lead. Run your water until it's cold.

Massachusetts Water Resources Authority (617) 242-LEAD
Requirements of the Lead and Copper Rule
• Sample stagnant water samples at high risk homes, primarily lead service lines
  – Most MWRA communities take 15 samples, based on population
  – MWRA takes a total of ~450 samples

• 90th percentile needs to below Action Level of 15 ppb
  – If above, take action
  – Non-enforceable goal of 0

• Two schools per sampling round
  – Fountain and faucet
  – Change locations each round
• If 90th percentile is above Action Level of 15 ppb, community is in exceedance and must take action:
  – Service Line Replacement component
    • Need to replace 7% of total each year
  – Education component
    • Mail brochures to every customer
    • Public health outreach – schools, doctors, WIC
What Is Changing In LCR Implementation?
What Is Changing In LCR Implementation?

- EPA Has Been Working on Rule Revisions for Several Years
- National and International Attention on Lead Issues After Flint
- EPA Letter to every Governor and State Drinking Water Program on February 29th
- Stricter attention to existing Rule requirements
Key NDWAC Recommendations

• Improve the public education aspects of the rule

• Help customers identify and respond to the risks of lead in home plumbing – especially lead service lines

• Require the all lead service lines be completely replaced (over the long term)

• Focus sampling efforts on providing customers with information they can use to identify and reduce the risks in their homes

• Strengthen corrosion control, with better process monitoring
- Keep aerator on (no change)
- Use wide mouth bottle
- Normal flow rate
- Normal use before sampling, no pre-stagnation flushing

• MWRA has implemented these changes

• Increased focus on sample sites with lead service lines
EPA Urging More Transparency With Lead Sample Results
Transparency With Lead Results

Lead Test Results, Drinking Water: 
Historical Household Data 
Massachusetts Water Resources Authority

Linked to this page are individual results going back to 1992, when lead levels had already dropped by about 50%.

1992-2009 (PDF) | 2010-2015 (PDF)

The results are presented with addresses eliminated to protect the individuals’ privacy. Each volunteer who participated in the sampling program received his or her own individual results.

These individual results provide a snapshot of what is happening in a specific house when the water has sat stagnant. Because the sampling protocol is designed to evaluate the effectiveness of corrosion control, the results do not provide real information about the water a typical customer would typically drink.

We sample only the homes most likely to have any lead, and then sample that stagnant water most likely to have leached any lead. Most consumers do not actually consume that stagnant water.

To remove stagnant water from your home’s system, and to reduce the potential of lead leaching into your tap water, run the faucet for about one minute, until the water turns noticeably colder. Visit our What You Need to Know about Lead in Drinking Water page for more information.

If you have questions or would like more information about lead in drinking water, please call our Water Quality Hotline: 617-242-5323, or email Joshua Das, Project Manager, Public Health: joshua.das@mwra.com

Updated December 18, 2015
EPA Urging Public Inventory Of Lead Service Lines

The Lead Replacement Incentive Program

Boston Water and Sewer Commission

Lead Service

Table Options

<table>
<thead>
<tr>
<th>Address</th>
<th>Lead Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>41 OAKVIEW TER Jamaica Plain</td>
<td>YES</td>
</tr>
<tr>
<td>73 PERSHING RD Jamaica Plain</td>
<td>YES</td>
</tr>
<tr>
<td>99-105 SHERIDAN ST Jamaica Plain</td>
<td>YES</td>
</tr>
<tr>
<td>24 BOYLSTON ST Jamaica Plain</td>
<td>YES</td>
</tr>
</tbody>
</table>
Improving Lead Service Line Inventories
Inventory Based On Water Tie Cards
If it looks like a nickel, it’s lead

If it looks like a penny, it’s copper

Information at www.mwra.com
Lead Service Map

Prior to 1950, lead was commonly used in the manufacture and installation of water service pipes and some private water service lines are made of lead. If too much lead enters your body, it can pose significant health risks, especially to children. For more information, see our Sources of Lead page.

The following map indicates, in yellow, properties within the City of Boston that have private lead service pipes. If your property has a lead service pipe, consider the following:

- Owners of properties with lead service pipes can call the BWSC Lead Hotline at (617) 989-7888.
- If you own a home, businesses, or rental properties, you may be eligible for BWSC’s Lead Replacement Incentive Program.
- Tenants of buildings with a lead water service should contact their landlord or building manager.

Instructions:
1. Begin entering an address in the search box, then select an address from the dropdown. Properties with lead service are highlighted in yellow and listed below the map.
2. Use the plus and minus buttons in the upper left corner to zoom in and out.
3. If you cannot find your street on the map, call the Lead Hotline at (617) 989-7888 for assistance.

Notes:
- To view a list of the buildings in the current map extent with lead service, click the up-arrow button at the bottom center of the map.
- To open the data in the Lead Buildings table to a CSV Excel file, click the ‘Options’ button to open a drop-down list. Click ‘Select Records in All Pages’ to select all records, or choose your own selection. Next, click the ‘Options’ button again to open the drop-down list, and click ‘Export to CSV’ at the bottom of the list. Click OK to generate the CSV file.

For more information on the health risks of lead, see our Lead in Drinking Water brochure.
Lead Service Line Notification Letters

• Each homeowner with a lead service line should be notified

• Notified periodically or before service replacements on the street
  – Draft Letter Templates Being Developed by MWRA
  – Send with Lead Brochure or Annual Water Quality Report

• Key Points
  – You have a lead service line
  – Risk of elevated lead levels/Health Risks
  – Process for confirming if lead or not
  – Urge **FULL** replacement
  – *Details of local program for replacement – any contracting or financial assistance*
Lead Service Line Replacement Programs
Lead Service Line Replacement Programs

- How to Efficiently and Effectively Replace a Lead Line
- How to Work with Your Customers
- Why Partial Replacements Should Be Avoided
- Incentives to Encourage Replacement of the Private Portion
- Risk Reduction After Any Replacement
Where Does The Lead Come From?

- **Kitchen Area**: 0.8 – 1.7 ug
- **Lead Service Line**: 31 – 139 ug
- **Premise Plumbing**: 3.4 – 125 ug
Lead Service Line Replacement
Partial Lead Service Replacement Provides No Benefit

- Levels rise for days to weeks; level off similar to before
• Levels rise for days; long-term reduction in lead exposure
• BWSC Contractor does the replacement

• BWSC pays first $1000

• Remainder paid on water bill over 24 months, interest free
• Lead levels can rise after full or partial replacement

• Customers must receive risk mitigation information

• Aggressive flushing, filters, or bottled water

• MWRA developing new information templates for community use
In light of lead, Newark mayor calls for N.J. water infrastructure overhaul.
• Be proactive
• Coordinate and communicate
• Parent and teacher outreach
Developing A Long-Term Program
To Get The Lead Out
New MWRA Resources For Communities

- New Lead Information Brochure
- Lead Line Notification Letters
- Template for post-replacement flushing
- CCR with lead focus
- On-going Technical Assistance
- Access to Water Research Foundation Reports
- Outreach and sharing of Best Practices
- MWRA zero-interest loans for community lead service line replacement programs
• Evaluate and improve inventory of lead service lines
  – Summer intern
  – Other opportunities: meter projects, etc
• Make inventory publicly available
  – On-line maps or list
• Notify all residents who have lead service lines
• Offer assistance for replacement
  – Logistical
  – Financial
• Improve education and outreach
  – Link to MWRA webpage – www.mwra.com
  – Send out new brochure
  – Collaborate with schools
This year’s report will be more focused on lead.
“The situation has to change. We need a national conversation to make sure this never happens again.”

“States need to step up and invest to make sure all of their citizens have access to clean drinking water.”

– Gina McCarthy, EPA

“For those of us in the water profession, Flint reminds us that our first and most important job is to protect the families we serve.”

“But the Flint crisis lays bare a simple fact: As long as there are lead pipes in the ground or lead plumbing in homes, some risk remains.”

– David LaFrance, AWWA
New Zero-Interest Loan Program

- $100 million added to the existing water loan program
- For full lead service line replacements
- Guidelines being drafted with Advisory Board
- Available as soon as possible