Flint Water Press Conference

September 15, 2017
1) Five rounds of lead in water testing (led by Ms. LeeAnne Walters and Flint residents)
Round 1 and 5 Funded by Virginia Tech.
Rounds 2-4 Funded by U.S. EPA R5

2) A special study of Legionella testing
Initial data funded by the State of Michigan;
Follow-up sampling funded by Virginia Tech
Flint resident sampling: August 2015 - August 2017

Min Tang, Kelsey Pieper, Sid Roy, Jeffrey Parks, and Marc Edwards
Sampling in August 2017

Sampling organized by LeeAnne Walters and the Flint citizen science team

Flint Citizen Science Team Leaders: LeeAnne Walters, Dennis Walters, Matt Smith, Tracy Hacker, Tonya Williams, Kaylie Mosteller, Carrie Nelson, Claire McClinton, Keri Webber, Jessica Owens
Sampling protocol

Collected water samples from a cold water tap that is used for drinking water

6+ hour stagnation $\rightarrow$ First draw

Flush for 45 seconds $\rightarrow$ FLUSH

Flush for 2 minutes $\rightarrow$ FLUSH

1 L First draw

500 mL 1 min flush

125 mL 3 min flush

Home Plumbing  Service Line  Flushed Water
Sampling protocol

Aug. 2015  
First Round

Mar. 2016  
Second Round

Jul. 2016  
Third Round

Nov. 2016  
Fourth Round

Aug. 2017  
Fifth Round

2015

6+ hour stagnation

1 L
First draw

Home Plumbing

2016

Flush for
45 seconds

500 mL
1 min flush

Service Line

2017

Flush for
2 minutes

125 mL
3 min flush

Flushed Water
Sampling protocol

138 homes participated in all 5 sampling efforts

Only data from those homes is presented herein
Service Line Material - Flint Records for the 138 Participants

- Copper (N=76): 55%
- Galvanized (N=12): 9%
- Lead (N=17): 12%
- Unknown (N=33): 24%

Source: https://www.umflint.edu/gis/gis-center-projects
April 2014: Flint discontinued corrosion control

Water flow *without* corrosion inhibitors

*Mobilization of corrosion rust layers*

Lead pipe
First draw lead in August 2015 (138 homes participating in all 5 rounds)

- 90th Percentile Lead (µg/L): 20.8
- EPA standard: 15 µg/L
- 1.4X elevation compared to EPA standard

N=138
Oct-Dec 2015: Connected to DWSD and added extra corrosion treatment

Water flow with corrosion inhibitors

Form new corrosion scales

Lead pipe
May 2016: Promoted high-flow flushing to remove loose sediment

Water flow with corrosion inhibitors

Loose leaded sediment

Lead pipe
First draw lead in March and July 2016

90th Percentile Lead (µg/L)

Aug. 15  Mar. 16  Jul. 16  Nov. 16  Aug. 17

EPA standard

N=138
First draw lead in November 2016

<table>
<thead>
<tr>
<th>Month</th>
<th>90th Percentile Lead (µg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 15</td>
<td>20.8</td>
</tr>
<tr>
<td>Mar. 16</td>
<td>22.5</td>
</tr>
<tr>
<td>Jul. 16</td>
<td>11.8</td>
</tr>
<tr>
<td>Nov. 16</td>
<td>8.4</td>
</tr>
<tr>
<td>Aug. 17</td>
<td>0</td>
</tr>
</tbody>
</table>

N=138

EPA standard
First draw lead in August 2017

![Bar chart showing 90th percentile lead (µg/L) for Aug. 15, Mar. 16, Jul. 16, Nov. 16, and Aug. 17. The EPA standard is marked with a dashed line at 15 µg/L.]

- Aug. 15: 20.8 µg/L
- Mar. 16: 22.5 µg/L
- Jul. 16: 11.8 µg/L
- Nov. 16: 8.4 µg/L
- Aug. 17: 8.3 µg/L

N=138
1-min Flush Sample: Service Line

Median Lead (µg/L)

- Aug. 15: 5.1 µg/L
- Jul. 16: <1 µg/L
- Aug. 17: <1 µg/L

1-min Flush (N=138) vs. 1-min flush (N=17 with LSLs)

LSLs=Lead Service Lines
3-min Flush Sample: Flushed Water

Median Lead (µg/L)

Aug. 15: 3.9
Jul. 16: <1
Aug. 17: 1.0

3-min Flush (N=138)
3-min flush (N=17 with LSLs)

LSLs=Lead Service Lines
% Below Detection Limit of Lead

FD
1-min Flush
3-min Flush

Aug. 15
Jul. 16
Aug. 17

N=138
% Below Detection Limit of Iron

% Below Detection Limit of 10 µg/L

- FD
- 1-min Flush
- 3-min Flush

Aug. 15  Jul. 16  Aug. 17

N=138
Flint Hospital 2015 vs. 2016

2015: Flint River without Corrosion Control

2016: Detroit Water with Enhanced Corrosion Control

Photographs: Zhu “Joyce” Ni, Min Tang, Pan Ji, Mariah Gnegy
% Below Detection Limit of Iron

![Graph showing percentage of samples below detection limit over time]

- **Aug. 15**: 1% (FD), 2% (1-min Flush), 2% (3-min Flush)
- **Jul. 16**: 22% (FD), 33% (1-min Flush), 34% (3-min Flush)
- **Aug. 17**: 46% (FD), 44% (1-min Flush), 55% (3-min Flush)

Increase from Aug. 15 to Aug. 17

*N=138*
% Below Detection Limit of Iron

![](image)

- **Aug. 15**: 1%, 2%, 2%
- **Jul. 16**: 22%
- **Aug. 17**: 33%, 34%

*FD, 1-min Flush, 3-min Flush*

*Increase*

*FROM LEEANNE WALTERS’ HOUSE*

*N=138*
Calculated LCR Results (using sample pool with 50% lead service line homes)

- Use data from 17 homes with lead pipes
- Randomly select 17 homes from the remaining 88 homes without lead pipes but built after 1986
- Calculate 90\textsuperscript{th} percentile for the 34 selected homes for each of 10 simulations

Error bar denotes a 95\% confidence interval.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{graph.png}
\caption{90\textsuperscript{th} Percentile Lead (\textmu g/L)}
\end{figure}
The 10th round of State Extended Sentinel data indicates 90 percent of the Tier 1 samples are at or below 6 µg/L.
Conclusions

1. State data indicate Flint is meeting the lead action level. Flint citizen and VT sampling confirm that.

2. Lead and iron levels have decreased very significantly compared to first sampling event in August 2015.

3. Residents should continue to use lead filters or bottled water until further notice from the State or EPA, to avoid lead mobilized by infrastructure upgrades and “normal” (but still too high by modern standards) levels of lead from pipes.
Water Heater Study: Update

William Rhoads, Taylor Bradley, Amy Pruden and Marc Edwards
Previous Press Conferences Reporting on this Study


Legionnaires’ Disease Incidence

91 confirmed cases; 12 deaths
Water Quality Testing in Homes

July 2016 – 30 Homes

- Tested water
  - Metals (Pb, Fe, Al, Cu)
  - Chemistry (Cl₂, pH, temperature)
  - *Legionella*
- Implemented intensive water heater cleaning protocol
- Very low detection rate of culturable *Legionella*
  - 2 out of 30 homes positive
Legionella bacteria is the cause of Legionnaires’ disease and Pontiac fever

*L. pneumophila serogroup 1* – identified in 85% of clinical isolates

Monoclonal Antibody Group 2 (MAb2)

*L. pneumophila serogroup 1 MAb2 is observed in 94% of outbreak cases*
Follow-Up Sampling in One of the Homes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Water</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Hot Water</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Possible Explanations for Improved Water Quality with Respect to *Legionella*

- Amount of time back on Detroit water
  - General Improved water quality stability
  - Chlorine residuals throughout system
  - Reduced Iron

- Increased water heater temperature
  - Hot water temperature = 53.7 °C (128.7 °F)

- **Seasonality**
  - Cooler weather = cooler water in mains
Follow up sampling Aug 2017

• Culturable *Legionella* in hot water
  • Not serogroup 1 or MAb2 positive
  • Concentration was very low
    • 0.025 CFU/mL (Below accurate quantification level)

• Levels of concern (French Guideline)
  • 1 CFU/mL (40X higher than what we detected)

Since initial sampling, we have not detected the strain of *Legionella* most commonly associated with disease outbreak.
Legionnaires’ incidence Jan-Aug

*Dotted line indicates average of 2011-2017, but excludes time on the Flint River (2014 and 2015)
Flint Citizen Science Team

Kaylie Walters  Matt Smith

Dennis Walters

Tracy Hacker

Stephanie Webber  Tonya Williams

Claire Mclinton  LeeAnnie Walters

Gavin Walters  Garrett Walters
Thank you!