Flint resident sampling:
August 2015 vs. March 2016

Kelsey Pieper and Marc Edwards

Virginia Tech

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Invent the Future

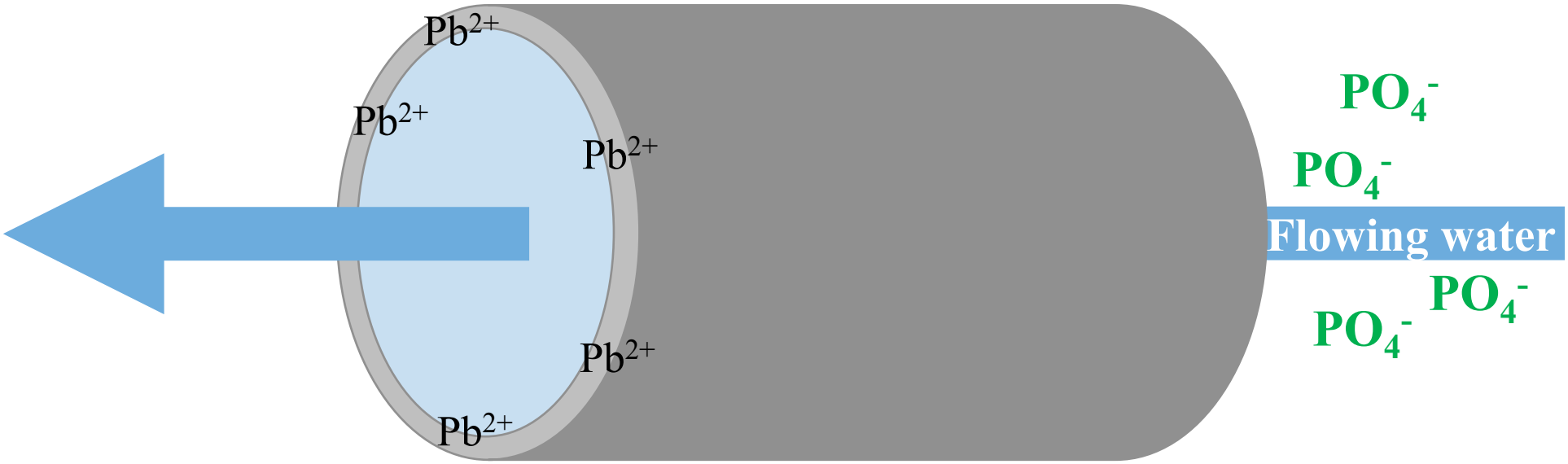
Flint residents

Dennis Walters, Matt Smith, Tracy Hacker, Tonya Williams, Kaylie Mosteller, Carrie Nelson, Claire McClinton, Keri Webber, Tony Palladeno Jr., Leah Palladeno, Jessica Owens

Formation of scale within the distribution system

Lead-bearing plumbing materials

Corrosion control chemicals



Formation of scale within the distribution system

Formation of protective scale layer: requires flowing water

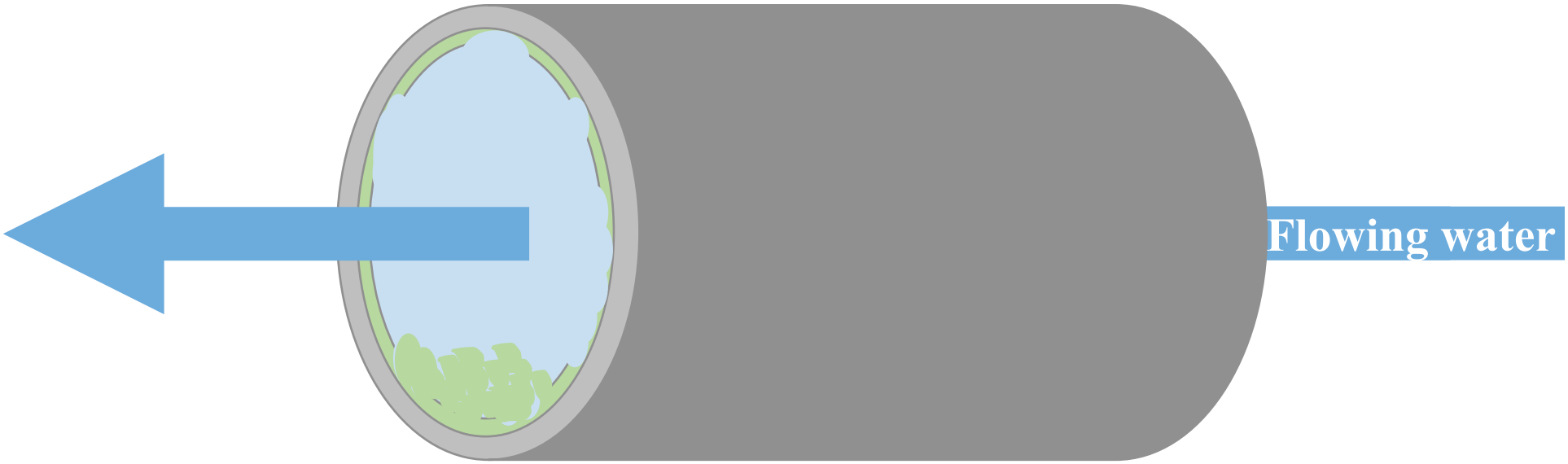
Water from Flint River disrupted developed scales and biofilms

Flushing at low flow will clean lead deposits very slowly: Maybe months to years

Water from Flint River disrupted developed scales and biofilms

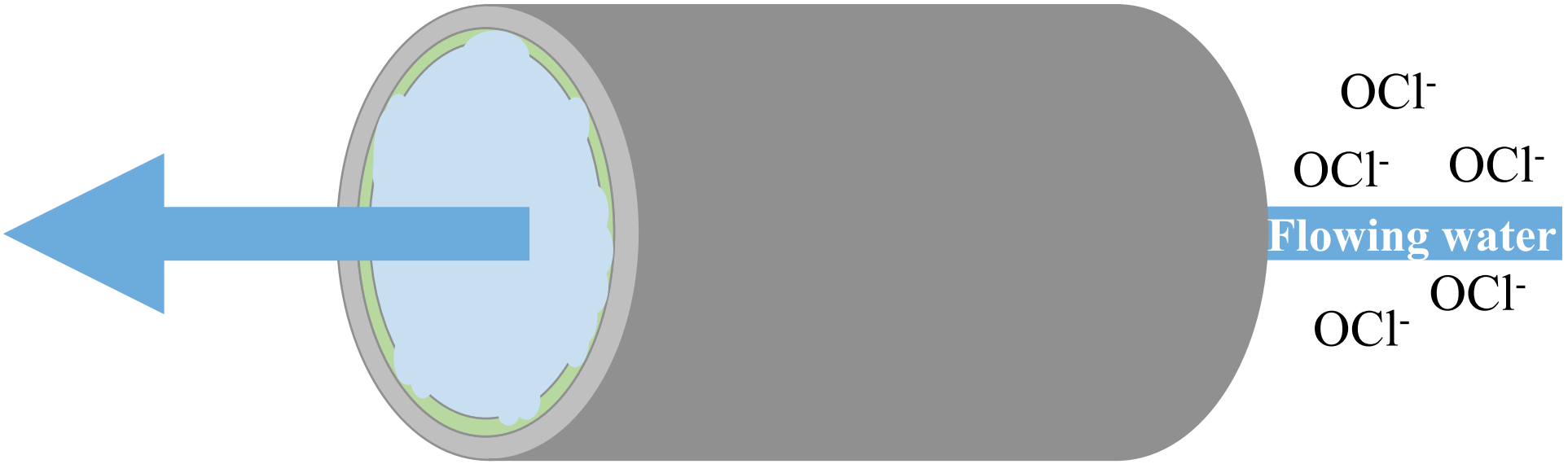
Flush pipes clean:

Remove lead and iron deposits in weeks



Promote biofilm (bacteria) control

Chlorine disinfection can treat water



Comparing water quality in August 2015 vs. March 2016

To assess improvements since switch back to Detroit water and implementation of improved corrosion control

Sampling protocol

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

6+ hour stagnation → 

1 L
First draw (FD)

Flush for 45 seconds → 

500 mL
~1 min flush

Flush for 2 minutes → 

250 mL
~3 min flush

Homeowner sampling in Flint

August 2015: 269 homes sampled

- Participation rate: 90%

March 2016: 187 homes sampled

- Participation rate: 70%

174 homes participating in both 2015 and 2016 used for analysis

174 households participated in both 2015 and 2016

	Non detects	Average	Median	90th	Max	% >AL
2015						
FD	10%	12.2	4.4	29.0	158	19%
1 min	37%	11.1	2.2	11.9	1,051	6%
3 min	49%	3.8	1.0	7.6	95	3%
2016						
FD	38%	32.3	1.8	23.0	2,253	15%
1 min	58%	3.6	0.5	9.0	81	5%
3 min	71%	1.9	0.5	3.4	69	2%

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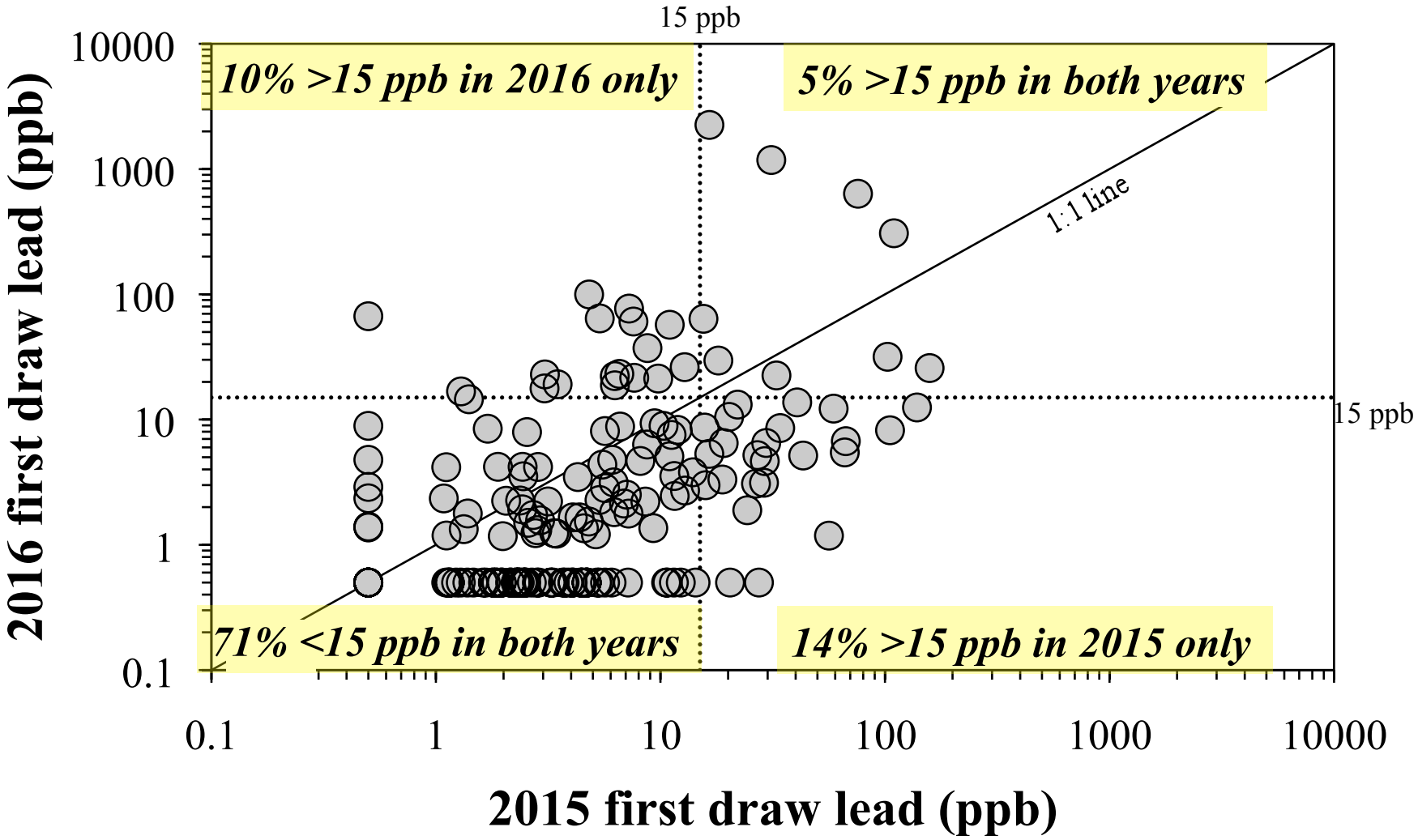
2015 vs. 2016 first draws



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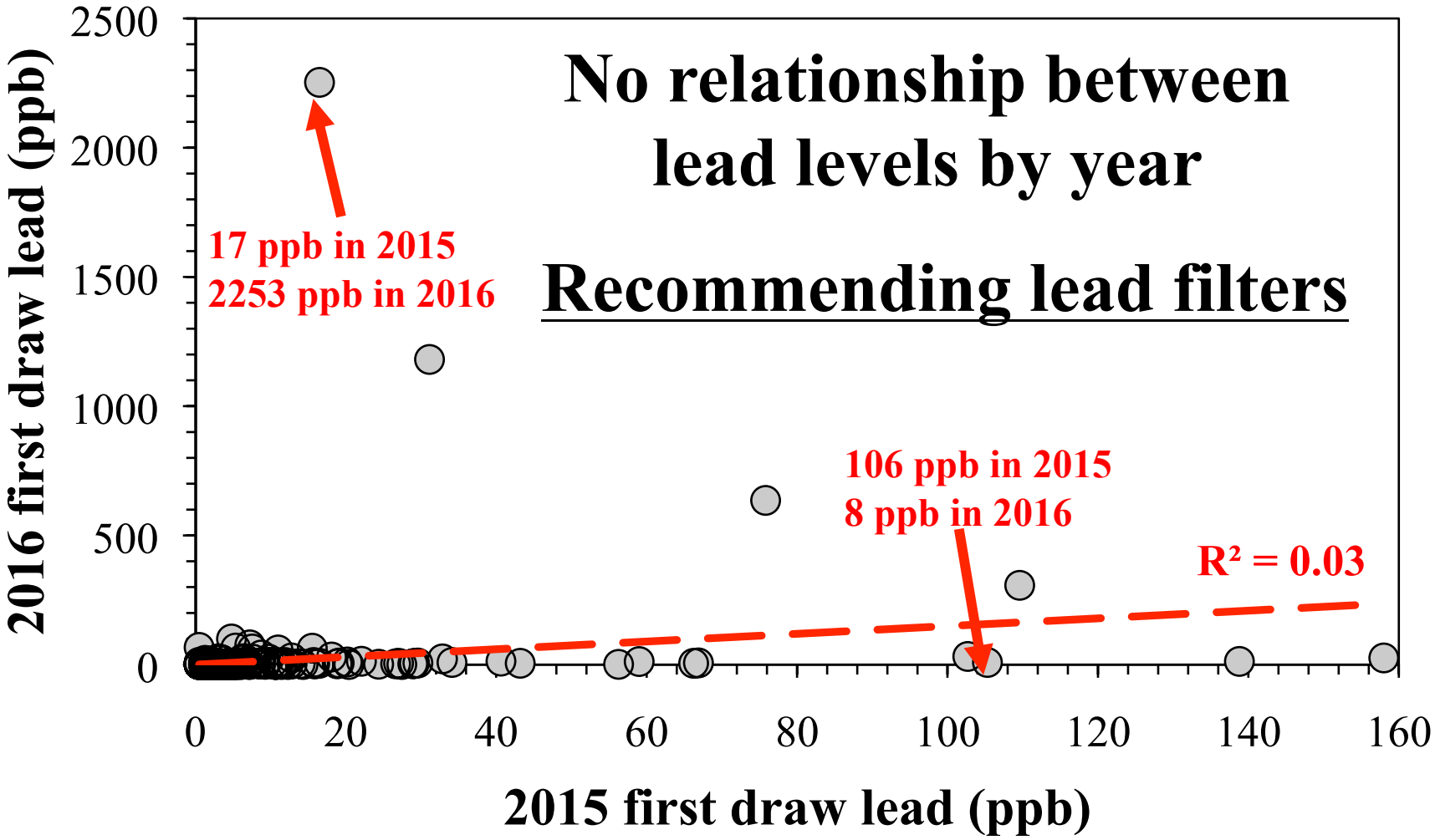

Iron in water concentrations

	Average	Median	90th	Max	%>SMCL
2015					
FD	305.6	125.7	349.4	9,195	13%
1 min	162.5	111.2	285.4	2,323	9%
3 min	148.5	119.5	247.8	1,627	7%
2016					
FD	292.7	53.7	418.4	13,820	14%
1 min	92.9	36.3	157.2	1,471	5%
3 min	83.0	40.5	160.6	1,572	4%

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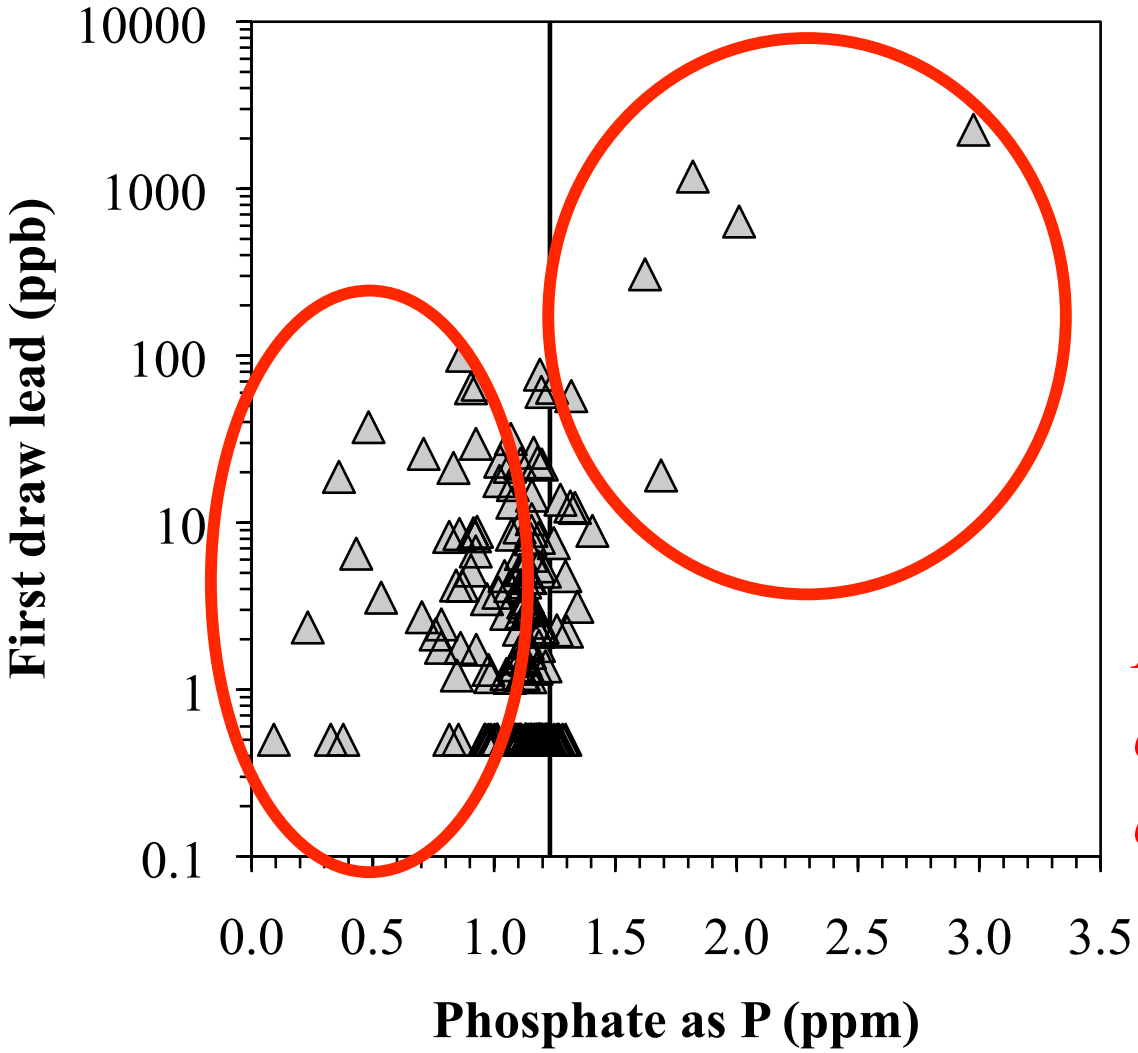
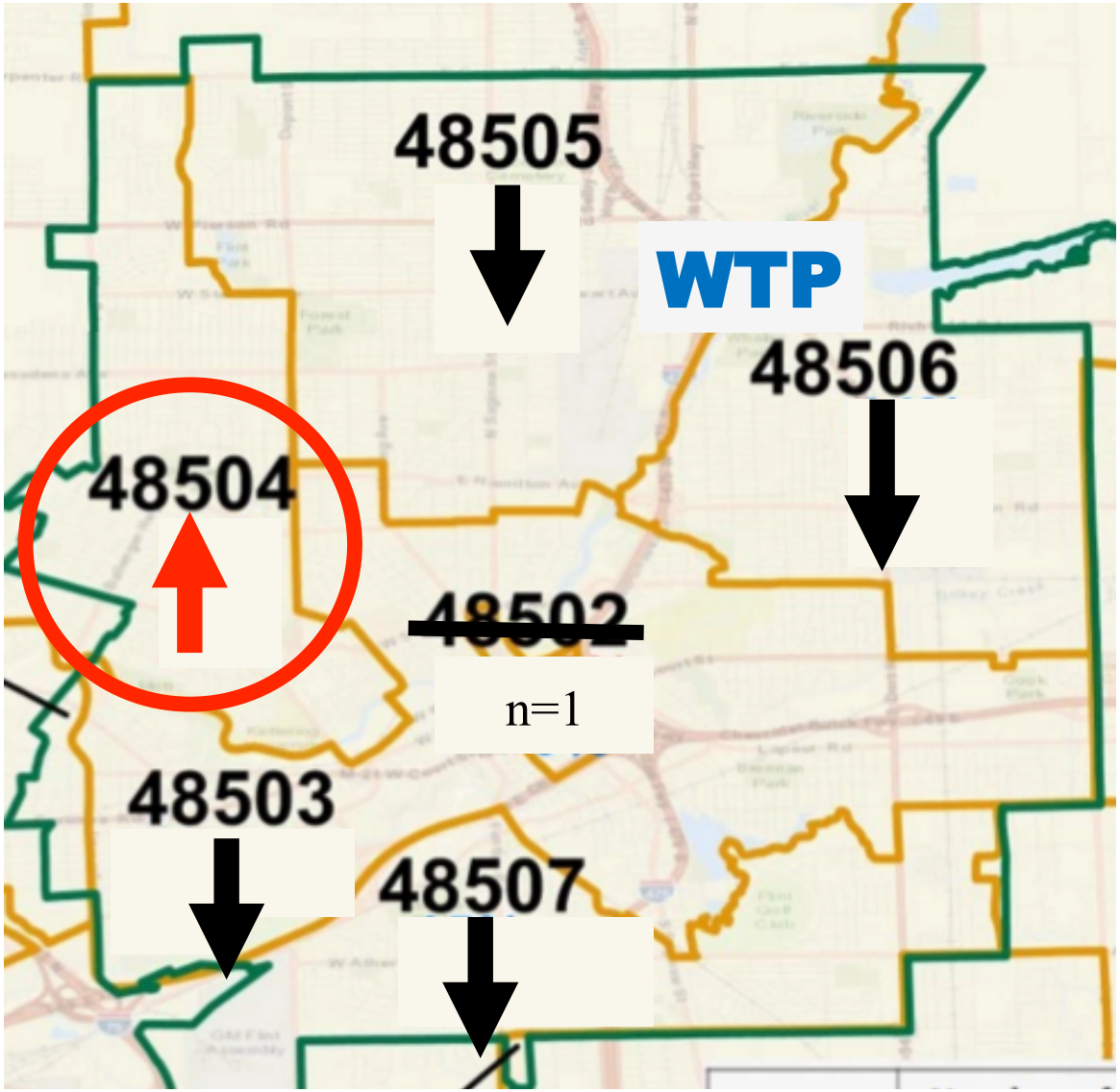
Phosphate levels in 2016



Detachment of leaded scale

Inadequate levels of corrosion control chemicals

Change in lead levels by zip code



Many Flint residents are using very little water

Two homes with persistent elevated lead problem only using ***20-45% of typical monthly volume***

1. Trying to reduce water bills
2. Showering only once per week (<5 min) to reduce the likelihood of rashes or exposure
3. Using bottled water for baths, washing dishes and other uses

Conclusions

1. Flint is not yet meeting the 90%'ile lead action level

2. Lead levels are lower than in August 2015

3. Iron levels (and red water complaints) are decreasing

4. To speed up recovery of the system, residents will need to use more water

Virginia Tech Research Team

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Thank you!

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