

The Flint Water Crisis Ut Prosim in Action



The Flint Water
Study Team

Siddhartha Roy

www.flintwaterstudy.org



Grateful acknowledgement

- National Science Foundation, #1556258
- **Citizens of Flint**
- WaterYouFightingFor? (Melissa Mays and LeeAnne Walters)
- **Hurley Medical Center (Mona Hanna-Attisha and others)**
- US EPA Region 5 (Miguel Del Toral, Mike Schock, Darren Lytle)
- ACLU - Michigan (Curt Guyette, Kate Levy)
- Sen. Jim Ananich, Congressman Dan Kildee (and their extraordinary staff)
- 1500+ donors supporting our work
- MI DHHS / Genesee Co. Health Dept



Dr. Amy
Pruden



Dr. Yanna
Lambrinidou

- Democracy Defense League (Nayyirah Shariff, Claire McClinton)
- Dr. Laura Sullivan
- Northeast-Midwest Institute (Elin Betanzo)
- Concerned Pastors for Social Action (Pastors Harris and Overton)
- Parents for Non-toxic Alternatives (Dr. Yanna Lambrinidou)
- City of Flint (Mayor Karen Weaver, Dayne Walling, Howard Croft, Mike Glasgow)
- Members of the media
- **Virginia Tech (staff and students)**



VirginiaTech



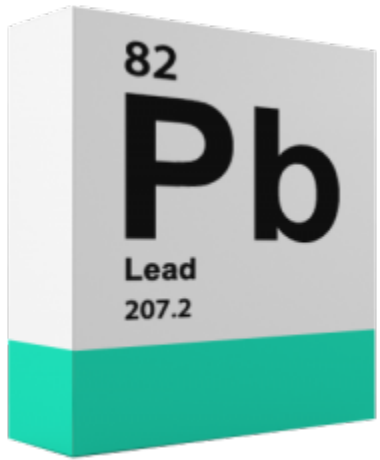
Undergrads: Madeleine **Brouse**, Margaret **Carolan**, Sara **Chergaoui**, Matthew **Dowdle**, Kim **Hughes**, Rebecca **Jones**, Philip **Smith**, Alison **Vick**

Graduate Students: Taylor **Bradley**, Christina **Devine**, Emily **Garner**, Catherine **Grey**, Pan **Ji**, Anurag **Mantha**, Rebekah **Martin**, Jake **Metch**, Victoria **Nystrom**, Colin **Richards**, William **Rhoads**, Siddhartha **Roy**, Laurel **Strom**, Owen **Strom**, Min **Tang**, Ni “Joyce” **Zhu**

Research Scientists: Brandi **Clark**, Dongjuan **Dai**, Sheldon **Masters**, Jeffrey **Parks**, Kelsey **Pieper**, David “Otto” **Schwake**, Fei **Wang**

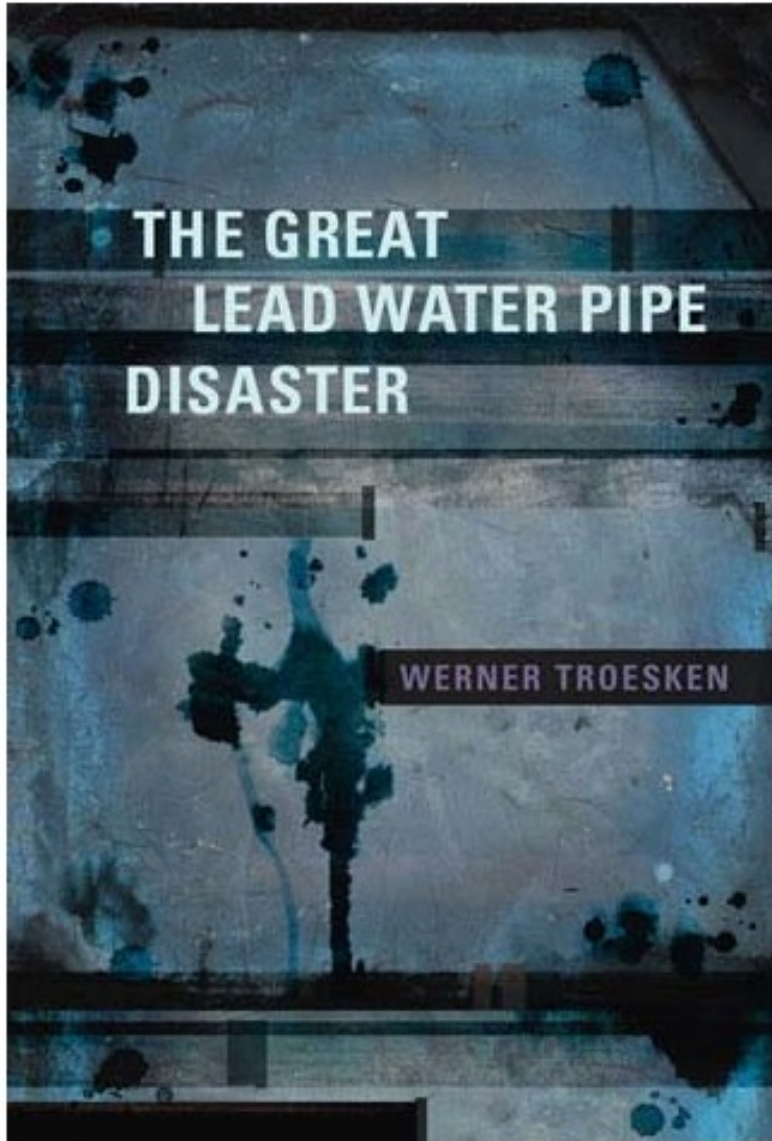
Staff: Cassandra **Hockman**

Principal Investigators: [Dr. Marc Edwards](#), [Dr. Amy Pruden](#), [Dr. Joseph Falkinham III](#)



**“Lead makes the
mind give way”**

– Discorides, 2nd Century BCE



the prolific installation of lead pipes across the U.S.:

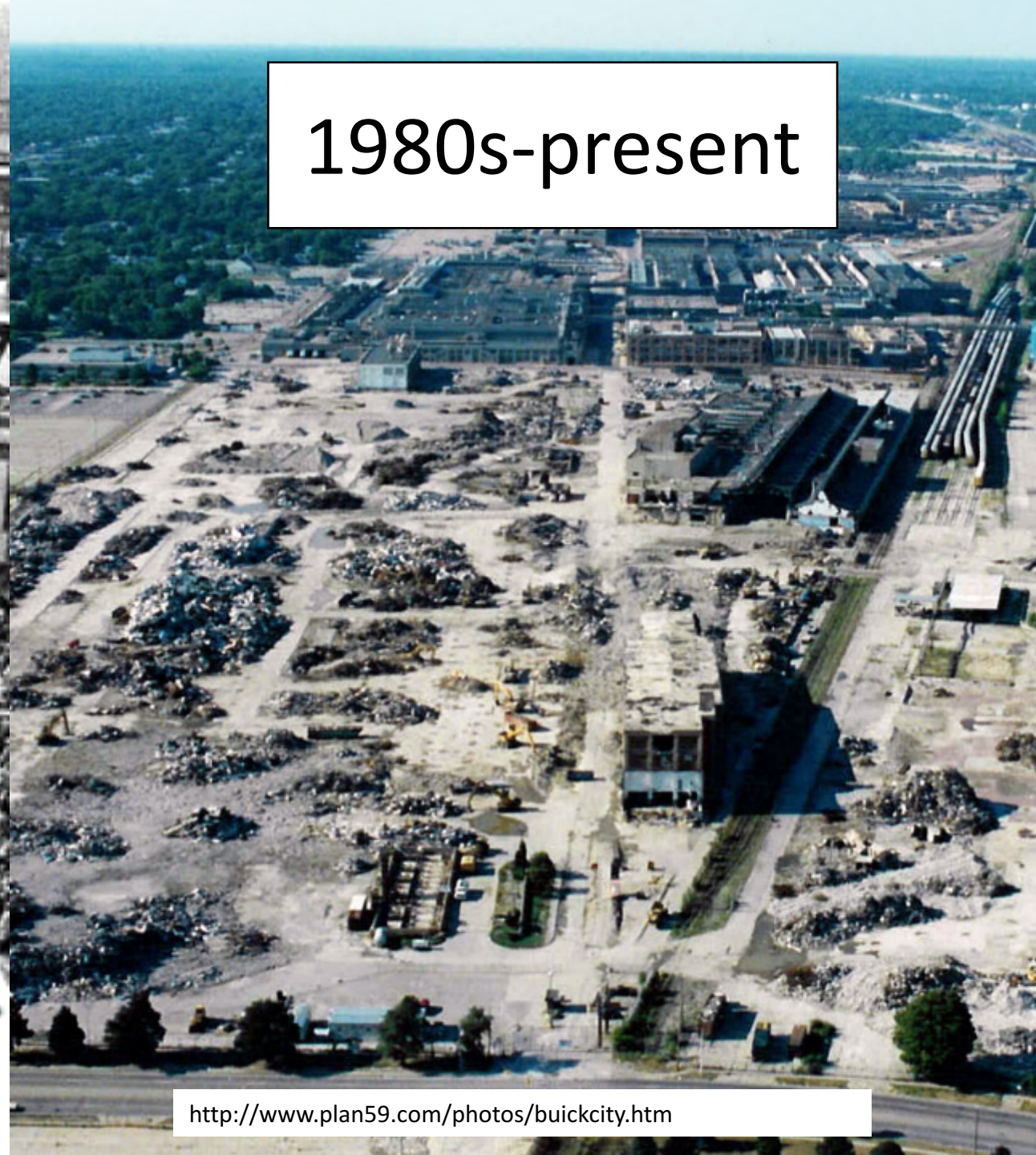
“a long-running environmental and public health catastrophe”

1950s-1960s

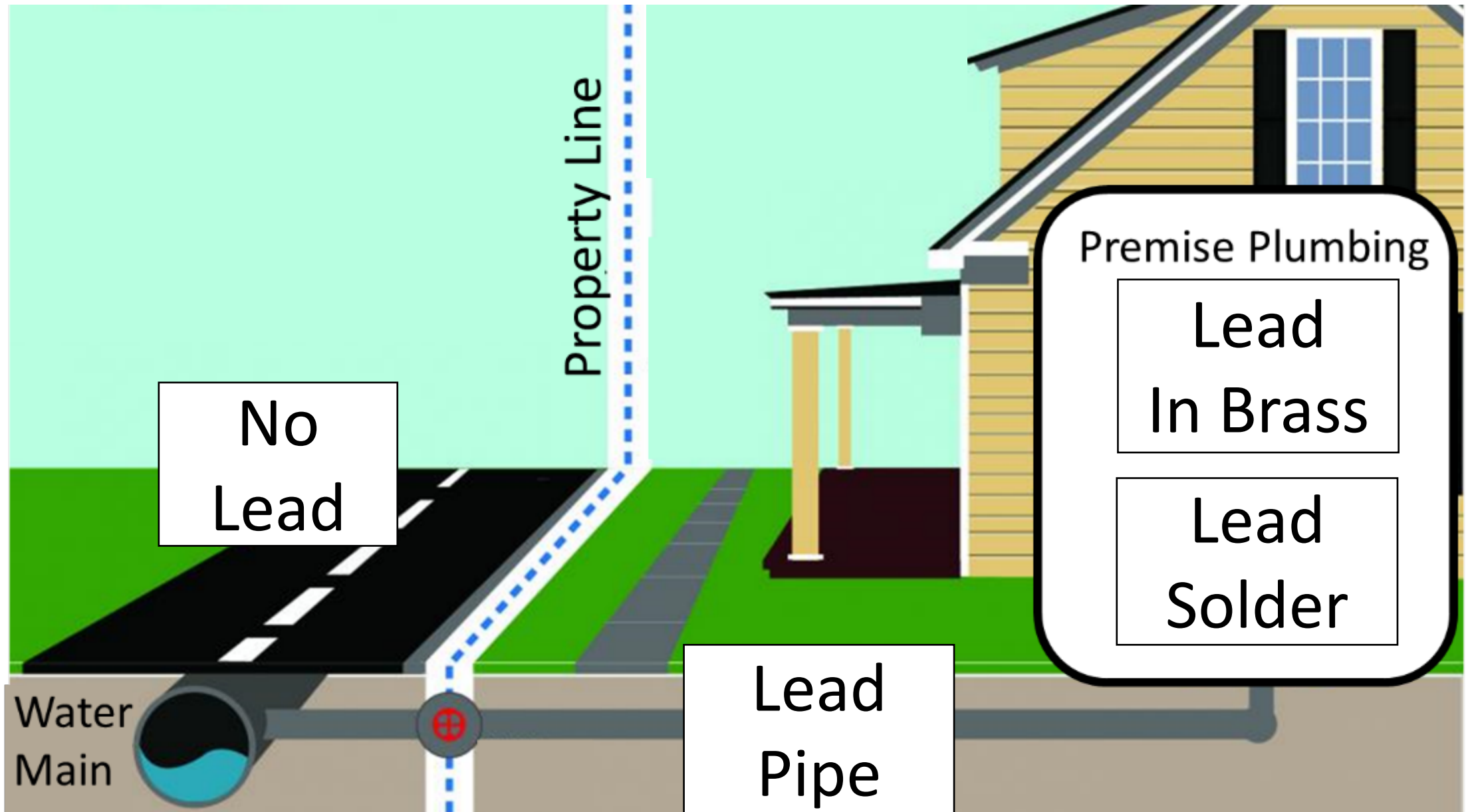


The Flint Journal, from <http://www.teardownbook.com/photos/>

1980s-present



<http://www.plan59.com/photos/buickcity.htm>





Historic Flint Drinking Water Source (CCT)



Flint River – Drinking Water Source: April 25, 2014

AP/Paul Sancya



Pipeline to Lake Huron – Projected Completion: Late 2016

Detroit Free Press



Samuel Wilson/The Flint Journal



April 2014
Switch to Flint River



General Motors shutting off Flint River water at engine plant over corrosion worries

October 2014
General Motors stops using Flint Water



By [Ron Fonger | rfonger1@mlive.com](mailto:rfonger1@mlive.com)

on October 13, 2014 at 6:00 PM, updated January 17, 2015 at 10:48 AM



4.4k
shares

FLINT, MI -- Chloride levels in treated Flint River water are so high that General Motors will no longer use it at its engine plant here because of fears it will cause corrosion.

GM spokesman Tom Wickham said Monday, Oct. 13, that the company has reached a temporary agreement to buy Lake Huron water from Flint Township for Flint Engine Operations on West Bristol Road.

FLINT WATER

State has handed out 165,000 cases of water in Flint, dialing back effort

Lead poisoning and impact on children on tap for Flint panel talk

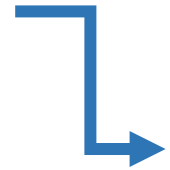
Kalamazoo water headed to Flint from efforts small and large



August - September 2014
Bacteria/*E. coli* violation

January 2015
Exceeds total trihalomethane limit

No Corrosion Control



Michigan Department of
Environmental Quality (MDEQ)
Responsibility

+ Corrosive Water



Due to Flint River water chemistry

= Perfect Storm For Lead Release



“Flint water is safe to drink.”







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

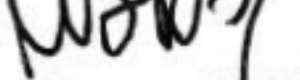
77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

“A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint”

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan – Interim Report

FROM: Miguel A. Del Toral 
Regulations Manager, Ground Water and Drinking Water Branch



Dr. Marc Edwards

Flint
**WATER
STUDY**

August 13, 2015

300 kits



YouTube



Sampling Water for Lead in Flint MI - Instruction Video

Flint Water Study
Subscribe

102 views

+ Add to < Share ... More

5 0



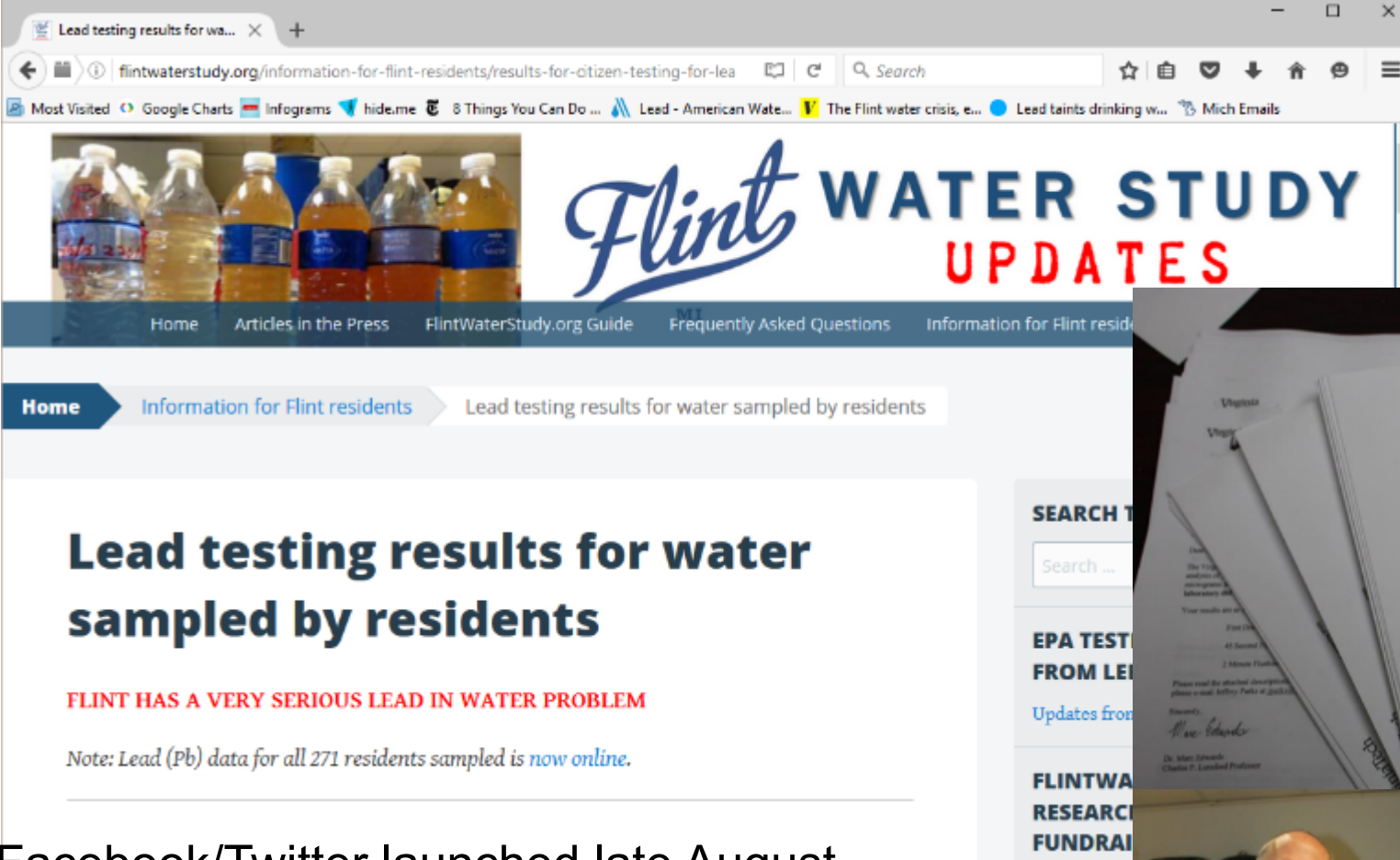
Romain Blanquart / Detroit Free Press



Getty Images

90%
return
rate





Letters/Phone calls

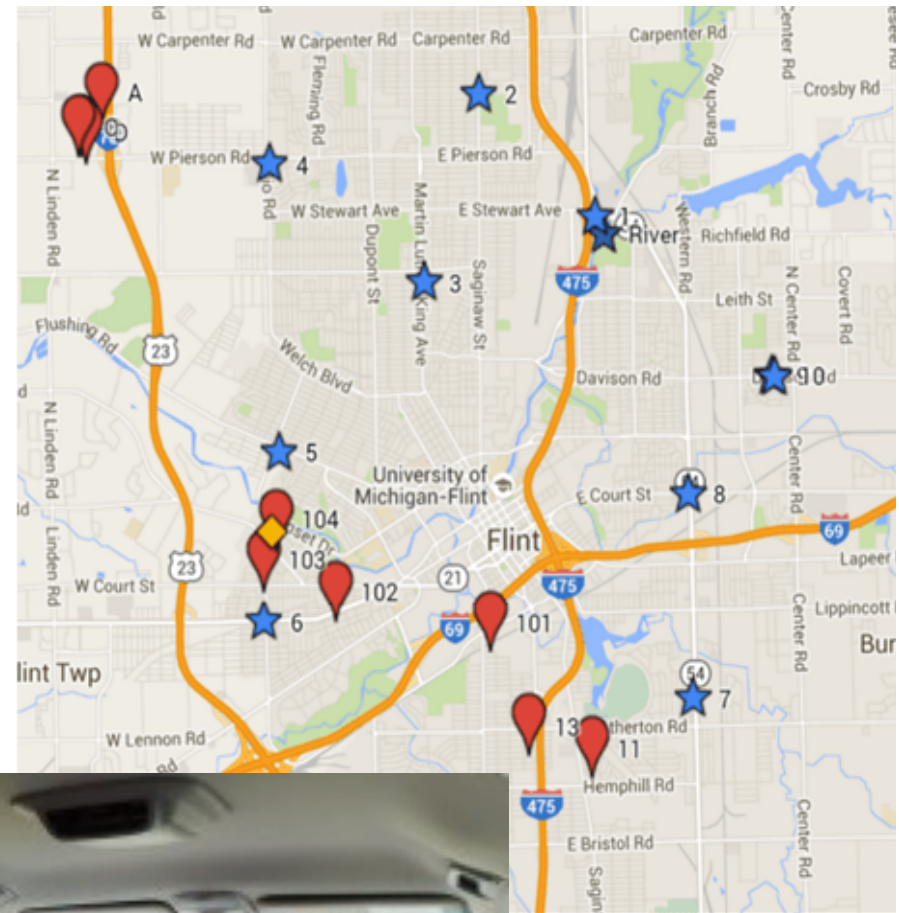
Website/Facebook/Twitter launched late August

Purpose:

- Inform Flint residents about water quality issues
- Bring public awareness w/ data and science
- Resident queries framing research questions

www.flintwaterstudy.org





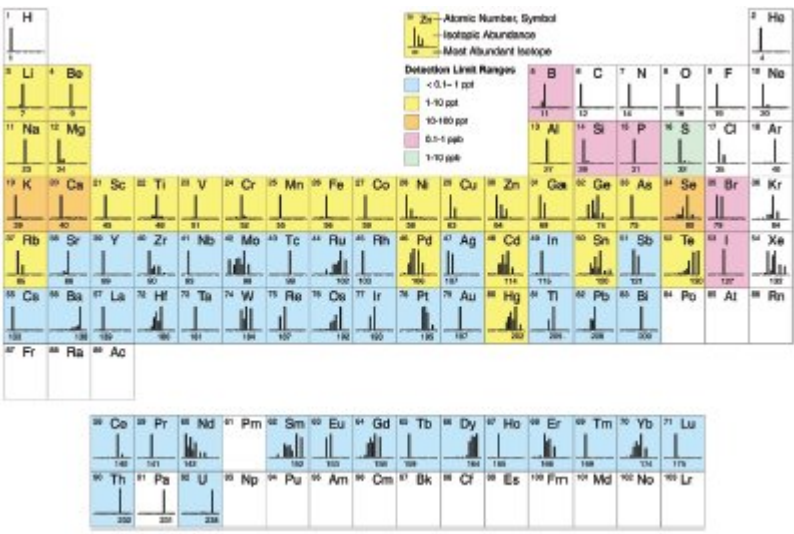
At a Flint hospital



Physical/Chemical Parameters Measured

Technology Used

Biological Parameters Measured



qPCR

ICP - MS

Probes

BART

Chlorimeter

THMFP

Culture

- Legionella pneumophila*
- Legionella spp.*
- Total Bacteria (16S)
- Mycobacterium avium*
- Mycobacterium spp.*
- Acanthamoeba polyphaga*
- Pseudomonas aeruginosa*
- Heterotrophic Bacteria
- Acid Producing Bacteria
- Iron Reducing Bacteria
- Sulfate Reducing Bacteria
- Slime Forming Bacteria
- Denitrifying Bacteria



Temperature
Dissolved Oxygen

Chlorine residual

THMs
(Disinfection by-products)

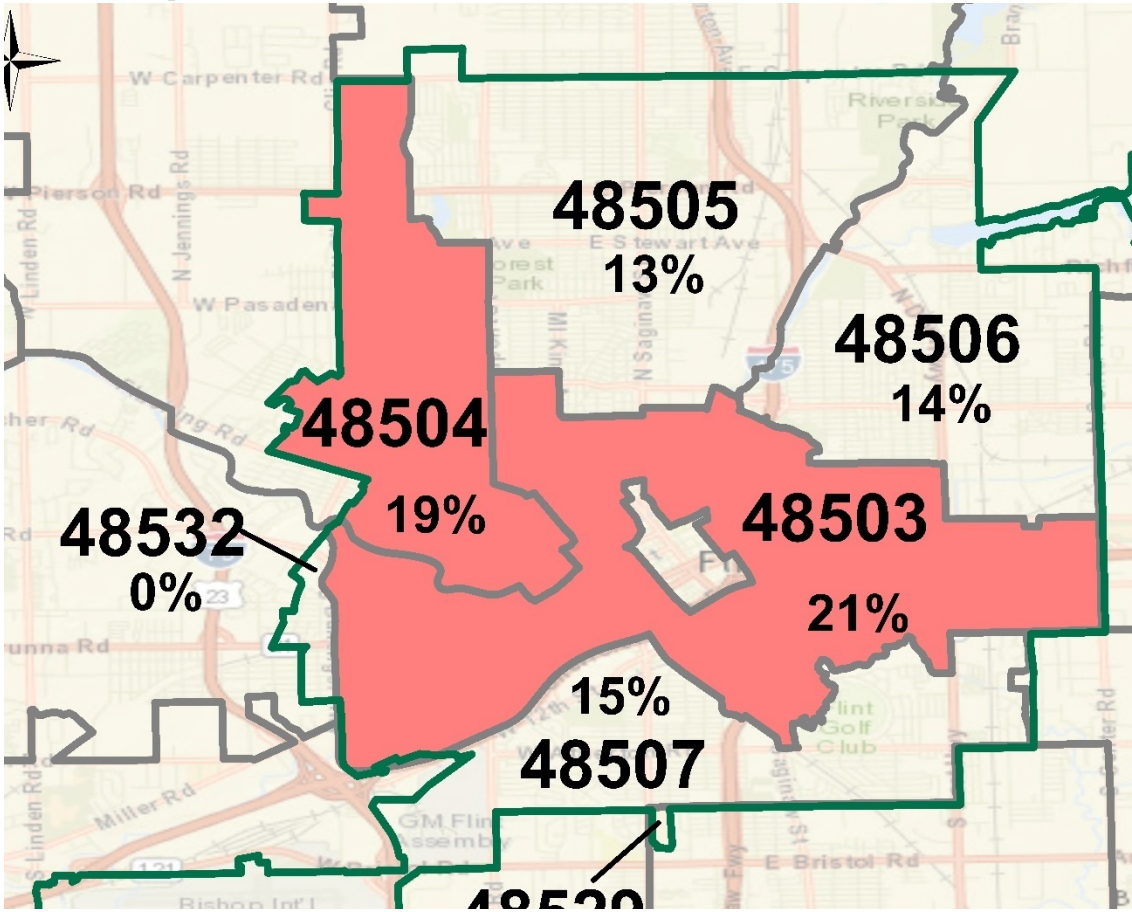
Staphylococcus








Public Health Advisory Press Conference – September 2015

Public Health Advisory: September 2015



Legend

-  Flint City Limits
-  USA ZIP Code Boundaries
-  Zip Codes with Highest Lead in Water and Elevated BLL



For 269 HOMES:
90%ile for First Draw
= **26.8 ppb**
EPA Action Level = **15 ppb**

Highest First Draw:
158 ppb
Highest overall: 1051 ppb

Anurag's story -- A Compassionate Call to Help!



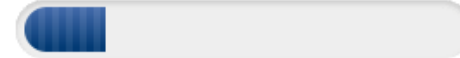
SafeWater4Flint



FLINT, MI

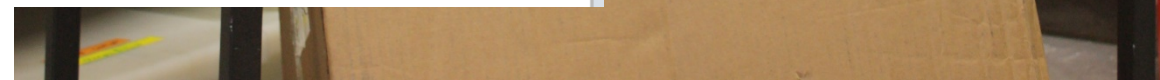
VOLUNTEER

\$4,345 of \$25k



Raised by 68 people in 25 days

Donate Now



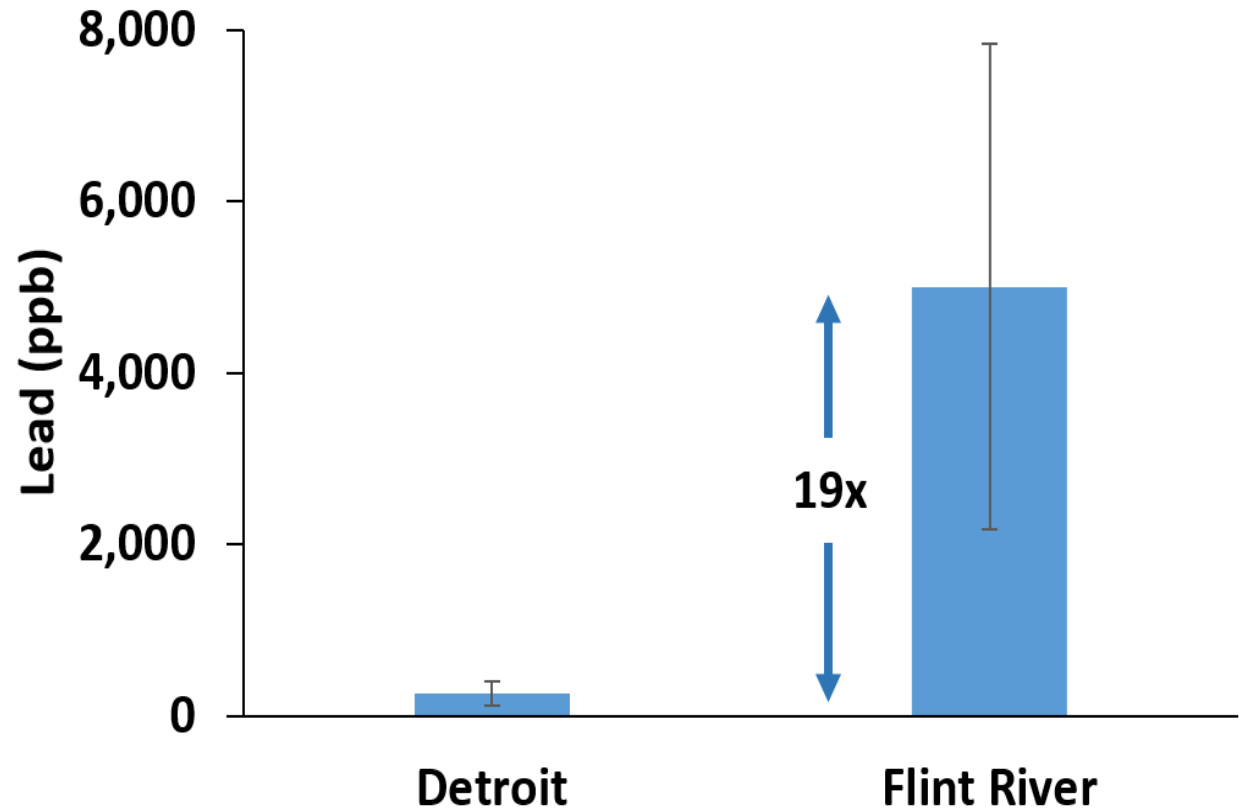
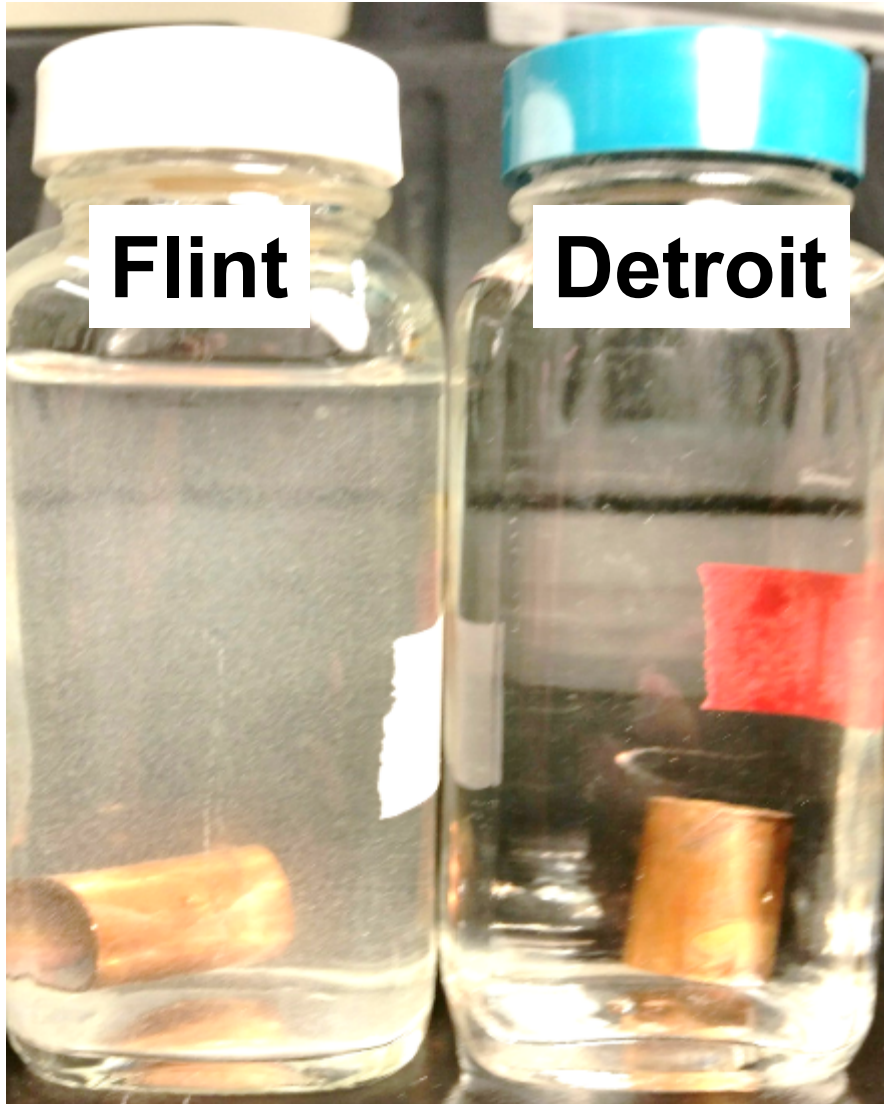
Response from MDEQ

“This group specializes in looking for high lead problems. They ***pull the rabbit out of that hat*** everywhere they go. Nobody should be surprised when the rabbit comes out of the hat, even if they can’t figure out how it is done”

-Brad Wurfel

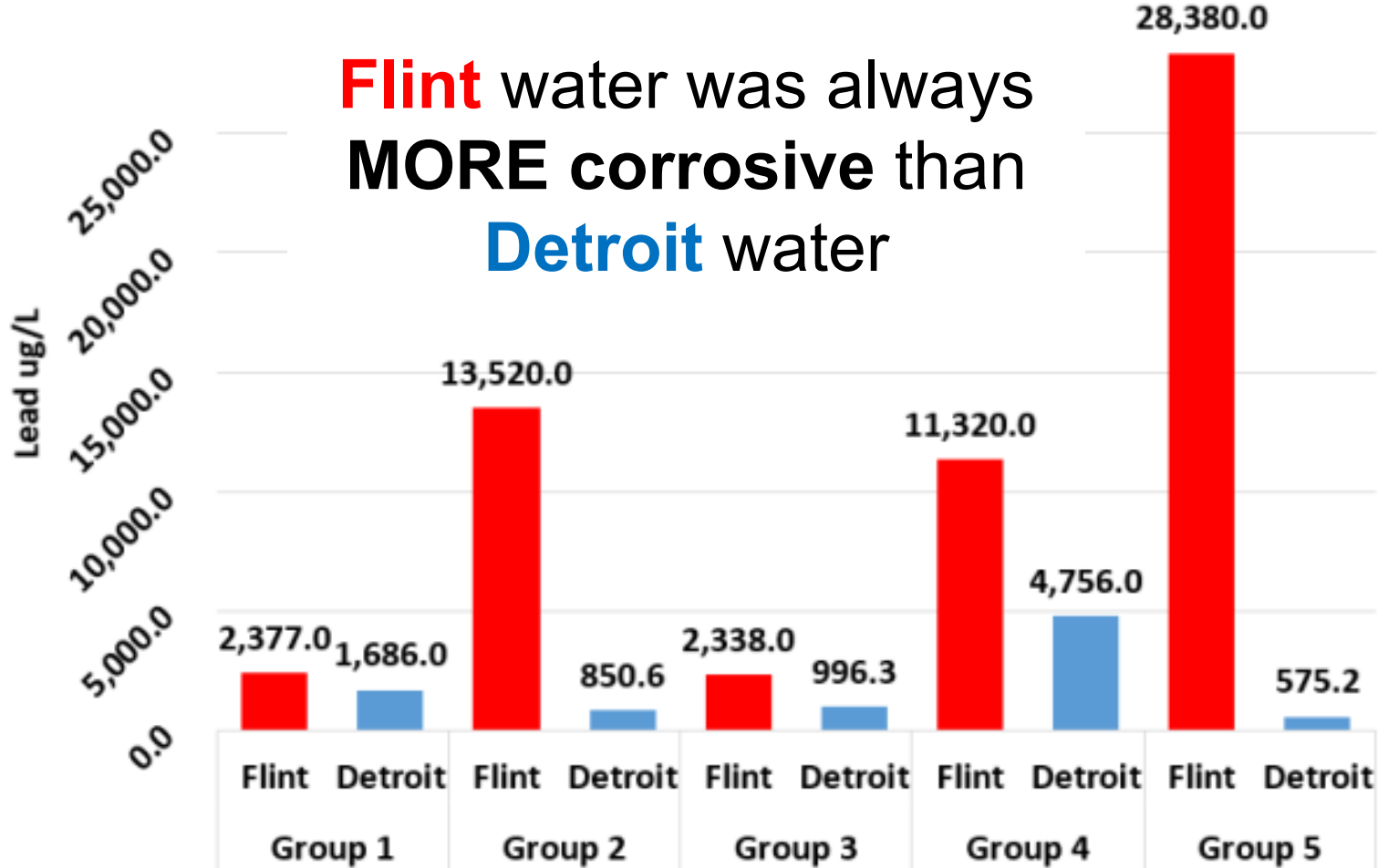
MDEQ’s Communications Director

Lead Corrosion Experiment



Lead Corrosion Experiment

Ms. Weiss' class at City School, Grand Blanc, MI



Student Observations

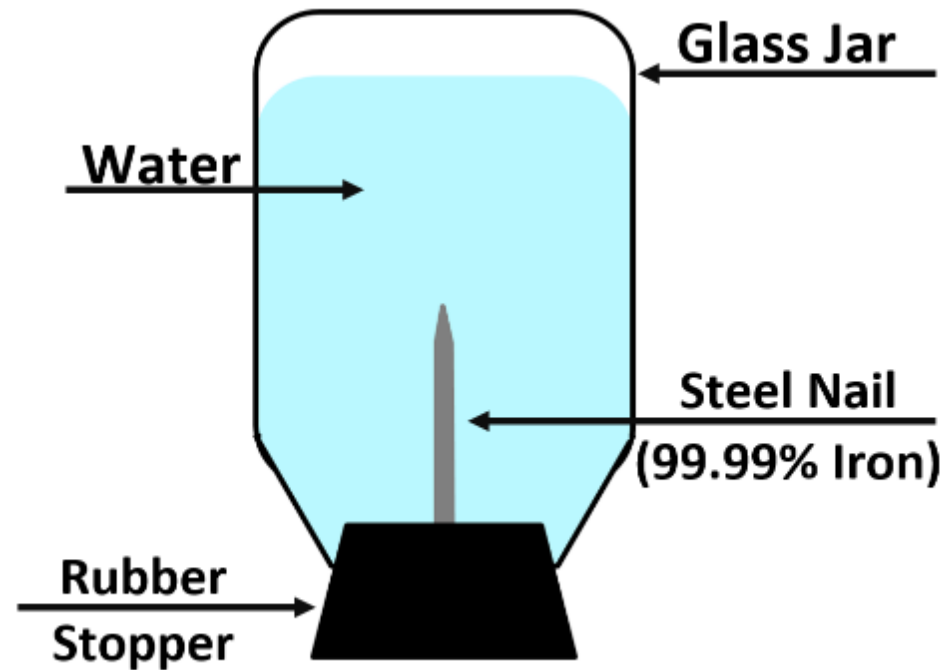
“Flint looks like a **snow globe** and Detroit looks like nothing barely happened” -Caroline



Drew: “...Flint water is **DISGUSTING!**”

Sophia: “...the Flint water looks bad and **unhealthy** to drink...”

Ridley: “Flint = **SNOW GLOBE**”



Iron Corrosion Experiments

Detroit Water



Flint Water



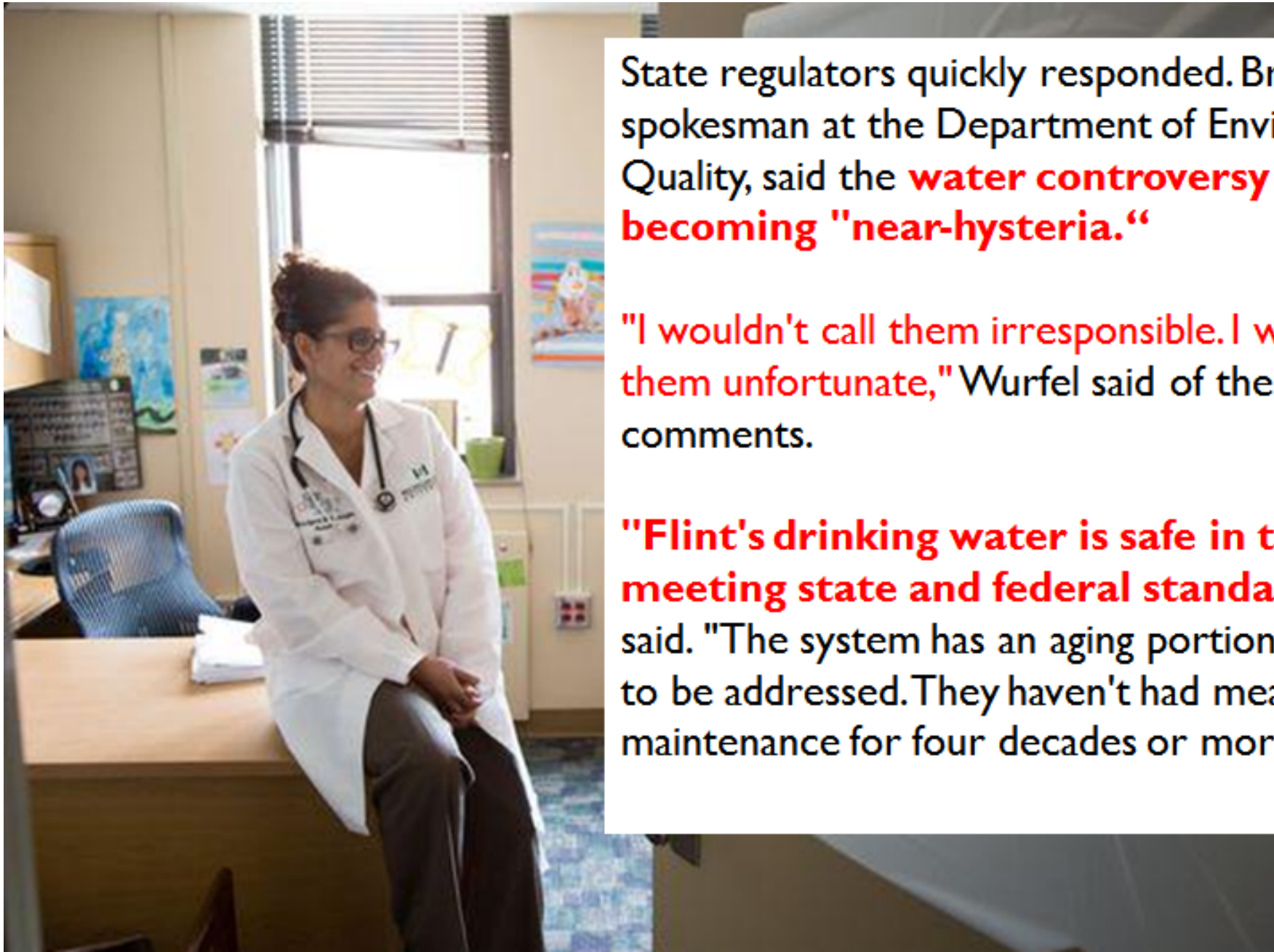
9X more Fe release



Elevated lead found in more Flint kids after water switch, study finds



Dr. Mona Hanna-Attisha, Director of Pediatric Residency at Hurley Children's Hospital, speaks to more than 60 that gather as doctors call for a public health advisory in relation to Flint's water woes, urging city residents in high risk groups -- which include infants on



State regulators quickly responded. Brad Wurfel, spokesman at the Department of Environmental Quality, said the **water controversy is becoming "near-hysteria."**

"I wouldn't call them irresponsible. I would call them unfortunate," Wurfel said of the doctors' comments.

"Flint's drinking water is safe in that it's meeting state and federal standards," he said. "The system has an aging portion that needs to be addressed. They haven't had meaningful maintenance for four decades or more."



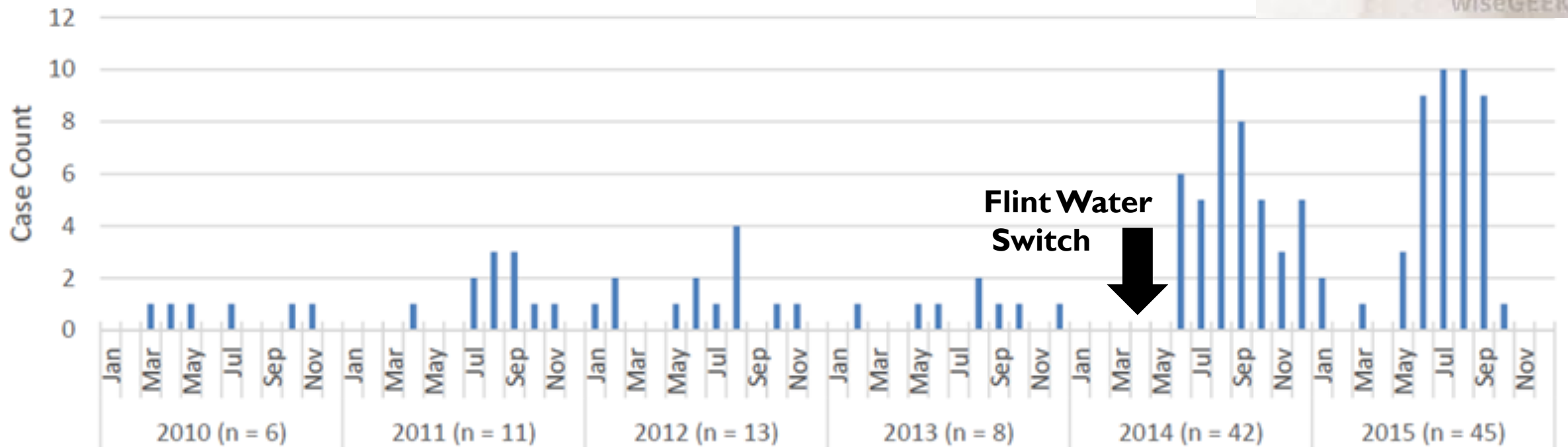
Detroit water begins flowing into Flint once again

Flint Mayor Dayne Walling announces an official switch back to Detroit water during a news conference on Friday, Oct. 16, 2015, outside Freeman Elementary School in Flint, Mich. The Detroit water will be flowing through Flint pipes as soon as 5 p.m. on Oct. 16th.

Legionnaires' Outbreaks ~ 90 cases; 12 deaths



Legionellosis Cases by Onset or Referral Date — Genesee County
January 2010 – December 2015



Jan 16 2016



Carolyn Kaster/AP

“I KNOW IF I WAS A PARENT UP THERE [IN FLINT], **I WOULD BE BESIDE MYSELF IF MY KIDS’ HEALTH COULD BE AT RISK.**”

- President Barack Obama, after declaring a federal emergency

TIME

The Poisoning Of An American City



Toxic water. Sick kids.
And the incompetent
leaders who betrayed Flint
By Josh Sanburn

18 months

100,000 residents

9000 kids exposed

200 confirmed cases

12 deaths

Legionnaire's Disease

100s of main breaks

Water > \$150/month

THE
GOVERNMENT
AND THE WATER
INDUSTRY
BETRAYED
FLINT, MICHIGAN

Actors

MDEQ

EPA

Emergency
Managers

MI Gov/City of
Flint/MI Health
Dept.

MDEQ/City of Flint **Cheated** on Lead Monitoring

Original LCR Report. Red highlights from Flintwaterstudy

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE
DRAFT DEQ

**LEAD AND COPPER REPORT AND
CONSUMER NOTICE OF LEAD RESULT
CERTIFICATE FOR COMMUNITY WATER SUPPLY**

Issued under authority of 1978 PA 399, MCL 325.1001 et al., and Administrative Rules, as amended.
Failure to submit this information is a violation of Act 399 and may subject the water supply to enforcement penalties.

Administrative Rule R 325.10710d requires water supplies to report lead and copper monitoring information within 10 days after the end of the monitoring period. This form may be used to meet this requirement. Submit the information to the appropriate Department of Environmental Quality (DEQ) district office. For district office addresses, visit www.michigan.gov/deq and click on Locations.

1. Water Supply Name: City of Flint Water Plant
2. County: Genesee 3. WSSN: 2310
4. Population: 99,763 5. Monitoring Period: From: 1/1/15 To: 6/30/15
6. Minimum # of Samples Required: 100 7. # of Samples Taken: 71
8. Name of Certified Laboratory: DEQ Drinking Water Laboratory

9. SAMPLE CRITERIA:

Yes	No	Explain No responses in Comments block.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. Are the same sampling points used as in the previous monitoring period?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. Are all samples from Tier 1 sites?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	c. Are all samples from Tier 1, 2, or 3 sites giving Tier 1 priority?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	d. If no Tier 1, 2, or 3 sites are available, do all sites have plumbing materials commonly found at other locations in the system?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	e. Is the minimum number of lead service line samples taken (when applicable)?

For more information see instructions paragraph 11, subparagraph "Sample Category."

Comments:
A total of 175 sample bottles and instructions were distributed to city residents. We are continuing to solicit samples due to the fact that we did not reach the minimum number for this monitoring period.

Lead service - majority (30000?)

10. NAME:
Name: Michael Glasgow
Title: Utilities Administrator Phone: 810-766-7135 Date: 7/28/2015

**ACTUALLY FAILED
W/ 71 SAMPLES**

FLINTWATERSTUDY and ACLU-MICHIGAN FOIA
Red highlights from FLINTWATERSTUDY

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE
DEQ

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1. Water Supply Name: City of Flint Water Plant
2. County: Genesee 3. WSSN: 2310
4. Population: 99,763 5. Monitoring Period: From: 1/1/15 To: 6/30/15
6. Minimum # of Samples Required: 60 7. # of Samples Taken: 69
8. Name of Certified Laboratory: DEQ Drinking Water Laboratory

9. SAMPLE CRITERIA:

Yes	No	Explain No responses in Comments block.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. Are the same sampling points used as in the previous monitoring period?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. Are all samples from Tier 1 sites?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	c. Are all samples from Tier 1, 2, or 3 sites giving Tier 1 priority?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	d. If no Tier 1, 2, or 3 sites are available, do all sites have plumbing materials commonly found at other locations in the system?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	e. Is the minimum number of lead service line samples taken (when applicable)?

For more information see instructions paragraph 11, subparagraph "Sample Category."

Comments:
Revised report after conference call with DEQ staff. Two samples were removed from list for not meeting sample criteria, and due to population the number of samples required was reduced to 60.

10. NAME:
Name: Michael Glasgow
Title: Utilities Administrator Phone: 810-766-7135 Date: 8/20/2015

**NOW PASSED!
W/ 69 SAMPLES**

According to Walters, [MI Nurse] stated that ***“He is barely lead poisoned. If CDC had not changed their lead poisoning standard from 10 down to 5, we would not be having this conversation.”***

Angry, Walters protested that [MI Nurse] was minimizing the problem, at which point [MI Nurse] cut her off and said ***“I am working with kids in their 40’s and 50’s. It is just a few IQ points...it is not the end of the world.”***

The 'Ut Prosim' perspective

*I'm not so sure
Flint is the
community we
want to go out
on a limb for.*

**- Internal EPA
Email**

v/s

*To hold
paramount the
safety, health,
and welfare of
the public – VT
(First Canon of
Civil Engineering)*



Governor Rick Snyder
P.O. Box 30013
Lansing, MI 48909

Dear Governor _____:

I am so mad what
happn in flint. it is bad
for kids. They dont have clean
water to drink for almost two
years. I hope you fix
this problem.

Thank you ♡

Help to Flint

A construction worker wearing a white hard hat and a high-visibility yellow safety vest is working in a deep trench. The worker is leaning over, and a large black pipe is visible running across the trench. A red-handled shovel is stuck in the ground nearby. The background is a dark, earthy wall of the trench.

- \$600+ million in relief
 - Bottled water, lead filters, blood testing, Water Bills
 - Health, Nutrition, Education Services
 - **Lead Pipe Replacement**
- EPA, MDEQ, VT – Best scientists (and students!) on the ground to improve water quality
- Three Congressional Hearings and 400+ lawsuits
- 13 Michigan and Flint civil servants criminally indicted

YOU WANT OUR
TRUST ???

WE WANT VA Tech!!!

VT

PSI

WVW



Spring Break





VirginiaTech
Invent the Future

UMASS
AMHERST



Water Heater Study- Summer 2015

- Initial testing did not find *Legionella pneumophila* in small buildings, even in August 2015
- This summer will intensively monitor for *Legionella pneumophila* in electric and gas water heaters
- Work with State of MI to study water heaters, and see if routine flushing improves water coming from tap
 - Increased Chlorine
 - Decreased Iron



**Summer
Vacation**

DY

AL

WIRED

HBO

The New York Times

FORTUNE

VICE



The Atlantic



TORONTO STAR



The Economist

Forbes

The Detroit News



Detroit Free Press



sky NEWS

THE DAILY BEAST

ALJAZEERA AMERICA

Rolling Stone

CBS NEWS

THE WALL STREET JOURNAL



abc NEWS



The Washington Post

AMERICAN SCIENTIST

THE ROANOKE TIMES

FiveThirtyEight

Post

TIME

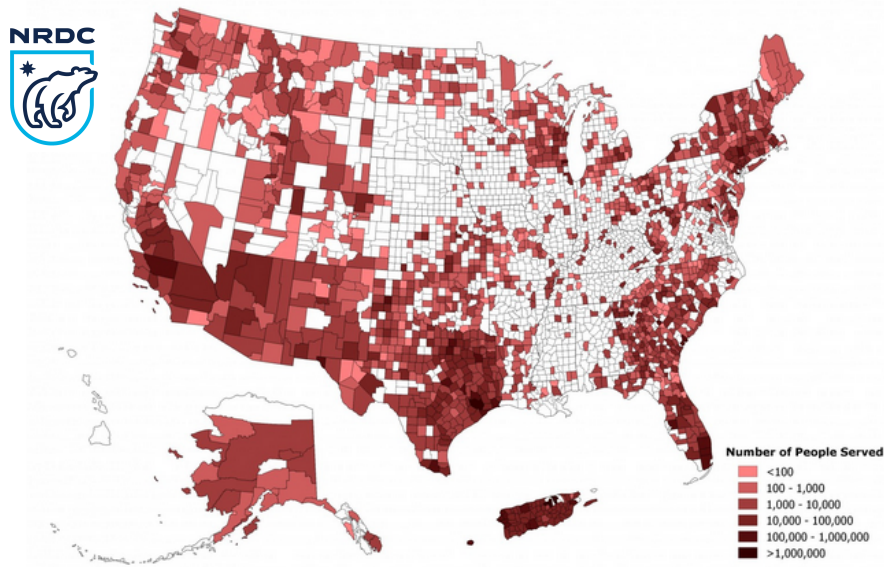
SCIENTIFIC AMERICAN

More than 5,300 U.S. water systems violated lead-testing rules last year

National Impact

By Brady Dennis June 28

FIGURE 1: 18 MILLION PEOPLE SERVED BY COMMUNITY WATER SYSTEMS WITH REPORTED VIOLATIONS OF THE LEAD AND COPPER RULE (2015)



The Boston Globe \$100m loan program aims to replace Mass. lead water lines

Schools around the country find lead in water, with no easy answers

By Brady Dennis July 4



5 HOME SEARCH

The New York Times

N.Y. / REGION

City Failed to Test for Lead in Water at Day Care Centers,

By ELI ROSENBERG JUNE 24, 2016

Lead-in-water testing in our lab (2016)

Cities

- Philadelphia, PA w/ Philly citizens
- Pittsburgh, PA
- New Orleans w/ LSU
- Flint, MI
- Buffalo, NY
- Dayton, OH (hospitals)

Public Schools near

- UNC Wilmington, NC
- Tuskegee College, AL
- Atlanta College, GA

Media Investigations

- NBC News (Milwaukee, New Orleans)
- HBO
- ABC13 (Roanoke, VA)

Private Wells

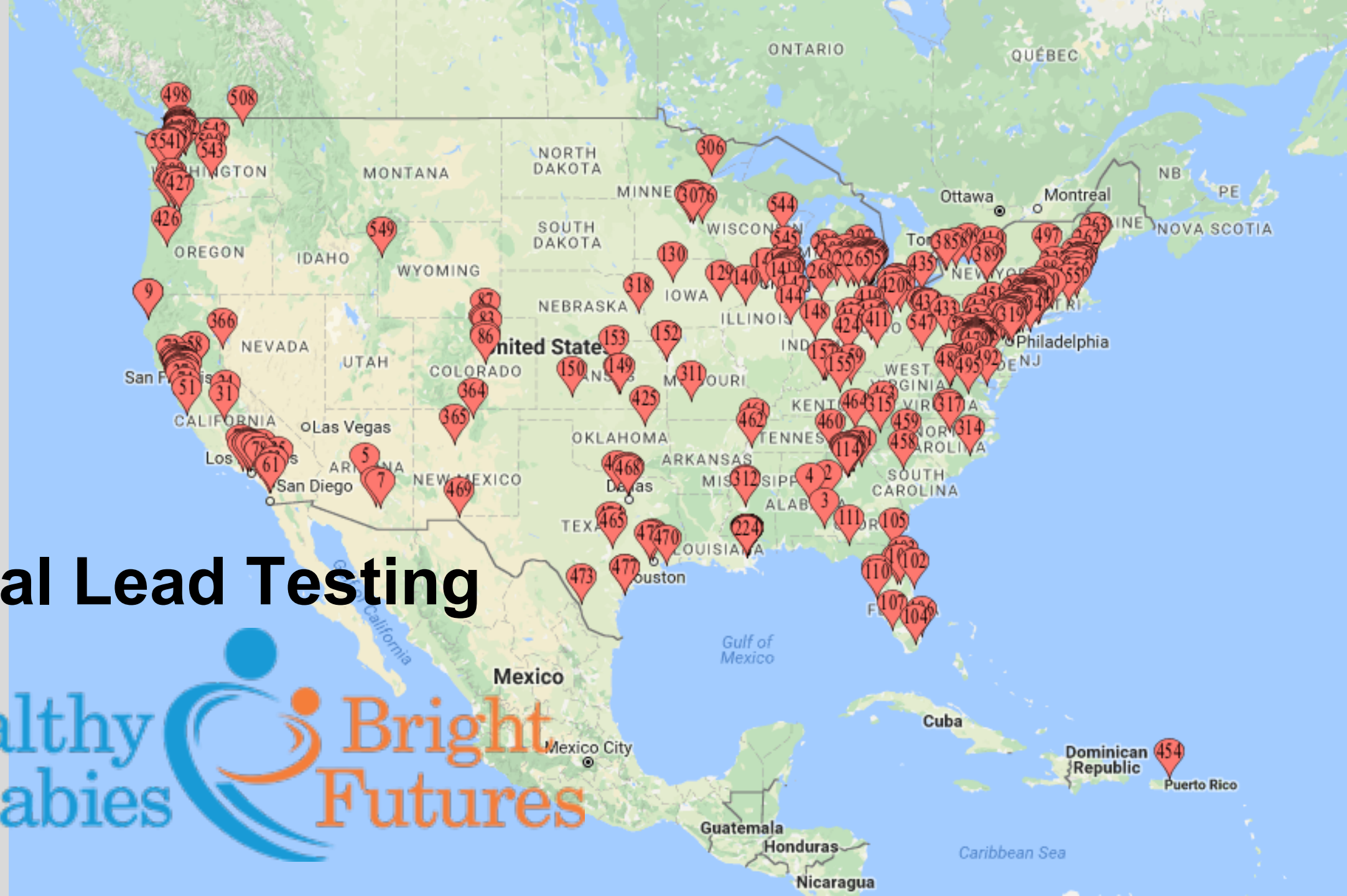
- North Carolina State (3 counties)
- Orleans, NY
- Virginia State

Corrosion Testing

- Indianapolis, IN
- Brick, NJ

National Lead Testing

w/



"Ut Prosim in its finest spirit."

"Thank you for your heroism."

"Thank you for your integrity and for acting on your moral convictions!"

"a credit to this country."

"The world would likely not have known if not for you"

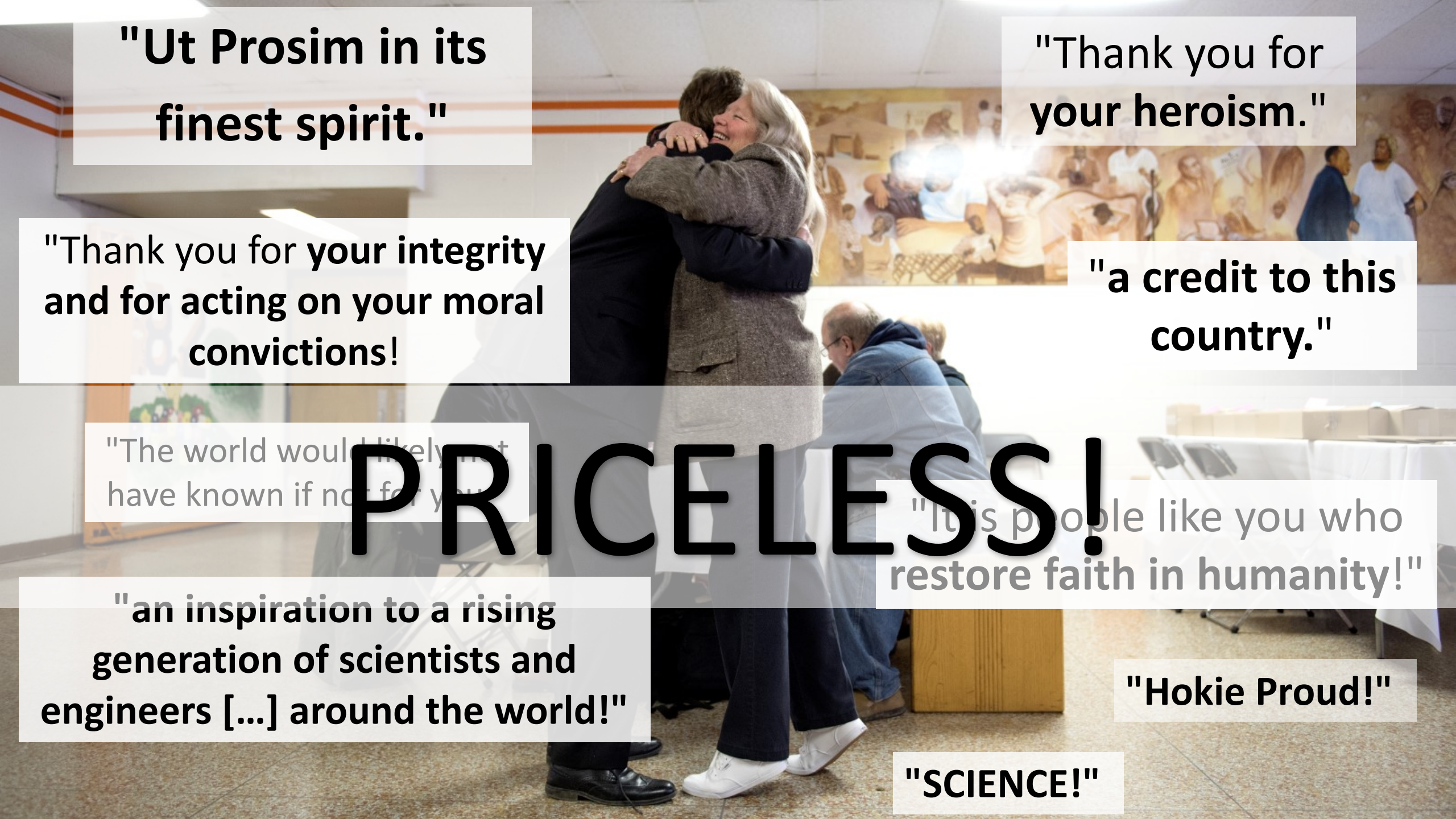
PRICELESS!

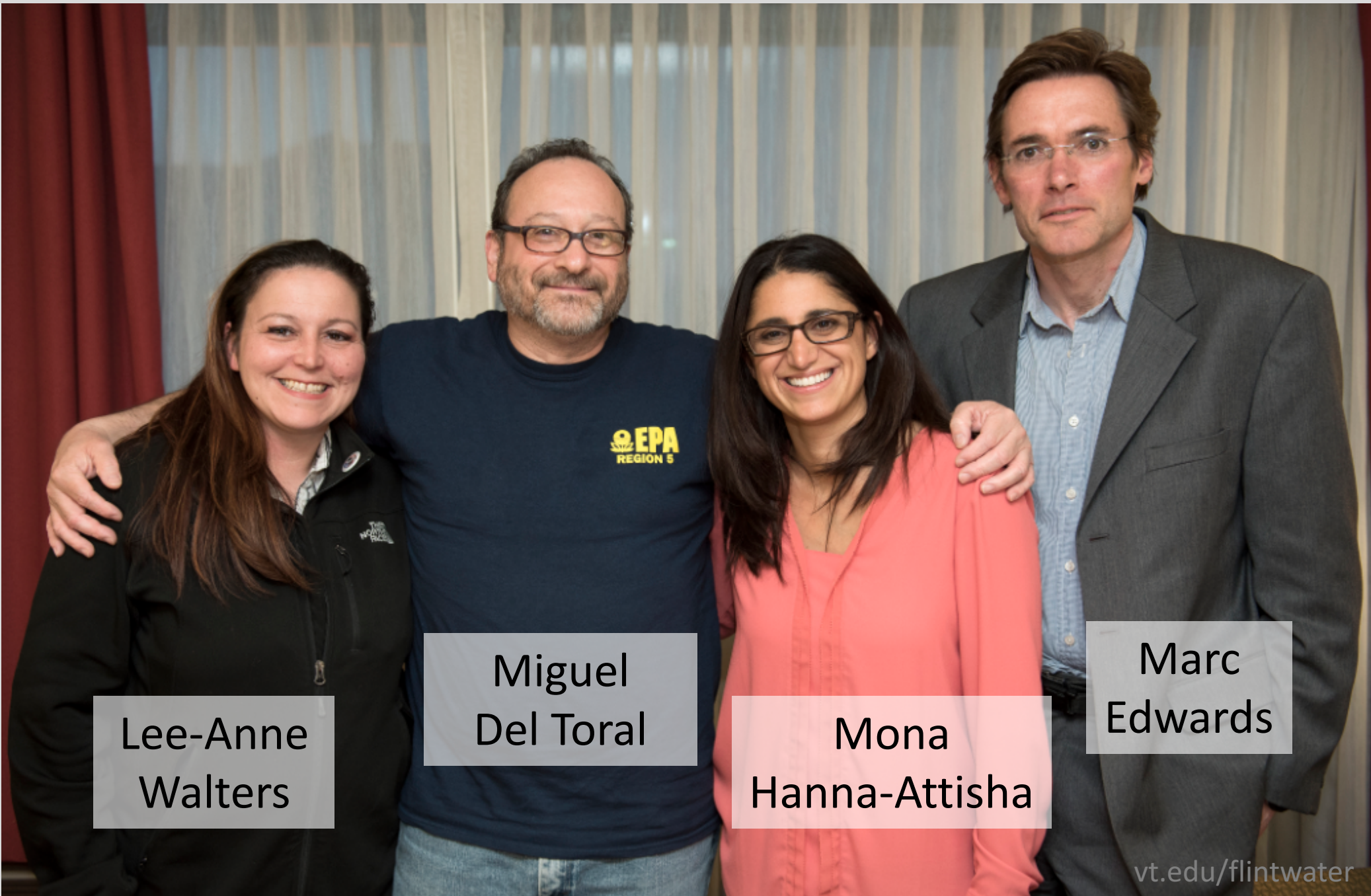
"It is people like you who restore faith in humanity!"

"an inspiration to a rising generation of scientists and engineers [...] around the world!"

"Hokie Proud!"

"SCIENCE!"





Lee-Anne
Walters

Miguel
Del Toral

Mona
Hanna-Attisha

Marc
Edwards

“Servant Leadership”

- VT – a unique & special place – “Ut Prosim” in our DNA
 - Service and Heroism prerequisites to doing meaningful work incl. good science
- Driven by ethics & focused on those you serve and lead
- Increased sensitivity towards injustices – social, environmental, institutional
- Never be a bystander to wrongdoing



*“We must always take sides.
Neutrality helps the oppressor,
never the victim. Silence
encourages the tormentor,
never the tormented.”*
– Elie Wiesel (Holocaust Survivor/
Nobel laureate)



Ut Prosim