The Flint Water Crisis
Lessons Learned: Communicating Science and Influencing Public Discourse Using Research

William Rhoads on behalf of
The Flint Water Study Team
www.flintwaterstudy.org
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**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 of Michigan (Curt Guyette, Kate Levy)
- Sen. Jim Ananich, Congressman Dan Kildee (and their extraordinary staff)
- 1500+ donors supporting our work
- Michigan State Health Department / Genesee County Health Department

**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 Alfred Harris, Allen 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
- UMass Amherst
- **Virginia Tech (staff and students)**
Graphic Adapted from: http://www.clevelandwater.com/customer-service/protect-your-home/home-tips
Historic Flint Drinking Water Source (CCT)

Flint River – Drinking Water Source: April 25, 2014

Pipeline to Lake Huron – Projected Completion: Late 2016
April 2014
Switch to Flint River

October 2014
General Motors stops using Flint Water

January 2015
Exceeds total trihalomethane limit

August - September 2014
Bacteria/E. coli violation

August 2015
Virginia Tech beings “Flint Water Study”
No Corrosion Control

= Perfect Storm For Lead Release

Michigan Department of Environmental Quality (MDEQ) Responsibility

+ Corrosive Water

Due to Flint River water chemistry and treatment
Summer 2014

“Flint water is safe to drink.”
“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

June 2015
Flint's mayor drinks water from tap to prove it's safe

"It's your standard tap water. You can taste a little bit of the chlorine," Walling said. Walling says he drinks the water every day.

“Let me start here – anyone who is concerned about lead in the drinking water in Flint can relax,” said MDEQ Spokesman on July 13th, 2015
2001 - 2004

Water in D.C. Exceeds EPA Lead Limit; Random Tests Last Summer Found High Levels in 4,000 Homes Throughout City

Virginia Tech professor uncovered truth about lead in D.C. water

NSF grant #1135328

Bridging the Gap Between Engineers and Society: Learning to Listen
Aug. 2015
300 Lead kits

90% return rate
At a Flint hospital
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
Iron Corrosion Experiment

Water

Glass Jar

Steel Nail
(99.99% Iron)

Rubber Stopper

Flint Water

Detroit Water
Iron Corrosion Experiment
Flint vs. Detroit Lead Corrosion Experiment

Comparison of Lead (ppb) levels:
- Detroit: 500 ppb
- Flint River: 9,500 ppb

Flint River contains 19 times more lead than Detroit.
Public Health Advisory: September 2015

For 271 samples:

90th Percentile for First Draw: 26.8 ppb (EPA Action Level = 15 ppb)

Highest First Draw: 158 ppb

Highest overall: 1051 ppb
“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
Elevated lead found in more Flint kids after water switch, study finds

Late Sept 2015

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
Blood Lead

Water Lead
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."
City of Flint/MDEQ **Cheated** on Monitoring

**ACTUALLY FAILED**

**NOW PASSED!**
State and Federal Emergencies, $16M spent to switch back to Detroit water and provide free testing

Oct 2015

Jan 2016
August 2015 to July 2016
Lead Data

Aug. 2015
90\text{th} percentile lead = 29 ppb

March 2016
90\text{th} percentile lead = 23 ppb

July 2016
90\text{th} percentile lead = 15.6 ppb

Aug. 2015 – March 2016
• Found out, people still using VERY LITTLE water.
• State initiated flushing program to bring corrosion control into homes

July 2016
• Still improving

Nov 2016…TBA
Our recent research also predicts that these circumstances will potentially create severe chemical/biological health risks for residents, due to impacts on water within building (premise) plumbing systems that include elevated levels of lead and opportunistic premise plumbing pathogens (OPPPs).
Lack of corrosion control = Increased *Legionella*

1. More nutrients in river
2. Iron corrosion = more iron entering buildings’ pipes
3. High iron corrosion removed chlorine disinfectant
Genesee County Legionnaires’ Outbreaks -- ~ 90 cases; 12 deaths
Oct. 17, 2014: Representatives of the county Health Department and the city's water treatment plant met, discussing the county's "concerns regarding the increase in Legionella cases and possible association with the municipal water system -- Health Dept decided announcement would “Inflame the situation”

CDC (April 27, 2015): “We are very concerned about this Legionnaires’ disease outbreak,” ..“It’s very large, one of the largest we know of in the past decade, and community-wide, and in our opinion and experience it needs a comprehensive investigation.”

June 4, 2015: MI Dept Health to CDC = “Outbreak is over”
Genesee County Legionnaires’ Outbreaks -- ~ 90 cases; 12 deaths

Outbreak is “over” and can’t investigate

Knew about outbreak
Legionella DNA Markers in Tap Water Coincident with a Spike in Legionnaires’ Disease in Flint, MI

David Otto Schwake, Emily Garner, Owen R. Strom, Amy Pruden, and Marc A. Edwards*

Department of Civil and Environmental Engineering, Virginia Tech, 418 Durham Hall, Blacksburg, Virginia 24061, United States

“This study fills an important knowledge gap linking the switch to Flint River water to the 2014 and 2015 clusters of Legionnaires’ disease in Genesee County ....”
I had no idea that lead also causes contortionism.
The Flint Water Crisis
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William Rhoads on behalf of The Flint Water Study Team
www.flintwaterstudy.org
I've Been POISONED by Policy
Lead and Copper Rule (LCR) 101

- Sample high-risk homes
  - Lead service line ("Tier 1" homes)
  - Pre-1986 construction
- Sample a certain number of homes, based on population of city
- When $\geq 10\%$ of homes have $[\text{Pb}] \geq 15$ ppb utility must take action
  - Optimization studies for corrosion control
  - Lead pipe replacement
  - Notify public
“Gaming” the LCR

• Don’t target high risk homes
• Collect more samples from locations you expect to be low
• Invalidate samples
• Time your sample collection to “good” times of the year
• Pre-flush water the night before compliance sampling
• Instructing homeowners to open tap slowly
  • Providing sample bottles with narrow opening
• Instructing homeowners to remove aerators
At least 33 US cities used water testing 'cheats' over lead concerns

Exclusive: Guardian investigation reveals testing regimes similar to that of Flint were in place in major cities including Chicago, Boston and Philadelphia

Water departments to change lead-testing methods after investigation

5,300 U.S. water systems are in violation of lead rules

By Sara Ganim, CNN

Updated 6:50 AM ET, Wed June 29, 2016
Requested that state agencies advice utilities to make public “the materials inventory that systems were required to complete under the LCR, including the locations of lead service lines, together with any more updated inventory or map of lead service lines and lead plumbing in the system.”
Requested clarification because EPA statement could “create a false impression of the data that many utilities have on hand”

LCR rule language calls for a “materials evaluation” rather than “materials inventory”

March 11, 2016

The Honorable Gina McCarthy
Administrator
U.S. Environmental Protection Agency
Washington D.C. 20460

Joel Beauvais
Deputy Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
Washington D.C. 20460

Re: Support for Transparency, Lead and Copper (LCR) Revisions and Request for Clarification of Compliance of Existing LCR Requirement (As Expressed in the Letters sent to Governors and state primacy agencies dated Feb. 29, 2016).
“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” First Canon of Civil Engineering
MDEQ to the City

“We hope you have 61 more lead/copper samples collected and sent to the lab by 6/30/15, and that they will be below the AL for lead. As of now with 39 results, Flint’s 90th percentile is over the AL for lead.”

email from MDEQ to City of Flint
“…I am really getting tired of the bad actors being defended, the bad actions being ignored, and people trying to do the right thing are constantly being subjected to intense scrutiny as if we were doing something wrong….. I am not happy to find bad things…but where these problems exist I will not ignore them”

Non-profit Misinformation
February 12, 2016: (FLINT, MI) – There is much more than lead in the water in Flint, Michigan. While Michigan’s Department of Environmental Quality and other authorities have focused primarily on lead leaching into drinking water, outbreaks of Legionnaires’ Disease.
What were they saying? … In **APRIL 2016**

It is irresponsible and incomprehensible for anyone to declare or suggest that the water in Flint is safe to bathe or shower in when the water used in bathing and

<<Group>> toxicologists have reviewed the testing results to date and have found that ...

• aerosolized particulate lead from showers ...can be inhaled directly to the lungs.

• excessive phosphates can lead to low blood pressure which residents of Flint are reporting.”
From the desk of Water Defense’s Scott Smith...

....the breaking news today, is the chloroform and trihalomethane ....I have been to 62 disasters, and I have never seen the levels of contamination for chloroform in water like it is here. ....As part of my 62 disasters, I have tested bathtubs and showers all over the country, and most of the time there is nothing there. ..To put it in context <I tested> fracking contaminated waters in Pennsylvania..I found 27 ppb of toluene....and the state agencies were freaking out. <In Flint> we are talking at Harold Harrington’s house ...900 PARTS PER BILLION OF DICHLOROBENZENE..At a hotel 150 ppb methylene chloride....I am putting this in context. At Water Defense ..data that is irrefutable.
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 continuous flushing improves water coming from.
  - Increased Coli
  - Decreased

EPA

Virginia Tech
Invent the Future

UMASS AMHERST
UMASS DBP Findings

• Very consistent with other cities
• None of the regulated DBPs exceeded Federal Standards
  • Even in water heaters, where they’d be expected to be higher
• None of the unregulated DBPs showed anything out of ordinary
  • (35 years of DBP research behind this statement)
Amid water crisis, Flint faces a Shigellosis outbreak
A-List Actor But F-List Scientist: Mark Ruffalo Brings Fear And Misinformation To Flint

May 16, 2016  Siddhartha Roy  Articles  chloroform, disinfection byproducts, flint water, mark ruffalo, tthm, water defense

Actor Mark Ruffalo (who once played a doctor in a movie) and his Water Defense team have been outspoken about current health dangers from bathing and showering in Flint water. Two weeks ago, Ruffalo went on CNN to highlight the unique dangers of bathing in Flint, due to corroding pipes:
Mark Ruffalo’s Water Nonprofit Has Allied Itself With An Opportunistic Sponge Salesman

And a respected scientist says they’re spreading false information in Flint, Michigan.

05/23/2016 07:59 am ET

Arthur Delaney
Senior Reporter, The Huffington Post
What Flint has shown America (and the world)

• Our crumbling infrastructure (deteriorating mains and Pb pipes)
• Issues with lead nationwide (>5300 of systems reporting high Pb – kids being exposed nationwide)
• Importance of understanding and maximizing corrosion control
• Consistent flaws in the LCR and Cheating on LCR sampling
  • June 2016: At least 33 major US cities still use faulty sampling
• Criminal charges for willful neglect by public servants (Flint: 9 ppl so far)
• Despite all best intentions, a culture focused on compliance and meeting regulations, rather than protecting public health
Lessons for academics – Getting involved 101

• Reach out to agencies/utilities first
• PARTNERSHIPS with/TRUST of citizens critical
• Be RESPECTFUL of concerns/pain and suffering
• An “OPEN SCIENCE” approach
• FOIA requests exposed wrongdoing, bad science
• Making a mistake is NOT an option
• Stay focused on the BIG PICTURE
• ADVOCATE for public health and good science
• Get comfortable with expressing EMOTION
• REFLECT on a regular basis
Observations for others

• Being HONEST, empathetic and COMPASSIONATE with the public whether in an emergency or not – *it could be your child!*

• DO NOT ridicule the public or trivialize their concerns
Examples from our FOIAs:

**MDEQ on citizen groups:**
“It’s been rough sledding thought a steady parade of community groups keeping everyone hopped-up and misinformed”

**DHHS to a mother on child’s blood lead level:**
“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.”
Observations for others

• Being HONEST, empathetic and COMPASSIONATE with the public whether in an emergency or not – it could be your child!
• DO NOT ridicule the public or trivialize their concerns
• QUESTION scientific basis for current water laws
• Continued investment in TRAINING of your employees
• Use SOCIAL MEDIA and Consumer Confidence Reports to your advantage!
• Recruit CITIZEN SCIENTISTS in data collection/decision making
• DISSENTING IS UNCOMFORTABLE, but we need better agency cultures to encourage whistleblowers to stand up
# JUSTICE FOR FLINT

www.flintwaterstudy.org