From: Shawn Patrick McElmurry [mailto:s.mcelmurry@wayne.edu]
Sent: Wednesday, October 7, 2015 4:18 PM
To: Marc Edwards <edwardsm@vt.edu>
Cc: Mhanna1@hurleymc.com
Subject: Flint Water

Hello Marc, I am an Associate Professor at Wayne State University that specializes in water quality and contaminant exposure. I have done a fair amount of work on Pb exposure and have worked in Flint in the past. As a result of this past work, I have a working hydraulic model of the Flint drinking water system. I spoke to Mona today and she suggested I connect with you. I realize you're likely swamped with everything that is happening but if you have a moment I would love to discuss. Any chance you have time tomorrow afternoon (1-3pm) or Friday morning (before 10am) to talk briefly?

Thanks,
Shawn

> **From:** Shawn Patrick McElmurry [mailto:s.mcelmurry@wayne.edu] **Sent:** Thursday, October 8, 2015 6:28 AM
> **To:** Faust, Kasey M <faustk@utexas.edu>
> **Subject:** Re: Articles arising from shrinking cities research with Flint and introductions
>
> Kasey, I took a look at the epanet model of Flint you used for your dissertation. It doesn't look like it was complete, at least the one you sent me. Do you have a complete model of the system? I'm trying to get a handle on what needs to be done.

From: Faust, Kasey M

Sent: Thursday, October 8, 2015 8:38 AM

To: Shawn Patrick McElmurry <s.mcelmurry@wayne.edu>

Subject: Re: Articles arising from shrinking cities research with Flint and introductions

Yes I do- I'll have to find it on my hard drive when I get home. It's going to be in GIS however. I then exported it to EPANET. Is GIs okay with you?

I'll have to look but the data was "rough" if I remember correctly. The basics are there though- diameter, length etc,. This data was from 2011.

From: Faust, Kasey M <faustk@utexas.edu>
Sent: Thursday, October 8, 2015 8:13 PM **To:** Shawn Patrick McElmurry
Subject: Flint Data

The data I have is in GIS format from 2011. I have attached a table that I made a few years ago that I just found with the descriptions of the data I do have.

Is this the kind of data you are looking for? Do you have a few minutes to chat tomorrow about which data would be useful (it is such a large amount that I am not sure if it can all be transferred through dropbox (or chat anytime, it just sounds like a short turn around is needed… I am even in the office now until 8pm CST when my football game starts!).

Kasey
<FAUST SENDS COMPLETE MODEL TO MCELMURRY>

From: Shawn Patrick McElmurry [mailto:s.mcelmurry@wayne.edu] **Sent:** Monday, October 12, 2015 9:41 AM
To: Marc Edwards <edwardsm@vt.edu> **Subject:** Re: Call me at 540 320 8740

Hey Marc, good talking to you today. I would love to continue working together on some level moving forward. As I said, please let me know when your team plans to be going back into Flint and I coordinate accordingly.

If you could send me the following information, it would be extremely helpful.

1) Map showing sampling locations

2) IRB material

Also, attached is the project summary of the NIH Rapid Response that we submitted and were asked to follow up with a full proposal. Obviously, given the dynamic situation, this will be changing but it gives you an idea of what we are doing.
Thanks, Shawn
Shawn P. McElmurry, Ph.D., P.E. Associate Professor

RAPID RESPONSE TO CONTAMINANTS IN FLINT DRINKING WATER

Once a robust city due to a booming automotive industry, Flint MI is now suffering a serious economic decline; so severe that it is compromising public health. The City of Flint is home to 99,002 residents, down from a peak of ~197,000 in 1960, of which 41.5% live below poverty[1]. In Spring of 2015, the economic challenges facing the city ushered in major changes to Flint's municipal water system – most notably changing the source of drinking water from Lake Huron to the Flint River. Unfortunately, the Flint River suffers from the chemical legacy of years of industrial activities. As a result, drinking water quality for Flint residents has plummeted and levels of disinfection-by-products (DBPs) in the water system have skyrocketed. In addition to exposure to carcinogenic DBPs, the director of Hurley Medical Center's pediatric residency program, Dr. Mona Hanna Attisha, reports that the percentage of children with elevated blood lead (Pb) levels has more than doubled in the areas with high water Pb levels since the changes to the water system were implemented.[2] A lead advisory was issued by the City of Flint on September 25, 2015. *A rapid assessment of children's exposure to the complex mixture of potentially toxic chemicals present in Flint's drinking water system is critically needed to protect public health. This unforeseen man-made disaster also represents a unique research opportunity as the conditions responsible for DBPs formation and Pb dissolution would be impossible to replicate in the laboratory.* Both of these characteristics require a rapid response to address this unforeseen man-made disaster.

With the goal of assessing childhood exposure to DBPs and Pb via drinking water, the project team will: (Aim 1) clearly define exposure within Flint's drinking water system; (Aim 2) quantify the concentration of DBPs and Pb that have resulted from the change in water treatment; (Aim 3) apply a high-throughput bioassay to evaluate toxicity of complex chemical mixtures; and (Aim 4) communicate results to water utility operators, government officials (city, state, and federal), public health agencies and residents using principles of risk communication through a variety of channels including social media. These aims will be achieved through a combination of intensive field sampling paired with hydraulic and geochemical models of the drinking water system as well as rapid toxicity screening.

Our team (part of the NSF funded Water@Wayne Group) is currently working together and able to respond with this rapid assessment based on our intimate understanding of the Flint regional water system and social infrastructure. Over the last 5 years the PI (McElmurry) has conducted research focused on how to best adapt Flint's existing water infrastructure to changes in population and industrial demand. As a result of this work, *the team already possesses a complete hydraulic model of Flint's drinking water system*. We will utilize this model to guide sample collection and, along with sample results, define the route of exposure. Co-PI Miller is an expert in hydraulic modeling and has experience with the drinking water distribution system that will be used during this study. She will oversee this portion of the project with Dr. McElmurry. PI McElmurry is an expert in environmental sampling and has conducted extensive research on evaluating water quality and Pb exposure[3,4,5]. The team will employ standard methods to quantify known DBPs and Pb present in drinking water samples as well as use advanced analytical methods to *identify unknown compounds using gas chromatography-time of flight mass spectrometry (GC-TOF)*. Because DBPs are a complex mixture of potentially toxic compounds a rapid, high-throughput approach for evaluating this hazard is required. PI McElmurry and co-PI Pitts have developed a bioassay system capable of measuring behavioral and physiological responses in *Daphnia*[6], a NIH model organism for biomedical research and US EPA toxicity assessment[7,8]. Although bioassay systems using other model organisms could be developed for evaluating water quality, we have already demonstrated the *ability of this method to quantify low-level, sub-lethal impacts of pollutants and pollutant mixtures*[9] and have recently increased the assay's throughput four-fold. We will apply this technique to samples collected throughout Flint's drinking water system. Finally, translation of the results of this work will be guided by co-PI Seeger, an expert in crisis and risk communication, crisis response and agency coordination and health communication. Seeger has worked extensively with the CDC on effective risk communication strategies.

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[1] US Census Bureau. http://quickfacts.census.gov/qfd/states/26/2629000.html
[2] National Public Radio, http://www.npr.org/2015/09/29/444497051/high-lead-levels-in-michigan-kids-after-city-switches-water-source
[3] Zahran et al. (2013) Environmental Science & Technology. DOI: 10.1021/es303854c
[4] Voice, et al. (2006) Journal of Exposure Science and Environmental Epidemiology. DOI: 10.1038/sj.jes.7500489
[5] Niagolova, et al. (2005) Environmental Pollution. DOI: 10.1016/j.envpol.2004.08.003
[6] Zein, et al. (2014) Environmental Toxicology and Chemistry. DOI:10.1002/etc.2404
[7] National Institute of Health (NIH), Model organisms for Biomedical Research, http://www.nih.gov/science/models/daphnia/
[8] US Environmental Protection Agency (EPA), Whole Effluent Toxicity, http://water.epa.gov/scitech/methods/cwa/wet/
[9] Zein, et al. (2015) Environmental Toxicology and Chemistry. DOI: 10.1002/etc.2908

Dr. Reynolds Testimony October 6, 2017

STATE OF MICHIGAN
IN THE 67TH DISTRICT COURT FOR THE COUNTY OF GENESEE

THE PEOPLE OF THE STATE OF MICHIGAN

CASE NO. 17T-1355-FY

v.

NICOLAS LYON

Defendant.
_____/

PRELIMINARY EXAMINATION VOLUME IV
BEFORE THE HONORABLE DAVID J. GOGGINS, DISTRICT JUDGE
Flint, Michigan - Friday, October 6, 2017

Q Okay, and you know if Mr. Hollins had done anything or took any steps as it relates to the advice you gave him?

A It may be shortly after that I got a rather urgent phone call from him saying did I know anybody who was capable of studying Legionella, and I recommended Doctor Shawn McElmurry, an environmental engineer at Wayne State because he had done hydraulic modeling for the city of Flint I think within the past year and since he had been a former Vice President at Wayne State he knew he could contact. Shall I go on?

McElmurry written statement to LARA. April 30, 2018: ***"..it was very confusing what information was available. I had initially thought the City of Flint provided Dr. Abraham, Kasey Faust and me with a fully functioning model of the Flint water distribution system."***

April 30, 2018

Stephanie Murphy, Investigator
Licensing and Regulatory Affairs
Bureau of Professional Licensing
Investigations & Inspections Division
Complaint Intake Section
P. O. Box 30670
Lansing, MI 48909

In fall, 2015, when I became reengaged in Flint, the water crisis was rapidly evolving, and it was very confusing what information was available. I had initially thought the City of Flint provided Dr. Abraham, Kasey Faust and me with a fully functioning model of the Flint water distribution system. This understanding is reflected in the hastily drafted Letter of Intent (LOI) submitted to NIEHS and provided by Dr. Edwards to LARA. The letter was quickly drafted during a time of crisis to allow the program manager to review prior to the panel meeting.

This understanding turned out to be incorrect and was recognized following the submission of the LOI to NIEHS. In the full proposal (page 76 is provided as Attachment E) submitted to the NIEHS, we describe "access to the Flint water distribution system details" and reference a letter of support from Flint's Director of Public Works, Mr. Howard Croft, for the additional information needed to complete the proposed modeling. This information was previously unavailable to me or my collaborators, including Dr. Faust, and is critical to modeling the Flint system.

August 16, 2018: McElmurry had no hydraulic model

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August 16, 2018

As to the second part, which requests "emails between McElmurray (sic) and co-PI Miller on the 2015 NIH grant, that discuss 'McElmurry's hydraulic and EPANET Flint model of the NIH proposal' and the scope of work", Wayne State denies this request on the grounds that there are no emails responsive to the request. McElmurry had no "hydraulic and EPANET (which is a software program) model". The NIH grant proposal sought funds to support, among other things, the development of a hydraulic model consistent with the grant proposal.