Proposal for Flint (MI) Drinking Water Round 2

Background. The issue of lead contamination in the City of Flint (MI) has been well documented over the past several months. The Flint MI Water Crisis (Apr 2014 – present) resulted from an ill-fated decision to switch from Detroit water with corrosion control, to Flint River water without corrosion control. This switch immediately led to violations for bacteria, then TTHMs, unprecedented corrosion of iron mains, main breaks, and elevated lead in water. Recent research demonstrated that incidence of elevated blood lead in Flint children increased in association with the switch in water sources. In response, during October 2015, the water source was shifted back to Detroit, and extra orthophosphate corrosion inhibitor was added in December. ***A key question is: What is the status of lead in water at the present, compared to last summer when water lead exposure is believed to have been near its zenith, or March 2016 when another round of sampling was coordinated by Virginia Tech with EPA funding?***

Our collaborative study with Flint residents to sample their water, executed in August 2015 and March 2016, can provide a basis for answering this question. Our unprecedented independent evaluation of lead in Flint water across the city, sampled 277 homes, of which it was determined that 271 were collected from Flint River water based on fingerprinting of that source water (i.e. characteristic levels of sodium, potassium, calcium, etc.). **Because our protocol did not have extra steps added onto the standard EPA sampling protocol, whereas sampling overseen by the city/state did, the August citizen-led test represents the only available and reproducible dataset that provides a snapshot of lead in water in Flint during the time that children's blood lead was being elevated by water exposure.**

Although this sampling cannot be considered for EPA Lead and Copper Rule (LCR) monitoring, because it is uncertain if the correct percentages of high risk homes with lead pipe or lead solder were sampled, it did cover a wide geographic distribution and range of homes. By re-sampling those same 271 sites in the same way in March 2016, we provided an important dataset on water quality before (August 2015) and after (March 2016) the switch to less corrosive Detroit water with extra corrosion control. This comparison allowed the Federal response team and residents to determine how much better, if at all, the lead in water levels are compared to August 2015. That sampling showed some significant improvements in lead occurred, but the water was probably still over the EPA action level. This project extension will repeat the March 2016 sampling event in mid-July 2016. It is hypothesized that the lead levels will have continued dropping since March 2016, due to the longer effective time of corrosion control, as well as a flushing program implemented and executed in May 2016. Only the 175 homes re-sampled in March 2016, will be resampled in this work, allowing a comparison of data collected August 2015, March 2016 to July 2016.

Approach for July 2016 sampling. We will repeat our March 2016 sampling of 174 homes that participated in the two prior volunteer surveys. The three bottles will once again be a 1-L first draw after a 6+ hour overnight stagnation, a 45 second flushed sample (500 mL), and a two minute flushed sample (125 mL). The bottles will be distributed using the same approach used last March, with the same Flint residents paid to coordinate the sampling with the assistance of Virginia Tech graduate students. Ms. LeeAnne Walters has agreed to oversee the distribution and sampling of the kits.

All water samples will be preserved with nitric acid upon receipt at Virginia Tech, allowed to sit at least 16 hours per the Lead and Copper Rule protocol, and analyzed for lead and other metals using a Thermo Electron X-Series ICP-MS. Result letters will be sent to the consumers within one month of receiving the

samples. Telephone calls will be made by Virginia Tech students to those consumers' whose water lead levels are still above the WHO's 10 ppb guideline.

The overall results will be posted on the collaborative web-site Flintwaterstudy.org, and provided to both EPA and Federal emergency response teams. Before and after comparisons will be made using a paired Student's *t*-test with an alpha of 0.05 to determine if the reduction in lead (if any) is statistically significant comparing August 2015 to present. This dataset will complement the official "LCR" monitoring of Flint water that will be overseen by the EPA task force.

Schedule. Our previous testing was conducted in approximately 8 weeks and proceeded as follows:

Week 1 – Procure supplies (sample bottles, shipping boxes, labels)

Week 2 – Assemble kits and ship (print/apply labels, assemble boxes, etc.)

Week 3 – none

Week 4 – Receive large group of samples (maintain sample log, acidify samples, prep samples for ICPMS)

Week 5 – Conduct ICPMS analyses, receive second large group of samples

Week 6 – Conduct ICPMS analyses from second group, receive third and final group of samples

Week 7 – Conduct ICPMS analyses from final group of samples; compile/analyze data

Week 8 – Telephone participants with high levels of lead; prepare results letters for all participants

For this resampling study we actually have all supplies necessary on-hand and we anticipate finishing faster than 7 weeks. The sample kits will be distribute from July 5 to July 19th, and results will be analyzed by mid-August.