Proposal for Flint (MI) Drinking Water Retest

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?***

Our collaborative study with Flint residents to sample their water, executed in August 2015, 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, we can provide an important dataset on water quality before (August 2015) and after (now) the switch to less corrosive Detroit water with extra corrosion control. This comparison will allow the Federal response team and residents to determine how much better, if at all, the current lead in water levels are compared to August 2015. It is hypothesized that the lead levels would have dropped dramatically after 4^+ months on Detroit and 2^+ months with enhanced corrosion control.

Approach. We propose to repeat our sampling in the 271 homes that participated in the prior volunteer survey. 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 August, but this time the volunteers involved in the August 2015 sampling event will be paid. Ms. Lee-Anne 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.

Dependent on the results, another re-sampling may be desirable in August 2016, when the water temperature is higher.

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

Table A6.1 Project Timeline

TASK	DUE DATE
Begin Project	15-Feb-16
Quality Assurance Project Plan (QAPP)	22-Feb-16
Assemble lead test kits	19-Feb-16
Ship lead test kits to Flint	2-Mar-16
Receipt of completed samples from Flint residents	14-Mar-16
Acidify samples at VT, analyze by ICP-MS	15-Mar-16 through 25-Mar-16
Telephone residents with high lead; send letters to all residents	2-Mar-16 through 29-Mar-16
Final Report on Core Lead Analysis	1-Apr-16
Additional Analysis and Follow up Work Peer review papers, etc.	1-Apr-16 to End
Project End	14-Feb-17