

Supplementary Materials

Katner et al 2018. Effectiveness of Prevailing Flush Guidelines to Prevent Water Lead Exposure in a Compliant City with Lead Service Lines

The following supplementary materials can be found in this document:

- **Table S1:** New Orleans 2015 water quality data for finished water (after purification)
- **Figure S1:** The New Orleans, Louisiana Sewerage and Water Board's 2015 Consumer Confidence Report presenting 2014 compliance sampling results.
- **Figure S2:** Percent of survey respondents by reported length of premise plumbing + service line measurements (meters)(n=80)
- **Figure S3:** Distributions of the difference in water lead levels (WLLs) in cold water samples collected at first draw (FD) compared to WLLs in samples collected after various flush times
- **Table S2:** Water lead levels (WLLs) in pre- and post- lead service lines replacement (LSLR) samples (n=5)
- **Table S3:** Participant and household characteristics of respondents associated with detectable (≥ 1 ppb) water lead levels (WLLs)
- **Table S4:** Water lead levels (WLLs) in first draw vs flushed cold samples.
- **Figure S4:** The New Orleans Louisiana Sewerage and Water Board's informational brochure, "Tips for reducing lead exposure from drinking water" (Source: NOLA S&WB's 2016 Consumer Confidence Report)
- **Survey for homes:** Lead exposure assessment for drinking water study.

References referred to here can be found in the Reference section of the main paper.

Information about New Orleans Sewerage and Water Board Water Treatment System:

The New Orleans Sewerage and Water Board (S&WB) operates two water treatment plants- one on the East Bank and the other on the West Bank of New Orleans (NOLA). This study focused on homes served only by the S&WB's East Bank or Carrolton plant. The Carrolton plant provides an average of 135 million gallons of water per day to an estimated population of 286,603 (S&WB 2016). The plant uses a conventional treatment system to purify water from the Mississippi River. Ferric sulfate and polyelectrolyte is used for coagulation followed by flocculation and sedimentation. Chlorine, in the form of sodium hypochlorite, is used as the primary disinfectant and chloramines are used as the secondary disinfectant. Lime is used for corrosion control pH adjustment and sodium hexametaphosphate is added as a sequestrant. The final step are fluoridations followed by filtration through rapid gravity filters (sand and anthracite) (Black and Veatch 2016). The city's water quality parameters are presented in **Table S1, Supplementary Materials**.

Table S1. New Orleans S&WB 2015 water quality data for finished water (after purification)

Parameter	n	Min	Avg	Median	Max
Temperature (°C)	588	9.5	22.4	23.4	33.4
Nephelometric turbidity (NTU)	588	0.07	0.12	0.13	0.79
pH	588	8.16	8.82	8.85	9.16
Free chlorine residual (ppm as Cl ₂)	588	0.1	0.2	0.2	0.5
Polyphosphate (ppm)	240	0.10	0.33	0.32	0.59
Total alkalinity (ppm as CaCO ₃)	588	82	126	127	172
Total chlorine (ppm)	588	0.7	3.0	3.2	4.2
Calcium (ppm)	588	36	55	51	66

Source: NOLA S&WB. Samples collected 1-1-2015 to 12-31-2015 from 11 points of entry to distribution system.

The New Orleans Sewerage and Water Board's Consumer Confidence Report Prior to Study Commencement (2015):

After EPA regulations on flush time recommendations were relaxed, the city's water utility, the Sewerage and Water Board, continued to promote the original flush recommendations from 2009 to 2015 [41, 46]. At the commencement of this study, the utility encouraged residents to flush their taps "for 30 seconds to 2 minutes before using water for drinking or cooking" daily under normal use conditions [41] (**Figure S1, Supplementary Materials**).

S&WB Consumer Confidence Report (2014)

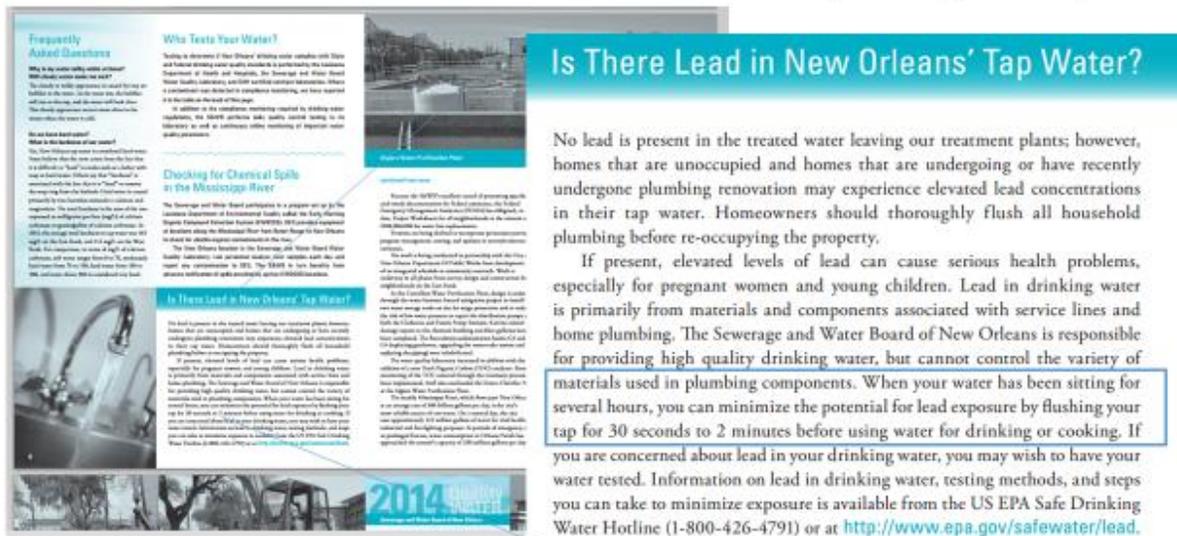


Figure S1. The New Orleans, Louisiana Sewerage and Water Board's 2015 Consumer Confidence Report presenting 2014 compliance sampling results. (Source: NOLA S&WB's 2015 Consumer Confidence Report, [41])

New Orleans, LA Study Participant Premise Plumbing and Service Line Lengths:

To determine the most probable location in the water distribution system or premise plumbing that each sample type may have been sitting during the stagnation period, an estimate of the volume of water and flush times required to purge the lines was derived based on estimated flow rates at low flow (3.0 liters per minute) and high flow (8.3 liters per minute); typical premise and service line pipe diameters; and survey respondent measurements of service lines and premise plumbing (**Figure S2, Supplementary Materials**). A 250-mL sample is estimated to represent water in approximately 2.4 meters (or 8 feet) of piping.

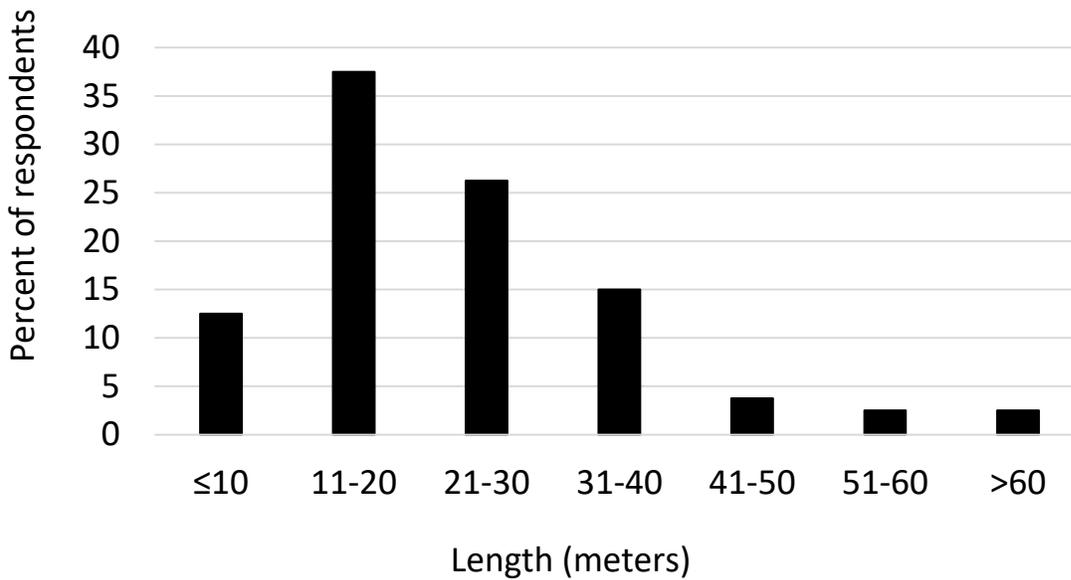


Figure S2. Percent of survey respondents by reported length of premise plumbing + service line measurements (meters)(n=80)

The lengths of water service lines and premise plumbing pipes were estimated based on resident measurements reported on returned surveys (**Figure S2, Supplementary Materials**). Residents were asked to measure the distance from the middle of the street to the water line as it enters the home (service line length) and the distance from where line enters home to the kitchen tap as measured along wall (premise plumbing). Researchers also derived google map measurements of potential service line lengths for all sites, based on measures taken from the center of the street to the front of the home in the satellite view of Google Maps using the distance and area tool.

Difference in Water Lead Levels in Flushed and First Draw Hot Samples Compared to First Draw Cold Water Samples:

The results of the WLL differences from FD to flushed samples (**Table 2, Figure S3**) demonstrate a small but significant increase (median=0 ppb and mean=0.6 ppb, $p=0.04$) in WLLs from FD to F30S sample. No significant change in WLLs was observed from FD to F3M samples ($p=0.219$). Small but significant declines in WLLs was observed in F6M (median=0 ppb and mean= -0.2 ppb) and FDH (median= -0.1 ppb and mean= -0.4 ppb) samples, compared to FD samples (**Table 2; Figure S3, Supplementary Materials**).

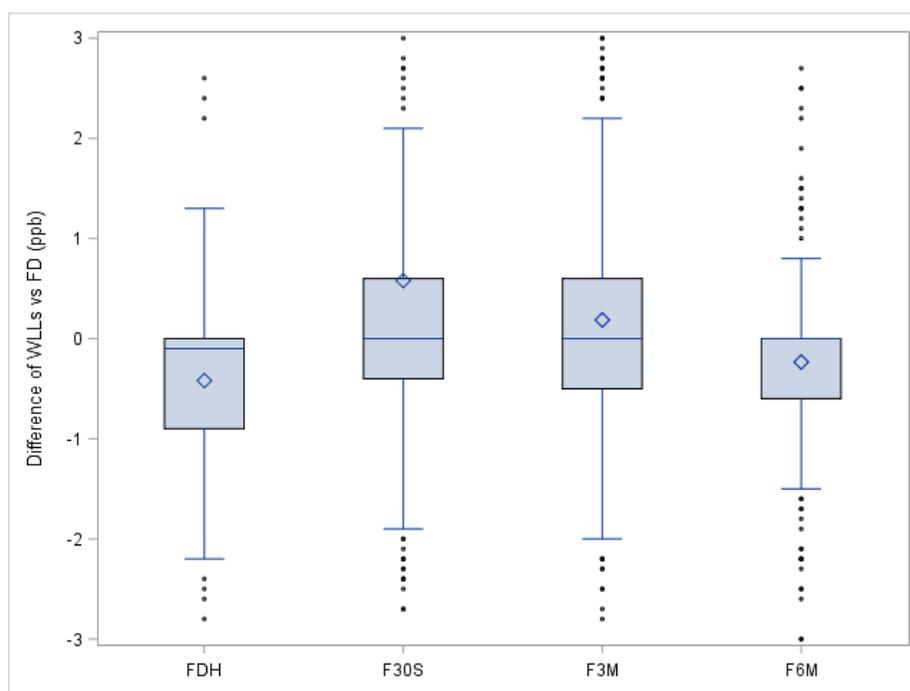


Figure S3. Distributions of the difference in water lead levels (WLLs) in cold water samples collected at first draw (FD) compared to WLLs in samples collected after various flush times

Key: FDH: first draw hot water; F30S: 30 second flush; F3M: 2.5-3 minute flush; and F6M: 5.5-6 minute flush samples. Diamonds inside box: mean value; line inside box: median value; bottom and top edges of box: 25th and 75th percentile; lower fence: 1.5 IQR (interquartile range) below 25th percentile; upper fence: 1.5 IQR above 75th percentile. **Notes:** Measures outside the range of -3 and 3 ppb were not shown. Refer to **Table 2** for the minimum and maximum values.

Water Lead Levels And Flushing Efficacy Associated With Atypical Use Conditions

While not a planned part of the study, conditions arose which allowed us to evaluate the impact of a one-time 15-minute utility flush on WLLs after lead service lines replacements at five residential sites. Lead service line replacements and construction are known to increase lead in water due to construction disturbances and galvanic corrosion for periods of weeks to years [19, 30, 38]. Five of our study participants contacted the city's water utility after our testing to request removal of their lead service lines. All but one of these residents received a partial lead service lines replacement (i.e., only the utility or customer side was replaced); while one had the full lead service lines replaced (from water main in the street to the home). All of the sites were sampled prior to, and after the line replacements and the utility or contractor 15-minute post-replacement flush. Only one of these homes was unoccupied due to ongoing home renovation work.

Table S2 shows sampling procedures and WLL results for each site- unfortunately, collection procedure for the samples varied from home to home. No definitive conclusions can be drawn from the post-line replacement samples due to the small sample size and variance in the sampling procedures. However, the persistent elevation in WLLs (exceeding the EPA AL) can be seen within the week after the line replacement in occupied homes, in both the full line replacement site (6 days later) and partial line replacement Site 3 (1-2 days later). Post-line replacement WLLs reached as high as 226 ppb one day after the partial line replacement (after a post-stagnation 30 second flush).

Table S2. Water lead levels (WLLs) in pre- and post- lead service lines replacement (LSLR) samples (n=5)

Site	WLLs in pre-line replacement samples (ppb)				WLLs in post-line replacement samples (ppb)				Post-Line Replacement Samples (after post-replacement 15-minute outdoor utility flush)
	FD	FDH	F30S	F3M	S1	S2	S3	S4	
Full LSLR	6.5	9.1	49.2^a	12.6	17.8	3.0	2.8	NS	S1: 6 days post-LSLR/OS- F30S S2: 2 weeks post-LSLR/OS- F30S S3: 3 weeks post-LSLR/OS- F30S
Partial LSLR Site 1	5.0	2.6	5.8	9.8	0.5	0.5	0.5	0.5	2 weeks post-LSLR/OS: S1: FD; S2: F30S; S3: F3M; S4: F6M
Partial LSLR Site 2	6.4	5.3	24.7	6.8	16.8	10.7	5.5	NS	S1: Post-LSLR- FD (same day) S2: 2 days post-LSLR/OS- FD S3: 3 days post-LSLR/OS- FD
Partial LSLR Site 3	30.0	151.9	7.4	1.3	6.5	225.8	61.8	NS	S1: Post-LSLR- F30S S2: 1 day post-LSLR/OS- F30S S3: 2 days post-LSLR, F30S
Partial LSLR Site 4 (uninhabited)	161.4	NS	26.6	283.5	64.5	2.5	0.5	0.5	Post-PLSLR (same day) S1: FD; S2: F30S; S3: F3M; S4: F6M

Note: ^a Bold WLLs exceeded the EPA AL of 15 ppb. **Key:** LSLR: lead service line replacement; WLLs: water lead levels; NS: no sample; FD: first draw sample; FDH: first draw hot water sample; F30s: sample collected after 30-34 second total flush; F3M: sample collected after 2.5-3 minute total flush; F6M: sample collected after 5.5-6 minute total flush; OS: overnight stagnation (6+ hour of stagnation prior to water collection); S#: Sample number.

These results suggest that rigorous extended flushing protocols may need to be repeated on a daily basis for an as yet indeterminate time period following line replacements. It is widely acknowledged that sites with partial replacements may have higher WLLs; and may require more rigorous and regular flushing than normal-use residential sites under typical conditions. [38, 70]. Post-replacement flush guidelines are not always consistent, and some guidelines (i.e., one-time 15 minute high velocity flush) may not be effective for maintaining low WLLs over a long period of time. In some circumstances, utilities are not required to promote flushing, such as after voluntary lead service line replacements in Pb-compliant cities.

When lead service line replacements are conducted in cities compliant with the Lead and Copper Rule, educating consumers about flushing is only required once a year, in the utility's annual Consumer Confidence Report for utility customers [3].

New Orleans has been undergoing extensive road work, including thousands of partial lead service line replacements [48]. For homes undergoing partial lead service line replacements, New Orleans officials recommend on their Roadwork website, that residents "Run cold water at a high flow at all of your faucets for at least 5 minutes each, one at a time, starting with the faucet closest to your water meter"; clean faucets aerators; and continue to flush for at least a month before using the water [71]. At the start of this study, this information was not consistently communicated nor readily available to New Orleans residents undergoing roadwork [72]. However, the persistent elevation in WLLs we observed days after the line replacements indicates that care should be taken to flush systems rigorously and regularly after line replacements (**Table S2, Supplementary Materials**).

The EPA's Science Advisory Board (SAB) stated that "the lack of mandatory water lead testing and homeowner education associated with voluntarily partial lead service line replacements suggests that in practice, voluntary replacement might be associated with greater exposure of the public to lead" [38]. The SAB recommends that utilities test the water and tell consumers to flush the lines "over a period of months" after a partial lead service line replacement; but concluded that while "line flushing appears to provide some benefit, the ... time to realize the benefit (up to several weeks of flushing in the reviewed studies) likely precludes any practical implementation of this technique" [38]. Despite the general knowledge about the ineffectiveness and potential danger that partial lead service line replacements pose, they are still required by the Lead and Copper Rule when certain compliance conditions have not been met [3].

More research is needed to evaluate how frequently flushing would need to be conducted to maintain low WLLs after a partial lead service line replacement. One study simulated partial lead service line replacements in New Orleans, and observed that intermittent flushing over a two week period was not long enough to stabilize WLLs [19]. In keeping, previous studies suggest several weeks, months, or maybe years may be required to remediate increased WLL exposure after partial lead service line replacements [38, 74]. These facts do not discount the benefits of more rigorous flushing protocols as an effective Pb remediation method for some systems when high WLLs are present. Improved remediation has been observed with higher velocity flushing (full open tap); continuous flushing (as opposed to intermittent flushing); increased flushing frequency and duration; and flushing at multiple taps [9, 11-12, 19, 24].

However, residents should be alerted that when conditions are severe enough to warrant more rigorous flushing protocols, as observed here after partial lead service line replacements, exposures to high WLLs are always a possibility. Flushing can mobilize particulate-bound Pb throughout the plumbing system, which can then serve as a long-term source of acute Pb exposure. Even after flushing water for 10-25 minutes, some Flint homes still had high WLLs [14]- at least one Flint tap still contained WLLs exceeding 15 ppb (217-13,200 ppb) after a 26 minute flush [75]. This was likely due to the presence of highly unstable lead scales and the continuous sloughing of particulate lead during the time in which corrosion control was not used by Flint officials. Factors associated with maintaining low WLLs under such conditions, such as flushing frequency, must be determined on a case by case basis.

Associations between Participant and Site Characteristics and Detectable WLLs:

Participant and household characteristics (and associated minimum, mean, median and maximum WLLs) are presented in Table S3 (Supplementary Materials). Select survey variables were evaluated using univariate and multivariate models to identify factors that may be correlated with detectable WLLs. Table S3 presents factors considered in univariate and multivariable mixed models and associated percentages of detectable WLLs in the FD samples. Besides flush time, the number of occupants and age of homes were significantly associated with detectable WLLs, after adjusting for flush time (Table 4). Lower occupancy homes and older homes (pre-1950) were associated with higher risk of detectable WLLs. The prevalence of detectable WLLs in FD samples decreased with occupancy: 1 occupant = 92%, 2–3 occupants = 67.6% and ≥ 4 occupants = 63.7% (Table S3). This trend is consistent with other prior studies, which show that less water use can increase water lead problems [55,56]. The prevalence of detectable WLLs in FD samples decreased in newer homes: Pre-1950 = 73.4%; Post-1950 = 48.5%, which is expected given increased WLLs content in plumbing of older homes. This same trend was observed for prevalence of detectable WLLs in older homes in F30S samples ($p < 0.0001$, $n = 375$), and F3M samples ($p = 0.010$, $n = 373$), but not for WLLs in F6M samples ($p = 0.069$, $n = 218$).

Table S3. Participant & household characteristics of respondents & associations with detectable (≥ 1 ppb) WLLs

Characteristics	n=361 N (%)	First Draw % of detectable WLLs (≥ 1 ppb)	P-value ¹	OR (95% CI) ²
Number of occupants in household				
1	25 (7.7)	92.0		
2-3	176 (54.2)	67.6	0.01	0.27 (0.10, 0.73)
≥ 4	124 (38.1)	63.7	0.004	0.22 (0.08, 0.61)
Income				
<50K	78 (26.4)	69.2		
51-74K	61 (20.7)	70.5	0.792	1.08 (0.59, 1.98)
≥ 75 K	156 (52.9)	64.7	0.535	0.86 (0.53, 1.39)
Race				
Caucasian	257 (75.0)	70.8		
African-American or others	86 (25.1)	54.7	0.013	0.59 (0.39, 0.89)
Education				
High School and under	32 (10.0)	65.6		
College	114 (35.4)	64.9	0.677	0.86 (0.43, 1.73)
Graduate	176 (54.7)	69.9	0.974	1.01 (0.52, 1.98)
Number of children <6 years old				
0	188 (60.1)	69.2		
1	85 (27.2)	69.4	0.843	0.96 (0.61, 1.50)
≥ 2	40 (12.8)	55.0	0.268	0.72 (0.40, 1.29)
Street sidewalk work in last year				
No	167 (56.6)	66.5		
Yes	128 (43.4)	66.4	0.814	0.95 (0.64, 1.43)

Characteristics	n=361 N (%)	First Draw % of detectable WLLs (≥ 1 ppb)	P-value ¹	OR (95% CI) ²
Era home was built				
Post-1950	66 (17.6)	48.5		
Pre-1950	248 (66.0)	73.4	<0.001	3.01 (1.89, 4.81)
Unknown	47 (13.0)	59.7	0.162	1.57 (0.83-2.96)
Home type				
Single family	247 (71.2)	67.5		
Multiple family/Apt complex	100 (28.8)	64.0	0.1516	0.74 (0.50, 1.12)
Ownership				
Own	276 (82.1)	69.2		
Rent	60 (17.9)	55.0	0.024	0.58 (0.36, 0.93)
Water Usage				
Monthly total (100 gallons)	45.9 \pm 28.1 (n=41)	73.2	-	-
Average daily (100 gallons)	1.8 \pm 2.4 (n=38)	71.1	-	-

Notes: “-” Sample size is too small (n<50) for solid modeling, Non-respondents were not included in the percentage and denominators; ¹Association with detectable (≥ 1 ppb) vs. non-detectable lead level using mixed model adjusted for flush times. ²Odds ratio (95% confidence interval)

Water Lead Levels (WLLs) in First Draw vs Flushed Cold Samples:

Table S4 presents the number of samples in each WLL category by sample type; and **Table 3** presents the number and percent of samples with a change in WLL detection or with insubstantial WLL changes (< 1 ppb), compared to FD WLLs. The majority of the households (80-81%) had no change in WLL (<1 ppb difference) in flushed samples compared to FD samples (**Table 3**). In general, most homes with FD WLLs below the reporting limit (<1 ppb) continued to have WLLs <1 ppb in flushed samples. Of sites with FD WLLs <1 ppb, 79%, 83% and 86% also had WLLs <1 ppb in F30S samples (n=136), F3M samples (n=135), and F6M samples (n=86), respectively (**Table S4**). Additionally, most homes with detectable FD WLLs (≥ 1 ppb) continued to have WLLs ≥ 1 ppb in flushed samples. Of sites with FD WLLs ≥ 1 ppb, 82%, 79% and 75% also had WLLs ≥ 1 ppb in F30S samples (n=238), F3M samples (n=237), and F6M samples (n=132), respectively. (**Table S4**).

Table S4. Water lead levels (WLLs) in first draw vs flushed cold samples.

FD WLL (ppb)	F30S WLL (ppb) (n)						F3M WLL (ppb) (n)						F6M WLL (ppb) (n)					
	<1	1-4.9	5-9.9	10-14.9	≥ 15	n	<1	1-4.9	5-9.9	10-14.9	≥ 15	n	<1	1-4.9	5-9.9	10-14.9	≥ 15	n
<1	108	27	0	0	1	136	112	22	1	0	0	135	74	12	0	0	0	86
1-4.9	41	134	15	2	4	196	48	127	18	1	1	195	33	75	3	0	0	111
5-9.9	1	6	22	3	3	35	1	10	20	3	1	35	0	8	9	2	0	19
10-14.9	0	2	2	1	0	5	1	1	2	0	1	5	0	0	1	0	0	1
>15	0	0	0	1	1	2	0	0	0	1	1	2	0	0	0	1	0	1
n	150	169	39	7	9	374	162	160	41	5	4	372	107	95	13	3	0	218

Key: FD: first draw cold sample; F30S: flushing cold water for 30-45 seconds; F3M: flushing cold water for 2.5-3 minutes; F6M: flushing cold water for 5.5-6 minutes.

Post-Study S&WB Risk Messages:

Homogenized exposure reduction and lead remediation guidelines are always susceptible to error, given the wide variability that can exist between buildings, e.g., in pipe age, lengths, materials, and diameters; scale buildup; and home occupancy and water use. Promotion of these practices need to be reconsidered as other more effective, evidence-based, low-cost technologies, such as NSF-certified faucet mount filtration devices, are now widely [82]. In acknowledgement of this issue, the US EPA's Lead and Copper Rule (LCR) Working Group recommended to US EPA officials in 2015, that the Consumer Confidence Reporting Rule be revised to exclude the currently required messaging: "When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking" [71]. Rather than promoting one-size-fits-all flush guidelines, greater effort should be expended on motivating and enabling proactive evidence-based solutions. Yet it was only after the preliminary release of our results in 2016 that S&WB revised their risk messaging and increased their flush guidelines to "30 seconds to 5 minutes"; however elsewhere in the same material, the messaging remained "30 seconds to 2 minutes"- conflicting messages which can increase confusion [84] (Figure S4, Supplementary Material).

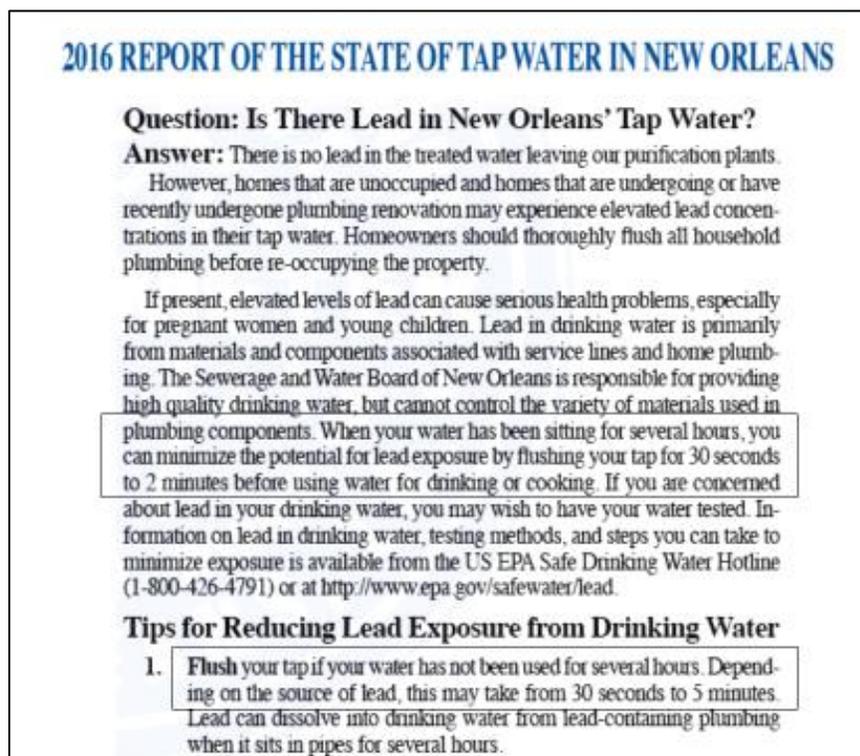


Figure S4. The New Orleans, Louisiana Sewerage and Water Board's informational brochure: "Tips for reducing lead exposure from drinking water" (Source: NOLA S&WB's 2016 Consumer Confidence Report)

The following pages present the participant survey:

LEAD EXPOSURE ASSESSMENT FOR DRINKING WATER STUDY

SURVEY FOR HOMES

Study participant _____ Date of home visit _____

Neighborhood _____ Home visitor _____

Contact Information

1. Address: _____

2. Contact Phone: _____ Contact email: _____

3. Prefer to be contacted by: Phone Email**Water Tested**4. Tap to be tested: Kitchen Water-fountain Other: _____5. Floor of tap to be tested: 1st 2nd 3rd Other: _____**Home Information**6. Do you own the home or rent? Own Rent7. Type of building: Single family Double 4-Plex Larger Apartment/Condo8. How old is the building/home? Year/Decade: _____ *OR* Pre1950 Post1950 Unknown

9. What year did you move into the home? _____

10. If no one currently lives in the home, how long has it been uninhabited? _____

11. Any new plumbing inside the home? Yes No Unknown

12. If known, when was the most recent plumbing repairs made (note location): _____

13. Do you know if any of these materials are in your plumbing? (check all that apply):

 Lead Plastic Galvanized metal Cast iron Copper Brass Other: _____ Not sure about all plumbing materials in the home Do not know about any of the plumbing materials in the home14. Do you have lead water service lines from the home to the street? Yes No Unknown

a. If you don't know but want to find out you can go through the steps here to find out:

<http://apps.npr.org/find-lead-pipes-in-your-home/#intro>

Or scan the QR code with your smart phone or tablet.



- b. Indicate if you went through this process to find out: Yes, I followed these steps No
15. Any partial or full replacement of water lines outside home? A full replacement is replacement of pipes from the home to the water main in the street. A partial replacement is just replacement of pipes from the meter to the main or from the meter to the home. None Partial Full Unknown
16. Any work on street or sidewalk in the last 6 months *within your block*? Yes No
17. Number of occupants in your building: _____
18. Number of occupants under the age of 6 years in your home: _____
- a. Are the children home-bound? Yes No Part-time
- b. Any there any other home-bound inhabitants? Yes No Part-time

Environmental Lead Levels

19. Ever tested the home for lead before? Yes No
- a. If yes, did you have lead anywhere? Yes No
- b. Where was the lead found? _____
- c. Did you remediate or remove the lead source? Yes No Unknown

Water Use

20. Source of drinking water?
- Bottled water Filtration system Tap water (unfiltered) Pitcher filter
- Other: _____
21. Do you ever use unfiltered water for cooking? Yes No
22. Do you ever use unfiltered water for drinking? Yes No
23. Do you ever use unfiltered *HOT* water for either drinking or cooking? Yes No
24. Do you flush your tap water before using? Yes No
- a. If yes, for how long? _____
25. Does the tip of your kitchen faucet have a filter on it (aerator filter)? Yes No
26. If so, do you ever clean the filter at the end of your faucet? Yes No
- a. If yes how often? 1/week 1/month Other: _____
27. If you have infants, have you used unfiltered tap water for milk formula? Yes No
28. Average number of cups of *unfiltered* home tap water you drink per day: _____
29. If you have water filtration system, what kind? _____
30. Do you see any signs of corrosion in your plumbing, such as frequent leaks, rust-colored water or stained dishes or laundry? Yes No
31. Does your water have a bad (metallic) taste? Yes No
32. What is your reported water usage on your Sewerage and Water Board Bill for your last water bill?

See "THIS BILL" at top of your last S&WB statement:

- a. Reading Date: _____
- b. Water Usage (100 gal): _____
- c. Age Usage/Day (100 gal): _____

Socio-demographic Information

We collect this information to make sure we are reaching low-income, minority populations who may be in need of outreach. This information will help us characterize our study population and redirect efforts if needed.

33. Race: Caucasian African-American Latin Asian Other _____
34. Home Net Income: ≤\$25k \$26-50k \$51-75k \$76-100k >100k
35. Highest degree earned: Grade school High school College Graduate

Knowledge and Concerns

36. Have you ever been told about health hazards of lead, lead sources and ways to reduce exposures to lead by your doctor or other public health official? Yes No
 - a. If yes, who was the source of this info? _____
37. Any lead-related issues or concerns? _____

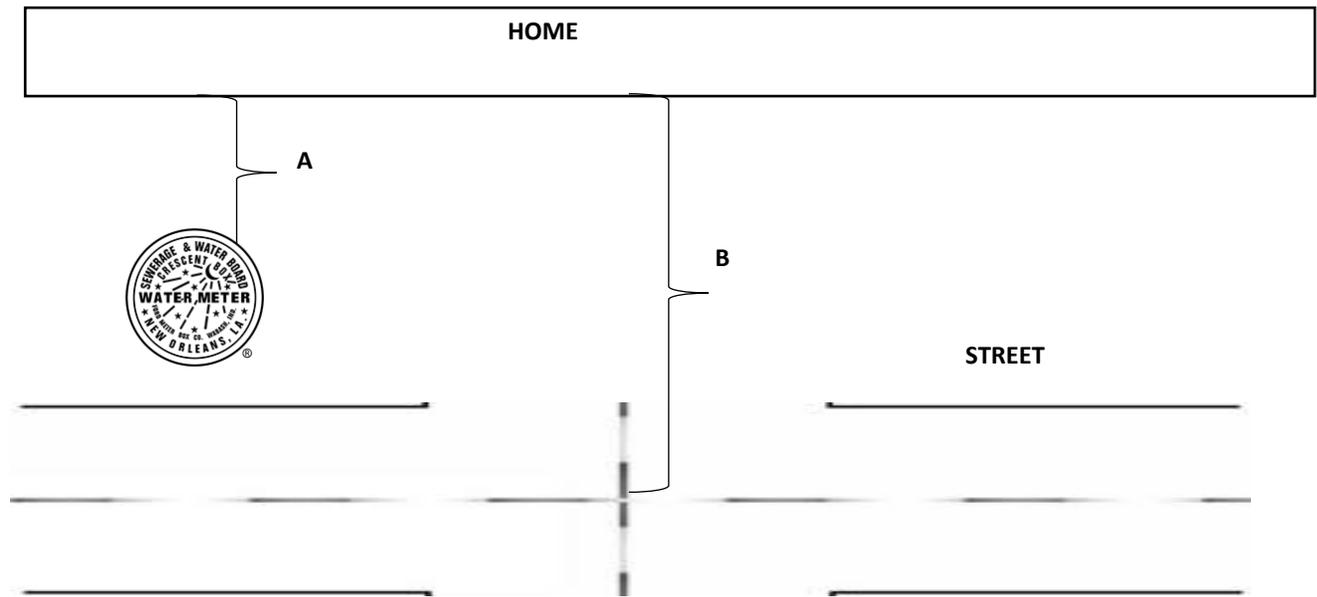
Lead Poisoning

38. Have you ever had your child tested for lead? Yes No (jump to question 39)
 - a. If so was his/her lead elevated (>5 ug/dL)? Yes No
 - b. What was the age of the child and year of test? _____
 - c. If you know the source of exposure, what was it? _____
 - d. Did you remove or remediate the source of exposure? Yes No
 - e. If you tested the child's blood lead level again after you removed the source of exposure how did his/her blood lead level change? Went up Went down Stayed same

Home Measurements (feet) (if have time)

If you have time, please see the diagram on the following sheet and get measurements for your home's plumbing. This information may assist us in estimating optimal flush times for reducing people's exposure to lead.

39. Distance from shut-off valve or water meter to front of home (A): _____
40. Distance from water main in middle of street to front of home (B): _____
41. Distance of internal plumbing from front of home to tap to be tested: _____
 (Measured along the wall from the front where pipe enters home to the tap)



42. Finally, how did you find out about the study?

LSUHSC letter

Media

Word of mouth

Other: _____

Use this space for any additional comments or concerns.

**Thank you for participating in this study.
We will contact you shortly as soon as the water test results are received,
and give you guidance on next steps if needed.**