

February 11, 2020

Mr. David Ross
Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Ave. NW
Mail code: 4101M
Washington, DC 20460-0001

RE: Comments regarding health equity, environmental justice, and civil rights aspects of proposed revisions to its Lead and Copper Rule in the National Primary Drinking Water Regulations, Docket No. EPA-HQ-OW-2017-0300

Dear Assistant Administrator Ross:

Harvard Law School's Emmett Environmental Law and Policy Clinic ("the Clinic"), Environmental Defense Fund ("EDF"), and Dr. Karen Baehler of American University respectfully submit these comments regarding the health equity, environmental justice, and civil rights aspects of the Environmental Protection Agency's ("EPA") proposed revisions to its Lead and Copper Rule ("LCR") (the "Proposal").¹

"Household-level changes that depend on ability-to-pay will leave low-income households with disproportionately higher health risks."

[EPA Environmental Justice Analysis](#) of the proposed rule

In EPA's summary of the environmental justice implications of the Proposal, the agency concluded that "the proposed LCR revisions are not expected to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations."² Our analysis of the Proposal as well as Dr. Baehler's study of more than 3,400 lead service line ("LSL") replacements ("LSLR") in Washington, DC, between 2009 and 2018 demonstrates that EPA's conclusion glosses over important aspects of the situation. In fact, the LSLR-related provisions of the proposal are likely to make the environmental justice and health equity issues worse – not better.

For these reasons, we ask that EPA modify its proposed new LSLR planning requirements at 40 CFR § 141.84 to explicitly require water systems to prevent disproportionate impacts from activities that could result in partial LSLRs and from situations in which low-income and minority residents are less likely to benefit from full LSLR programs than wealthier, white residents. The agency should require community water systems ("CWS") to demonstrate that their implementation of the LCR will not result in significant disproportionate impacts on low-income and minority residents. In addition, EPA should require that CWSs track performance in achieving these goals. As a potential model, EPA should consider its recent variance for Denver Water that requires tracking of performance on health equity and environmental justice impacts.³

¹ EPA [published the proposed revisions](#) in the November 13, 2019, *Federal Register* at 84 Fed. Reg. 61,684 and extended the comment period to February 12, 2020 in the December 19, 2019, *Federal Register* at 84 Fed. Reg. 69,695. It is accepting comments at Docket No. [EPA-HQ-OW-2017-0300](#).

² 84 Fed. Reg. at 61,740.

³ EPA Region 8, In the Matter of Denver Water, Colorado, Variance Under SDWA Section 1415(a)(3), December 16, 2019 at [Docket No. EPA-R08-OW-2019-0404-0005](#).

The simplest way to prevent the majority of these health disparities would be to follow Michigan’s approach and strictly limit partial LSLRs to situations when emergency repairs are needed or when the resident expressly refuses to participate. This clear mandate would ensure that not only are their fewer partials but that all residents are benefit equally in situations when LSLs must be disturbed. It would also reduce the burden to states in reviewing various plans.

By implementing these recommendations, EPA can address the Proposal’s shortcomings, thereby fulfilling its responsibilities under Executive Order 12898,⁴ reducing health disparities, and helping states and communities that receive federal funding avoid violating Title VI of the Civil Rights Act of 1964.⁵

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I. EPA’S CONCLUSION ON THE ENVIRONMENTAL JUSTICE ASPECTS OF THE PROPOSAL RESTS ON BETTER CORROSION CONTROL BUT IS MISLEADING ON LSLR

In the preamble to the proposed rule, EPA “finds that this action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations and/or indigenous peoples.”⁶ The agency’s conclusion is based on an analysis by its contractor that is available in the rulemaking docket.⁷ Recognizing that LSLs – the lead lines connecting the main under the street to homes – are a significant source of lead in drinking water, this analysis finds that, under the current LCR, low-income and minority children suffer disproportionate impacts because:

⁴ Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7629; February 16, 1994. See <https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice>.

⁵ 42 U.S.C. § 2000d et seq. See <https://www.justice.gov/crt/fcs/TitleVI-Overview>.

⁶ 84 Fed. Reg. at 61,740.

⁷ Abt Associates, *Environmental Justice Analysis for the Proposed Lead and Copper Rule Revisions, October 22, 2019*, Docket No. EPA-HQ-OW-2017-0300-0008. Consultant prepared the report for EPA pursuant to Contract # EP-W-17-009.

- 1) Residents in housing with LSLs are expected to be exposed to more lead in their drinking water than those in homes without LSLs;
- 2) Low-income and minority residents are more likely to live in older housing; and
- 3) Older housing is more likely to have LSLs.

This conclusion is reinforced by the evidence that these children are more likely to have higher blood lead levels than wealthy or white children.⁸

EPA maintains that the Proposal will reduce this disparity primarily by improving system-wide corrosion control treatment (“CCT”) that reduces leaching of lead into drinking water. In essence, the entire community will benefit, and those with LSLs will experience the greatest reductions. We think the analysis for CCT is fair. However, improved CCT is only one aspect of the Proposal.

The agency is more circumspect on the environmental justice implications of the LSLR provisions. These provisions are of crucial importance, both because LSLR provides a permanent solution to lead exposure from LSLs and because of the consequences of partial LSLR. Partial LSLR, in which a CWS removes and replaces only the portion of the line on public property while leaving in place the portion on private property, has been shown to significantly increase lead in drinking water for months and provide limited or no long-term benefit.⁹ In contrast, full LSLR results in smaller and shorter lead increases than partial LSLR, while providing the most lasting and sustainable benefits to the community given that it permanently removes a major source of lead exposure.

In the Proposal, EPA does acknowledge that the “LSLR provision[s] may be less likely than the CCT provision to address baseline health risk disparity among low-income populations because LSLR may not be affordable for low-income households.”¹⁰ Its only response to this recognized issue is to identify four federal grant or loan programs¹¹ that can support full LSLR, and to observe that state and local governments may make additional financing support available.

However, the agency’s summary omits a critical finding from its contractor’s analysis. That finding says “Household-level changes that depend on ability-to-pay *will leave low-income households with disproportionately higher health risks.*”¹² In other words, when households are expected to pay to replace all or part of an LSL, low-income residents are likely to be exposed to greater levels of lead than their wealthier and – more likely than not – white counterparts.¹³

This finding undermines EPA’s conclusion that the Proposal will not have disproportionate impacts on minority and low-income communities because the Proposal continues to make full LSLR dependent on property owners’ ability to pay. Although the Proposal requires CWSs to take steps that may help

⁸ *Id.*

⁹ A 2015 study indicated that “elevated lead originating from configurations of partial replacements, in which a copper pipe is placed upstream of the lead pipe, does not necessarily ameliorate with time but can actually worsen.” See St. Clair, J., Cartier, C., Triantafyllidou, S., Clark, B., and Edwards, M. (2016) “Long-Term Behavior of Simulated Partial Lead Service Line Replacements.” *Environmental Engineering Science*, 33(1). DOI: 10.1089/ees.2015.0337.

¹⁰ 84 Fed. Reg. at 61740.

¹¹ EPA states that “financing support for lead reduction efforts may be available from State and local governments, EPA programs (*e.g.*, the Drinking Water State Revolving Fund (DWSRF), the WIFIA Program, and the Water Infrastructure Improvements for the Nation Act of 2016 (WIIN Act) grant programs), and other federal agencies (*e.g.*, HUD’s Community Development Block Grants).” *Id.*

¹² Abt Associates, [*Environmental Justice Analysis for the Proposed Lead and Copper Rule Revisions, October 22, 2019*](#) at Exhibits ES-1 and 4-1. Emphasis added.

¹³ *Id.* at Exhibit 2-1.

minimize the harm from partial LSLRs, this practice is likely to continue under the Proposal – whenever a CWS-initiates infrastructure improvements or emergency repairs.¹⁴ Because wealthier households are more likely to be able to afford to replace the customer-owned portion of the line in conjunction with CWS-initiated replacements, partial LSLRs, when they continue to occur, will predominately affect low-income and minority households.

In addition, when customers initiate LSLR on their privately-owned portion of the line, the Proposal mandates that water systems replace the publicly-owned portion.¹⁵ This approach prioritizes LSLR for wealthy property owners who are able to pay, and could result in fewer replacements for low-income households due to limited water system resources.

Finally, when a CWS has high enough levels of lead in drinking water to trigger mandatory LSLR, the Proposal only gives the CWS credit for full LSLR (which is positive) but does not address how to pay for the replacement of the customer-owned portion of the LSL. Presumably, the property owner must pay. Therefore, the CWS has a significant incentive to prioritize LSLRs in the wealthier neighborhoods where they are more likely to find able participants and where the cost to the water system will be lower. This outcome would disproportionately impact low-income and minority residents. While the CWS should certainly not get credit for partial LSLR, EPA has not set guardrails to prevent inequitable practices during mandatory LSLR.

The agency's list of four federal funding sources fails to cover the shortfall to pay for replacement of customer-owned LSLs. Two are essentially loans that must be repaid, another consists of only \$10 million to deal with a billion-dollar challenge, and the fourth is already overcommitted.

As a result, the rule, when finalized and implemented as written, is likely to make the health disparities for low-income and minority residents worse, not better. This outcome runs contrary to EPA's obligations under Executive Order 12898 to redress environmental justice problems. And it leaves states and water systems who receive federal funding vulnerable to legal challenges from affected residents who demonstrate that the funds were used to support work that disproportionately impacted minorities and, therefore, violated Title VI of the Civil Rights Act of 1964.

II. FRAMEWORK FOR EVALUATING LSLR CHALLENGES AND SUMMARY OF ANALYSIS

As noted in the previous section, EPA acknowledged in its Environmental Justice Analysis that the current LCR disproportionately impacts low-income and minority residents. Any analysis of the LSLR provisions of the Proposal must consider the different scenarios under which an LSL may be fully or partially replaced because the health equity and environmental justice implications – and therefore, the solutions – are different. We divide the triggers for LSLR into four categories:

- 1. CWS-initiated infrastructure improvements that disturb LSLs:** This category consists of LSL disturbances associated with capital improvement projects that involve replacing or rehabilitating the drinking water main under the street. The projects are initiated and planned by the CWS, typically based on concerns that the main will leak or otherwise fail. The work on the main disturbs the portion of the LSL that is connected to the main and requires the replacement of that portion. Because the work must be done to maintain the integrity of the water system, the

¹⁴ The provision at § 141.84(d) does not limit when partial LSLRs may be conducted. Rather it establishes conditions, albeit important ones, on how partial LSLRs are conducted.

¹⁵ 84 Fed. Reg. at 61,698.

central issue is whether the LSL will be partially or fully replaced, not whether the CWS needs to conduct the project.

2. **Emergency repairs that disturb LSLs:** This category consists of repairs to a leaking or otherwise failing main or service line. They are typically initiated by the CWS when the main fails or by the customer when the service line fails. As with the prior category, the work disturbs the portion of the LSL or main that is failing and requires the replacement of that portion. Because the work must be done to maintain the integrity of the system, the central issue is whether the LSL will be partially or fully replaced on an expedited timeline, not whether the CWS needs to conduct the project.
3. **CWS-initiated mandatory LSLR:** This category consists of LSLs that the CWS must fully replace to comply with the LCR because the compliance sampling indicates that it has high levels of lead in the drinking water. Under the current LCR, that means that the 90th percentile exceeds the 15 parts per billion (ppb) Lead Action Level. The central issue is how the CWS selects which LSLs to prioritize.
4. **Customer-initiated LSLR:** This category consists of LSLRs initiated by the customer who seeks to replace the service line because of concerns with lead or that the line may fail.

Table 1 below summarizes our analysis of the health equity and environmental justice aspects for each of the four categories of LSLR. The following explains the rows in the table:

- **Situation with the current LCR:** Our understanding of the current situation focuses on the frequency of LSLRs and the likelihood of partial LSLRs occurring. For the first three categories, we maintain that partial LSLRs are common and much more likely than full LSLRs except for those CWSs that have a special program to make it easier for residents to participate, including those that fully fund or subsidize through grants or zero-interest loans the cost of a full LSLR. Customer-initiated LSLRs are uncommon, but when done, likely to be full. See Section V for details.
- **Health equity implications of the current situation:** We briefly describe our assessment of the health equity concerns with the current situation and our findings from Dr. Baehler's study of the LSLR data for Washington, DC between 2009 and 2018. For the first three categories, our primary health equity concern is that low-income and minority residents are more likely to have partial LSLRs because they cannot afford to pay for full replacement. For customer-initiated LSLRs, our health equity concern is that wealthier residents are more likely to participate because they can afford the cost. See Sections III and V for details.
- **Impact of EPA's Proposal:** We briefly describe the changes in EPA's Proposal, its impact on the frequency of LSLRs, and our analysis of the impacts of those changes on health equity concerns. See Section VI for details.
- **Recommendations to improve the Proposal:** We summarize our recommended changes (see Section IX) that EPA should make when it finalizes the LCR so it can fulfill its responsibilities under Executive Order 12898 (see Section VII) and help states and communities that receive federal funding avoid violations of Title VI of the Civil Rights Act of 1964 (see Section IX).

Table 1: Summary of health equity and environmental justice aspects for four categories of lead service line replacements under current and proposed revisions to Lead and Copper Rule.

Situation		CWS-initiated infrastructure improvements that disturb LSLs	Emergency repairs that disturb LSLs	CWS-initiated mandatory LSLRs	Customer-initiated LSLRs
Situation with current LCR	Frequency of LSLR (full or partial)	Common. Customers typically expected to pay to replace portion they own.		Only if CWS finds high lead levels through compliance sampling.	Uncommon unless CWS has special program.
	Likelihood of partial LSLR	High unless CWS has special program to ensure full LSLR.			Low since customer won't pay for partial LSLR.
Health equity concerns with current LCR	Health equity concern	Low-income and minority residents are more likely to have partial LSLRs because they cannot afford to pay for full replacement.			Wealthier residents are more likely to participate because they can afford costs.
	Findings of Washington, DC LSLR study	Health equity concern confirmed.	Not confirmed.	Not evaluated.	Health equity concern confirmed.
Impact of proposed LCR revisions	Change proposed by EPA	CWS must provide 45-days advance notice, provide filters, offer to coordinate full LSLR, and conduct post-replacement samples in 3-6 months.	Same as left, but only 24-hour notice required.	Same as left, except that no credit given for partial LSLR.	CWS must replace portion it owns, if given timely notice by customer that portion he/she owns will be replaced.
	Impact on frequency of LSLR	Because of advance notice, customers are more likely to fully replace LSLs to avoid increased risk from partial LSLR.		More CWSs likely to have to meet full LSLR milestones.	More customers likely to participate in full LSLR.
	Impact on health equity concern	Increased disparities since wealthier customers are more likely to have full LSLRs because they can afford to pay.		Greater concern because CWS may prioritize wealthier residents to reduce costs of full LSLR and meet milestones.	Potentially increased disparities because wealthier customers more likely to participate.
Recommendations to improve the Proposal		Prohibit or strictly limit partial LSLRs or otherwise ensure no disproportionate impact on low-income or minority populations.		Require balanced participation to avoid significant disparities.	

III. DR. BAEHLER'S STUDY OF WASHINGTON, DC LSLRS BETWEEN 2009 AND 2018

The Robert Wood Johnson Foundation funded EDF to partner with American University and DC Water – the CWS that provides drinking water to Washington, DC residents – to evaluate whether there are health equity or environmental justice impacts when property owners are required to pay for LSLR on their property. Our hypothesis was that such programs have a disproportionate impact on minority and low-income residents, who may be less able to participate due to financial constraints, and thus, may have higher lead exposure.

In early 2019, DC Water provided Dr. Baehler and her team at American University (AU) with data on LSLRs that occurred between 2009 and 2018. The data included:

- Location of the property in terms of a premise ID (assigned by DC Water), and street address.
- Whether the property was residential or multifamily housing.
- The construction material of the service line on public and private property, categorized as lead, brass, copper, or “nonlead.” For our purposes a line was an LSL if any portion was made of lead pipe.
- Whether a full or partial LSLR was done. For our purposes, a full LSLR meant there was no lead pipe remaining after the work was completed.
- Classification of LSLR according to DC Water’s three categories¹⁶ described below:
 - **Capital Improvement Projects (“CIP”)**: 1,666 LSLRs – either full or partial – that resulted from CIPs conducted by DC Water. A full LSLR only occurred if the property owner paid for a contractor to replace the portion on private property. During the study period, DC Water continued to streamline the process to make it easier for property owners to participate. Dr. Baehler assigned these to our **“CWS-initiated infrastructure improvements that disturb LSLs”** category described earlier.
 - **Emergency**: 453 LSLRs – either full or partial – that resulted from DC Water-initiated emergency repairs to the main under the street. A full LSLR only occurred if the property owner paid for a contractor to replace the portion on private property. Dr. Baehler assigned these to our **“Emergency repairs that disturb LSLs”** category described earlier.
 - **Voluntary**: 1,367 LSLRs that were requested by the property owner through a program offered by DC Water. The property owner paid to replace the portion on private property and DC Water paid for the remaining portion. All but two of these LSLRs were full. We do not know why the remaining two were partial. Dr. Baehler assigned these to our **“Customer-initiated LSLR”** category described earlier.
- Date that the work was completed.

The AU Team removed 59 records where there were multiple entries for a single service line – 43 for CIP, 8 for Voluntary and 8 for Emergency – producing a final set of 3,427 LSLRs. Many of the removed records consisted of partial LSLRs that were followed by a full replacement. If the full replacement occurred within two years of the earlier partial, the premise was coded once as a full LSLR. If more than two years elapsed between the partial and full replacements, the premise was counted twice – once as a partial LSLR and once as a full LSLR

Next, the AU Team geocoded the data and assigned every address to a census tract using ArcGIS. This enabled them to link information about spatial patterns of LSLRs with demographic information about the

¹⁶ Note that DC Water was not mandated to replace LSLRs during the study period so the fourth of our categories was null and could not be evaluated.

179 census tracts in Washington, DC available through the U.S. Census American Community Survey's (ACS) five-year estimates. Total LSLRs (including both partial and full) occurred in 151 census tracts. Within census tracts, the total LSLR count ranged from one to 177 after duplicates were removed.

Using geocodes, the AU Team linked those census tracts with Washington, DC's eight wards. Wards are the primary political subdivision of the city and are displayed in Figure 1. Within wards, the total LSLR count ranged from 58 to 628 after duplicates were removed.

The percent of all LSLRs across the city that involved full replacement ranged from 20% for Emergency to 50% for CIP and almost 100% for Voluntary.

For CIP and Emergency LSLRs, the AU Team compared the percentage of full LSLRs (the outcome variable) to the demographic information and found statistically significant correlations between CIP-related outcomes and key demographic data but none for Emergency-related outcomes. Table 2 provides the results for the CIPs. Figure 2 summarizes the analysis for CIP LSLRs by ward.

For Voluntary LSLRs – those initiated by the customer instead of DC Water – the percent of full LSLRs was not relevant because all but two of the 1,359 LSLRs were full. In addition, comparing raw numbers of Voluntary LSLRs across census tracts and wards was not appropriate because the number of all residential service lines in these areas varied dramatically.

Therefore, the AU Team used the total number of service lines in each ward and census tract as a denominator for the outcome variable in the analyses of Voluntary LSLRs. Focusing on the number of Voluntary LSLRs as a percent of all residential service lines provided a standardized measure of the likelihood that low-income or minority residents in different wards and census tracts would participate in Voluntary (full) LSLR. That outcome measure (Voluntary LSLRs as a percentage of all service lines) can be compared to the outcome measure used for CWS-initiated LSLRs under DC Water's CIP program (i.e., full LSLRs as a percentage of total LSLRs), as in Table 2.

The analysis of Voluntary LSLRs revealed statistically significant correlations with the same three demographic characteristics seen for CIP LSLRs for wards. The analysis was not attempted for census tracts. Table 2 provides the results for the Voluntary LSLRs alongside the CIPs. Figure 3 summarizes the analysis for Voluntary LSLRs by ward. For more details on the analysis, see Appendix 1.

Figure 1: Map of Washington, DC's wards for City Council

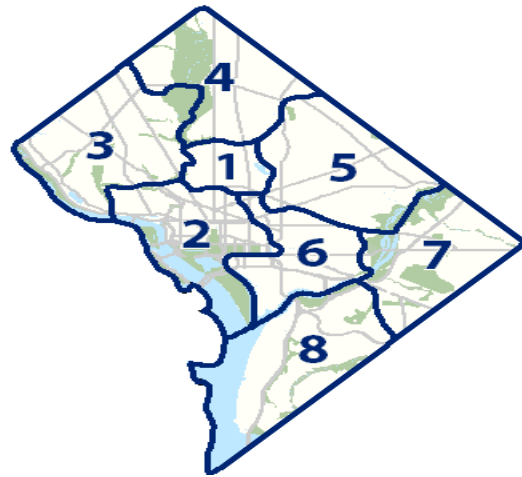
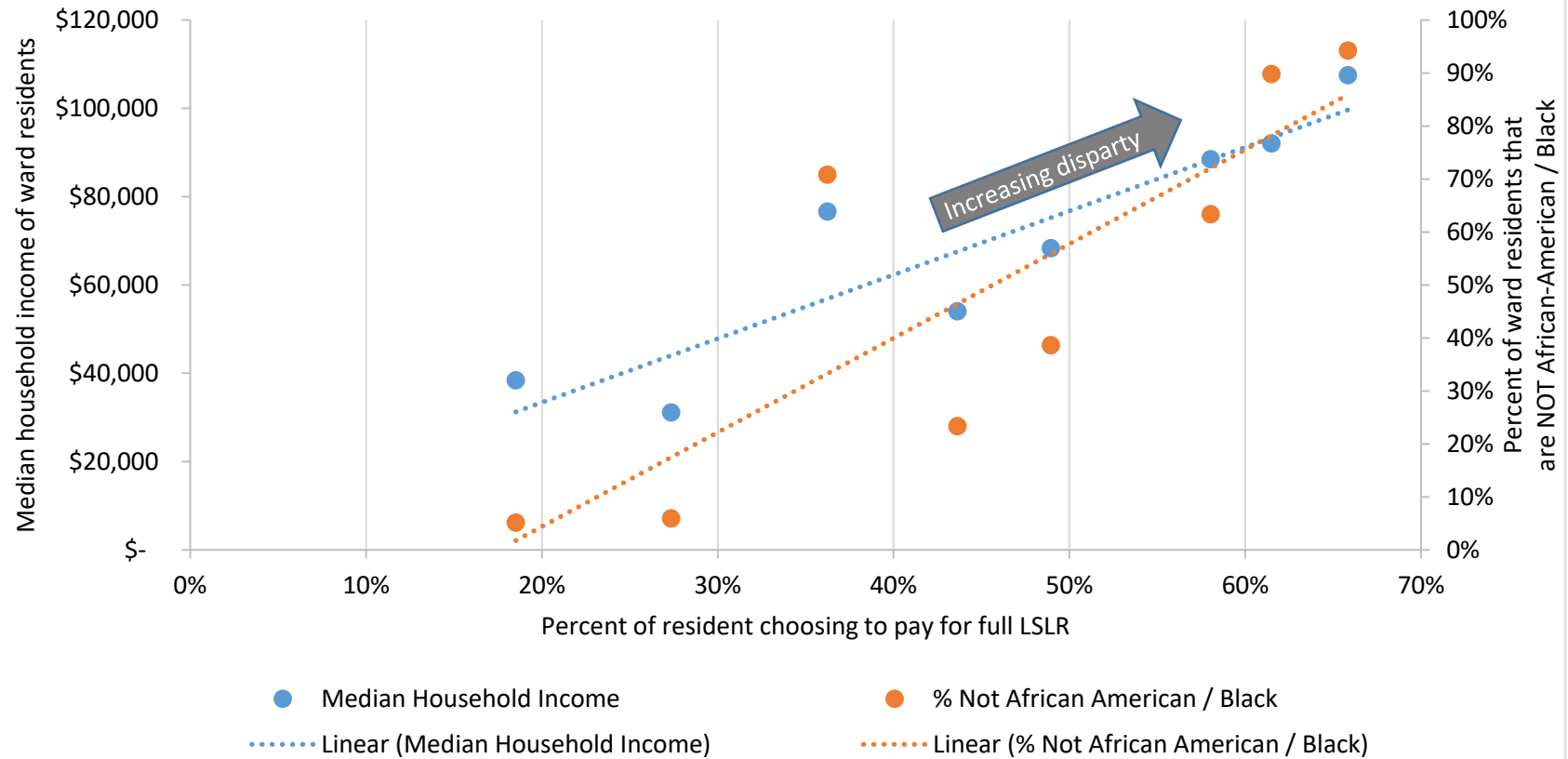


Table 2: Statistically significant bivariate correlations for with full LSLRs associated with Capital Improvement Projects (as a percentage of all CIP replacements, full and partial) in Washington, DC between 2009 to 2018.

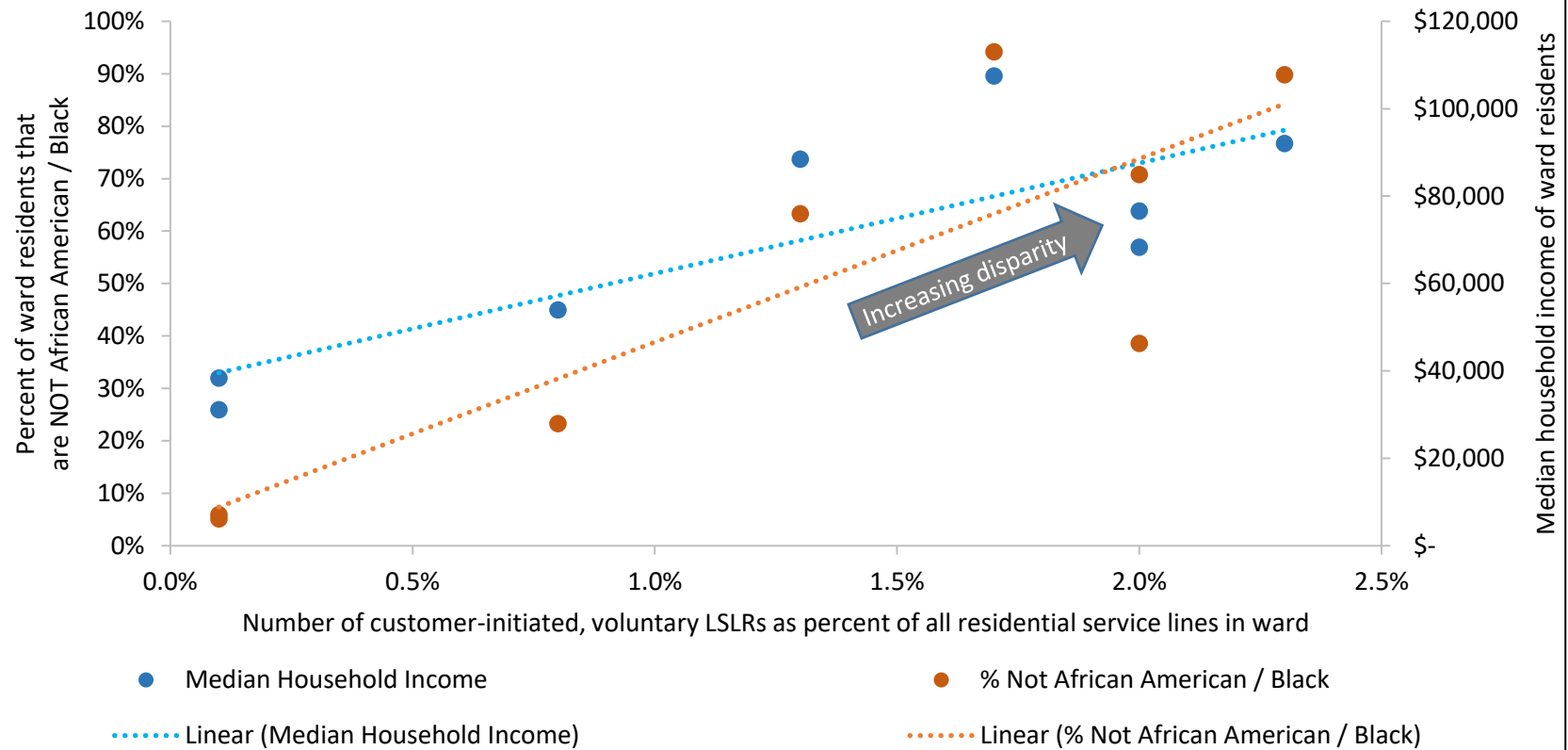
Statistically-significant demographic characteristics	% of LSLRs associated with DC Water-initiated Capital Improvement Projects that were full*		% of customer-initiated Voluntary LSLRs as a percent of all residential service lines**	
	Census Tracts	Wards	Census Tracts	Wards
% of residents that are African American / Black***	R = - 0.306	-0.864	NA	-0.869
Household Median Income	R = 0.246	0.898	NA	0.847
Area Deprivation Index (ADI)**** for Washington DC	R = - 0.310	-0.888	NA	-0.878
Degrees of freedom	94	6	NA	6
R-value needed for statistical significance of 0.05	> 0.205 or < -0.0205	< 0.707 or < -0.707	NA	< 0.707 or < -0.707
* Based on 1,623 CIP-related LSLRs consisting of 805 (49.5%) fulls and 818 (50.5%) partials. ** Based on 1,359 Voluntary LSLRs. *** Data available through the U.S. Census American Community Survey's (ACS) five-year estimates. **** See Appendix 1 for details on ADI.				

Figure 2: Percent of full LSL replacements (CWS-initiated) compared to demographic characteristics in Washington, DC between 2009-2018, by ward



Characteristics of Ward	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
% Full replacements	36%	61%	66%	49%	44%	58%	19%	27%
Median household income	\$ 76,610	\$ 92,025	\$ 107,499	\$ 68,277	\$ 53,986	\$ 88,477	\$ 38,374	\$ 31,097
% of Residents NOT African American / Black	71%	90%	94%	39%	23%	63%	5%	6%
Number of total replacements	298	361	82	96	275	379	27	106

Figure 3: Full, voluntary LSL replacements as percent of residential service lines compared to demographic characteristics in Washington, DC between 2009-2018, by ward



Characteristics of Ward	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
No. of customer-initiated LSLRs	179	164	241	403	151	199	13	7
No. of all residential service lines	8,853	7,284	14,364	20,317	18,399	14,846	15,114	7,676
% of customer-initiated LSLRs	2.0%	2.3%	1.7%	2.0%	0.8%	1.3%	0.1%	0.1%
Median household income	\$ 76,610	\$ 92,025	\$ 107,499	\$ 68,277	\$ 53,986	\$ 88,477	\$ 38,374	\$ 31,097
% of residents NOT African American / Black	71%	90%	94%	39%	23%	63%	5%	6%

IV. WASHINGTON, DC'S NEW LSLR PROGRAM

It is important to note that, in 2019, Washington, DC passed an ordinance that took steps to resolve the health equity issues moving forward and began to replace the private-side lead pipes at properties with past-partials to address the legacy issue. Specifically, the city now:

- Prohibits partial LSLRs for CIP and emergency repairs, using funds paid by ratepayers to cover the cost of replacing the LSL on private property. As a result, there is no cost to property owners except through the rates paid by all customers and through taxes.
- Invites property owners at locations where partial LSLRs had been conducted in the past to fully replace the remaining lead portion. The cost is subsidized between 50% and 100% based on resident's income compared to the area median income. The city designated \$2 million for each of the first two years of this effort.

V. CURRENT LCR FOR LSLRS – HEALTH EQUITY ANALYSIS

For each LSLR scenario, this section explains the study results, relevance to other CWSs, and recommendations for the final LCR.

1. CWS-initiated infrastructure improvements that disturb LSLs:

- Dr. Baehler's study confirmed that these activities in Washington, DC, from 2009 to 2018 were likely to result in health equity and environmental justice disparities. She found statistically significant impacts by census tract and ward, with lower rates of full replacement in areas with lower mean household incomes, higher percentages of African American / Black residents, and higher deprivation rankings according to the Area Deprivation Index (ADI), which combines 14 social, economic, and demographic factors associated with deprivation and poor health outcomes.
- While city-wide, property owners paid for full LSLR almost half the time, the rate was 66% in the ward with the highest income and greatest percentage of non-African American / Black residents (Ward 3) compared to 25% weighted average for the two wards (Wards 7 and 8) with the lowest median household income and greatest percentage of African American / Black residents.
- We expect the study's findings to apply to any CWS that expects property owners to pay to replace the portion of the LSL on their property in order to avoid a partial LSLR.
- *Therefore, the Proposal MUST take measures to prevent the disproportionate impacts on low-income and minority residents during CWS-initiated infrastructure improvements.*

2. Emergency repairs that disturb LSLs:

- Dr. Baehler's study did not confirm health equity and environmental justice disparities for these activities. We suspect that the lack of confirmation stemmed from three factors: 1) the circumstances of an emergency repair vary widely; 2) the numbers of emergency repairs were much smaller than for CIP (445 v. 1,623); and 3) a smaller percentage of the residents overall opted for full LSLR in this scenario (20% for emergency repair v. 50% for CIP).
- Despite the lack of confirmation, we expect that the disparities are likely present and would be present in any CWS that expects property owners to pay to replace the portion of the LSL on their property in order to avoid a partial LSLR.
- *Therefore, the Proposal SHOULD take measures to prevent the disproportionate impacts on low-income and minority residents during emergency repairs.*

3. CWS-initiated mandatory LSLR:

- Because Washington, DC was below the Lead Action Level during the study period of 2009 to 2018, it was not obligated to conduct mandatory LSLR. Therefore, Dr. Baehler's study did not evaluate the activity.
- We expect that the health equity concerns are likely the same as the first category because, under DC policy during the study period, the work was similar to a planned infrastructure improvement project where the CWS expected property owners to pay to replace the portion of the LSL on their property.
- *Therefore, the Proposal MUST take measures to prevent the disproportionate impacts on low-income and minority residents during CWS-initiated mandatory LSLR.*

4. Customer-initiated LSLR:

- Dr. Baehler's study confirmed that these activities in Washington, DC, from 2009 to 2018 were likely to result in health equity and environmental justice disparities. She found statistically significant impacts by census tract and ward, with lower rates of customer-initiated LSLRs in areas with lower mean household incomes, higher percentages of African American / Black residents, and higher deprivation rankings according to the ADI.
- The differences between wards was significant. In the two wards (Wards 7 and 8) with the lowest median household income and greatest percentage of African American / Black residents (5% and 6% non-African American / Black, respectively), only 0.1% of all LSLRs were customer-initiated. By comparison, 2.3% of LSLRs were customer-initiated in Ward 3, which has more than two-and-a-half times greater median household income and a 94% non-African-American/Black population.
- We expect health inequities because wealthier residents concerned about lead in drinking water are more likely to initiate a LSLR based on their ability to pay whereas others may find it difficult to make the issue a priority and commit the resources.
- *Therefore, the Proposal MUST take measures to prevent the disproportionate impacts on low-income and minority residents of customer-initiated LSLR.*

For convenience, Table 3 is the portion of Table 1 that applies to EPA's Current LCR.

Table 3: Health equity and environmental justice aspects for four categories of lead service line replacements under current Lead and Copper Rule.

Situation		CWS-initiated infrastructure improvements that disturb LSLs	Emergency repairs that disturb LSLs	CWS-initiated mandatory LSLRs	Customer-initiated LSLRs
Situation with current LCR	Frequency of LSLR (full or partial)	Common. Customers typically expected to pay to replace portion they "own."		Only if CWS finds high lead levels through compliance sampling.	Uncommon unless CWS has special program.
	Likelihood of partial LSLR	High unless CWS has special program to ensure full LSLR.			Low since customer won't pay for partial LSLR.

Table 3: Health equity and environmental justice aspects for four categories of lead service line replacements under current Lead and Copper Rule.

Situation		CWS-initiated infrastructure improvements that disturb LSLs	Emergency repairs that disturb LSLs	CWS-initiated mandatory LSLRs	Customer-initiated LSLRs
Health equity concerns with current LCR	Health equity concern	Low-income and minority residents are more likely to have partial LSLRs because they cannot afford to pay for full replacement.			Wealthier residents are more likely to participate because they can afford costs.
	Findings of Washington, DC LSLR study	Health-equity concern confirmed.	Not confirmed.	Not evaluated.	Health-equity concern confirmed.

VI. EPA'S PROPOSAL FOR LSLRS – HEALTH EQUITY ANALYSIS

The Proposal addresses the shortcomings of the current LCR with regard to LSLs by requiring CWSs to encourage and support full LSLR. As a result, we expect that many more full LSLRs will occur and, therefore, reduce consumer's overall exposure to lead in drinking water. However, the Proposal continues to adhere to the fundamental concept that the customer is fully responsible for the portion of the LSL it owns, even where the CWS has control – but not ownership – of the service line.

Despite EPA's broad assurances, we expect that the Proposal, by retaining this concept, will have the unintended consequence of making the health equity and environmental justice disparities of the current LCR significantly worse. Currently, virtually all CWS-initiated LSLRs result in partial LSLRs, and few customers initiate full LSLR. Under the Proposal, those with ability to pay for full replacement will choose that option, resulting in the unintended consequence of disproportionate harm to low-income and minority residents. In essence, those with access to money will preferentially benefit from the Proposal.

We recognize that the Proposal takes important steps to minimize consumers' exposure from LSL disturbances. Specifically sections 141.84(c), (d), and (e) and 141.85(e) require that CWSs that disturb LSLs proactively provide filters and a three-month supply of cartridges to customers and consumers who may be affected. If the filters are used properly, this requirement should reduce the potential exposure from both partial and full LSLRs. However, the Proposal rests on the assumption that the filters will be properly and uniformly used. That may be true, but we are skeptical, and EPA did not provide evidence to back up that assumption. We anticipate that EPA's variance to Denver Water should provide that type of evidence, but it is not yet available.¹⁷ We are concerned that only providing filters and cartridges will have the additional unintended consequence of aggravating health equity and environmental justice disparities if not uniformly and properly installed.

Additionally, in many ways, the Proposal is likely to result in CWSs adopting programs similar to those Dr. Baehler studied in Washington, DC in which the CWS made full LSLRs significantly easier for

¹⁷ EPA Region 8, In the Matter of Denver Water, Colorado, Variance Under SDWA Section 1415(a)(3), December 16, 2019 at [Docket No. EPA-R08-OW-2019-0404-0005](#).

customers but still continued to require that the customer fully pay to replace the LSL on their property. Therefore, the lessons learned from her study are particularly relevant.

With this context in mind, we applied the framework described in Table 1 to the four LSLR scenarios. For each scenario, we summarized: 1) the change proposed by EPA in the Proposal; 2) the expected impact on the frequency of LSLRs; and 3) the anticipated impact on health equity.

CWS-initiated infrastructure improvements that disturb LSLs:

The Proposal requires CWSs to proactively give 45-days advance notice of infrastructure improvement work, offer to coordinate full LSLR, provide filters, and collect post-replacement samples in 3-6 months. Compared to the current LCR, these provisions should encourage many more customers to pay for full LSLR in order to avoid a partial.

We expect that the Proposal will result in most CWSs adopting a program substantially similar to the CIP program that Washington, DC had in place from 2009 to 2018. Dr. Baehler's study of this program found that it resulted in health equity and environmental justice disparities. Her team found statistically significant impacts by census tract and ward, with lower rates of full replacement in areas with lower mean household incomes, higher percentages of African American / Black residents, and higher deprivation rankings according to the Area Deprivation Index (ADI), which combines 14 social, economic, and demographic factors associated with deprivation and poor health outcomes. While city-wide, property owners paid for full LSLR almost half the time, the rate was 66% in the ward with the highest income and greatest percentage of non-African American / Black residents (Ward 3) compared to 25% weighted average for the two wards (Wards 7 and 8) with the lowest median household income and greatest percentage of African American / Black residents.

Based on this analysis, we expect that the Proposal will increase health inequities in the service area of any CWS that expects property owners to pay to replace the portion of the LSL they own.

Emergency repairs that disturb LSLs:

The Proposal treats emergency repairs in much the same way as CWS-initiated infrastructure improvements except that 24-hour advance notice is allowed instead of 45-days. Therefore, we would expect the impact on the frequency of LSLRs to be similar.

Unlike DC Water's infrastructure improvements, Dr. Baehler's study did not confirm health equity and environmental justice disparities for emergency repairs. We suspect that the lack of confirmation stemmed from three factors: 1) the circumstances of an emergency repair vary widely; 2) the numbers of emergency repairs were much smaller than for CIP (445 v. 1,623); and 3) a smaller percentage of the residents opted for full LSLR under that scenario (20% for emergency repair v. 50% for CIP).

Despite the lack of confirmation, we expect that the Proposal would likely increase health inequities in the service area of any CWS that expects property owners to pay to replace the portion of the LSL they own.

CWS-initiated mandatory LSLR:

The Proposal provides incentives for full LSLR to CWSs that must replace LSLs because of high lead levels found through compliance samples; those water systems will only receive credit for full LSLR. The CWS may still conduct partial LSLRs but will not receive credit for fulfilling its replacement obligations at § 141.84(f) and (g).

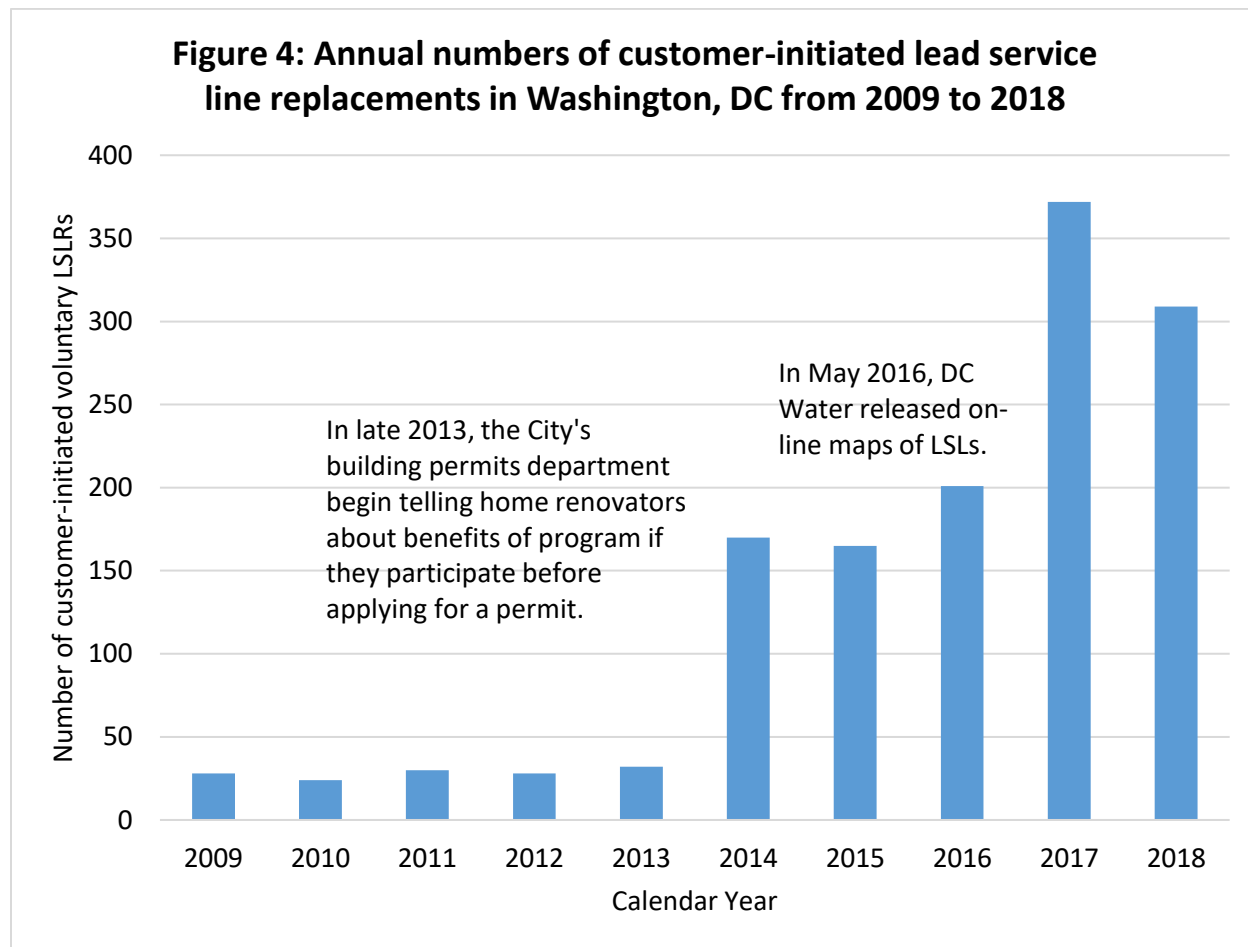
We expect the proposed requirement will significantly increase the number of full LSLRs in the affected CWSs. However, as an unintended consequence, CWSs that expect customers to pay to replace the

portion of the LSL they own have a strong incentive to favor projects in wealthier neighborhoods where they are more likely to find willing participants. Therefore, the Proposal, while encouraging full LSLRs, could make health inequities worse.

Customer-initiated LSLR:

The Proposal requires CWSs to replace the portion of the LSL they own if customers provide timely notice that they intend to replace their portion of the service line. The requirement is substantially similar to key elements of the Voluntary LSLR program that Washington, DC had in place from 2009 to 2018 and that Dr. Baehler and her AU Team studied. In that program, DC Water paid to replace the portion of the LSL on public property if the customer proactively agreed to pay to replace the remainder of the line. DC Water also took steps to coordinate the replacement and streamline the contracting costs and arrangements for customers. These steps are consistent with, but go further than, those called for in the Proposal.

Dr. Baehler's study provides critical insight into the likelihood that customers will take advantage of the opportunity for full LSLR as well the importance of various means to promote the program. Figure 4 provides the annual rates of customer-initiated, full LSLR in Washington, DC from 2009 to 2018. The first five years of the program had relatively low participation rates – about 25 replacements per year. From 2014 to 2016, the rate jumped about seven-fold to nearly 175 full LSLRs a year. DC Water told us that the jump most likely resulted from a change in the building permits department that provided an incentive for home renovators to participate in the program before applying for a renovation permit.



In 2017 and 2018, there was another jump – about 75% – after DC Water posted an interactive map online that made it easier for customers – and the public – to see which properties had LSLs. The Proposal, at § 141.84(b), requires all CWSs to make their LSL inventory publicly available and all large water systems – those serving more than 100,000 people – to make the inventory available electronically. However, the provisions do not require specific addresses to be disclosed and do not require interactive maps to be used.

Based on these results, we would expect that customer-initiated full LSLRs would increase dramatically under the Proposal because LSL inventories must be made public and CWSs will be required to annually notify customers and consumers with an LSL that they still have one and should replace it.

However, Dr. Baehler’s study found DC Water’s Voluntary LSLR program had the unintended consequence of aggravating the disproportionate impacts on low-income and minority populations because wealthy residents were more likely to initiate a full LSLR. The AU Team found statistically significant impacts by census tract and ward, with lower rates of customer-initiated LSLRs in areas with lower mean household incomes, higher percentages of African American / Black residents, and higher deprivation rankings according to the ADI.

The differences between wards were significant. In the two wards (Wards 7 and 8) with the lowest median household income and greatest percentage of African American / Black residents (5% and 6% non-African American / Black, respectively), only 0.1% of all LSLR were customer-initiated. By comparison, 2.3% of LSLR were customer-initiated in Ward 3, a ward with almost three times greater median household incomes and a 94% non-African American / Black population.

We expect customer-initiated LSLR under the Proposal to result in health inequities because wealthier residents concerned about lead in drinking water are more likely to participate based on their ability to pay whereas others may find it difficult to make the issue a priority and commit the resources.

Overall, we find that in each of the four LSLR replacement scenarios, the Proposal will likely make the disproportionate impacts on low-income populations and minorities worse, not better, than the current LCR. For convenience, Table 4 is the portion of Table 1 that applies to EPA’s Proposal.

Table 4: Summary of health equity and environmental justice aspects for EPA’s proposed revisions to the Lead and Copper Rule.

Situation	CWS-initiated infrastructure improvements that disturb LSLs	Emergency repairs that disturb LSLs	CWS-initiated mandatory LSLRs	Customer-initiated LSLRs
Change proposed by EPA	CWS must proactively provide 45-days advance notice, provide filters, offer to coordinate full LSLR, and conduct post-replacement samples in 3-6 months.	Same as left but only 24-hour notice required.	Same as left, except that no credit given for partial LSLR.	CWS must replace portion it owns if given timely notice.
Impact on frequency of LSLR	Because of advance notice, customers are more likely to fully replace LSLs to avoid increased risk from partial LSLR.		More CWSs likely to have to meet full LSLR milestones.	More customers likely to participate in full LSLR.

Impact on health equity concern.	Increased disparities since wealthier customers are more likely to have full LSLRs because they can afford to pay.	Greater concern because CWS may prioritize wealthier residents to reduce costs of full LSLR and meet milestones.	Potentially increased disparities because wealthier customers more likely to participate.
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VII. EPA'S OBLIGATIONS PURSUANT TO E.O. 12898 TO MINIMIZE ENVIRONMENTAL JUSTICE IMPACT

Executive Order 12898, issued by President Clinton in 1994, requires that each federal agency “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”¹⁸ EPA commissioned the Environmental Justice Analysis for the Proposal to address its obligations under this executive order.¹⁹

The adequacy of an agency's Analysis “is properly subject to ‘arbitrary and capricious’ review under the [Administrative Procedure Act].”²⁰ Under this standard, an agency's “analysis must be ‘reasonable and adequately explained,’ but the agency's ‘choice among reasonable analytical methodologies is entitled to deference.’”²¹ A “bare-bones conclusion that [environmental justice communities] would not be disproportionately harmed by” a proposal is insufficient.²² As the Fourth Circuit recently put it when reviewing compliance with a state environmental justice policy, “environmental justice is not merely a box to be checked.”²³

The Proposal's consideration of its environmental justice impacts is cursory and inadequate. The Environmental Justice Analysis candidly acknowledges that “[h]ousehold-level changes that depend on ability-to-pay will leave low-income households with disproportionately higher health risks.”²⁴ Yet EPA, in the rulemaking preamble, brushes this concern aside with a generic discussion of the Proposal as a whole. It does not address in any way the impact that the Proposal will have on the frequency of partial LSLRs or on a CWS's incentive to replace LSLs for higher income households compared to other households.

To comply with its duty under Executive Order 12898, EPA must specifically analyze in the final rule the environmental justice implications of the portions of the Proposal discussed above. Specifically, the analysis should address in detail the environmental justice implications of the following:

- The Proposal allows CWSs to carry out partial LSLRs during CWS-initiated infrastructure improvements that disturb LSLs and emergency repairs that disturb LSLs.

¹⁸ Exec. Order No. 12,898, 59 Fed. Reg. 7629 (Feb. 16, 1994).

¹⁹ 84 Fed. Reg. at 61,740.

²⁰ *Communities Against Runway Expansion, Inc. v. F.A.A.*, 355 F.3d 678, 689 (D.C. Cir. 2004); accord *Coliseum Square Ass'n, Inc. v. Jackson*, 465 F.3d 215, 232 (5th Cir. 2006).

²¹ *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1368 (D.C. Cir. 2017) (quoting *Communities Against Runway Expansion*, 355 F.3d at 689).

²² *Standing Rock Sioux Tribe v. U.S. Army Corps of Engineers*, 255 F. Supp. 3d 101, 140 (D.D.C. 2017).

²³ *Friends of Buckingham v. State Air Pollution Control Bd.*, 947 F.3d 68 (4th Cir. 2020).

²⁴ Abt Associates, [Environmental Justice Analysis for the Proposed Lead and Copper Rule Revisions, October 22, 2019](#) at Exhibits ES-1 and 4-1.

- When customers initiate LSLR on their privately-owned portion of the line, the Proposal mandates that water systems replace the publicly-owned portion. This approach prioritizes LSLR for wealthy property owners who are able to pay, and could result in disproportionately fewer replacements for low-income communities due to limited water system resources.
- When CWSs must initiate mandatory LSLR due to high levels of lead in drinking water, the Proposal incentivizes full LSLRs where the customer or property owner is willing to pay to replace the privately-owned portion. As with customer-initiated LSLRs, this approach prioritizes wealthy property owners who are able to pay, and could result in fewer replacements for low-income communities due to limited water system resources.

VIII. EPA’S AND CWSS’ OBLIGATIONS PURSUANT TO TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 TO PREVENT DISPROPORTIONATE IMPACT ON MINORITIES

Title VI of the Civil Rights Act of 1964 prohibits discrimination “on the ground of race, color, or national origin” in any “program or activity receiving Federal financial assistance.”²⁵ All states with authority to implement the Safe Drinking Water Act and most CWSs receive some form of federal funding through the EPA. Therefore, they must abide by Title VI’s requirements.²⁶

While private individuals can prevail in a lawsuit against a recipient of federal funding under Title VI only if they prove that the federally-funded program *intentionally* discriminated,²⁷ EPA has promulgated regulations that prohibit funding recipients from carrying out actions that create a discriminatory *disparate impact*.²⁸ Affected individuals can file administrative complaints with EPA regarding such impacts.²⁹ If EPA fails to respond to such a complaint, it can be sued under the APA.³⁰ If, in response to the complaint, EPA concludes that the funding recipient caused a discriminatory disparate impact, it can withhold federal funds from the funding recipient.³¹

As discussed above, several aspects of the Proposal create incentives for CWSs or otherwise cause a situation in which LSLR programs are likely to cause disparate impacts for minorities. Minority residents are more likely to live in older housing that is more likely to contain LSLs; as a result, they are expected to be exposed to more lead in their drinking water than non-minorities. The Proposal, however, creates incentives for CWSs to replace LSLs more often for wealthy (and on average non-minority) homeowners, thereby exacerbating these pre-existing disparities.

Moreover, the Proposal allows CWSs to replace only the utility-owned portion of an LSL during infrastructure improvements and emergency repairs. Because minority households are, on average, less likely to be able to afford to replace the customer-owned portion of the line, the result is that minority households are more likely to have partial LSLRs, which do not reduce long-term exposure and can make short-term exposure worse. Dr. Baehler’s study demonstrated that this disproportionate impact is real.

²⁵ 42 U.S.C. § 2000d.

²⁶ EPA, *Drinking Water Costs and Federal Funding*, <https://perma.cc/N4QF-7ZDY>.

²⁷ *Alexander v. Sandoval*, 532 U.S. 275, 280-81 (2001).

²⁸ 40 C.F.R. § 7.30 (“No person shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving EPA assistance on the basis of race, color, national origin, or on the basis of sex in any program or activity receiving EPA assistance under the Federal Water Pollution Control Act, as amended, including the Environmental Financing Act of 1972.”).

²⁹ [40 C.F.R. § 7.120\(a\)](#).

³⁰ *Rosemere Neighborhood Ass’n v. U.S. EPA*, 581 F.3d 1169 (9th Cir. 2009); *Californians for Renewable Energy v. U.S. EPA*, No: C 15-3292 SBA, 2018 WL 1586211 (N.D. Cal. Mar. 30, 2018).

³¹ 42 U.S.C. § 2000d-1.

Cumulatively, the LSLR aspects of the Proposal increase the risk that CWSs, when implementing those aspects, will increase the disparity between minorities' and non-minorities' lead exposure through drinking water. EPA should not adopt a regulation whose logical consequence is that CWSs – and in some circumstances states as well –will violate EPA's own Title VI regulations in the normal course of implementation.

IX. OUR RECOMMENDED CHANGES TO THE PROPOSAL IN THE FINAL RULE

For these reasons, we ask EPA to modify its proposed new LSLR planning requirements at 40 CFR § 141.84 to explicitly require CWSs to prevent disproportionate impacts and track performance. EPA should consider its recent variance for Denver Water to track performance regarding health equity and environmental justice.³² The variance allowed Denver Water to fully replace LSLs instead of implementing ortho-phosphate treatment to reduce corrosion following an exceedance of the lead action level.

For CWS-initiated infrastructure improvements that disturb LSLs and may result in partial LSLRs, EPA should consider requiring full LSLRs. We suggest Michigan's approach³³ of strictly limiting partial LSLRs to situations when emergency repairs are needed or when the resident expressly refuses to participate. The Illinois Department of Public Health is preparing to finalize a rule with a similar approach.³⁴ This clear and uniform mandate would ensure that all residents are treated equally and simplify state review of the plans. In addition, the programs initiated by communities such as Washington, DC; Cincinnati, OH; and Philadelphia, PA, as well as the Indiana, Missouri, and Pennsylvania subsidiaries of American Water may also serve as useful models.

For mandatory LSLRs, EPA should require states to evaluate replacement plans to confirm that the work will be conducted in a manner that avoids significant disparities. This may mean that CWSs prioritize low-income and minority neighborhoods or offer incentives for property owners in those neighborhoods to participate.

Customer-initiated LSLRs present a more complicated situation because CWSs should encourage participation by all. However, states should ensure that participation is balanced and does not unnecessarily draw limited resources away from full LSLRs for low-income and minority residents.

Finally, because so many of the health equity and environmental justice disparities stem from the fundamental concept that customers pay for the portion of the LSL they own, we recommend that EPA should require that CWSs explicitly address their ability to use ratepayer funds to cover the cost of full LSLR. In a recent white paper, two of the signatories of this comment (EDF and the Emmett Clinic) reviewed the laws of the 13 states with the most LSLs in the country. That review concluded that both publicly-owned and investor-owned CWSs had the authority under state law to use ratepayer funds for this purpose—although in some cases only after receiving approval from a state public utilities commission. EPA should require that CWSs determine their authority to pay for to replace the portion of an LSL on private property. Specifically, EPA should modify the language at 141.84(b)(6) to mandate a

³² EPA Region 8, In the Matter of Denver Water, Colorado, Variance Under SDWA Section 1415(a)(3), December 16, 2019 at [Docket No. EPA-R08-OW-2019-0404-0005](https://www.epa.gov/docket/epa-r08-ow-2019-0404-0005).

³³ Michigan Department of Environment, Great Lakes and Energy, Supplying Water to the Public Rule, https://dtmb.state.mi.us/ORRDocs/AdminCode/1928_2019-035EQ_AdminCode.pdf.

³⁴ Illinois Department of Public Health, Second Notice of Revisions to Illinois Plumbing Code, JCAR770890-1824640r01, November 2019, http://www.dph.illinois.gov/sites/default/files/890%20Plumbing_DPH%20Second%20Notice%20Text_112219.pdf. See Section 890.1150(e) page 62-64.

“determination whether the water system has the authority to use funds paid by ratepayer in order to replace LSLs on private property.

By implementing these recommendations, EPA can address the Proposal’s shortcomings, thereby fulfilling its responsibilities under Executive Order 12898,³⁵ reducing health disparities, and helping states and communities that receive federal funding avoid violating Title VI of the Civil Rights Act of 1964.³⁶

X. ABOUT THE COMMENTERS

Environmental Defense Fund’s mission is to preserve the natural systems on which all life depends. We have more than two million members and a staff of 700 scientists, economists, policy experts, and other professionals around the world. Guided by science and economics, we find practical and lasting solutions to the most serious environmental problems. This has drawn us to areas that span the biosphere: climate, oceans, ecosystems and health.

EDF’s Health Program seeks to safeguard human health by reducing exposure to toxic chemicals and pollution, including accelerating LSLR to reduce lead in drinking water. We have conducted extensive analysis of the LSLR aspects of the current rule and closely tracked state and local innovations. We also collaborated with the Emmett Environmental Law and Policy Clinic on a report regarding state laws on use of rates paid by customers to support full LSLR.³⁷ We also supported American University’s analysis of LSLR data for Washington, DC between 2009 and 2018. For more information on EDF’s lead-related work, see www.edf.org/lead.

Harvard Law School’s Emmett Environmental Law and Policy Clinic offers students an opportunity to do real-life and real-time legal and policy work. Clinic offerings include local, national and international projects covering the spectrum of environmental issues. Depending on the project, students may undertake litigation and advocacy work by drafting briefs, preparing testimony, conducting research, developing strategy, and reviewing proposed legislation.

The Emmett Clinic was lead author on a joint report with EDF titled “Rates could fund lead pipe replacement in critical states: Laws in states with the most lead service lines support the practice.”³⁸ The paper reviews the laws of 13 states that collectively account for 2/3 of all LSLs in country, and concludes that there are no explicit barriers to using ratepayer funds to replace LSLs—including the portion on private property.

Shaun Goho, Deputy Director of the Emmett Clinic, and Laurel Petrulionis, a Harvard Law School student, conducted the analysis of EPA’s and CWSs’ obligations under Executive Order 12898 and Title VI of the Civil Rights Act of 1964.

³⁵ Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7629; February 16, 1994. See <https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice>.

³⁶ 42 U.S.C. § 2000d et seq. See <https://www.justice.gov/crt/fcs/TitleVI-Overview>.

³⁷ Tom Neltner, Laws in states with the most lead service lines support using rates to fund replacement on private property: New analysis, April 2, 2019, <http://blogs.edf.org/health/2019/04/02/laws-states-support-rates-fund-replacement-private-property-new-analysis/>

³⁸ Shaun A. Goho & Marcelo Saenz of Emmett Environmental Law & Policy Clinic, Harvard Law School and Tom Neltner of Environmental Defense Fund, Rates could fund lead pipe replacement in critical states: Laws in states with the most lead service lines support the practice, April 2019, https://clinics.law.harvard.edu/environment/files/2019/09/Rates-Fund-LSL-Replacement-States_Harvard_EDF_2019.pdf.

Professor Karen Baehler is Scholar in Residence in the Department of Public Administration and Policy at American University's School of Public Affairs.³⁹ She holds a Ph.D. in Policy Sciences from the University of Maryland and brings twenty years of experience teaching courses in policy analysis and the policy process at the doctoral, masters, executive-training, and undergraduate levels in the U.S., Australia, and New Zealand. She has served on the faculties of the School of Government, Victoria University of Wellington, Wellington, New Zealand, and the Australia and New Zealand School of Government (ANZSOG), Melbourne, Australia. Professor Baehler has an active scholarly research agenda and is currently working on several papers on topics that include welfare implementation, water system governance, and environmental justice.

The AU research team consisted of Professor Baehler, PhD student Carley Weted, and MPP student Theo Affonso Laguna. They conducted the analysis of the LSLR data for Washington, DC between 2009 and 2018 with the support of EDF and funding from the Robert Wood Johnson Foundation.

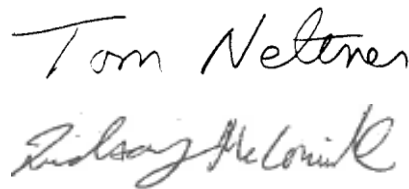
XI. CONCLUSION

We appreciate EPA's Proposal and look forward to a Final Rule that prevents a disproportionate impact on low-income and minority residents going forward.

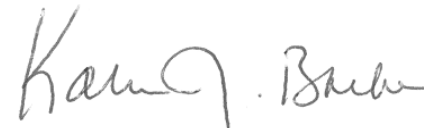
If you have any questions, please contact Tom Neltner at tneltner@edf.org or 202-572-3263.

Sincerely,

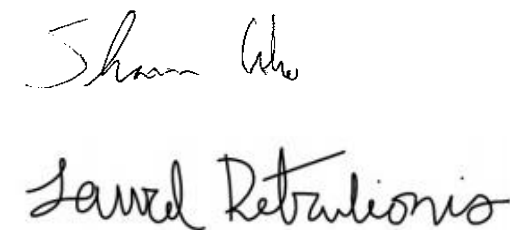
Tom Neltner and Lindsay McCormick for Environmental Defense Fund.

Handwritten signatures of Tom Neltner and Lindsay McCormick.

Karen Baehler for the Center for Environmental Policy at American University's School of Public Affairs.

Handwritten signature of Karen Baehler.

Shaun Goho and Laurel Petrulionis for Emmett Environmental Law and Policy Clinic.

Handwritten signatures of Shaun Goho and Laurel Petrulionis.

³⁹ See <https://www.american.edu/spa/faculty/baehler.cfm> for full biography.

Appendix 1: Details of Dr. Baehler’s Study Design and Results

As consensus grows regarding the desirability of encouraging full LSLRs whenever possible in lieu of partial replacements, evidence is needed regarding the effects of various financing arrangements on the relative uses of full vs. partial replacement. Common sense predicts that shared utility-customer funding arrangements like those used in many parts of the U.S., including the District of Columbia prior to October 1, 2019, would lead to more partial replacements of LSLs on properties whose owners have lower incomes and other markers of disadvantage that may pose barriers to participating in an opportunity for full replacement. If true, disadvantaged residents will experience higher probability of lead exposure through drinking water under shared funding arrangements.

The study described here tested that hypothesis using spatial patterns of disadvantage within Washington, D.C.’s census tracts and wards, and comparing these with spatial patterns of LSLR. In the absence of financial support for replacing private side LSLs in DC during the study period, it is reasonable to expect disproportionately higher rates of inferior remediation (in this case, partial rather than full LSLRs) in areas of the city with more markers of disadvantage. Two growing bodies of academic literature—on health equity and environmental justice—support the plausibility of this hypothesis.

American University (“AU”) signed a Memorandum of Understanding with DC Water in April 2019 giving the AU research team access to information about service line materials across the utility’s customer base of roughly 123,000 addresses, which includes 3,427 LSLRs (fulls and partials) completed during the study period. DC Water’s electronic recordkeeping with respect to service line materials improved substantially beginning in 2009. Therefore, the study period 2009 through 2018 was chosen to maximize data quality.

The research was made possible by a grant from Environmental Defense Fund with funding from the Robert Wood Johnson Foundation. An earlier version of results was presented at the Association of Public Policy and Management’s 41st Annual Fall Research Conference in Denver, Colorado in November 2019.

Outcome Variables for Full LSLR

Our main outcome variable is the percentage of total LSLRs in each ward or census tract that consisted of full replacements over the study period 2009-2018. Higher values for that variable represent more desirable policy outcomes because full replacements are preferred over partial replacements for the reasons stated earlier in this comment. We calculated these outcome values for each ward and census tract from the DC Water data, all years combined, with separate values for LSLR associated with utility-initiated, block-by-block capital improvement projects (CIPs) vs. emergency repairs.

For purposes of analyzing Voluntary, customer-initiated replacements, a different outcome variable was needed because Voluntary LSLRs are, almost by definition, all fulls, making it impossible to calculate Voluntary fulls as a percentage of total LSLRs (fulls plus partials).⁴⁰ Therefore, we used Voluntary replacements as a percentage of all service lines within each ward as the alternative outcome variable for those analyses. We did not study Voluntary replacements at the census tract level.

Income, Race, and Deprivation

Income and race data was obtained from the American Community Survey’s 5-year estimates published by the U.S. Census Bureau. The Census Bureau recommends use of 5-year averages at the census tract

⁴⁰ Two anomalous partial LSLRs occurred in DC’s Voluntary Program during the study period.

level to ensure adequate sample sizes. We averaged ACS estimates from 2013 (incorporating annual survey results from 2009-2012) and 2018 (incorporating annual survey results from 2013-18) to cover all relevant years and avoid double counting of overlapping years.

Specifically, we focused on three markers of disadvantage that vary significantly by area:

- Median Household Income: a direct measure of capacity to pay for full replacements in systems where customers are expected to pay for replacements on private property;
- Percent African-American / Black Residents: an alarmingly reliable predictor of poor health and environmental outcomes in many studies of health equity and environmental justice; and
- Area Deprivation Index (ADI): a rank-order index based on a cluster of social background variables (including race and income) often associated with poor health and education outcomes. ADI was developed at the University of Wisconsin Medical School and is available online through the Neighborhood Atlas.⁴¹ Higher index numbers indicate greater levels of deprivation. See Figure 5 for elements of the ADI.

We expected median income to be positively correlated with our outcome variables. We expected percent African-American and ADI to be negatively correlated with our outcome variables. Similar results were expected for both outcome variables: (1) percentage of total replacements that are full (for LSLRs associated with CIPs and Emergency Repairs) and (2) Voluntary replacements as a share of all service lines in an area.

Results

As summarized above, our bivariate correlation tests showed statistically significant relationships in the expected direction between the outcome variables and all three measures of potential disadvantage for customer-initiated, voluntary replacements and utility-initiated replacements associated with CIPs, but not for replacements associated with emergency repairs. Pearson's R values for the CIP and Voluntary correlations indicate consistently strong relationships between spatial disparities in LSLR activity and spatial disparities in income, race, and deprivation. It should be noted that ward-level analyses involve a very small n of 8 (6 degrees of freedom), which sets the threshold for statistical significance very high (95% confidence requires $R > 0.707$ or < -0.707). All ward-level analyses were able to meet that demanding test of significance.

In addition to the results reported above at ward level, we also calculated bivariate correlations at the ward-year level, which involves an n of 80 (8 wards x 10 years). Thus, we calculated the outcome variable for each year in each ward and correlated these values with the ACS 5-year estimate for each year 2009-2018 separately. These calculations also produced statistically significant results. Pearson's R for percent African-American / Black correlated with percent full LSLRs across all three types of replacements (CIP, Emergency, and Voluntary) was -0.503, and the correlation with household median

⁴¹ The ADI is available at block-group level at <https://www.neighborhoodatlas.medicine.wisc.edu>. The 17 components of the index are described in Figure 5 and are as follows: % of population aged ≥ 25 years with < 9 years of education; % of population aged ≥ 25 years with $<$ a high school diploma; % of employed persons ≥ 16 years of age in white-collar occupations; median family income; income disparity (log of 100 * ratio of the number of households with $< \$10,000$ in income to the number of households with $\$50,000$ or more in income; median home value; median gross rent; median monthly mortgage; percent owner-occupied housing units (home ownership rate); % of civilian labor force population ≥ 16 years of age unemployed (unemployment rate); % of families below the poverty level; % of population below 150% of the poverty threshold; % single-parent households with children < 18 years of age; % of households without a motor vehicle; % of households without a telephone; % of occupied housing units without complete plumbing; % of households with more than one person per room (crowding).

income was 0.586. Both results meet and exceed the threshold for critical R / statistical significance with an n of 80: 95% confidence requires $R > 0.232$ or < -0.232 .

Finally, we conducted regression analyses at the census-tract level using our first outcome variable (full LSLRs as percent of all LSLRs in each tract) for all types of LSLRs combined and for CIPs only. Simple regression using one independent variable at a time generated statistically significant results for race, income, and deprivation for all LSLRs combined and for CIPs only (with p values well below 0.01 in each case, providing greater than 99% confidence that the null hypothesis could be rejected).

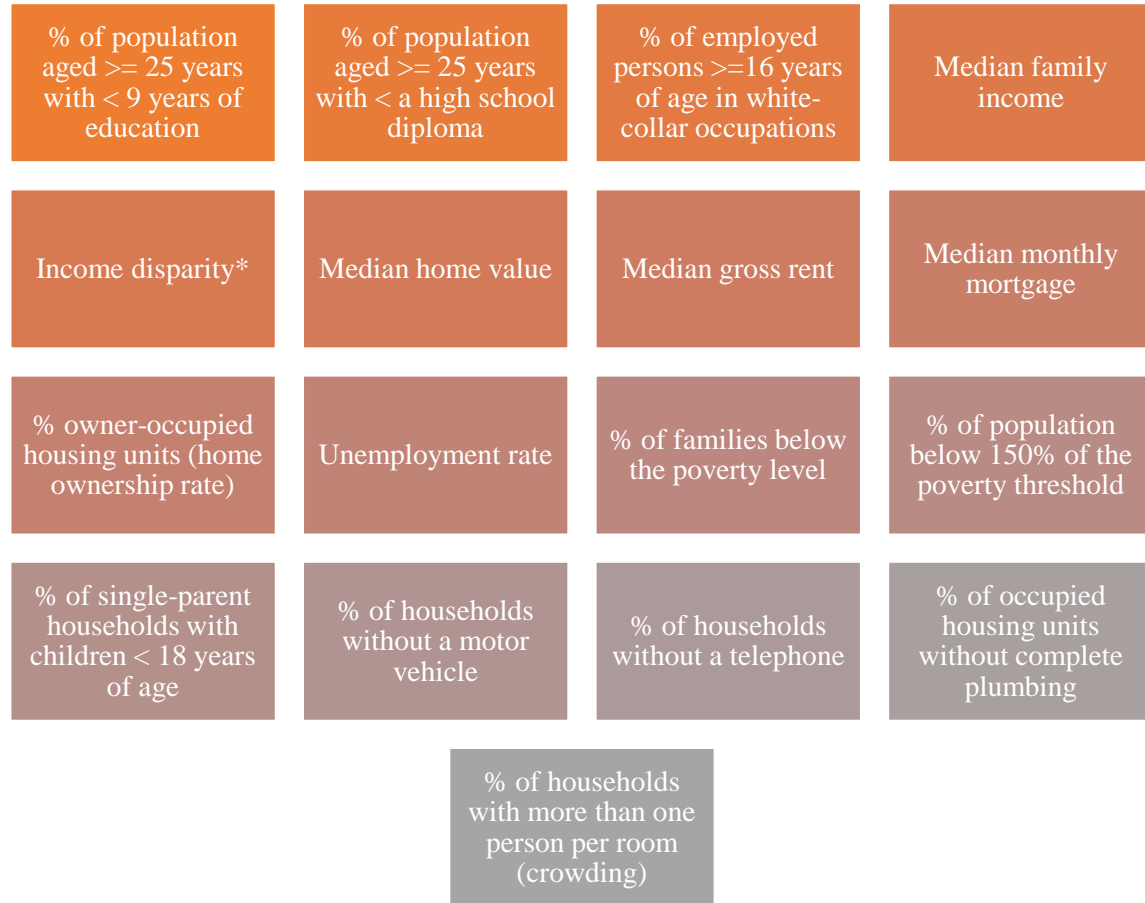
Simple regression using the deprivation index produced a notable result: a regression coefficient of -4.52 with $p < 0.0000$ for all LSLRs combined and regression coefficient of -4.19 with p of 0.0021 for CIPs. This indicates that a one decile increase in ADI in a census tract would predict either a 4.52 or 4.19 decrease in the percent of LSLRs that are full.

Using both race and income as independent variables in a multivariate regression revealed race to be the more powerful explanatory factor, with a regression coefficient of -0.31 and p value of 0.0034 (highly significant). Income was not statistically significant in the multivariate model. It should be noted that race and income are highly correlated with each other in DC at the census tract and ward level (collinear), which makes the deprivation score measure more meaningful than a multivariate regression model with multiple, overlapping markers of disadvantage.

Study Limitations

Ideally, our analysis would be run at the address level as well as the census-tract and ward levels, but the timeframe was too short to apply for access to household-level demographic data from the 2010 decennial Census—a process that takes 6-9 months. We intend to extend our analysis using address-level data from DC Water and the 2010 decennial Census, and with possible additional variables from publicly available, address-level records provided by the DC government.

Figure 5: Factors considered in Area Deprivation Index



*log of 100 x ratio of # of households with $< \$10,000$ income to # of households with $\$50,000$ or more in income