U.S. Chamber of Commerce

ECONOMIC IMPACTS OF EPA PROPOSED CERCLA DESIGNATIONS OF PFOA AND PFOS ON PUBLIC SERVICES AND HOUSEHOLDS

August 2023

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I. Introduction

Many towns provide public works to their residents such as drinking water, wastewater treatment, and trash disposal services. In providing these services, municipalities gather, store, distribute, and then discharge numerous constituents that are or could be designated as, or otherwise deemed, "hazardous substances" under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Generally, CERCLA creates liability for owners, operators, generators, arrangers, and transporters responsible for discharges of hazardous substances into the environment. This liability is strict, joint, and severable, and has been found to be retroactive; thus, even a small release of a hazardous substance could render a party liable for a cleanup of a contaminated site.

EPA has proposed to designate certain per- and polyfluoroalkyl substances (PFAS) (e.g., PFOA, PFOS, and additional PFAS) as hazardous substances under CERCLA.[1] If finalized, the designation would create liability for PFOA and PFOS for municipalities who are owners of contaminated properties or for the discharges of PFOA and PFOS for which they are responsible. This could affect the costs of municipal services, such a sewage treatment, trash pickup, landfills, and drinking water systems. While EPA has recently announced that it will use appropriate enforcement discretion for PFOA and PFOS sites under CERCLA, the statute allows third parties to sue other potentially responsible parties, including local governments, for contribution and recovery of cleanup costs. A claim could be filed even though the municipalities were mere passive recipients of PFOA and PFOS from other parties.

This analysis, conducted by the U.S. Chamber of Commerce and our members, examines the strategies and calculates the costs of reducing the resulting CERCLA liability from this EPA action as firms and other entities do today for other CERCLA hazardous substances. The untested CERCLA 102(b) authority will result in avoidable and significant unintended consequences, costs, and impacts for communities. CERCLA also does contain certain exemptions that may be applicable to municipalities. For example, Congress exempted releases that are authorized in a federal permit. Congress also exempted municipal solid waste (MSW) from CERCLA liability. When considering how the new rule would affect municipalities, municipalities will consider the available exemptions from CERCLA liability and take actions to qualify for these exemptions.[2]

Specifically, we select five municipalities, in five states, and examine their municipal services, the likely occurrence of PFOA and PFOS in their materials and drinking water, and likely strategies to minimize their liability. We select municipalities based on two criteria that allow for representative and diverse results. First, we choose states that cut across different geographic regions: mid-Atlantic; Northeast; South; Midwest; and West. Second, we choose different population sizes (i.e., between 15,000-90,000 residents) to present impacts across a range of small- and medium-sized municipalities. In order to demonstrate that these impacts are applicable to any municipality, we do not apply any further criteria that would imply only certain municipalities will be impacted. With the growing regulatory risks surrounding PFAS, towns will likely undertake a variety of expensive upgrades to POTWs, drinking water systems, and landfill operations. This report estimates the costs of such upgrades and the impact on household expenses and finally, compares the costs to household incomes in the community with a focus on environmental justice communities.

Table 1: Summary of Findings: Estimated Annual Cost Increases per Household ($/year/HH)

Municipality	Baseline	Post Reg	Increase
Charleston, WV	1,168	1,487	319
Portland, ME	2,093	2,693	600
Lumberton, NC	457	1,485	1,028
Wixom, MI	472	949	383

[1] 87 Fed. Reg. 54415 (Sept. 9, 2022).

[2] It is important to note that the Chamber supports accelerating cleanup of PFAS contamination based on the best science and risk. CERCLA is the wrong policy tool to do so. Rather than offering liability exemptions, EPA would be better served by utilizing existing alternative authorities.

Merced, CA	1,576	1,936	360

II. Methodology

We gather data on the town, its population, and household income from the U.S. Census. We also report demographics to assist in analyzing disproportionate effects of the proposed rule on environmental justice communities, if any.[3] The report includes jurisdictions serving small to large populations to provide insight into the disproportionate impact on smaller towns. We obtain the current fees charged to residential households for municipal services from the town's website and other public information. Using the town's website, other public information, and EPA's ENVIROfacts data, we identify if the town owns or operates a drinking water treatment facility, a wastewater treatment facility (WWTP), and a municipal solid waste landfill. From the same sources and EPA's ENVIROfacts website, we attempt to obtain the size and average annual flow of the drinking water and WWTP.

To determine PFOA/PFOS occurrence in the town's systems, we use a mix of state monitoring data and national estimates in the published literature that address PFOA, PFOS or other PFAS. Systems in Maine, North Carolina, Michigan, and California have been required to test their water systems for various PFAS and at levels of detection lower than EPA's values in the UCMR3 national sampling for PFAS. If the system did not identify any PFAS at a detection limit of 4 ppt or below, PFAS treatment is not required. We use all detectable PFAS chemicals as a proxy for the presence of PFOA/PFOS where specific PFOA/PFOS data are unavailable. EPA's proposed national drinking water standard for PFOA and for PFOS[4] may trigger PFAS treatment at these systems; this analysis only considers whether CERCLA liability management would encourage treatment sooner. Thus, the report may underestimate drinking water costs at these locales.

Except for Wixom, Michigan, we did not find data on PFAS concentrations in wastewater effluent, biosolids, or landfill leachate. We use the national averages from published studies of numerous U.S. WWTPs and of the leachate at multiple landfill sites.

As discussed above, municipalities will need to seek federal permits for its discharges. Specifically, the town will seek to modify its existing, or obtain a new, NPDES discharge permit to include specific limits on PFOA and on PFOS releases in its effluent. EPA and authorized states will set the discharge limit to protect human health and the environment. We calculate a discharge limit based on EPA's draft reference dose from November 2021.[5] Using EPA's most recent guidance for calculation of ambient water quality criteria (AWQC) for human health, discharges must achieve a level below 1 ppt.[6] From national studies of WWTP effluent and its sources, domestic wastewater contains levels more than 10 times the AWQC corresponding to EPA's draft reference dose.[7] Thus, this analysis assumes that, even if WWTPs require pre-treatment of PFOA or PFOS by indirect dischargers, the remaining concentration will still exceed the expected AWQC. Thus, we assume that WWTP will be required to treat their liquid effluent discharge for PFOA and PFOS.

Based on published data on many sources, PFAS appears to be ubiquitous in biosolids and in landfill leachate.[8] We assume that the town will send its WWTP biosolids to its local landfill as long as that landfill treats its collected leachate for PFAS and then releases the treated water under a federal permit. We therefore include the costs of landfill leachate treatment at the town's landfill.

[3] U.S. Environmental Protection Agency, "Overview of Socioeconomic Indicators in EJScreen;" Available at: https://www.epa.gov/ejscreen/overview-socioeconomic-indicators-ejscreen.
[4] Potential Costs of Meeting Safe Drinking Water Act (SDWA) Standards for PFOA and PFOS | Global Energy Institute.
[5] U.S. Environmental Protection Agency, "External Peer Review Draft: Proposed Approaches to the Derivation of a Draft Maximum Contaminant Level Goal for Perfluorooctanoic Acid (PFOA)."
[6] U.S. Environmental Protection Agency, "Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health." Specifically, this analysis used equation 4-1 on pg. 4-1. For PFOA and PFOS the analysis uses EPA's draft water concentration BAF estimate in its 2022 draft aquatic criteria documents for PFOA and PFOS. The analysis uses 50th percentile values for other variables from EPA's Exposure Factors Handbook.
[7] Thompson et al., "Poly- and Perfluoroalkyl Substances in Municipal Wastewater Treatment Plants in the United States: Seasonal Patterns and Meta-Analysis of Long-Term Trends and Average Concentrations."
[8] EPA Effluent Guidelines Program Plan 15, January 2023. PFAS present in 95% of leachate of 200 landfills sampled (pages 6-13). Most of the positive PFAS observations likely include PFOA/PFOA.

III. Data and Assumptions

Drinking Water. We use the following cost curves to estimate the treatment unit cost based on size (MGD) of the water system.[9] This data comes from an October 2021 EPA analysis of its Office of Research and Development's drinking water treatment cost model and reflects the costs of a granulated activated carbon treatment (GAC) system.[10] EPA ran its model for different drinking water treatment sizes and different system configurations. GAC systems are generally considered one of the lowest costs and one of the most effective available treatment systems for substantially reducing PFOA/PFOS concentrations in water.

Small System		Large System		Very Large System	
MGD	$/1000 gal	MGD	$/1000 gal	MGD	$/1000 gal
0.008	5.5	0.6	1.3	6	0.6
0.011	4	1	1	10	0.58
0.012	3	3	0.7	60	0.39
0.07	2	6	0.65		
0.1	1.5				
0.15	0.8				

There are limitations to these estimates. Many systems chose to treat PFAS in drinking water with ion exchange systems. While the costs are often comparable to GAC, a system may choose an ion exchange system if the total costs are lower than the GAC costs listed above. In addition, while EPA updates its cost model regularly, recent price increases for material and labor and shortages in GAC imply that current costs are greater than these estimated costs.

Wastewater Treatment Effluent. Numerous studies have been conducted of advanced wastewater treatment to remove emerging chemicals and nutrients remaining in secondary wastewater treatment.[11] The technologies identified include treatment with ultraviolet light, using advanced oxidation processes, and additional clarification and removal of suspended solids and constituents. These technologies may reduce PFAS concentrations. We draw on a recent published study that compares the levelized cost of water across systems that have installed these technologies in the United States.[12] We draw upon the costs at the Orange County Water District project that applies ultraviolet light and reverse osmosis treatment for nutrient removal to the effluent from one of its WWTP. This treatment approach has also been shown to destroy PFAS in water with other organics and solids. We apply the cost per 1,000 gallons of effluent to the WWTP effluent in this study.

While advanced treatment is mandated in the European Union[13], national governments have been rolling out requirements over the past decade.[14] In the United States, water systems have installed advanced treatment when further nutrient reduction is necessary to achieve water quality goals and when the treated water is needed as a raw water source for drinking water or other consumptive uses.

There are several limitations to this approach. Because large water systems are not currently treating PFAS, advanced treatment systems to improve removal of PFAS from municipal wastewater may be different. In addition, because there are

9 https://www.epa.gov/sdwa/drinking-water-treatment-technology-unit-cost-models.
10 https://www.epa.gov/system/files/documents/2022-03/gac-documentation-.pdf_0.pdf.
11 See, for example, Giammar et al., "Cost and Energy Metrics for Municipal Water Reuse," American Chemical Society EST Engg. 2, 489−507 (2022).
12 Giammar et al.
13 European Parliament and the Council of the European Union, Urban Wastewater Treatment Directive (Council Directive 91/271/EEC).
14 See, for example, WaterWorld, "Swiss for Sustainability."

so few systems installed in the United States, we do not have actual data on how unit treatment costs vary with system size. While we would expect smaller systems to have greater unit costs than larger systems, we do not have data to model this relationship.

Biosolids and Landfill Leachate. If we do not have actual biosolids generation from the town's WWTP, we use a national estimate of biosolids generation per gallon of wastewater. We assume all biosolids are dewatered with the extracted water returned to the WWTP for treatment. We consider different options for the biosolids that will minimize or exempt the municipality from CERCLA liability: management in a local landfill that has leachate treatment and a federal permit for the PFAS treatment and discharge, shipment to another country and thus outside CERCLA's jurisdiction,[15] and pyrolysis to destroy the PFAS in the biosolids. Because landfill operators will seek to minimize their CERCLA liability by treating their leachate and obtaining a federal permit for its subsequent discharge, local land disposal is typically the lowest cost option. Landfill leachate is treated using the same unit costs as wastewater.

IV. Charleston, WV

1. Description

Charleston, West Virginia (WV) has a population of 48,913.[16] It has 21,409 households, with a median household income of $49,769 per year.[17] We also note that Charleston has a minority community for consideration:

Charleston Demographics[18]

White	77.6%
African American	14.2%
Native American	0.2%
Asian	2.4%
Two or More Races	5.4%
Hispanic or Latino	1.3%

Charleston gets its water from West Virginia American Water with surface water supplied from the Elk River and treated at the Kanawha Valley Water System plant. Charleston owns its sewage system, the Charleston Sanitary Board. The city manages its trash at the 55.5-hectare (ha) Charleston Landfill. The landfill is publicly owned and privately managed by Waste Management, Inc.

[15] It is unclear how often it is practical to ship biosolids out of the country. There is no legal constraint on transboundary shipment of solid waste and biosolids. News coverage shows that it is happening: https://www.nebiosolids.org/a-story-that-does-not-smell-good. Currently, there are no requirements to report, so the volumes are unknown. The only constraint will be economic. We assume a municipality will determine the least costly option, which may be transnational shipment if it determines that it minimizes costs.
[16] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates"; U.S. Census Bureau, "Census QuickFacts."
[17] Ibid.
[18] Ibid.

Category	Name	Ownership	Size	Service Population
Drinking Water Facility	Kanawha Valley Water System[19]	Private/ Contract	27.4 MGD (2018)	195,706
Sewage	Charleston Sanitary Board[20]	Public/ Owned	10.5 MGD (2012)	60,000
Landfill	Charleston Landfill[21]	Public/ Owned	289,884 mt/yr (2021); 55.5 ha	48,913

2. Occurrence of PFAS

According to a U.S. Geological Survey (USGS) 2022 report, PFAS have been detected in 67 public water systems across West Virginia.[22] The report includes detections of only perfluoropentane-sulfonate (PFPeS) at8.1 ng/L for the Elk River near the intake of the plant supplying Charleston.

Because we are not aware of sampling for PFOA and for PFOS in the city's wastewater treatment plant effluent and biosolids, we assume that they contain the mean values reported in a large and recent WWTP PFAS occurrence survey.[23] As a result, we assume that the Charleston WWTP's biosolids contain detectable PFOA and PFOS.

We also are unaware of any specific sampling of the city's solid waste or the leachate from its landfill. Based on numerous surveys of U.S. landfill leachate for PFAS, we assume that the leachate would require treatment to receive a discharge permit under the Clean Water Act. We assume that the town requires that commercial wastes are not co-mingled with its municipal solid waste, allowing the town to maintain the MSW exemption from CERCLA liability.

Town Strategy in Response to a CERCLA Designation

Assuming that Charleston has, or is assumed to have, detectable PFOA and PFOS in its wastewater effluent, biosolids, and leachate from its MSW, it will take action to minimize its CERCLA liability from these ongoing releases. The city will seek to add enforceable limits to its WWTP's effluent discharge permit. Achieving the expected permit limits will require the WWTP to install PFAS treatment for its effluent. The city will also shift biosolid management to solid waste landfills that collect and treat PFAS prior to the leachate's discharge or reuse. Finally, the city will require its landfill operator to treat the landfill's leachate for PFAS and seek a permit or permit modification to discharge the treated leachate.

3. Results

We estimate a total annual increase in costs of $319 per household. We find the greatest increase for a household's sewage bill. These costs have disproportionately greater impact on lower-income households with costs exceeding one percent of annual income for all households earning less than $35,000 per year.[24]

[19] West Virginia American Water, "Source Water Protection Plan: West Virginia American Water Kanawha Valley Water System."
[20] U.S. Environmental Protection Agency, "Clean Watershed Needs Survey (CWNS) 2012 Data and Reports."
[21] WV Solid Waste Management Board, "Annual West Virginia Landfill Tonnage Report CY 2021."
[22] U.S. Geological Survey, "Occurrence of Per- and Polyfluoroalkyl Substances and Inorganic Analytes in Groundwater and Surface Water Used as Sources for Public Water Supply in West Virginia."
[23] Thompson et al., "Poly- and Perfluoroalkyl Substances in Municipal Wastewater Treatment Plants in the United States: Seasonal Patterns and Meta-Analysis of Long-Term Trends and Average Concentrations."
[24] 2.5% of median household income has been used by EPA to identify water treatment technologies that are unaffordable. A 1% impact on the lower income populations would also constitute a significant disproportionate impact and is used in this analysis.

Population (2021)[25]	48,913
Households (HH)	21,409
Median HH Annual Income (in 2020 $)	$49,769

Income Distribution[26]

Households	Percentage of Population (%)	Number of people	Post-Reg Increase Percentage of Mean Income (%)
Less than $10,000	8.8	4,304	6.37%
$10,000 to $14,999	8.6	4,207	2.55%
$15,000 to $24,999	12	5,870	1.82%
$25,000 to $34,999	8.9	4,353	1.06%
$35,000 to $49,999	12	5,772	0.75%
$50,000 to $74,999	16	7,924	0.51%
$75,000 to $99,999	9.9	4,842	0.36%
$100,000 to $149,999	11	5,234	0.25%
$150,000 to $199,999	4.8	2,348	0.18%
$200,000 or more	8.2	4,011	0.16%
Mean income (2020 $/year)	80,595		

Table 2: Estimated Annual Cost Increases per Household (HH) for Charleston, WV

Cost per HH	Baseline ($/year/HH)	Post Reg ($/year/HH)	Increase (%)	Increase ($/year/HH)
DW	437	437	0%	0
Sewage	552	867	57%	315
Trash	180	183	2%	3
Total	1,168	1,487		319

[25] U.S. Census Bureau, "Census QuickFacts."
[26] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."

V. Portland, ME

1. Description

Portland, ME has a population of 68,313.[27] It has 30,796 households with a median household income of $61,695 per year.[28] Approximately, 12.7 percent of the population lives in poverty.[29] Portland also has a notable minority population:

Portland Demographics[30]

White	81.7%
African American	9.0%
Asian	4.0%
Hispanic or Latino	2.4%
Native American	0.2%
Two or More Races	3.1%

Portland owns its drinking water system, the Portland Water District. Portland also owns its sewage system, the Portland East End Wastewater Facility. The 105-ha Portland Landfill is owned and operated by ecomaine with municipal ownership under 20 Southern Maine towns.

Category	Name	Ownership	Size	Service Population
Drinking Water Facility	Portland Water District	Public/ Owned		
Sewage	Portland East End WWTF[31]	Public/ Owned	18.14 MGD (2012)	55,181
Landfill	Portland Landfill	Public/ Owned	191,419 mt/yr; 105 ha	68,313

2. Occurrence of PFAS

As of August 2022, the Portland Water District tested twenty-five PFAS, including PFOA and PFOS, and found no detections (ND) in either the surface water or groundwater sources.[32] For this reason we assume that Portland would not have to treat their drinking water under a CERCLA designation. We exclude this from the following results.

Because we are not aware of sampling for PFOA and for PFOS in the city's wastewater treatment plant effluent and biosolids, we assume that they contain the mean values reported in a large and recent WWTP PFAS occurrence survey. As a result, we assume that the Portland WWTP's biosolids contain detectable PFOA and PFOS.

Recent 2022 testing found PFOA and PFOS in ecomaine landfills at detection levels between 40.9 to 1,220 ng/L.[33] Based on this data, we assume that the leachate would require treatment to receive a discharge permit under the Clean Water Act.

[27] U.S. Census Bureau; U.S. Census Bureau, "Census QuickFacts."
[28] Ibid.
[29] Ibid.
[30] Ibid.
[31] U.S. Environmental Protection Agency, "Clean Watershed Needs Survey (CWNS) 2012 Data and Reports."
[32] Portland Water District, "Are There Concerns about PFAS in Our Drinking Water?"
[33] Maine Department of Environmental Protection, "Collected and Managed Landfill Leachate In Maine."

We assume that the city requires that commercial wastes are not co-mingled with its municipal solid waste, allowing the town to maintain the MSW exemption from CERCLA liability.

City Strategy in Response to a CERCLA Designation

Assuming that Portland has, or is assumed to have, detectable PFOA and PFOS in its wastewater effluent, biosolids, and leachate from its MSW, it will take action to minimize its CERCLA liability from these ongoing releases. The city will seek to add enforceable limits to its WWTP's effluent discharge permit. Achieving the expected permit limits will require the WWTP to install PFAS treatment for its effluent. The city will also shift biosolid management to solid waste landfills that collect and treat PFAS prior to the leachate's discharge or reuse. Finally, the city will require its landfill operator to treat the landfill's leachate for PFAS and seek a permit or permit modification to discharge the treated leachate.

3. Results

We estimate a total annual increase in household costs of $600. We find the greatest increase for a household's sewage bill. These costs have a disproportionately greater impact on lower-income and middle-income households with costs exceeding one percent of annual income for all households earning less than $100,000 per year.

Population (2021)[34]	68,313
Households (HH)	30,796
Median HH Annual Income (in 2020 $)	$61,695

Income Distribution[35]

Households	Percentage of Population (%)	Number of people	Post-Reg Increase Percentage of Mean Income (%)
Less than $10,000	8.1	5,533	12%
$10,000 to $14,999	3.8	2,596	5%
$15,000 to $24,999	8.4	5,738	3%
$25,000 to $34,999	9	6,148	2%
$35,000 to $49,999	12.2	8,334	1%
$50,000 to $74,999	16.9	11,545	1%
$75,000 to $99,999	12.7	8,676	1%
$100,000 to $149,999	16.1	10,998	0%
$150,000 to $199,999	6.2	4,235	0%
$200,000 or more	6.6	4,509	0%
Mean income (2020 $/year)	81,634		

[34] U.S. Census Bureau, "Census QuickFacts."
[35] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."

Table 3: Estimated Annual Cost Increases per Household (HH) for Portland, ME

Cost per HH	Baseline ($/year/HH)	Post Reg ($/year/HH)	Increase (%)	Increase ($/year/HH)
DW	625	625	0%	0
Sewage	994	1,587	60%	593
Trash	473	481	2%	8
Total	2,093	2,693		600

VI. Lumberton, NC

1. Description

Lumberton, NC has a population of 18,694.[36] It has 7,270 households with a median household income of $36,846 per year.[37] This town also has a high concentration of minority residents compared to the national average:

Lumberton Demographics[38]

White	40.0%
African American	37.2%
Native American[39]	13.8%
Asian	1.0%
Two or More Races	2.6%
Other race	5.3%

Lumberton owns its drinking water system, the City of Lumberton Water Plant. Lumberton also owns the City of Lumberton Wastewater Plant. The 13-hectare (ha) county-owned solid waste landfill is Robeson County SW and serves all residents of Robeson County.

[36] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."
[37] Ibid.
[38] Ibid.
[39] This percentage may underestimate actual values given ongoing debates on whether to extend federal recognition to the Lumbee tribe, which is based in Lumberton. Were the Lumbee to be recognized, the number may be higher: https://abc11.com/lumbee-recognition-cherokee-choctaw/8064221/ ; https://www.robesonian.com/news/178536/full-federal-recognition-for-lumbees-left-out-of-senate-spending-bill-whats-next.

Category	Name	Ownership	Size	Service Population
Drinking Water Facility	City of Lumberton Water Plant[40]	Public/ Owned	16 MGD	18,694
Sewage	City of Lumberton Wastewater Plant[41]	Public/ Owned	5.43 MGD	21,520
Landfill	Robeson County SW[42]	Public/ County-Owned	127,341 mt/yr; 12.87 ha	35,050

2. Occurrence of PFAS

Lumberton draws its drinking water from a system of seven wells. The North Carolina PFAS testing network collected samples from Lumberton and found a combined detection of 19.4 ppt for PFOA and PFOS in at least one of the wells.[43] Total PFAS, including perfluoroalkane sulfonic acids (PFSAs), per- and polyfluoroalkyl ether acids (PFEAs), perfluoroalkane sulfonamides (PFASAs), and more was at a concentration of 56.6 ppt. While the city may be able to reduce pumping of the well(s) with detectable PFAS, we assume for resiliency purposes the city installs PFAS treatment for its drinking water.

Because we are not aware of sampling for PFOA and for PFOS in the city's wastewater treatment plant effluent and biosolids, we assume that they contain the mean values reported in a large and recent WWTP PFAS occurrence survey.[44] As a result, we assume that the Lumberton WWTP's biosolids contain detectable PFOA and PFOS.

We also are unaware of any specific sampling of the city's solid waste or the leachate from its landfill. Based on numerous surveys of U.S. landfill leachate for PFAS, we assume that the leachate would require treatment to receive a discharge permit under the Clean Water Act. We assume that the town requires that commercial wastes are not co-mingled with its municipal solid waste, allowing the town to maintain the MSW exemption from CERCLA liability.

Town Strategy in Response to a CERCLA Designation

Assuming that Lumberton has, or is assumed to have, detectable PFOA and PFOS in its drinking water, wastewater effluent, biosolids, and leachate from its MSW, it will take action to minimize its CERCLA liability from these ongoing releases. The city will install treatment for its drinking water. The city will seek to add enforceable limits to its WWTP's effluent discharge permit. Achieving the expected permit limits will require the WWTP to install PFAS treatment for its effluent. The city will also shift biosolid management to solid waste landfills that collect and treat PFAS prior to the leachate's discharge or reuse. Finally, the city will require its landfill operator to treat the landfill's leachate for PFAS and seek a permit or permit modification to discharge the treated leachate.

3. Results

We estimate a total annual increase in household costs of over $1,000. We find the greatest increase from drinking water costs. If Lumberton can treat just a few wells or blend its raw water, its drinking water treatment costs will be less. However, even without additional drinking water costs, annual household costs rise by over $570. All households in Lumberton face increased costs greater than one percent of their income.

[40] City of Lumberton, NC, "Water Treatment Plant."
[41] City of Lumberton, NC, "Wastewater Plant."
[42] Robeson County SW, "Robeson County Solid Waste."
[43] North Carolina PFAS Testing Network, "NC PFAS Quantitative Screening Results for Raw Drinking Water."
[44] Michigan Department of Environment, Great Lakes, and Energy and AECOM, "Evaluation of PFAS in Influent, Effluent, and Residuals of Wastewater Treatment Plants (WWTPs) in Michigan."

Population (2021)[45]	18,694
Households (HH)	7,270
Median HH Annual Income (in 2020 $)	$36,846

Income Distribution[46]

Label	Percentage of Population (%)	Number of people	Post-Reg Increase Percentage of Mean Income (%)
Less than $10,000	15.7	2,935	21%
$10,000 to $14,999	9.4	1,757	8%
$15,000 to $24,999	12.6	2,355	6%
$25,000 to $34,999	9.9	1,851	3%
$35,000 to $49,999	13.3	2,486	2%
$50,000 to $74,999	14.6	2,729	2%
$75,000 to $99,999	11.3	2,112	1%
$100,000 to $149,999	7.2	1,346	1%
$150,000 to $199,999	3	561	1%
$200,000 or more	3	561	1%
Mean income (2020 $/year)	54,775		

Table 4: Estimated Annual Cost Increases per Household (HH) for Lumberton, NC

Cost per HH	Baseline ($/year/HH)	Post Reg ($/year/HH)	Increase (%)	Increase ($/year/HH)
DW	119	572	382%	454
Sewage	234	805	245%	572
Trash	105	107	2%	2
Total	457	1485		1,028

[45] U.S. Census Bureau, "Census QuickFacts."
[46] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."

VII. Wixom, MI

1. Description

Wixom, MI has a population of 17,185.[47] It has 6,373 households with a median household income of $58,886 per year.[48]

Wixom Demographics[49]

White	74.6%
African American	11.7%
Asian	5.9%
Hispanic or Latino	4.6%
Native American	0.3%
Two or More Races	3.5%

Wixom purchases its drinking water from the Great Lakes Water Authority (GLWA). Wixom owns and operates a small 2.3 MGD wastewater plant that generates sludges and discharges treated water into Norton Creek in the Huron watershed. Wixom pays fees to send garbage to the regional Arbor Hills landfill.

Category	Name	Ownership	Size	Service Population
Drinking Water Facility	Great Lakes Water Authority	Private / Contract	1.39 MGD	13,928
Sewage	Wixom WWTP	Public/ Owned	2.8 MGD	17,185
Landfill	Arbor Hills	Public/ Regional-Owned	13,970 mt/yr; 136 ha	17,185

2. Occurrence of PFAS

GLWA has not reported PFAS detections at 2 ppt level. We assume there will be no treatment in the drinking water system.

The State of Michigan sampled Wixom's WWTP effluent and biosolids. The wastewater effluent contained 10 ppt of PFOA and 269 ppt of PFOS.[50] Dewatered sludge contained 108 ppt of PFOA and 11,700 ppt of PFOS.

We are unaware of any specific sampling of the city's solid waste or the leachate from its landfill. Based on numerous surveys of U.S. landfill leachate for PFAS, we assume that the leachate would require treatment to receive a discharge permit under the Clean Water Act. We assume that the town requires that commercial wastes are not co-mingled with its municipal solid waste, allowing the town to maintain the MSW exemption from CERCLA liability.

47 U.S. Census Bureau.
48 Ibid.
49 Ibid.
50 Michigan Department of Environment, Great Lakes, and Energy and AECOM, "Evaluation of PFAS in Influent, Effluent, and Residuals of Wastewater Treatment Plants (WWTPs) in Michigan."

Town Strategy in Response to a CERCLA Designation

Assuming that Wixom has, or is assumed to have, detectable PFOA and PFOS in its wastewater effluent, biosolids, and leachate from its MSW, it will take action to minimize its CERCLA liability from these ongoing releases. The city will seek to add enforceable limits to its WWTP's effluent discharge permit. Achieving the expected permit limits will require the WWTP to install PFAS treatment for its effluent. The municipality will also shift biosolid management to solid waste landfills that collect and treat PFAS prior to the leachate's discharge or reuse. Finally, the city will require its landfill operator to treat the landfill's leachate for PFAS and seek a permit or permit modification to discharge the treated leachate.

3. Results

We estimate a total annual increase in household costs of approximately $377 due to an increase in the sewage services bill. These costs have disproportionately greater impact on lower-income and middle-income households with costs exceeding one percent of annual income for all households earning less than $75,000 per year.

Population (2021)[51]		17,185	
Households (HH)		6,373	
Median HH Annual Income (in 2020 $)		$58,886	
	Income Distribution[52]		
Households	Percentage of Population (%)	Number of people	Post-Reg Increase Percentage of Mean Income (%)
Less than $10,000	3	516	8%
$10,000 to $14,999	3.9	670	3%
$15,000 to $24,999	12.9	2217	2%
$25,000 to $34,999	10.5	1804	1%
$35,000 to $49,999	12.8	2200	1%
$50,000 to $74,999	16.3	2801	1%
$75,000 to $99,999	10.6	1822	0%
$100,000 to $149,999	15.1	2595	0%
$150,000 to $199,999	7.9	1358	0.2%
$200,000 or more	7	1203	0.2%
Mean income (2020 $/year)	81,635		

[51] U.S. Census Bureau, "Census QuickFacts."
[52] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."

Table 5: Estimated Cost Increases per Household (HH) for Wixom, MI

Cost per HH	Baseline ($/year/HH)	Post Reg ($/year/HH)	Increase (%)	Increase ($/year/HH)
DW	216	216	0%	0
Sewage	118	495	320%	377
Trash	138	138	0%[53]	0.09
Total	472	849		377

VIII. Merced, CA

1. Description

Merced, California has a population of 89,308.[54] It has 26,626 households with a median household income of $ 49,973 per year.[55] Over 26.6 percent of the population live in poverty.[56] This city also has a high concentration of minority residents when compared to the national average:

Merced Demographics[57]

Hispanic or Latino	58.1%
White	23.8%
Asian	11.2%
African American	4.5%
Native American	1.7%
Two or More Races	8.4%

Merced operates a 35 MGD drinking water plant. Merced owns and operates a 12 MGD wastewater plant that generates sludges and discharges treated water. Merced residents pay fees to send garbage to the regional Highway 59 landfill operated by a county municipal authority.

[53] The trash increase is reported as 0 percent because $0.09 per household is far closer to 0 percent than 1 percent for reporting to nearing percent of the $138/year cost.
[54] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."
[55] Ibid.
[56] Ibid.
[57] Ibid.

2. Occurrence of PFAS

Based on 2019 samples, the City of Merced detected PFOA at an annual average value 0.11 ng/L and PFOS at 0.14 ng/L.[58]

Sample results from California's geotracker finds PFOA and PFOS detections in several of the Merced's WWTF's treatment wells up to 1,000 for PFOA and 40 for PFOS.[59]

In 2019, the State Water Resources Control Board identified the Highway 59 landfill as one of several sites that has accepted, stored, or used materials that may contain per- and polyfluoroalkyl substances (PFAS) and ordered testing to take place.[60] Based on numerous surveys of U.S. landfill leachate for PFAS, we assume that the leachate would require treatment to receive a discharge permit under the Clean Water Act.[61] We assume that the town requires that commercial wastes are not co-mingled with its municipal solid waste, allowing the town to maintain the MSW exemption from CERCLA liability.

Town Strategy in Response to a CERCLA Designation

Assuming that Merced has, or is assumed to have, detectable PFOA and PFOS in its drinking water, wastewater effluent, biosolids, and leachate from its MSW, it will take action to minimize its CERCLA liability from these ongoing releases. The city will install treatment for its drinking water. The city will seek to add enforceable limits to its WWTP's effluent discharge permit. Achieving the expected permit limits will require the WWTP to install PFAS treatment for its effluent. The municipality will also shift biosolid management to solid waste landfills that collect and treat PFAS prior to the leachate's discharge or reuse. Finally, the city will require its landfill operator to treat the landfill's leachate for PFAS and seek a permit or permit modification to discharge the treated leachate.

3. Results

We estimate a total annual increase in household costs of approximately $560. We find the greatest increase for a household's sewage bill, followed by a somewhat smaller increase for drinking water treatment. These costs have a disproportionately greater impact on lower-income and middle-income households with costs exceeding one percent of annual income for all households earning less than $100,000 per year.

Population (2021)[62]	89,308
Households (HH)	26,626
Median HH Annual Income (in 2020 $)	$49,973

Income Distribution[63]

Households	Percentage of Population (%)	Number of people	Post-Reg Increase Percentage of Mean Income (%)
Less than $10,000	8.6	7680	11%
$10,000 to $14,999	6.4	5716	4%
$15,000 to $24,999	11.1	9913	3%
$25,000 to $34,999	9.7	8663	2%

[58] City of Merced, CA, "City of Merced Consumer Confidence Report: Reporting Year 2021."
[59] CA State Water Resources Control Board, "Geotracker PFAS Map."
[60] https://www.waterboards.ca.gov/pfas/docs/landfill_pfas_13267_go_03202019.pdf
[61] The State Water Resources Control Board has required sampling at certain landfills. This information may be available from waterboards.ca.gov/pfas/
[62] U.S. Census Bureau, "Census QuickFacts."
[63] U.S. Census Bureau, "2016-2020 American Community Survey 5-Year Estimates."

$35,000 to $49,999	14.1	12592	1%
$50,000 to $74,999	19.8	17683	1%
$75,000 to $99,999	10.2	9109	1%
$100,000 to $149,999	12.2	10896	0%
$150,000 to $199,999	3.9	3483	0%
$200,000 or more	3.8	3394	0%
Mean income (2020 $/year)	81,635		

Table 6: Estimated Annual Cost Increases per Household (HH) for Merced, CA

Cost per HH	Baseline ($/year/HH)	Post Reg ($/year/HH)	Increase (%)	Increase ($/year/HH)
DW	387	588	52%	201
Sewage	600	960	60%	360
Trash	589	589	0%[64]	0
Total	1,576	2,137		561

IX. Conclusion

The untested use of CERCLA Section 102(b) hazardous substance designations will unleash significant costs and unintended consequences that communities and their citizens will face during everyday life. Basic services, such as water, wastewater, and trash disposal costs will be impacted as municipalities of all sizes must upgrade the technologies needed to identify and treat these chemistries to meet their regulatory, environmental, and public health responsibilities. As a result, this data underscores that households will likely see their costs rise—especially presenting challenges for the most vulnerable populations with least ability to pay. EPA has existing authority to accelerate cleanups that would not trigger and avoid such costs and impacts.[65]

[64] The trash increase is reported as 0 percent because $0.12 per household is far closer to 0 percent than 1 percent for reporting to nearing percent of the $561/year cost.
[65] https://www.uschamber.com/assets/documents/230406_CERCLAAlternatives_Analysis.pdf

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Appendix 1: Detailed Results for Charleston, WV

These appendices include both the reference input data and the calculated results data.

Category	Wastewater	
	Effluent	Biosolids
Service Population		60,000
Facility Size (MGD)	10.5	
Dewatering Costs ($/year)	14,188	
Treatment Cost ($/day)	24,700	
Annual Incremental Costs ($/year)	9,000,000	46
Cost per Household ($/year/household)	315	0.0

Category	Landfill
Service Population	48,913
MSW Annual Generation (mt/year)	289,884
Treatment Unit Cost ($/1,000 gallons)	3
Annual Treatment Costs ($/year)	70,000
Cost per Household ($/year/household)	3.1
Cost per mt ($/mt)	0.2

Appendix 2: Detailed Results for Portland, ME

These appendices include both the reference input data and the calculated results data.

Category	Wastewater	
	Effluent	Biosolids
Service Population	55,181	
Facility Size (MGD)	18.1	
Dewatering Costs ($/year)	24,516	
Treatment Cost ($/day)	42,602	
Annual Incremental Costs ($/year)	15,600,000	140
Cost per Household ($/year/household)	593	0.01

Category	Landfill
Service Population	68,313
MSW Annual Generation (mt/year)	191,419
Treatment Unit Cost ($/1,000 gallons)	2
Annual Treatment Costs ($/year)	119,054
Cost per Household ($/year/household)	7.70
Cost per mt ($/mt)	0.03

Appendix 3: Detailed Results for Lumberton, NC

These appendices include both the reference input data and the calculated results data.

Category	Drinking Water
Service Population	18,694
Facility Size (MGD)	16.0
Treatment Cost ($/day)	0.55
Annual Treatment Costs ($/year)	3,200,000
Cost per Household ($/year/household)	454

Category	Wastewater	
	Effluent	Biosolids
Service Population		21,520
Facility Size (MGD)	5.4	
Dewatering Costs ($/year)	7,339	
Treatment Cost ($/day)	12,752	
Annual Incremental Costs ($/year)	4,660,000	572
Cost per Household ($/year/household)	572	0.001

Category	Landfill
Service Population	35,050
MSW Annual Generation (mt/year)	127,341
Treatment Unit Cost ($/1,000 gallons)	2
Annual Treatment Costs ($/year)	15,000
Cost per Household ($/year/household)	2.10
Cost per mt ($/mt)	0.004

Appendix 4: Detailed Results for Wixom, MI

These appendices include both the reference input data and the calculated results data.

Category	Wastewater	
	Effluent	Biosolids
Service Population		17,185
Facility Size (MGD)	2.8	
Dewatering Costs ($/year)	3,784	
Treatment Cost ($/day)	6,576	
Annual Incremental Costs ($/year)	2,400,000	27
Cost per Household ($/year/household)	377	0.004

Category	Landfill
Service Population	17,185
MSW Annual Generation (mt/year)	13,971
Treatment Unit Cost ($/1,000 gallons)	2
Annual Treatment Costs ($/year)	154,000
Cost per Household ($/year/household)	0.09
Cost per mt ($/mt)	0.04

Appendix 5: Detailed Results for Merced, CA

These appendices include both the reference input data and the calculated results data.

Category	Wastewater	
	Effluent	Biosolids
Service Population		89,308
Facility Size (MGD)	12	
Dewatering Costs ($/year)	16,218	
Treatment Cost ($/day)	28,182	
Annual Incremental Costs ($/year)	10,300,000	16,000
Cost per Household ($/year/household)	360	0

Category	**Landfill**
Service Population	89,308
MSW Annual Generation (mt/year)	73,000
Leachate Volume (1,000 gal/year)	1,318
Treatment Unit Cost ($/1,000 gallons)	2.3
Annual Treatment Costs ($/year)	16,000
Cost per Household ($/year/household)	0.12
Cost per mt ($/mt)	0

U.S. Chamber of Commerce