U.S. Chamber of Commerce

Potential Costs of Meeting Safe Drinking Water Act (SDWA) Standards for PFOA and PFOS

Prepared for the United States Chamber of Commerce

U.S. Chamber of Commerce

Table of Contents

Introduction

Potentially Responsible Parties (PRPs) at per- and poly-fluoroalkyl substances (PFAS) Superfund sites may incur costs for remediating contaminated ground and surface waters to drinking water standards. That cost is unknown, largely because the scope of public water systems (PWS) requiring cleanup is unknown. The Environmental Protection Agency (EPA) has neither identified the universe of Superfund sites with historical PFAS releases to PWS water sources, nor published the maximum contaminant level (MCL) establishing cleanup levels.[1] Further, EPA's third unregulated contaminant monitoring rule (UCMR3) does not identify populations exposed to PFAS concentrations lower than state established MCLs.

The PFAS drinking water remediation cost for a given PWS is also highly uncertain. Attributes including the extent of source contamination, total water demand, influent PFAS concentrations, existing water treatment infrastructure, and nature of the feasible remedial action determine total costs. These attributes—and therefore total costs—can vary significantly across PWS. Minnesota, for example, expects capital and operation and maintenance (O&M) costs to meet its health-based values for five PFAS in seven communities (population 161,000) will average \$47 million (\$326 million total) and range from \$3 million to \$153 million.

Despite this uncertainty, the consensus is that meeting PFAS drinking water standards will likely require substantial investment. EPA's 70 nano grams per liter (ng/L) lifetime health advisory (LHA) for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) combined (PFOS) is unlikely to be the MCL. States including Massachusetts and Vermont (20 ng/L), New Hampshire (15 ng/L), New Jersey (14 ng/L), New York (10 ng/L), and Michigan (8 ng/L) established lower MCLs.[2] The MCLs implied in EPA's recently proposed methodology are lower than 0.5 ng/L—virtually non-detectable. Although President Joe Biden committed up to \$10 billion of Infrastructure Investment and Jobs Act (IIJA) for drinking water remediation, \$5 billion of which is dedicated for PFAS, its significance depends largely on the MCL EPA sets.

Researchers commissioned by the Chamber developed a Monte Carlo model for the cost of meeting potential PFAS drinking water standards to evaluate the degree of SDWA compliance costs under CERCLA and the significance of the Biden Administration's funding commitment. The model includes four cost scenarios defined by increasingly stringent potential federal PFOS/PFOA MCLs: 70 ng/L, 20 ng/L, 10 ng/L, and non-detect. Each scenario includes from the PWS investigated for PFAS exposure, the subset with PFOS/PFOA concentrations exceeding the MCL. It is assumed that universal treatment using granulated activated carbon (GAC) technology can account for uncertainty by simulating 10,000 cost outcomes for each MCL, with each simulation drawing values varying by PWS from probability distributions for the geographic extent of contamination, GAC treatment system capacity, and the existence of water treatment infrastructure. Total costs for each simulated outcome are extrapolated for the sampled PWS to the nationwide total including non-sampled PWS.

As Figure 1 shows, the model finds that nationwide drinking water remediation costs increase sharply as the potential MCL declines from the EPA LHA value. There is virtually no chance of nationwide PWS treatment costs surpassing the \$10 billion in IIJA funds unless the MCL is below 20 ng/L. If the MCL is 10 ng/L or less, nationwide PWS treatment costs will certainly exceed \$10 billion. At 10 ng/L, there is a 50 percent probability that costs exceed \$12 billion, whereas the 50 percent probability is \$43 billion for the non-detect scenario. As expected, a key driver of cost and uncertainty is the MCL, because a substantial number of PWS exhibit PFAS exposure at low concentrations and the number of systems is the key driver of nationwide treatment cost.

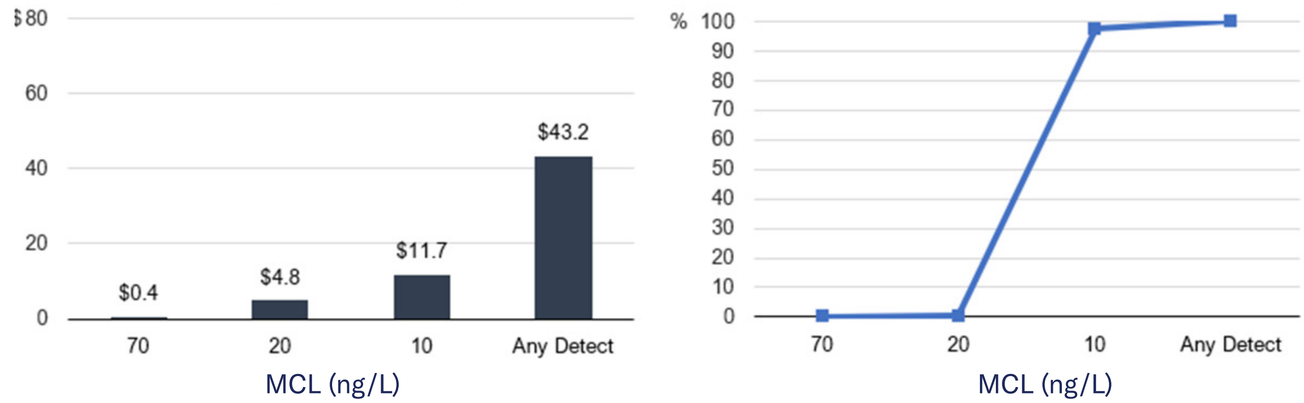
These results illustrate the uncertain cost of meeting PFAS drinking water standards. The exponential cost increase observed as MCLs decline below 10 ng/L suggests that cost-benefit analysis required by the SDWA should play a pivotal role in determining MCLs, which could ultimately influence CERCLA cleanup levels and therefore PRPs' liability.

* Study results have been updated; please see Appendix A.

Figure 1: Monte Carlo Simulation Estimates for Meeting PFOS/PFOA Drinking Water Standards

Cost of Meeting PFOS/PFOA Drinking Water Standards in Public Water Systems Nationwide, Billions

Probability of Nationwide PWS Costs Exceeding $10 Billion, N=10,00



Notes: Source is a Monte Carlo analysis developed using Andrews and Naidenko 2020, California SRWCB PFAS Investigation Data, SWRCB 2021 "Drinking Water Assesment Needs", UCMR3, USGS 2015 "Water Use in the United States".

The portion of the modeled drinking water treatment costs borne through Superfund site remedial actions is unknown. However, the absolute cost estimates may very well be indicative if EPA or the states require that all Superfund sites with PFAS releases to public drinking water sources implement cleanup meeting MCLs. Analysis of EPA data finds 60 percent of PWS have at least one facility (six on average) the EPA identified as “may be handling PFAS” within the same zip code.[3]

There are important limitations and caveats to consider when interpreting and using the model results. Among the most critical are:

- The model understates costs to the extent that EPA develops MCLs for PFAS substances other than PFOA and PFOS, and there are significant PWS exceeding those standards but not PFOA and PFOS.
- The sample of PWS investigated for PFAS exposure derives from a non-random process and may be unrepresentative of PWS nationwide.
- Alternatives to GAC filtration maintained as the universal treatment technology may be more cost-effective depending on unobserved (or not readily observed) PWS-specific characteristics.
- The model makes use of current water demand, thus potentially overstating costs in PWS with declining demand (i.e., conservation, reuse, out-migration) and understating costs otherwise.

The discussion section provides further details. The sections that follow present the models’ methods and assumptions, data, and results.

Methods and Data

Public Water Systems

An important driver of drinking water treatment costs is the number of PWSs with PFAS concentrations above the MCL. Analysts compiled 3,017 PWS with PFOS/PFOA concentrations obtained through historical investigations. Although located in 33 states, 95 percent of the PWS are in eight states.[4] Andrews and Naidenko (2020) provided population served and PFOA/PFOS concentrations for 2,799 PWSs they compiled from state agency, EPA/United States Geological Survey (USGS), and Environmental Working Group (EWG) data. California’s State Water Resources Control Board (SWRCB) reported PFOS/PFOA concentrations in drinking water concentrations from an average of ten sample locations within 218 cities and towns. Analysts considered a city or town a PWS and obtained its corresponding population from the US Census Bureau.

Total treatment costs will vary in proportion to total water demand. Although water demand can be assumed proportional to the population served, Dieter et al. (2015) shows that per capita consumption varies by state. Therefore, water demand in each PWS is estimated using the state specific daily per capita public water use. The U.S. average public waste use rate of 82 gallons per day (gal/d) was used for the subset of 25 PWS from the EPA/USGS source that does not specify state location.

As Table 1 shows, the 3,017 PWS comprise 6 percent of the 50,061 PWS nationwide required to meet MCLs and 29 percent of the 297 million people served nationwide.[5] The 4,519 PWS sampled for PFAS during 2013-2015 were not used as part of UCMR3. Although including more PWS selected from a specified sampling procedure, the UCMR3 data are inadequate for identifying populations exposed to PFOS/PFOA concentrations lower than 20 ng/L.

Treatment Cost

Water treatment costs are modeled assuming that all PWS use GAC treatment technology. SWRCB (2021) provided the GAC cost data summarized in Table 2. Equipment costs increase with the number and size of carbon vessel units and flow rate. SWRCB computes installation cost as 40 percent of the equipment cost. Overhead and profit is 10 percent and contingency 20 percent of the installed equipment cost (i.e., equipment plus installation cost).

SRWCB (2021) assumes GAC system operation and maintenance (O&M) costs are $280 per million gallons (Mgal). The figure is from the EPA's Work Breakdown Structure (WBS) model. It is assumed that EPA regulates PFAS as RCRA hazardous wastes and increase GAC O&M cost by 0.87 percent to $282.44 per Mgal to reflect the incremental cost of disposing of carbon filters in hazardous waste landfills.[6]

As explained below, the model also considers the fact that a PWS may require new or expanded water treatment plants (WTP) to house the GAC systems necessary to treat influent demand. Based on experience, it is assumed that WTP costs range from $2 million to $5 million per plant, and that a single plant supports a flow rate of up to 7,500 gallons per minute (gpm).

Table 1: Public Water System Sample Statistics

PWS Universe	#	Population Served (millions)	Water Demand (MGD)	Average PFOS/ PFOA (ng/L), All (w/Detections)
Andrews & Naidenko	2,799	64	4,922	13.5 (24.1)
California SWRCB	218	22	1,921	3.0 (11.0)
Out of Sample	47,263	211	17,302	NA
Total (25+ Connections)	50,061	297	24,145	

Notes: MGD ≡ million gallons per day. California SWRCB data are organized by city or town, each of which was treated as a PWS for this study.

Table 2: GAC Capital Costs

Vessel Diameter (ft x vessels)	GAC Mass (lb/vessel)	Flow Range (gpm)	Equipment Cost ($)	Installation Cost ($)	Overhead, Profit, Contingency ($)	Total Capital	Average Capital Cost ($/Mgal)
6 x 1	6,000	0 – 250	437,000	174,800	214,130	825,930	314
8 x 1	10,000	251 – 425	536,000	214,400	262,640	1,013,040	227
12 x 1	20,000	426 – 875	745,000	298,000	365,050	1,408,050	153
12 x 2	20,000	876 – 1,750	1,490,000	596,000	730,100	2,816,100	153

Notes: Notes: GAC ≡ Granulated Activated Carbon. gpm ≡ gallons per minute. Mgal ≡ million gallons. Average Cost is Total Cost divided by the 20-year flow assuming continuous operation at the maximum flow rate. Source is SWRCB (2021).

Compliance Scenarios

Four different potential drinking water standards for PFOS/PFOA were selected to distinguish separate treatment cost simulations: 70 ng/L, 20 ng/L, 10 ng/L, and non-detect. The 70 ng/L alternative is EPA's current LHA value of 70 ng/L. The 20 ng/L alternative is Massachusetts Maximum Contaminant Level (MMCL) for six PFAS. The 10 ng/L is considered a standard both because the MMCL is more restrictive than a standard of 20 ng/L for just PFOS/PFOA and other states have established lower PFOS/PFOA MCLs. Finally, the non-detect standard to reflect the MCLGs is considered-0.003 for PFOA and 0.006 ng/L for PFAS–implied by the oral reference doses that EPA used MCLG methodology documents it recently sent for peer review. Following is the number of PWS exceeding the MCL in each scenario.

Model Simulations

A Monte Carlo model was developed to simulate 10,000 treatment cost outcomes for the PWS included in each of the four drinking water standard scenarios (i.e., 40,000 total outcomes). Monte Carlo simulations can account for a wide range of potential outcomes and allow for estimating the probability that nationwide costs exceed a specific value for any MCL.

For each simulation, the PWS included are the subset of the 3,017 with PFOS/PFOA concentrations exceeding the PFAS drinking water standard scenario plus an additional number randomly selected from the subset. Augmenting the PWS sample accounts for the dataset's likely underrepresentation of the true universe of PWS requiring treatment. This results from factors such as newly discovered PFAS plumes or further migration, new testing methods, new testing locations, EPA developing MCLs for other PFAS substances, and the sample's concentration among 8 states. Analysis of the UCMR3 data finds that the sampled PWS likely underestimated the number of PWS exceeding the MCL by approximately 25 percent. Thus, for the 20 ng/L, 10 ng/L, and non-detect scenarios, the model selects additional PWS using a percentage scaling factor drawn from a Beta PERT distribution (minimum = 5 percent, mode = 25 percent, maximum = 30 percent).[7] For the 70 ng/L scenario, the model selects 100 percent of the PWS subset, because there are relatively few and the averaging of drinking water sample concentrations within PWS may disproportionately underrepresent the portion exceeding higher standards.

Within each simulation, there are also parameters determining treatment costs to vary by PWS. GAC capital costs vary by system size and flow rate. For each simulation and PWS, associated total capital cost modeled in SWRCB were selected based on PWS water treatment demand (SWRCB 2021). Both the total GAC capital costs and O&M costs for each PWS depend on the portion of PWS water demand requiring treatment. The model randomly assigns between 25 percent and 100 percent of PWS water demand for GAC treatment to account for uncertainty in the extent of PFAS contamination. The model determines total O&M costs by computing the 20-year treated water demand in millions of gallons and multiplying by the $282.44 per million gallons O&M cost.[8]

The model selects a 20 percent random sample of the included PWS as those requiring additional WTP infrastructure. It is assumed that one WTP building houses up to 7,500 gpm of GAC water treatment capacity. WTP building costs are modeled assuming the $2 million and $5 million per building cost range follows a uniform distribution.

Each simulation generates an estimate for the cost of meeting the drinking water standard for the 3,017 PWS in the sample dataset. Assuming the augmented sample adequately represents the scope and extent of PWS nationwide exceeding the MCL, the treatment cost for the sampled PWS was scaled (multiplied) to the national total by a factor for 3.45. The scaling factor is derived by dividing the 297 million people nationwide served by a PWS by the 86 million people served by the 3,017 PWS in the sample. Thus, for each simulation, the model computes the nationwide treatment cost as the sum of the GAC capital and O&M costs and WTP infrastructure costs for the sampled PWS multiplied by the 3.45 scaling factor.

Results

Table 3 shows the number and percentage of the 3,017 sampled PWS exceeding the drinking water standard. Few PWS exceed the EPA LHA (70 ng/L), whereas nearly one in three (about 29 percent) have detectable PFOS/PFOA concentrations.

The number of PWS exceeding the drinking water standard informs the number of PWS requiring treatment in each simulation. As seen in Table 4, estimated costs increase exponentially as the MCL declines. Nationwide costs from every simulation for the non-detect standard and almost every simulation for the 10 ng/L standard are $10 billion or more. For the 20 ng/L standard, fewer than 2 percent of simulations meet or exceed $10 billion, whereas costs do not reach $10 billion to meet a 70 ng/L standard. The highest median simulation cost ($43.2 billion) belonged to the non-detect standard, and the lowest ($447 million) to the EPA LHA standard of 70 ng/L standard.

As seen in Table 5, except for in the 70 ng/L scenario, GAC O&M costs over 20 years make up the largest percentage of median simulated costs in each drinking water standard scenario, followed closely by GAC capital costs. WTP Infrastructure costs comprise a small percentage of nationwide costs, largely because these occur in just 20 percent of the PWS.

Table 3: Sampled PWS Exceeding Each Drinking Water Standard

PFOS/PFOA Drinking Water Standard	Sample PWS Exceeding Drinking Water Standard	
	#	percent
70 ng/L (EPA)	14	0.5%
20 ng/L	119	3.9%
10 ng/L	244	8.4%
Non-Detect	864	28.6%

Table 4: Monte Carlo Simulation Results – Cost Estimates for Each Drinking Water Standard

PFOS/PFOA Drinking Water Standard	Probability Cost ≥ $10B (percent)	10th Percentile Cost ($B)	50th Percentile (Median) Cost ($B)	90th Percentile Cost ($B)
70 ng/L (EPA)	0	0.3	0.4	0.9
20 ng/L	0.49	4.2	4.8	5.6
10 ng/L	97.4	10.5	11.7	13.2
Non-Detect	100	40.2	43.2	46.5

Table 5: Monte Carlo Simulation Results – Median Estimate for Each Cost Category

PFOS/PFOA Drinking Water Standard	50th Percentile (Median) GAC Capital Costs ($B)	50th Percentile (Median) GAC O&M Costs ($B)	50th Percentile (Median) WTP Infrastructure Costs ($B)
70 ng/L (EPA)	0.197	0.176	0.074
20 ng/L	1.98	2.42	0.374
10 ng/L	4.81	6.03	0.812
Non-Detect	17.8	22.4	2.96

Discussion

There is little variation in nationwide costs across simulations within a drinking water standard scenario, particularly as the standard declines from the 70 ng/L LHA. For example, Table 4 shows the 90th percentile cost is greater than 100 percent of the median (50th percentile) cost for the 70 ng/L standard and just 8 percent greater for the non-detect scenario. This occurs because the sample is augmented by doubling the PWS exceeding 70 ng/L whereas the scaling factor is typically 25 percent for all other scenarios. Indeed, an important driver of variability is both the number of PWS additionally subject to treatment (for standards below 70 ng/L), but also which PWS were randomly selected to be additionally subject to treatment filtration. Selection of larger PWS results in greater treatment costs.

Within each simulation, the parameter describing the percentage of water demand requiring treatment in each PWS is the main driver of cost variability. This parameter varies plus or minus 37.5 percent of the expected value (62.5 percent). As such, if a PWS is subject to treatment, its capital and O&M costs are not expected to vary accordingly across simulations, although a PWS could use a different GAC system size depending due to variation in the percentage of water requiring treatment. On the other hand, individual PWS can incur infrastructure costs, and larger PWS will incur larger infrastructure costs than smaller PWS. However, infrastructure costs represent a small fraction of total costs because they occur only in 20 percent of the included PWS.

It is important when interpreting the model results not to lose sight of the fact they are derived from a model. Certain modeling assumptions and data limitations may inhibit making certain representations, and could bias the absolute costs higher or lower than actual costs:

- The model cannot estimate the expected value for PFOS/PFOA drinking water treatment costs because there is no assigned probability for the likelihood EPA will select a specific standard. Rather, the model estimates expected costs for each drinking water standard. That construct is useful for illustrating the uncertainty of costs in response to MCLs and their exponential nature.
- The model cannot predict uncertainty or otherwise capture incremental costs if EPA develops drinking water standards for other PFAS substances, as Massachusetts has already done, because the model's underlying data report only PFOS/PFOA concentrations. While analysis attempts to capture this by augmenting (adding to) the PWS subset, the true percentage of PWS exceeding future standards for other PFAS is not known. Costs are underestimated to the extent there are many PWS with exceedances for other PFAS substances but not PFOA and PFOS.
- The sample of PWS investigated for PFAS exposure is not generated from a random process or specific sampling procedure, and the PWS are concentrated in just eight states. Thus, contrary to the model's assumption, the sampled PWS may be unrepresentative of nationwide PFAS exposure. Based on UCMR3 data, it is expected that the sample may underrepresent the number of PWS requiring treatment. Although Table 1 shows that sampled systems have greater drinking water demand on average than the non-sampled systems, suggesting the sample overestimates population total costs, economies of scale mean treatment costs are lower per unit (i.e., gallon, person) in larger PWS than the smaller non-sampled systems.
- Alternatives to GAC filtration, including non-adsorption methods (e.g., well relocation, well shutdown, interconnection), may be more, or less, cost-effective given the specific contaminant characteristics (e.g., mixtures, other contaminants, geographic extent), existing infrastructure, and alternative water supplies that are not directly observed for the thousands of PWS in the model.
- The model uses current water demand because localized population growth projections are not available from a harmonized source. Thus, other factors constant, it overstates costs in areas with declining water demand (due to migration or conservation) and understates costs in areas with increasing demand. Sections that follow detail the models' methods and assumptions, data, and results.
- While capital and O&M costs are jointly determined, the model makes a simplifying assumption that GAC systems operate for 20 years at a $282.44 per million-gallon average cost for every combination of influent PFAS concentration and drinking water standard.

Conclusion and Discussion

The model results illustrate the uncertain cost of meeting PFAS drinking water standards. The exponential cost increase observed as MCLs decline below 10 ng/L suggests that a cost-benefit analysis required by the SDWA should play a pivotal role in determining MCLs, which could ultimately influence CERCLA cleanup levels and therefore PRPs' liability. Whether President Biden's $10 billion funding commitment is sufficient to offset treatment costs remains unclear. If a drinking water standard between 20 ppt and 70 ppt is selected, $10 billion will most likely be sufficient, or close to sufficient. However, just $5 billion of the funding is dedicated for PFAS. Nevertheless, the probability that treatment would exceed $10 billion if the drinking water standard were 20 ppt or 70 ppt is low. However, the probability that treatment would exceed $10 billion if the drinking water standard were 10 ppt or lower is high, particularly given that EPA's proposed MCLGs will likely be lower than 0.5 ng/L.

Endnotes

1. Pursuant to CERCLA Section 121 (d)(2)(A), EPA believes that MCLGs "should be attained where relevant and appropriate as cleanup levels for ground or surface waters that are current or potential sources of drinking water". See EPA (1990).
2. For some states, for example Massachusetts, the MCL applies to the combination of PFOA, PFOS and other PFAS substances, and is thus more stringent than a MCL for PFOA and PFOS.
3. PFAS facilities were identified from EPA data the Public Employees for Environmental Responsibility published in October 2021 and the PWS from the EPA's ECHO database download for Safe Drinking Water Identification System (SDWIS). The analysis excludes PFAS facilities classified as "National Defense".
4. These are MI, NJ, CO, NH, NC, CA, KY, and RI.
5. The SDWA requires PWS with at least 25 service connections. EPA's ECHO database reports 50,061 community, non-transient, and transient PWS with at least 25 service connections serving more than 312 million people. However, this transient use includes community and non-transient populations. Therefore, analysis followed A&D (2020) and used 297 million served by PWS nationwide.
6. According to SWRCB (2021), EPA models carbon disposal as 0.17 percent of the O&M cost. Based on EPA (1997), it is assumed hazardous waste disposal costs are 5 times greater than non-hazardous waste. Thus a 500 percent increase in disposal cost multipled by 0.17 percent of the O&M cost assuming non-hazardous waste is a 0.87 percent increase.
7. For example, if 100 PWS exceed a given MCL, simulation 1 draws from the Beta PERT distribution a percentage scaling factor. If that number is 25 percent, the model includes 125 PWS by selecting the incremental 25 randomly from the 100 PWS with actual PFOS/PFOA concentrations exceeding the scenario MCL. While the scaling factor selected for each simulation ranges from 5 percent to 30 percent, the mode value of 25 percent is the most likely outcome.
8. Future O&M costs are not discounted. Because constant dollar cost figures are being used, the discount rate necessarily reflects the real (i.e., inflation-free) rate of return on a risk-free investment. Currently, the real yield for the 10-year Treasury bill is 0.1 percent, thus discounting future costs has little impact.

References

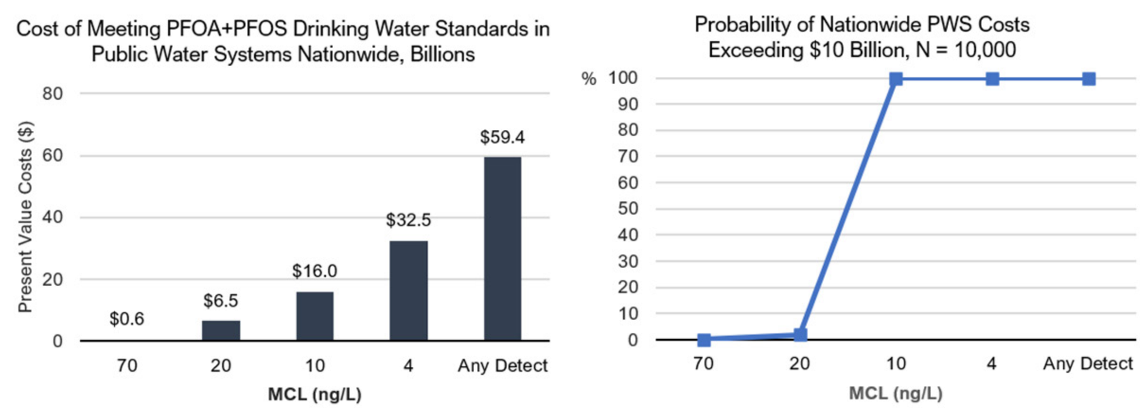
- Andrews and Naidenko. 2020. Population-Wide Exposure to Per- and Polyfluoroalkyl Substances from Drinking Water in the United Sates. Environ. Sci. Technol. Lett. 7: 931-936. https://dx.doi.org/10.1021/acs.estlett.0c00713
- California State Water Resources Control Board. 2021. State Water Resources Control Board 2021 Drinking water Needs Assessment Cost Assessment Methodology Appendix C. https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/c3.pdf
- "GeoTracker PFAS Map". https://geotracker.waterboards.ca.gov/map/pfas_map
- Congressional Research Service. 2021. Safe Drinking Water Act (SDWA): A Summary of the Act and Its Major Requirements. Updated July. https://sgp.fas.org/crs/misc/RL31243.pdf
- Dieter, C.A., Maupin, M.A., Caldwell, R.R., Harris, M.A., Ivahnenko, T.I., Lovelace, J.K., Barber, N.L., and Linsey, K.S., 2018, Estimated use of water in the United States in 2015: U.S. Geological Survey Circular 1441, 65 p., https://doi.org/10.3133/cir1441. [Supersedes USGS Open-File Report 2017–1131.]
- Interstate Technology Regulatory Council. PFAS Fact Sheets: Water and Soil Values. Last Updated October 2021. https://pfas-1.itrcweb.org/fact-sheets/
- Minnesota Pollution Control Agency and Minnesota Department of Natural Resources. 2021. Conceptual Drinking Water Supply Plan: Long-term Options for the East Metropolitan Area. Document number: c-pfc1-23. August. https://3msettlement.state.mn.us/sites/default/files/Final-Plan-chapters-1-10.pdf
- "PFAS Map | EPA Identifies More Than 120,000 Potential PFAS Sites in U.S.", Public Employees for Environmental Responsibility. Available: https://www.peer.org/areas-of-work/public-health/pfas/pfas-map/
- United States Bureau of the Census. Annual Estimates of the Resident Population for Incorporated Places in California: April 1, 2010 to July 1, 2019. https://www2.census.gov/programs-surveys/popest/tables/2010-2019/cities/totals/SUB-IP-EST2019-ANNRES-06.xlsx
- United States Environmental Protection Agency (USEPA) Enforcement and Compliance History Online (ECHO) Data Downloads, Safe Drinking Water Information System (SDWIS). File: SDWA Dataset.zip. Downloaded November 19, 2021. https://echo.epa.gov/files/echodownloads/SDWA_latest_downloads.zip
- United States Environmental Protection Agency (USEPA). Occurrence Data for the Unregulated Contaminant Monitoring Rule: UCMR 3 (2013-2015) Occurrence Data. File: UCMR 3 Occurrence Data.zip. https://www.epa.gov/sites/default/files/2017-02/ucmr-3-occurrence-data.zip
- United States Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response. 1990. CERCLA Compliance with Other Laws Manual Quick Reference Fact Sheet: CERCLA Compliance with the CWA and SWDA. Publication 9234.2-06/FS. February.
- USEPA Science Advisory Board. 2021. PDF for Proposed Approaches to the Derivation of a Draft Maximum Contaminant Level Goal for Perfluorooctane Sulfonic Acid (PFOS) (CASRN 1763-23-1) in Drinking Water. https://sab.epa.gov/ords/sab/apex_util.get_blob?s=9578091699047&a=100&c=11827063920714714&p=18&k1=2467&k2=&ck=tkXjpRyIcAW4p9bTNxCx9FI6BbOsrgQ7OiW-9qw97KRcPIZK2j-g3g3rqWRHtI8Kjn_L_ZcX1Gan1K5yZQkq0w&rt=IR
- PDF for Proposed Approaches to the Derivation of a Draft Maximum Contaminant Level Goal for Perfluorooctanoic Acid (PFOA) (CASRN 33567-1) in Drinking Water. https://sab.epa.gov/ords/sab/apex_util.get_blob?s=9578091699047&a=100&c=11827063920714714&p=18&k1=2469&k2=&ck=SVU5ZlXtNfEOIEtRZaQ3Jhn_H5o96_HIZE2hWbw-TYsjszjyWpzChCSNDc-hT7HzjzhiwWWGvnWnPxfAe53frA&rt=IR

Appendix A. Potential Costs of Meeting Safe Drinking Water Act (SDWA) Standards for PFOA and PFOS

The U.S. Chamber of Commerce (the Chamber), working with its team of experts in environmental and economic consulting, completed an analysis estimating the costs for public water systems (PWSs) nationwide to comply with potential PFOA and PFOS Maximum Contaminant Levels (MCLs) anticipated in the National Primary Drinking Water Regulations (NPDWR). The study dated December 10, 2021, provided drinking water treatment cost estimates (stated in 2020 dollars) for four MCL scenarios, 70 ppt, 20 ppt, 10 ppt, and any detection. Its findings suggested that the $10 billion for addressing PFAS and other emerging contaminants in drinking water provided by the Infrastructure Investment and Jobs Act of 2021 is likely to absorb nationwide compliance costs if EPA set the MCL at or above 20 ppt, whereas the funding commitment is certainly exhausted if the MCL is 10 ppt or lower.

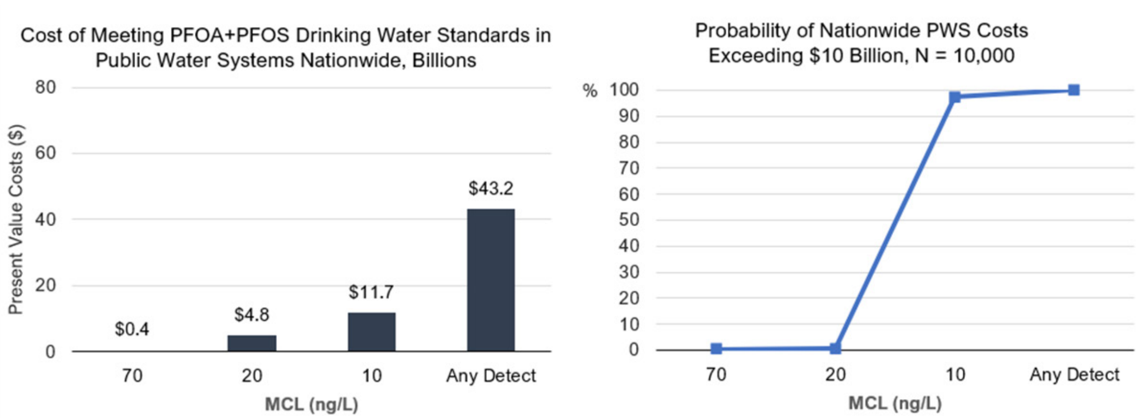
In October 2022, the Chamber explored expansion of the scope of its study to include a 4 ppt MCL scenario, and to restate all drinking water treatment capital and operating and maintenance (O&M) costs in 2022 (year-to-date) dollars. Additionally, the significant increase in real risk-free interest rates over the past year, from 0.1% to 1.78%, now effectively reduces the present value of 20-year O&M costs.

Figure 1: Monte Carlo Simulation Present Value Cost Estimates for Meeting PFOA+PFOS Drinking Water Standards **UPDATE – OCTOBER 2022 (2022$)**



Notes: Source is a Monte Carlo analysis developed using Andrews and Naidenko 2020, California SRWCB PFAS Investigation Data, SWRCB 2021 "Drinking Water Assessment Needs", UCMR3, USGS 2015 "Water Use in the United States".

Figure 1:Monte Carlo Simulation Present Value Cost Estimates for Meeting PFOA+PFOS Drinking Water Standards **ORIGINAL – DECEMBER 2021 (2020$)**



Notes: Source is a Monte Carlo analysis developed using Andrews and Naidenko 2020, California SRWCB PFAS Investigation Data, SWRCB 2021 "Drinking Water Assessment Needs", UCMR3, USGS 2015 "Water Use in the United States".

U.S. Chamber of Commerce