REVISED 12/16

Regulatory Analysis Form

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INDEPENDENT REGULATORY REVIEW COMMISSION

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IRRC Number: **3334**

(1) Agency:

Department of Environmental Protection

(2) Agency Number: 7

Identification Number: 569

(3) PA Code Cite: 25 Pa. Code, Chapter 109 (Safe Drinking Water)

(4) Short Title: Safe Drinking Water PFAS MCL Rule

(5) Agency Contacts (List Telephone Number and Email Address):

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(6) Type of Rulemaking (check applicable box):

- ☐ Proposed Regulation
- ☒ Final Regulation
- ☐ Final Omitted Regulation
- ☐ Emergency Certification Regulation;
- ☐ Certification by the Governor
- ☐ Certification by the Attorney General

(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)

This rulemaking sets drinking water standards for two chemicals – perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) – which are part of a larger group of perfluoroalkyl and polyfluoroalkyl substances (PFAS). The rulemaking also describes monitoring requirements for public water systems (PWSs) to demonstrate compliance with the PFOA and PFOS standards. Currently, these contaminants are not regulated in drinking water at the federal level or in Pennsylvania. Implementation of the drinking water standards in this rulemaking will protect Pennsylvanians from the adverse health effects of these contaminants.

The rulemaking also includes minor revisions to address incorrect cross-references and citations, delete duplicated text, and update language; these minor updates codify existing practices and will not change current practice.

(8) State the statutory authority for the regulation. Include specific statutory citation.

Section 4 of the Pennsylvania Safe Drinking Water Act, 35 P.S. § 721.4, and section 1920-A of The Administrative Code of 1929, 71 P.S. § 510-20.

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

The rule is not federally mandated.

In 2016, the United States Environmental Protection Agency (EPA) established a lifetime health advisory level (HAL) for PFOA and PFOS of 70 parts per trillion (ppt) combined. HALs are not enforceable standards, but the Department has the regulatory authority to require corrective actions by PWSs if HALs are exceeded, as well as having the statutory authority to set state maximum contaminant levels (MCLs) in drinking water. Current research indicates that the 2016 EPA HAL is not sufficiently protective of public health. On February 22, 2021, EPA issued final regulatory determinations for contaminants on the fourth Contaminant Candidate List, which included a final determination to regulate PFOA and PFOS in drinking water. This determination was published in the *Federal Register* on March 3, 2021 (86 FR 12272), which starts a 24-month time clock for EPA to publish a proposed rulemaking. In the meantime, one of the goals of the PFAS Action Team in Pennsylvania, created by Executive Order 2018-08 signed in September 2018 by Governor Wolf, is the establishment of a state MCL in drinking water. Until EPA publishes a final rulemaking for PFOA and PFOS, a state drinking water standard is needed to improve public health protection for the nearly 12 million Pennsylvanians served by the PWSs to which this final-form rulemaking applies.

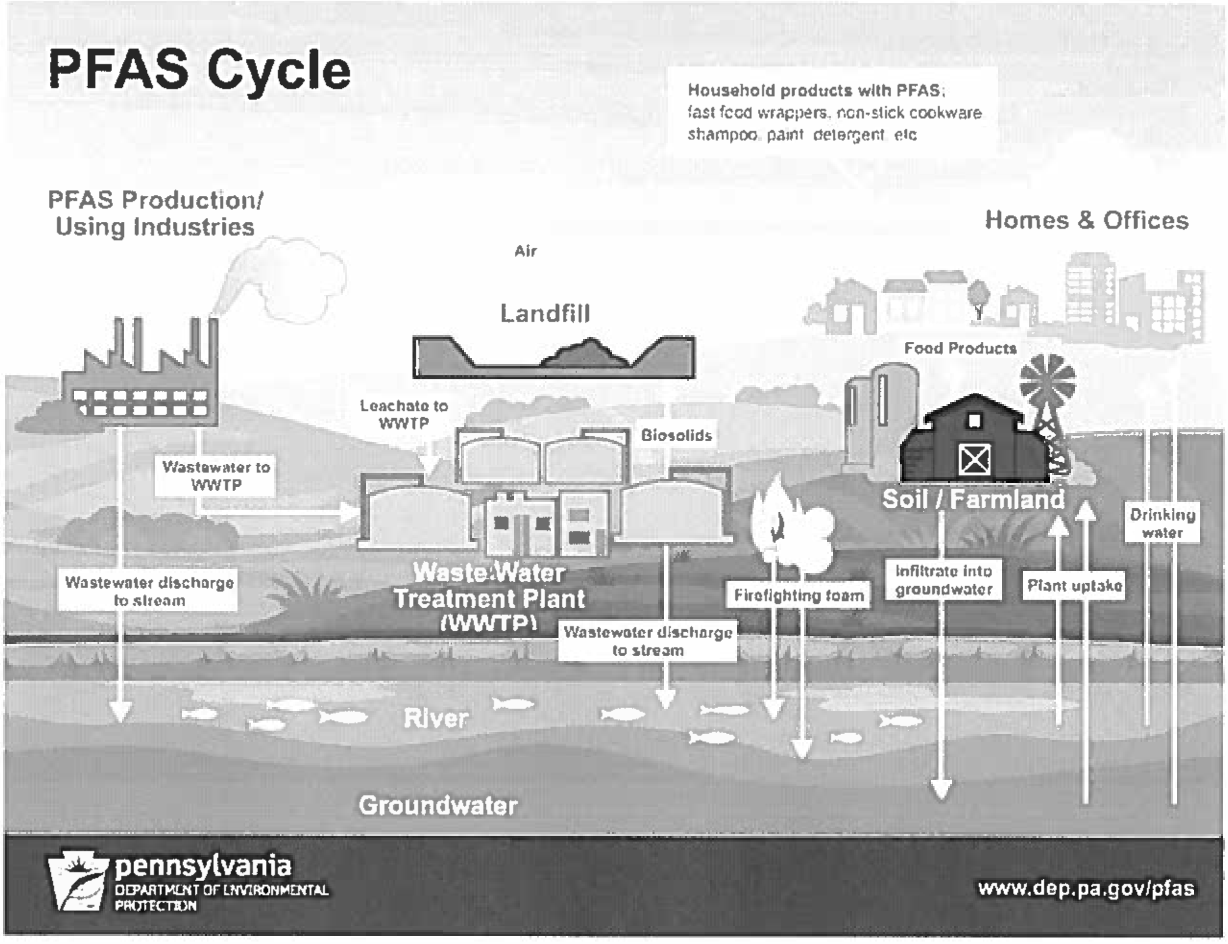
(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

This rule is needed to better protect Pennsylvanians from the adverse health effects of exposure to PFOA and PFOS in drinking water.

PFAS are a large class of man-made synthetic chemicals that were created in the 1930s and 1940s for use in many industrial and manufacturing applications. It is estimated that the PFAS family includes more than 6,000 chemical compounds. PFAS have been widely used for their unique properties that make products repel water, grease and stains, reduce friction, and resist heat. PFAS are found in industrial and consumer products such as clothing, carpeting, upholstery, food packaging, non-stick cookware, fire-fighting foams, personal care products, paints, adhesives, metal plating, wire manufacturing, and many other uses. Because of their unique chemical structure, PFAS readily dissolve in water and are mobile, are highly persistent in the environment, and bioaccumulate in living organisms over time.

Decades of widespread use of products containing PFAS has resulted in elevated levels of environmental pollution and exposure in some areas of the state. As illustrated below, PFAS remain in the environment and cycle through various media (i.e., air, water, soil) depending on how and where the substances were released. The primary means of distribution of PFAS throughout the environment has been though the air, water, biosolids, food, landfill leachate, and fire-fighting activities.

The PFAS cycle and its exposure pathways.



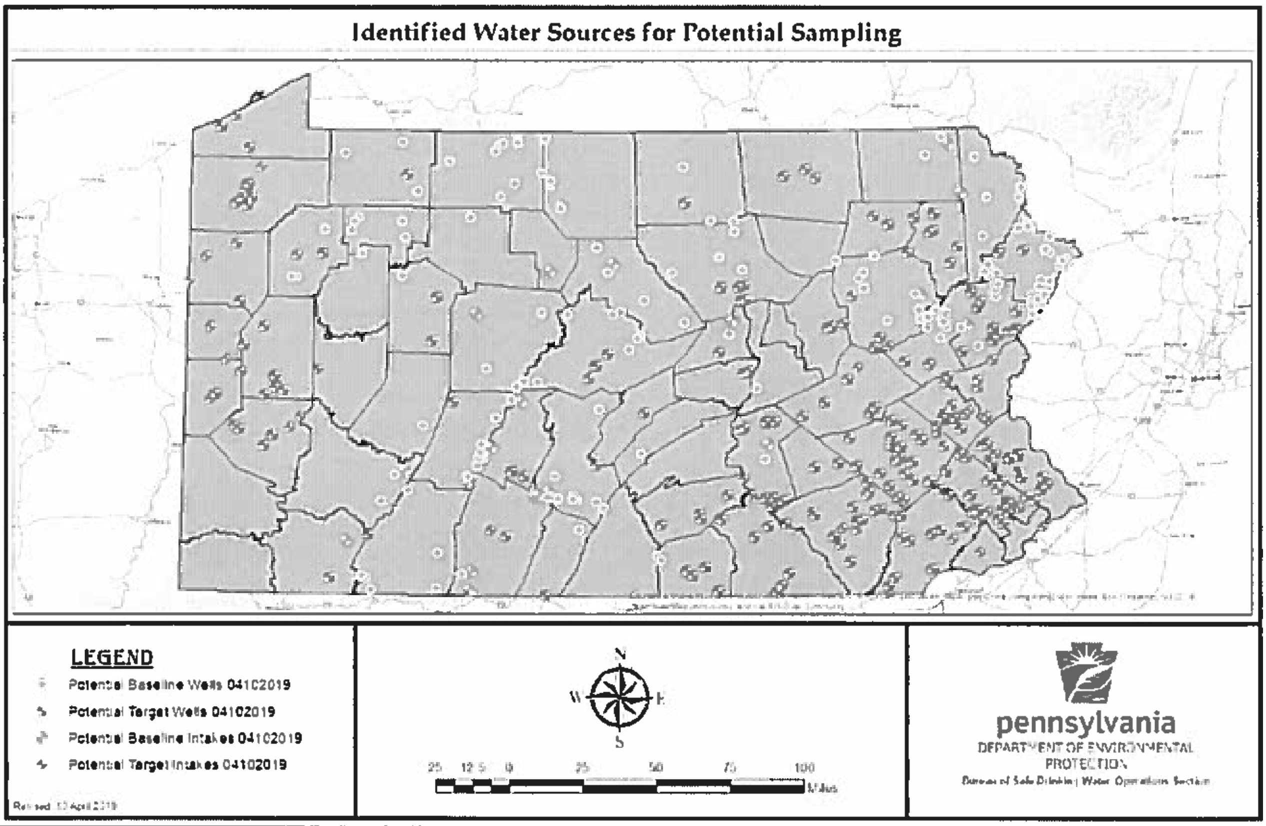
Through a toxicology services contract, a group of toxicologists and other scientific professionals at Drexel University – referred to here as the Drexel PFAS Advisory Group (DPAG) – determined that PFOA exposure has been linked to developmental effects (neurobehavioral and skeletal effects) and PFOS exposure has been linked to adverse immune system effects (including immune suppression); specific references used by DPAG in this research are cited in the DPAG report and workbook, links to which are provided in the response to question 28.

In 2016, EPA established a combined lifetime HAL for PFOA and PFOS of 70 ppt in finished drinking water. While HALs are not enforceable regulatory standards, the Department has the regulatory authority to require corrective actions if HALs are exceeded. However, current research suggests that the 2016 EPA HAL for PFOA and PFOS is not sufficiently protective of public health. EPA has started the process of setting more stringent standards for PFOA and PFOS in drinking water, but that process is expected to take several years to complete. For that reason, it is important that the Board act now to propose more protective standards for this Commonwealth, to protect the health of the nearly 12 million Pennsylvanians served by the PWSs to which this rule applies. This rule will improve public health protection by requiring PWSs to comply with a lower standard for PFOA and PFOS in drinking water and to routinely monitor the drinking water they provide to ensure compliance with those lower standards.

The Department contracted DPAG to review current health-based studies and research on select PFAS. Based on this research, DPAG made maximum contaminant level goal (MCLG) recommendations to the Department for select PFAS. MCLGs are non-enforceable levels based solely on health effects and do not take into consideration other factors such as technical limitations or cost. Based on MCLGs recommended by DPAG, the Department determined MCLs for PFOA and PFOS in part by assessing the percentage of improvement in health protection at various levels, including the recommended MCLGs, compared to the 2016 EPA HAL. Compared to the 2016 EPA HAL, the MCL of 14 ppt for PFOA represents a 90% increase in public health protection and the MCL of 18 ppt for PFOS represents a 93% increase in health protection. This increase in public health protection is expected to result from a reduction in instances of human development disruption and immune system impacts.

Occurrence data for PFAS were also used in development of this rulemaking. The Department's Bureau of Safe Drinking Water (BSDW) collected data as part of BSDW's sampling plan for PFAS in drinking water supplies. The below map identifies the PWS sources for potential sampling, including the targeted and baseline sites. Targeted sites were selected based on their proximity to potential sources of PFAS contamination (PSOC). The initial sampling pool included 493 PWS sources. The sampling pool contained a mix of PWS types and sizes and provided a good spatial distribution across the state. Based on available funding of $500,000, the Department proposed sampling at 360 targeted and 40 baseline entry point (EP) sites. Baseline sources are located in a HUC-12 watershed (a watershed assigned a 12-digit hydrologic unit code, or HUC, by the United States Geological Survey) with at least 75% forested land and at least five miles from a PSOC. Ultimately, samples were collected from 412 EPs, including 372 targeted sites and 40 baseline sites. Note that an EP to a distribution system may include water from more than one source of supply.

PFAS Sampling Plan – Pool of Identified PWS Sources for Potential Sampling.



The Department also conducted a review of sample results from monitoring conducted by PWS in Pennsylvania under EPA's Third Unregulated Contaminant Monitoring Rule (UCMR3). The UCMR3 data includes results analyzed for six PFAS via EPA Method 537 Version 1.1. The samples collected as part of BSDW's sampling plan were analyzed for 18 PFAS via EPA Method 537.1. In the occurrence data, PFOA was detected in 29.9% of samples and PFOS was detected in 27.1% of samples. The occurrence data were also compared to the MCLGs and MCLs. For PFOA, 10.6% of results were over the MCLG of 8 ppt and 5.7% of results were over the MCL of 14 ppt. For PFOS, 5.3% of results were over the MCLG of 14 ppt and 5.1% of results were over the MCL of 18 ppt. These data indicate that implementing a lower standard for PFOA and PFOS than the 2016 EPA HAL represents a meaningful opportunity to improve public health protection in Pennsylvania.

This rulemaking applies to all 3,117 community, nontransient noncommunity, bottled, vended, retail, and bulk PWSs in Pennsylvania. Of these, 1,905 are community water systems (CWSs), serving a combined population of approximately 11.4 million Pennsylvanians; another 1,096 are nontransient noncommunity water systems (NTNCWSs) serving approximately 507,000 persons. Therefore, the rulemaking benefits approximately 11.9 million Pennsylvanians.

(11) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

Yes, the provisions in this rulemaking are more stringent than current federal standards. EPA has not set MCLs for PFOA or PFOS, and the MCLs for PFOA and PFOS in this rulemaking are more stringent than the 2016 HAL established by EPA. Since PFOA and PFOS in drinking water are not currently regulated at the federal level, the monitoring frequencies and other provisions in this rulemaking are also more stringent than any federal requirements. The Department developed these provisions to better protect public health in Pennsylvania, in accordance with the goals of Pennsylvania's PFAS Action Team.

- The MCLGs in this rulemaking at § 109.202(a)(4)(ii) are based on the most current toxicological research available at the time. Through a toxicology services contract, DPAG conducted a thorough and independent review of federal and other states' work on MCLs for PFAS, including the available research, data, and scientific studies. Based on this research, DPAG mad MCLG recommendations to the Department for select PFAS. MCLGs are non-enforceable levels based solely on health effects and do not take into consideration other factors such as technical limitations or cost. MCLGs are the starting point for determining MCLs.

- The MCLs in this rulemaking at § 109.202(a)(4)(ii) were determined based on a variety of factors, including DPAG's MCLG recommendations and review of available health effects information, occurrence data, a cost-benefit analysis, and technical considerations such as analytical methods and available treatment techniques. The cost-benefit analysis evaluated the percentage of improvement in health protection relative to the percentage of increased cost of implementation at various levels compared to the 2016 EPA HAL. The MCLs determined based on this process represent a 90% and 93% improvement in health protection for PFOA and PFOS, respectively. This is a significant increase in public health protection and a compelling reason to move forward with more stringent standards than federal requirements. DPAG's review of PFAS blood serum levels at various PFAS concentrations in drinking water correlate well with the Department's assessment of at least 90% improvement in public health at the MCLs (DPAG, 2022).

- The monitoring requirements for CWSs, NTNCWSs, and bottled, vended, retail, and bulk systems (BVRBs) for PFOA and PFOS in this rulemaking at § 109.301(16) and § 109.1003(a)(1)(xv) are necessary to demonstrate compliance with the MCLs. Monitoring requirements include initial quarterly monitoring, reduced repeat monitoring where there are no detections, quarterly repeat monitoring where there is a detection or an MCL exceedance, confirmation samples to confirm an MCL exceedance, and monitoring requirements for systems with treatment to remove PFAS, to ensure treatment efficacy.

- This rulemaking also establishes MCL exceedances for PFOA and PFOS as chronic health-based violations requiring Tier 2 public notification (PN) and includes health effects language at § 109.411(e)(1)(ii) and (iii) to include in notices for MCL exceedances of PFOA or PFOS. Public notification of any MCL exceedance is a critical component of public health protection.

(12) How does this regulation compare with those of the other states? How will this affect Pennsylvania's ability to compete with other states?

At the time of this final-form rulemaking, seven other states – Massachusetts, Michigan, New Hampshire, New Jersey, New York, Vermont, and Washington – have enacted regulations on PFAS in drinking water. A few other states – including California, Connecticut, Minnesota, and Ohio – have implemented advisory, guidance, or response levels for PFAS in drinking water. Table 1 below summarizes other states' regulatory limits, applicability, PN requirements, best available technology (BAT) or acceptable treatment, and analytical methods and minimum reporting levels (MRLs) and compares them to the provisions of this rule. Monitoring requirements are summarized for comparison in Table 2.

Table 1. Comparison of state MCLs, applicability, PN requirements, BAT, and analytical methods for PFAS

State	PFOA MCL (ppt)	PFOS MCL (ppt)	Other PFAS MCLs (ppt)	Applicability	PN	BAT or Acceptable Treatment	Analytical Methods/MRL
PA	14	18	NA (monitoring and reporting required for 5 additional PFAS during initial quarterly monitoring only)	CWSs, NTNCWSs, BVRBs	Tier 2	GAC, ion exchange, reverse osmosis (RO), or other technologies approved by DEP	EPA 537 version 1.1, EPA 537.1, EPA 533; MRL = 5 ppt
MA	20 (sum of six PFAS: PFOA, PFOS, PFHxS, PFNA, PFHpA, PFDA)			CWSs & NTNCWSs (TNCs must conduct 1 round of monitoring)	Tier 2; Note: MCL exceedance triggers delivery of public education materials.	GAC, PAC, ion exchange resins, nanofiltration, and RO	EPA 537, EPA 537.1; MRL=2.0 ppt; Note: rule requires analysis and reporting of all PFAS in method
MI	8	16	HFPO-DA=370 PFBS=420 PFHxS=51 PFHxA=400,000 PFNA=6	CWSs & NTNCWSs (TNCs may be required to monitor)	Tier 2	GAC or an equally efficient technology	EPA 537.1 or other methods approved; MRL=2 ppt

NH	12	15	PFHxS=18 PFNA=11	CWSs & NTNCWSs	No PN Tier assignment	Not specified in rule; summary indicates compliance achieved using GAC	Methods not specified; Detection limit = 2 ppt
NJ	14	13	PFNA=13	CWSs & NTNCWSs	No PN Tier assignment	Not specified in rule	Methods not specified; recommended PQL values are 6 ppt for PFOA and 4.2 ppt for PFOS
NY	10	10	NA	CWSs & NTNCWSs	Tier 2	GAC	
VT	20 (sum of five PFAS: PFOA, PFOS, PFHxS, PFHpA, PFNA)			CWSs & NTNCWSs	Tier 1, Do Not Drink		EPA 537.1 or subsequent EPA-approved method; MRL = 2 ppt
WA	10	15	PFNA=9 PFHxS=65 PFBS=345	CWSs & NTNCWSs	Tier 2	Not specified in rule	EPA 537.1, EPA 533 MRL not specified
CA	5.1	6.5		Notification Levels			
	10	40		Response Levels			
CT	16	10	PFNA = 12 PFHxS = 49	Action Level			
MN	35	15	PFBS = 100 PFHxS = 47 PFBA = 7,000 PFHxA = 200	Health Advisory Levels			
OH	70 (alone or combined with PFOS)	70 (alone or combined with PFOA)	HFPO-DA=21 PFBS=2,100 PFHxS=140 PFNA=21	HALs for PFOA and PFOS; all other PFAS listed have Action Levels			

Table 2. Comparison of state monitoring requirements for PFAS

State	Monitoring
PA	<u>Initial</u>: 4 Quarterly (Q) samples <u>Repeat</u>: If detected at or above minimum reporting level (MRL), continue Q for at least 4 Q and until reliably and consistently (R&C) < MCL. If R&C < MCL, DEP may allow system to monitor annually (A) during previously highest quarter. If detected > MCL, continue Q for at least 4 Q and until R&C <MCL. If R&C <MCL, DEP may allow A monitoring during previous highest quarter. <u>Reduced</u>: If not detected (ND), monitor every 3 years. <u>Waivers</u>: Systems with previous detections <MCL may apply for a use waiver to reduce from A to triennial monitoring. <u>Notes</u>: Confirmation sample required within 2 weeks of notice from lab of result > MCL. Entry points (EPs) with treatment monitor for compliance at least A, performance monitoring Q.

MA	Initial: 4 Q samples Routine: If ND, monitor every 3 years (small systems: 1 Q sample, medium/large systems: 2 Q samples) Increased: If detect > 10 ppt (50% of MCL), monitor monthly. If detect < 10 ppt, or R&C < 10, monitor A. If ND for 3 A periods, monitor every 3 years. Waivers: PWS on routine monitoring can request waiver for 3-year period which must be renewed; monitoring must be conducted at least once during first 3-year period of each 9-year cycle. Waivers are combination use and susceptibility. Notes: During initial monitoring, PWS can request to substitute previous Q data. If ND in first 2 Qs, PWS can request waiver for Qs 3 & 4. EPs w/treatment monitor Q. Detects require confirmation sample within 2 weeks and source water monitoring.
MI	Initial: If PWS participated in MI's Statewide PFAS Survey and results were >50% of MCL, PWS shall collect Q samples; if results were <50% of MCL, PWS shall collect one sample within 6 months. If PWS did not participate in Statewide Survey, PWS shall collect Q samples. Reduced: If ND, PWS may monitor A. If detects, monitor Q until results are R&C below MCL. If R&C below MCL, PWS may monitor A. Waivers: No waivers.
NH	Initial: 4 Q samples. If first 2 Qs ND, final 2 Qs can be waived. Reduced: If average of initial results is </=50% of MCL, monitor once every 3 years. If average of initial results is >50% of MCL, monitor A. Monitor during Q with highest result. Confirmation sample required within 14 days if result >50% of MCL. Increased: If running annual average (RAA) > MCL, monitor Q. If PWS installs treatment, monitor Q. Waivers: No waivers.
NJ	Requires monitoring as per EPA VOC requirements (141.24(f)). Includes initial Q monitoring. Rule allows substitution (grandfathering) of select existing data to fulfill initial Q monitoring requirement. Rule does not mention waivers.
NY	Initial: 4 Q samples. Repeat: Continue Q if detected. Reduced: State can reduce Q to A if R&C below MCL. After 3 A periods w/no detect, can apply for waiver. If detects, repeat monitoring must include all PFAS contained in method. If ND, sample every 18 months (medium /large systems >3,300) or every 3 years (small systems <3,300). Waivers: Rule allows 3-year use waivers.
VT	Initial: A monitoring. Reduced: If ND, monitor every 3 years. If ND for 2 consecutive triennial periods, monitor every 6 years. Increased: If detected <15 ppt, stay on A. If detected >15 ppt, conduct Q monitoring. If <15ppt for 4 Qs, monitor A.
WA	Initial: One sample prior to December 31, 2025 Reduced: If ND, one sample every 3 years. Repeat: If detected, 1 or 2 additional quarterly samples if level detected < 80% of regulatory limit (then reduced to A); quarterly if level detected is >= 80% of regulatory limit.

Other states not identified in the preceding tables did not have state MCLs or other regulatory limits for PFAS established as of the time of this final-form rulemaking. Those states have the 2016 EPA lifetime HAL of 70 ppt combined for PFOA and PFOS to use as a guidance value, until such time that EPA or the individual state publishes a final rule setting MCLs and monitoring requirements for PFOA and PFOS.

By improving public health protections for nearly 12 million Pennsylvania, this rule will enhance Pennsylvania's ability to compete with other states. This rulemaking is not expected to negatively affect Pennsylvania's ability to compete with other states for at least two reasons. First, the MCLs for PFOA and PFOS in this rulemaking are of similar magnitude as MCLs for PFOA, PFOS, and other PFAS established by other states (see Table 1), and the monitoring requirements in this rulemaking are similar to those established by other states (see Table 2). Second, states that have not established state-level drinking water standards for PFAS would be required to adopt federal MCLs set by EPA.

(13) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

The amendments will be incorporated into the existing language of 25 Pa. Code Chapter 109. Other than this incorporation, the amendments should not affect any existing or currently proposed regulations of the Department or any other state agency.

(14) Describe the communications with and solicitation of input from the public, any advisory council/group, small businesses and groups representing small businesses in the development and drafting of the regulation. List the specific persons and/or groups who were involved. ("Small business" is defined in Section 3 of the Regulatory Review Act, Act 76 of 2012.)

The Public Water System Technical Assistance Center (TAC) Board is the Department's primary advisory board for the Department's Safe Drinking Water Program. The TAC Board includes representatives from a broad array of drinking water professional associations and stakeholder organizations.

The Department presented the draft proposed rulemaking to the TAC Board for review and discussion on July 29, 2021; the TAC Board unanimously supported the draft proposed rulemaking as it was presented. The TAC Board also expressed support for the draft proposed rulemaking in a letter dated July 30, 2021, available at https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/November%2016/03_7-569_PFAS%20MCL_Proposed%20RM/04b_7-569_PFAS%20MCL_Proposed_TAC%20Comment%20letter.pdf.

The Department presented the draft final-form rulemaking to the TAC Board on July 14, 2022; the TAC Board unanimously supported the draft final-form rulemaking as it was presented. The TAC Board also expressed support for the draft final-form rulemaking in a letter dated July 18, 2022 (copy attached).

(15) Identify the types and number of persons, businesses, small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012) and organizations which will be affected by the regulation. How are they affected?

This rulemaking applies to all 3,117 community, nontransient noncommunity, bottled, vended, retail, and bulk PWSs in Pennsylvania. Of these, 1,905 are CWSs, serving a combined population of approximately 11.4 million Pennsylvanians; another 1,096 are NTNCWSs serving approximately 507,000 persons.

A review of the federal Small Business Size Regulations at 13 CFR Part 121 provides a standard for determining what constitutes a small business for the North American Industry Classification System (NAICS) category relating to PWSs. A PWS falls within NAICS category 221310, Water Supply and Irrigation Systems, which comprises establishments primarily engaged in operating water treatment plants and/or operating water supply systems. The federal small size standard for this NAICS category is annual receipts of not more than $27.5 million.

The Pennsylvania Safe Drinking Water Act and Chapter 109 regulations do not contain any requirements for the submission of financial records. As such, the Department has no way to estimate annual receipts of PWSs. The Department and EPA have historically classified system size based on the number of persons served by a water system. The National Primary Drinking Water Regulations at 40 CFR § 141.2 define three drinking water system size classifications: small systems, serving 3,300 persons or fewer; medium systems, serving 3,301 to 50,000 persons; and large systems, serving more than 50,000 persons.

For purposes of identifying small businesses affected by this rulemaking, the Department used the federal definition of a small water system in 40 CFR § 141.2 (i.e., a water system that serves 3,300 persons or fewer), and applied that definition to any PWS owned by a private individual or investor.

Of the 3,117 PWSs for which this rulemaking is applicable, 1,519 are privately owned or investor-owned and can be considered as a small business; 887 of these are CWSs and 632 are NTNCWSs.

Of the 3,117 PWSs covered by the rulemaking, at least 2,898 would be required to monitor for compliance with the MCLs by sampling for PFOA and PFOS for four consecutive quarters in either the first or second year of implementation. CWSs and NTNCWSs serving more than 350 persons would monitor in the first year and CWSs and NTNCWSs serving 350 or fewer persons would monitor during the second year; BVRBs would all conduct initial monitoring in the first year of implementation. The remaining 219 PWSs are consecutive systems that purchase finished water from another PWS and would not be required to conduct monitoring unless the selling system fails to monitor as required. Those PWSs that detect PFOA or PFOS during the initial monitoring period would be required to perform additional monitoring. Those PWSs whose monitoring results exceed the PFOA MCL and/or the PFOS MCL would have several options for addressing the contamination including taking contaminated sources offline, making operational changes such as blending sources, using alternate sources of supply (developing new sources or using purchased sources from a new interconnect), or adding treatment. A more detailed discussion of how the regulated community will be affected is included in the response to question 17.

The persons and communities served by these systems benefit from increased public health protection and avoidance of health effects from consuming water containing PFOS and PFOA at levels above the MCLs. As detailed in the response to question 19 below, complying with this rule will result in some cost increases to PWSs, which may be passed on to the customers they serve.

(16) List the persons, groups or entities, including small businesses, that will be required to comply with the regulation. Approximate the number that will be required to comply.

All 3,117 CWS, NTNCWS, and BVRB systems in Pennsylvania are required to comply with this regulation. However, 219 of these systems are consecutive systems (i.e., purchasing finished water from another PWS) and would not be required to conduct monitoring unless the selling system fails to monitor as required. Consecutive systems would not be required to install treatment unless monitoring indicates PFAS levels within their system exceed a PFAS MCL.

As noted in the response to question 15, of the 3,117 systems required to comply with this rule, 1,519 are considered small businesses. However, 23 of these small systems are consecutive systems and would not be required to conduct monitoring. The remaining 1,496 small systems that are considered small businesses would be required to conduct monitoring and install treatment if results indicate levels are above the MCLs.

(17) Identify the financial, economic and social impact of the regulation on individuals, small businesses, businesses and labor communities and other public and private organizations. Evaluate the benefits expected as a result of the regulation.

The expected benefits of this rule are the avoidance of adverse health effects from the consumption of drinking water contaminated with PFOA and PFOS, including chronic illnesses, as well as the cost savings expected from prevention of those illnesses. Improved health benefits expected to result from implementation of the rule include a reduction in instances of developmental effects (including neurobehavioral and skeletal effects) and decreased immune response. More detailed information on the benefits expected as a result of this rulemaking are provided in the response to question 18.

This regulation provides a positive economic impact to individuals, small businesses, and businesses that provide services to the drinking water industry for sample collection and laboratory analysis, and design, construction, and operation and maintenance of water treatment technology.

The rule is intended to reduce the public health risks and associated costs related to consumption of drinking water contaminated with PFAS. Compared to the current 2016 EPA HAL for PFOA and PFOS of 70 ppt combined, the MCL for PFOA is expected to result in a 90% improvement in public health protection, and the MCL for PFOS is expected to result in a 93% improvement in public health protection.

There are 3,117 PWSs affected by this rule, including 2,648 small water systems (population served ≤ 3,300 persons); of those, 1,519 are privately owned or investor-owned and, therefore, considered small businesses. Complying with this rule will result in increased costs for additional monitoring by affected PWSs and increased treatment or other operational modification costs for those PWSs where monitoring shows MCL exceedances. While it is possible that some of these costs may be passed on to PWS customers, it is not possible to estimate the costs to individual ratepayers for several reasons. First, the specific water systems that will need to address elevated PFAS levels have not all been identified yet and will be determined by the initial monitoring required by this final-form rulemaking. Once these systems are identified, there are several other factors that affect if and how drinking water rates may change, including the following: not all water systems are regulated by the Pennsylvania Public Utility Commission, so rate-setting requirements vary widely; some water systems may be able to absorb some of the costs or have the ability to spread the costs over a larger ratepayer base; the eligibility of funding for treatment is based on ranking criteria that incorporate multiple factors; and each water system has unique, site-specific considerations (such as the type and age of equipment, the ability to take a source offline or blend with other sources, the availability of alternate sources, etc.) that will influence whether treatment or other measures are the appropriate corrective action.

Additional monitoring

This rulemaking specifies monitoring for PFAS at each EP. Since most small systems have only one EP, the monitoring cost estimates for small systems assumes one EP per system. The cost of the additional monitoring these systems are expected to incur from this rulemaking is estimated at $516 per sample, with an additional potential cost of approximately $200 for sample collection services provided by a laboratory. During the quarterly initial monitoring specified in this rulemaking, this represents an annual cost of approximately $2,064 to $2,864 per EP. This estimate is based on a survey conducted by the Department of Pennsylvania-accredited laboratories for PFAS analysis and represents an average analytical cost of laboratories that responded to the survey, including the cost of the associated field reagent blank.

This rulemaking specifies that the monitoring requirements following the initial monitoring year are determined by results of the initial monitoring. If PFOA or PFOS is detected at a level that is reliably and consistently below the MCL, the rulemaking specifies that monitoring continue annually at an average annual cost of $516 to $716 per EP. If neither PFOA nor PFOS are detected in the initial monitoring, the rulemaking specifies that monitoring may be reduced to one sample every three years. If PFOA or PFOS or both exceeds the relevant MCL during initial monitoring, quarterly compliance monitoring continues until results demonstrate levels are reliably and consistently below the MCLs, or until additional corrective actions are needed. If PFAS removal treatment is ultimately installed to comply with the MCLs, annual monitoring would include, at a minimum, annual compliance monitoring and quarterly performance monitoring, for a total annual cost of $2,580 to $3,580 per EP.

In addition to sample collection by the water system – as opposed to the water system paying a laboratory for sample collection services – additional potential cost savings include laboratory analysis discounts for fewer analytes than included in the approved method, no analysis of the associated field blank if PFAS are not detected in the sample, and discounts for multiple samples per monitoring period.

MCL exceedances

In the occurrence data used in the development of this rule, either the PFOA MCL or the PFOS MCL or both MCLs were exceeded at 7.4% of the sites sampled. This exceedance rate may overestimate the exceedance rate for the other PWSs in Pennsylvania that were not sampled because the occurrence data sampling predominately targeted sites near PSOCs. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in Pennsylvania. Based on the occurrence data, it is estimated that up to 7.4% of PWS EPs may exceed one or both MCLs. Excluding consecutive water systems and assuming small systems have only one EP, at an estimated noncompliance rate of 7.4%, approximately 110 systems of the 1,496 small systems that are considered small businesses may exceed one or both MCLs.

For systems that exceed one or both MCLs, one way they may be able to achieve compliance is to install treatment for PFAS removal. As part of this rulemaking, cost estimates for installation and operation and maintenance (O&M) of granular activated carbon (GAC) treatment and ion exchange (IX) treatment were used for the cost-benefit analysis. An annual average capital cost estimate for treatment installation of $248,025 per 1 million gallons per day (MGD) per EP was used. This represents an average of capital costs for GAC and IX, annualized over a 20-year period at 4% interest. Annual average O&M costs of $163,818 per MGD per EP plus annual performance monitoring costs of $22,167 per EP were also used. Performance monitoring costs are considered part of treatment O&M costs because performance monitoring is used to make operational decisions, such as when to change out treatment media.

The expected annualized capital costs for a system serving >3,300 customers to install treatment is estimated to be $248,025 per MGD per EP, with annual O&M costs of $163,818 per MGD per EP and annual performance monitoring costs of $22,167 per EP.

According to Department records in the Pennsylvania Drinking Water Information System (PADWIS), the average design capacity of small investor-owned or privately owned water systems affected by this regulation is approximately 0.1 MGD. The expected annualized capital costs for a small system with a design capacity of 0.1 MGD to install treatment is estimated to be $24,803 per EP, with annual O&M costs of $16,382 per EP and performance monitoring costs of $22,167 per EP.

Treatment cost estimates were based on surveys the Department conducted of systems with treatment installed and of treatment technology vendors.

For systems that have multiple water supply sources, another option for achieving compliance may involve source management. Abandoning a source or blending two or more sources are two options that would be less costly than installation and O&M of treatment.

Available funding

There are currently several funding sources available to PWSs for PFAS treatment costs. The Pennsylvania Infrastructure Investment Authority's (PENNVEST) Per- and Polyfluoroalkyl Substances Remediation Program is currently available to remediate PFAS contamination or presence in the water supply of public drinking water supply systems not related to the presence of a qualified former military installation. The Federal Infrastructure Investment and Jobs Act (IIJA) also provides relevant funding, including $4 billion nationally in Drinking Water State Revolving Fund (DWSRF) monies for projects to address emerging drinking water contaminants like PFAS and $5 billion nationally in grants to small and disadvantaged communities for projects addressing emerging drinking water contaminants like PFAS. Over 5 years, the Commonwealth's allocation of these IIJA funds is expected to be $116 million in DWSRF emerging contaminants funds and an additional $140.5 million in funding for projects addressing emerging drinking water contaminants in small and disadvantaged communities, for a total of $256.5 million.

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

This rulemaking improves public health protection by ensuring that PWSs provide water that meets lower, more protective standards for PFOA and PFOS than the 2016 HAL established by EPA.

Safe drinking water is vital to maintaining healthy and sustainable communities. Ensuring that water systems are providing drinking water that meets standards based on the most recent research and data can reduce health care costs and prevent illness and possibly death. Improved health benefits expected to result from implementation of the rule include a reduction in instances of developmental effects (including neurobehavioral and skeletal effects) and decreased immune response associated with exposure to PFOA and PFOS, respectively, in drinking water.

The rulemaking reasonably balances the health protection benefits to Pennsylvanians served by PWSs with the increased costs that will be incurred by PWSs in complying with the rule.

In 2022, DPAG provided additional information on the health benefits achieved by these MCLs. In a report titled "Review of Proposed Maximum Contaminant Levels for PFOA and PFOS in Drinking Water for the Commonwealth of Pennsylvania", the DPAG concluded that the proposed MCLs are predicted to have a significant economic benefit to Pennsylvania because the MCLs will reduce health care problems associated with PFAS (DPAG, 2022).

To predict the value of health care benefits, the DPAG used two approaches – the value transfer method and the counterfactual method. The value transfer method applies and scales quantitative estimates of health care impact costs from one study site to another. The counterfactual method assumes that reduction in exposure to PFOA and PFOS from drinking water will result in a health care cost benefit equal to estimated health care costs attributable to the base exposures to PFOA and PFOS. Although each of these methods has their limitations, it is possible to estimate projected savings from reducing exposure to PFOA and PFOS.

DPAG's health care analysis was broken down into three steps: (1) testing whether the selected MCL will result in hypothetical serum levels known to be associated with disease specific critical effects identified by the DPAG working group; (2) applying the counterfactual method to data derived from a study of a subpopulation of Pennsylvanians near a PFAS-contaminated site to estimate health care benefits for that group; and (3) deriving a value transfer estimate from other health care impact studies.

DPAG reviewed several studies that examined the exposure response relationship between PFOA levels and low birth weight. The authors of the Malits study selected a maternal serum level of 3.1 ng/mL as a reference level (Malits 2018); below this level, the adverse health effects on low-birth-weight infants would be reduced. The 3.1 ng/mL level also represents the upper limit of the lowest tertile in the study by Maisonet and colleagues (Maisonet 2012) and represents the point above which statistically significant associations have been demonstrated when median serum or plasma levels during pregnancy were above approximately 3.1 ng/mL (Maisonet 2012; Fei 2011; Wu 2012).

DPAG utilized a serum PFAS calculator developed by Bartell to estimate blood serum concentrations of PFOA, based on an initial serum concentration and proposed levels of PFOA (Bartell 2017). DPAG found that the model predicts that a woman of childbearing age would reach a steady-state PFOA serum level of 3.1 ng/mL if the consumed water was at the proposed MCL of 14 ng/L. Furthermore, the Bartell calculator confirms that the proposed MCL of 14 ng/L for PFOA is protective and is consistent with the Department's analysis that the MCL represents a 90% improvement in blood serum levels compared to the serum level predicted at the EPA HAL of 70 ng/L (DPAG, 2022).

DPAG conducted a similar analysis for PFOS using data from the Grandjean (2012) study. The method developed by Bartell predicts that in women of childbearing age, the PFOS MCL of 18 ng/L would result in a steady-state serum level of 7.2 ng/L, which is below the lower bound of interquartile range and the geometric mean in mothers in the Grandjean study.

To summarize, DPAG's review of PFAS blood serum levels at various PFAS concentrations in drinking water correlate well with the Department's assessment of at least 90% improvement of public health at the proposed MCLs.

In estimating the health care benefits for the MCLs, DPAG noted that Malits (2018) estimated the total socioeconomic cost of PFOA-attributable low-birthweight births in the United States from 2003 through 2014 (over 11 years) was $13.7 billion. These costs included the direct hospital costs at the time of birth and lost economic productivity due to low-birthweight births being associated with longer-term outcomes such as lower lifetime earning potential. To determine what this would mean in Pennsylvania, DPAG applied a value transfer method that assumes a scalable relationship between impacts of PFOA-attributable low-birthweight births quantified by Malits in the total United States population. Since 4.0% of the United States population lives in Pennsylvania, the total costs for the entire statewide population due to low birthweight from PFOA exposure for the same period (2003 – 2014) are calculated to $548 million (approximately $637.58 million in 2022 dollars). To compare the costs and benefits to the Commonwealth's PWSs and the 11.9 million customers they serve, DPAG estimated the total socioeconomic costs equate to $583 million in 2022 dollars. In other words, the PFOA MCL of 14 ng/L is estimated to result in health care cost savings of $583 million over a similar time period, or an average of $53 million annually.

DPAG analyzed two additional studies to inform the estimated annual health care costs. In 2018, Nair studied communities near two former military bases in Pennsylvania that were exposed for several decades to PFAS through contaminated drinking water (Nair 2021). The population in that community was estimated to be 84,000. Serum PFAS levels were compared with the national averages for 2013-2014 and their relationships with demographic and exposure characteristics were analyzed. The average levels of PFOA and PFOS among the study participants were 3.13 and 10.24 ng/mL, respectively. Overall, 75% and 81% of the study participants had levels exceeding the national average for PFOA (1.94 μg/L) and PFOS (4.99 μg/L), respectively. This study places these 2018 Pennsylvania communities in the same broad category as the 2003 National Health and Nutrition Examination Survey data for the United States population. A similar value transfer analysis suggests that the total health care costs associated with PFOA exposure in these Pennsylvania communities alone over a similar time period (11 years) would be $4.3 million in 2022 dollars. Assuming that PFAS levels fell in these Pennsylvania communities in the same manner that they fell nationally, the costs would average to $390,000 per year.

Finally, DPAG reviewed a study by the Nordic Council of Ministers (2019) that estimated the annual monetized impact of elevated mortality due to PFAS exposure ranged from $3.5 to $5.7 billion for a total population of 20.7 million people. Adjusted for the 11.9 million Pennsylvanians served by public water, this produces a value transfer estimate of $2 to $3.3 billion. This suggests that PFAS contamination in drinking water may account for 2% to 3% of the total annual health care costs in Pennsylvania, which are estimated by the Kaiser Family Foundation at $120 billion annually (KFF 2022).

(19) Provide a specific estimate of the costs and/or savings to the **regulated community** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

Compliance Monitoring Costs

Compliance monitoring cost estimates for this rulemaking were determined based on a survey the Department conducted of laboratories accredited by Pennsylvania for PFAS analysis by one or more of the analytical methods in the rule, as well as assumptions made based on an analysis of the occurrence data. According to lab survey results, the analytical cost for PFAS by either EPA Method 533, EPA Method 537 version 1.1, or EPA Method 537.1 varied greatly among the labs that responded, with a range of $325 to $750, and an average of $516, including the cost of analysis of the associated field reagent blank required by the methods for each sample site. This does not include an additional fee for sample collection, which also varied greatly among the labs offering that service; sample collection is approximately an additional $200 based on the survey.

Approximately half of the responding laboratories noted that they offer a cost reduction for reporting of fewer analytes than included in the method, which would provide a cost savings for systems since monitoring is required for only two analytes – PFOA and PFOS. Also, a few labs noted potential savings if there are no detections in the sample; the associated field blank would be extracted, but would not need to be analyzed, which would reduce the overall cost. A few labs also noted potential additional fees for PFAS-free blank water, overnight shipping costs for samples, and Level 4 data reports if requested.

For compliance monitoring cost estimates, it was assumed that approximately half of all water systems will collect their own samples and half will utilize sample collection services provided by the laboratory. Therefore, an average cost of $616 per sample was used in the following compliance monitoring cost estimate calculations.

In the rule, initial quarterly monitoring for CWS and NTNCWS serving a population of more than 350 persons begins January 1, 2024, and initial quarterly monitoring for CWS and NTNCWS serving 350 or fewer persons begins January 1, 2025. This population breakdown was selected to evenly split initial monitoring across two years in order to ease laboratory capacity issues and allow small systems more time to prepare for compliance monitoring. Based on the number of PWSs and EPs in PADWIS at the time of this rulemaking, there are 1,885 EPs that will begin monitoring in year 1 (2024) and 1,900 that will conduct initial monitoring in year 2 (2025). Initial quarterly monitoring for BVRB systems begins January 1, 2024. However, in response to public comments, water systems may be able to use data collected under EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5). Water systems may adjust their UCMR5 schedule to coincide with their initial monitoring begin date or submit a request to DEP to adjust their initial monitoring begin date to coincide with their UCMR5 schedule. This is an additional cost savings by eliminating duplicate monitoring.

The rule requires repeat compliance monitoring on a quarterly basis for any EPs at which either PFOA or PFOS is detected at a level above its respective MRL, including those EPs at which one or both MCLs are exceeded. If the quarterly repeat monitoring results are reliably and consistently below the MCLs, the frequency of repeat monitoring may be reduced from quarterly monitoring to annual monitoring. Based on the occurrence data, it is assumed that up to 34.9% of all EPs will have a detection of PFOA and/or PFOS at or above the relevant MRL; this equates to 658 EPs of the year 1 initial systems that will need to continue quarterly repeat monitoring in year 2, and 663 EPs of the year 2 initial systems that will need to continue quarterly repeat monitoring in year 3. The remaining systems (1,227 EPs in year 1 and 1,237 EPs in year 2) were assumed to conduct annual repeat monitoring in each year following the initial monitoring. However, this overestimates the repeat monitoring requirements and costs after the initial monitoring because, for EPs where initial monitoring results do not detect PFOA or PFOS, the frequency of repeat monitoring is reduced from annual to once every three years.

In addition to and separate from the performance monitoring required by permit special condition, systems with EPs that exceed one or both MCLs may require treatment, which would require the system to conduct ongoing repeat compliance monitoring at least annually. Using the noncompliance rate of 7.4% from the occurrence data (as described in the response to question 17), a total of 280 EPs are estimated to require ongoing repeat compliance monitoring: 139 EPs from initial year 1 and 141 EPs from initial year 2. However, this is likely an overestimate because: (1) systems may have options other than installing treatment to address concentrations of PFOA and/or PFOS above the relevant MCL; and (2) the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination, so the exceedance rate in the occurrence data may overestimate the exceedance rate for other PWSs in Pennsylvania that were not included in the occurrence data. For total compliance monitoring cost estimates, the ongoing annual compliance monitoring for EPs where treatment is installed was assumed to begin in the third year of monitoring (year 3 or year 4 overall).

Using these assumptions (which likely overestimate the compliance monitoring requirements and costs for the reasons described previously) and an estimated average cost of $616 per sample, Table 3 summarizes the overall cost estimates for compliance monitoring costs in each of the first four years of rule implementation. Note that this estimate does not include performance monitoring costs.

Table 3. Compliance monitoring costs

	Total # EPs	Quarterly Initial EPs	Annual Repeat EPs	Quarterly Repeat EPs	Quarterly Compliance Monitoring Cost	Annual Compliance Monitoring Cost	Total Yearly Compliance Monitoring Cost
Year 1	1885	1885	0	0	$4,644,640	$0	$4,644,640
Year 2	1900	1900	1227	658	$6,302,579	$755,915	$7,058,495
Year 3		0	3122	663	$1,633,878	$1,923,090	$3,556,969
Year 4		0	3785	0	$0	$2,331,560	$2,331,560

Based on these estimates, the average annual monitoring costs over the first four years is $4,397,916.

Treatment costs

Treatment cost estimates were determined based on a survey conducted of Pennsylvania systems with existing PFAS treatment and of PFAS treatment manufacturers, a PFAS Case Study published by the American Water Works Association (AWWA, 2020), and from information provided by members of the Association of State Drinking Water Administrators (ASDWA). Costs were provided for GAC, IX, and reverse osmosis (RO). The RO costs were not included in the final cost estimates because, due to wastewater disposal requirements, the technology is currently impractical. Additionally, the costs for GAC, IX, and RO provided from the vendors were excluded from the final cost estimates because they were limited to media costs and did not include the infrastructure requirements.

GAC and IX construction costs were based on a lead lag configuration where the first vessel (lead vessel) is capable of treating the entire flow and second vessel (lag vessel) is provided for polishing.

All treatment costs were normalized to construction costs for treating 1 MGD. As shown in Table 4, the average capital cost for the GAC treatment was $3,457,110 per MGD per EP with an average annual O&M cost of $171,970 per MGD per EP.

Table 4. GAC Treatment Costs

Treatment	System	Capital Cost per MGD per EP	Annual O&M Cost per MGD per EP
GAC	Vendor A	$343,000 *	$32,018
GAC	Vendor B	$535,000 *	$356,000
GAC	System A (2 GAC and 1 IX)	$3,125,000	$107,007
GAC	System B, Site 1	$1,675,347	$121,528
GAC	System B, Site 2	$2,454,259	$220,820
GAC	System B, Site 3	$2,433,333	$194,444
GAC	System C	$9,250,000	unknown
GAC	System D	$3,139,000	unknown
GAC	System E	$1,135,497	unknown
GAC	System F	$4,444,444	unknown
Average cost of GAC per MGD per EP		$3,457,110	$171,970

* Not included in calculations

As shown in Table 5, the average capital cost for the IX treatment was $3,284,360 per MGD per EP with an average annual O&M cost of $155,666 per MGD per EP.

Table 5. IX Treatment Costs

Treatment	System	Capital Cost per MGD per EP	Annual O&M Cost per MGD per EP
IX	Vendor A	$357,000 *	$59,361 *
IX	Vendor B	$500,000 *	$175,000
IX	Vendor D	No information	$159,722
IX	System G	$10,400,000	unknown

IX	System H	$3,333,000	unknown
IX	System I	$634,900	unknown
IX	System J	$1,128,000	unknown
IX	System K	$925,900	$132,275
Average cost of IX per MGD per EP		$3,284,360	$155,666

* Not included in calculations

The average capital costs of the GAC and IX treatment is $3,370,735 per MGD per EP with an average annual O&M costs $163,818 per MGD per EP.

To estimate annual treatment costs, the average capital cost of treatment installation of $3,370,735 per MGD per EP was annualized over 20 years at a 4% interest rate. This yields an estimated annualized capital cost of $248,025 per MGD per EP.

In addition, water systems that install treatment will need to conduct performance monitoring to verify treatment efficacy. Using the average cost per sample of $616 and assuming a total of 36 performance monitoring samples per year – monthly samples at each of three locations (raw water, mid-point of treatment, and finished water) – that is an additional annual cost of $22,176 per EP.

In the occurrence data, the percentage of EPs exceeding the MCLs for PFOA and PFOS was 5.7% and 5.1%, respectively; however, due to co-occurrence of PFOA and PFOS, some EPs that exceeded the MCL for PFOA also exceeded the MCL for PFOS. In the occurrence data, the percentage of EPs exceeding the MCL for PFOA and/or the MCL for PFOS was 7.4%. However, this exceedance rate may overestimate the exceedance rate for the other PWSs in Pennsylvania that were not sampled, because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. Also, as treatment for PFOA and PFOS is the same, EPs exceeding both MCLs would not be required to install two different treatment systems; therefore, the estimated percentage of EPs requiring treatment is less than the combined percentage of EPs exceeding either MCLs in the occurrence data. Additionally, systems with MCL exceedances may have several options to address the contamination aside from installing treatment, including taking contaminated sources offline, making operational changes such as blending sources, or using alternate sources of supply (developing new sources or using purchased sources from a new interconnect). Recognizing that the MCL exceedance rates from the occurrence data may overestimate the proportion of systems that will need to install treatment to address MCL exceedances for the aforementioned reasons, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in Pennsylvania. Using the 7.4% exceedance rate from the occurrence data to estimate how many of the larger universe of 3,785 EPs may require treatment to meet one or both MCLs produces an estimate of 280 EPs. At an average annualized treatment capital cost of $248,025 per MGD per EP, and assuming 280 EPs require treatment installed, the total estimated annual treatment costs are shown in Table 6.

Table 6. Total Estimated Annual Treatment Costs

Estimated average annualized treatment *capital* costs (per MGD per EP)	$248,025
Estimated average annual treatment *O&M* costs (per MGD per EP)	$163,818
Estimated average annual treatment *capital* + *O&M* costs (per MGD per EP)	$411,843
Estimated annual *performance monitoring* costs (per EP)	$22,167
Estimated # of EPs (of 3,785) that require treatment for one or both MCLs	280
Total estimated average annual treatment *capital* + *O&M* costs (per MGD)	**$115,316,040**
Total estimated annual *performance monitoring* costs	**$6,206,760**

Compliance Assistance Plan

The Department's Safe Drinking Water Program utilizes PENNVEST programs to offer financial assistance to eligible PWSs. This assistance is in the form of a low-interest loan, with some augmenting grant funds for hardship cases. Eligibility is based upon factors such as public health impact, compliance necessity, and project/operational affordability.

In addition to the standard funding mentioned above, PENNVEST approved an additional funding program in 2021 under authority of Act 101 of 2019. The PENNVEST PFAS Remediation Program is designed as an annual funding opportunity to aid in the remediation and elimination of PFAS in PWSs. In 2021, approximately $25 million was made available for this grant program.

Additionally, and as noted in the response to question 17, IIJA also provides relevant funding, including $4 billion nationally in DWSRF monies for projects to address emerging drinking water contaminants like PFAS and $5 billion nationally in grants to small and disadvantaged communities for projects addressing emerging drinking water contaminants like PFAS. Over 5 years, the Commonwealth's allocation of these IIJA funds is expected to be $116 million in DWSRF emerging contaminants funds and an additional $140.5 million in funding for projects addressing emerging drinking water contaminants in small and disadvantaged communities, for a total of $256.5 million.

The Department's Safe Drinking Water Program has established a network of regional and Central Office training staff that is responsive to identifiable training needs. The target audience in need of training may be either program staff or the regulated community.

In addition to this network of training staff, the Department's Bureau of Safe Drinking Water has staff dedicated to providing both training and technical outreach support services to PWS owners and operators. The Department's web site also provides timely and useful information for treatment plant operators.

(20) Provide a specific estimate of the costs and/or savings to the **local governments** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

The only costs to local government are costs incurred by systems that are owned and/or operated by local government. The cost estimates are based on the figures in question 19. Of the 3,117 PWS affected by this rulemaking, 291 are owned by municipalities.

There is currently no reliable way to predict which specific PWSs will need to conduct repeat compliance monitoring, at what frequencies, or which specific PWSs will need to install additional treatment as a result of this rulemaking. Therefore, the only costs for municipal-owned PWSs that may be estimated with reasonable certainty at this time are for the initial quarterly monitoring and annual monitoring, which are estimated to be $2,464 the first year and $616 for each year subsequent. However, as noted in the response to question 19, for municipal-owned systems where initial monitoring results do not detect PFOA or PFOS, the frequency of repeat monitoring would be reduced from annual to once every three years.

(21) Provide a specific estimate of the costs and/or savings to the **state government** associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

The costs to state government are those incurred by systems that are owned and/or operated by state government and costs to the Department associated with implementing and administering the rule. The cost estimates are based on the figures in question 19. Of the 3,117 PWS affected by this rulemaking, 30 are owned by state government entities, including the Department of Corrections, the Department of Conservation and Natural Resources, the Department of Military and Veterans Affairs, the Pennsylvania State System of Higher Education, and the Department of Human Services.

There is currently no reliable way to predict which specific PWSs will need to conduct repeat compliance monitoring, at what frequencies, or which specific PWSs will need to install additional treatment as a result of this rulemaking. Therefore, the only costs for state-owned PWSs that may be estimated with reasonable certainty at this time are for the initial quarterly monitoring and annual monitoring, which are estimated to be $2,464 the first year and $616 for each year subsequent. However, as noted in the response to question 19, for state government-owned systems where initial monitoring results do not detect PFOA or PFOS, the frequency of repeat monitoring would be reduced from annual to once every three years.

(22) For each of the groups and entities identified in items (19)-(21) above, submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

Paperwork and reporting requirements include:

- Reporting of PFAS monitoring results using existing electronic reporting systems.
    - DEP's *Drinking Water Electronic Lab Reporting (DWELR) System*
- Optional monitoring waiver application using existing monitoring waiver application modules and forms.
    - *Monitoring Waiver Applications* (3930-FM-BSDW0020)
- Public water supply permit application, in the event of treatment installation to reduce PFAS levels, using existing permit application modules and forms.
    - *Public Water Supply Permit Application* (3900-PM-BSDW0002)
- Public notification (PN) and certification, in the event of an MCL exceedance, using existing forms and templates for Tier 2 PN.
    - *Public Notification (PN) Certification Form* (3930-FM-BSDW0076)
    - *Standard Health Effects Language for Public Notification* (3930-FM-BSDW0190)

(22a) Are forms required for implementation of the regulation?

No new forms are required for implementation of the regulation. The existing forms listed above are required for implementation of this regulation.

(22b) If forms are required for implementation of the regulation, **attach copies of the forms here.** If your agency uses electronic forms, provide links to each form or a detailed description of the information required to be reported. **Failure to attach forms, provide links, or provide a detailed description of the information to be reported will constitute a faulty delivery of the regulation.**

No new forms are required for implementation of the regulation. The existing forms listed above are required for implementation of this regulation.

(23) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

	Current FY 2022-23	**FY +1 2023-24**	**FY +2 2024-25**	**FY +3 2025-26**	**FY +4 2026-27**	**FY +5 2027-28**
SAVINGS:	**$**	**$**	**$**	**$**	**$**	**$**
Regulated Community	0	0	0	0	0	0
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Savings	0	0	0	0	0	0
COSTS:						
Regulated Community	0	4,644,640	7,058,495	63,884,359	123,854,360	123,854,360
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Costs	0	4,644,640	7,058,495	63,884,359	123,854,360	123,854,360
REVENUE LOSSES:	0	0	0	0	0	0
Regulated Community	0	0	0	0	0	0
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Revenue Losses	0	0	0	0	0	0

The estimated costs to the regulated community include the estimated compliance monitoring costs presented in Table 3 in the response to question 19 plus the estimated annual treatment capital, O&M, and performance monitoring costs presenting in Table 6 in the response to question 19. The compliance monitoring costs for FY+5 are assumed to be the same as the compliance monitoring costs for FY+4 (Year 4 in Table 3). For purposes of totaling costs, the costs that vary with system design capacity (treatment O&M costs and treatment capital costs) were multiplied by a benchmark design capacity of 1 MGD. As described in the response to question 19, 280 systems are estimated to install treatment: 139 systems based on initial compliance monitoring conducted in FY+1 and 141 systems based on initial compliance monitoring conducted in FY+2. To account for the time these systems would need to install treatment, the annual treatment costs (capital, O&M, and performance monitoring costs) are accounted for two years following the initial compliance monitoring. In other words, the treatment costs start in FY+3 for the 139 systems that install treatment based on initial compliance monitoring conducted in FY+1, and the treatment costs start in FY+4 for the 141 systems that install treatment based on initial compliance monitoring conducted in FY+2. For reasons discussed in the responses to questions 20 and 21, the estimated costs to systems owned by local and state governments are included with the costs to the regulated community, rather than broken out separately.

(23a) Provide the past three-year expenditure history for programs affected by the regulation.

Program	**FY -3 (2019/20)**	**FY -2 (2020/21)**	**FY -1 (2021/22)**	**Current FY (2022/23)**
Environmental Program Management (161-10382)	$27,920,000	$32,041,000	$34,160,000	$35,739,000
Safe Drinking Water Fund (092-60065)	$4,412,000	$4,874,000	$9,894,000	$12,381,000

(24) For any regulation that may have an adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), provide an economic impact statement that includes the following:

(a) An identification and estimate of the number of small businesses subject to the regulation.

All 3,117 CWS, NTNCWS, and BVRB systems in Pennsylvania are required to comply with this regulation. However, 219 of these systems are consecutive (i.e. purchasing finished water from another PWS) and are not be required to conduct monitoring unless the selling system fails to monitor as required. Of the remaining 2,898 non-consecutive systems, 1,519 are small systems (serving a population of 3,300 persons or fewer) that are owned by a private individual or investor and can be considered as small businesses.

(b) The projected reporting, recordkeeping and other administrative costs required for compliance with the proposed regulation, including the type of professional skills necessary for preparation of the report or record.

Administrative costs associated with this rulemaking may increase minimally, if at all. There are no new administrative requirements; PFOS and PFOA are added to the existing standardized monitoring duties (e.g., sampling and reporting).

(c) A statement of probable effect on impacted small businesses.

Due to economies of scale, small systems with limited customer bases may be impacted more than larger systems. However, these small systems have the same access to funding as other systems. The two most common treatment technologies for PFAS – GAC and IX – are not new technologies. These technologies are currently in use by various PWS types and sizes to treat for other contaminants such as volatile organic contaminants, nitrates, and various ions.

(d) A description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation.

No alternative regulatory schemes were considered because all customers of PWSs deserve equitable water quality and public health protection.

Additionally, the rulemaking provides PWSs the flexibility to select the least costly method to comply. If either PFOA or PFOS is found at levels above the relevant MCL, a PWS has several options for addressing the contamination including taking contaminated sources offline, making operational changes such as blending sources, using alternate sources of supply (developing new sources or using purchased sources from a new interconnect), or adding treatment. Each PWS with PFOA or PFOS levels above the relevant MCL will need to decide the most feasible option for addressing the contamination. PWSs that do not detect PFOA or PFOS at levels above the relevant MCL can request or qualify for reduced monitoring to save costs.

(25) List any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, the elderly, small businesses, and farmers.

The rulemaking gives the smallest CWS and NTNCWS (those serving 350 or fewer people) extra time to prepare by proposing for those systems to begin initial compliance monitoring in year 2 rather than year 1. This will assist some small businesses in preparing to comply with the rulemaking.

(26) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

No alternative regulatory schemes were considered because all customers of PWSs deserve equitable water quality and public health protection.

The regulatory provisions contain the least burdensome acceptable option because it provides PWSs the flexibility to select the least costly method to comply. If either PFOA or PFOS is found at levels above the relevant MCL, the PWS has several options for addressing the contamination including taking contaminated sources offline, making operational changes such as blending sources, using alternate sources of supply (developing new sources or using purchased sources from a new interconnect), or adding treatment. Each PWS with PFOA or PFOS levels above the relevant MCL will need to decide the most feasible option for addressing the contamination. PWSs that do not detect PFOA or PFOS at levels above the relevant MCL can request or qualify for reduced monitoring to save costs.

(27) In conducting a regulatory flexibility analysis, explain whether regulatory methods were considered that will minimize any adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), including:

a) The establishment of less stringent compliance or reporting requirements for small businesses;

   For these provisions, no less stringent compliance or reporting requirements for small businesses were considered.

b) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses;

   For these provisions, no less stringent schedules or deadlines for small businesses were considered. However, smaller systems will not begin initial monitoring until 2025 which allows an additional year for these systems to plan for the monitoring.

c) The consolidation or simplification of compliance or reporting requirements for small businesses;

For these provisions, neither consolidation nor simplification of compliance or reporting requirements for small businesses was considered.

d) The establishment of performance standards for small businesses to replace design or operational standards required in the regulation; and

For these provisions, no performing standards for small businesses to replace design or operational standards required in the regulation for small businesses were considered.

e) The exemption of small businesses from all or any part of the requirements contained in the regulation.

For these provisions, no exemptions for small businesses from all or any part of the requirements contained in the regulation were considered.

Alternative provisions were not considered for small water systems because the customers of water systems classified as small businesses must be afforded the same level of public health protection as customers of large water systems.

(28) If data is the basis for this regulation, please provide a description of the data, explain in detail how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

Substantial studies, reports, and data were used to develop this rulemaking.

Occurrence data:
To determine whether PFAS contaminants were occurring in Pennsylvania's water supplies at frequencies and concentrations expected to be at a level of concern, the Department collected occurrence data on a range of PFAS. The two primary sources for occurrence data were the final results from BSDW's PFAS Sampling Plan and UCMR3 data.

The BSDW PFAS Sampling Plan prioritized sites for targeted PFAS sampling. A literature review identified several likely potential sources of PFAS contamination; specific references reviewed are cited in the sampling plan.

- PA DEP, April 2019, "Pennsylvania Department of Environmental Protection Bureau of Safe Drinking Water PFAS Sampling Plan," Available at www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/DEP-Involvement.aspx.

PWS sources located within 0.5 miles of an identified PSOC were included in the plan as target sites; additional sources located within 0.75 miles of a PSOC were later added to the plan as needed to complete sampling. A selection of baseline sources representing a control group were also included; these baseline sites were PWS sources located at least five miles from a PSOC and within a watershed containing 75% or more forested land. Sampling was planned for 360 target sites and 40 baseline sites. Sampling was conducted beginning in 2020 and ending in March 2021. Samples were analyzed by the

Department's Bureau of Laboratories and a third-party contract lab via EPA Method 537.1. In all, a total of 412 sites were collected and analyzed, representing 372 target sites and 40 baseline sites. Final sampling plan results can be found on the Department's website.

- PA DEP, May 2021, "Summary of Results for SDW Sampling Project Using EPA Method 537.1," Available at www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/default.aspx.

The Department's BSDW also reviewed UCMR3 data for PFAS detections. UCMR3 results can be found on EPA's website.

- US EPA, January 2018, "UCMR 3 Occurrence Data by State," Available at www.epa.gov/monitoring-unregulated-drinking-water-contaminants/occurrence-data-unregulated-contaminant#3.

Toxicology:
Through a toxicology services contract, DPAG – consisting of toxicologists and other scientific professionals at Drexel University – conducted a thorough and independent review of federal and other states' work on MCLs for PFAS, including the available research, data, and scientific studies to develop recommended MCLGs for select PFAS. MCLGs are non-enforceable, developed solely based on health effects, and do not take into consideration other factors, such as technical limitations and cost. MCLGs are the starting point for determining MCLs.

Specific references used by DPAG in this research are cited in the DPAG report and workbook.

- DPAG, June 2020, "Drexel PFAS Workbook," https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/June%2015/03_PFAS%20Petition/01b_App%202%20Drexel%20PFAS%20Workbook%20January%202021.pdf.
- DPAG, January 2021, "Maximum Contaminant Level Goal Drinking Water Recommendations for Per- and Polyfluoroalkyl Substances (PFAS) in the Commonwealth of Pennsylvania," https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/June%2015/03_PFAS%20Petition/01a_App%201%20Drexel%20PFAS%20Report%20January%202021.pdf.

Analytical considerations:
Resources were consulted to ensure that analytical methods sufficient to support the rulemaking exist, including the following:

- Association of State Drinking Water Administrators (ASDWA), October 2020, "Technical Bulletin to Laboratories Reporting PFAS Analysis Using EPA Methods 533, 537, or 537.1," www.asdwa.org/wp-content/uploads/2020/10/ASDWA-PFAS-Lab-Reporting-Technical-Bulletin-FINAL-101420-1.pdf.
- Association of State Drinking Water Administrators (ASDWA), February 2021, "Per- and Polyfluoroalkyl Substances (PFAS) Laboratory Testing Primer for State Drinking Water Programs and Public Water Systems," www.asdwa.org/wp-content/uploads/2021/02/ASDWA-PFAS-Lab-Testing-Primer-FINAL-02032021.pdf.
- Rosenblum, Laura and Steven C. Wendelken, November 2019, "Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry," US EPA

Office of Water, EPA Document No. 815-B-19-020, www.epa.gov/sites/default/files/2019-12/documents/method-533-815b19020.pdf.

- Shoemaker, J.A. and D.R. Tettenhorst, November 2018, "Method 537.1. Determination of Selected Per-and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MC/MC)," Version 1.0, US EPA Office of Research and Development, EPA Document # EPA/600/R-18/352, https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NERL&dirEntryId=343042.
- Shoemaker, J.A., P.E. Grimmett, and B.K. Boutin, September 2009, "Method 537. Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MC/MC)," Version 1.1, US EPA Office of Research and Development, EPA Document # EPA/600/R-08/092, https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NERL&dirEntryId=198984&simpleSearch=1&searchAll=EPA%2F600%2FR-08%2F092+.

In addition, the Department conducted a survey of laboratories accredited by Pennsylvania for PFAS analysis to evaluate available lab capacity and minimum reporting limits:

- PA DEP, May 2021, "Summary of Responses from Survey of Pennsylvania Accredited Laboratories for PFAS." (Copy attached.)

Treatment technologies:

The Department conducted a survey of PWSs currently treating for PFAS, other state agencies, and water treatment manufacturers to evaluate treatment technologies and treatment costs.

- PA DEP, July 2021, "PFAS Treatment Survey Response Summary." (Copy attached.)

Cost to Benefits:

To provide additional information to support the cost to benefits analysis, the Department utilized the services of the DPAG by extending the contract with Drexel University. The Department charged DPAG with estimated monetized benefits expected to be realized from implementation of the MCLs.

- DPAG, July 2022, "Review of Proposed Maximum Contaminant Levels for PFOA and PFOS in Drinking Water for the Commonwealth of Pennsylvania." (Copy attached.)
- American Water Works Association (AWWA), 2020, "PFAS Case Study: Cape Fear Public Utility Authority (CFPUA)," www.awwa.org/Portals/0/AWWA/ETS/Resources/Technical%20Reports/CFPUA%20Case%20Study%20Report_FINAL.pdf?ver=2021-01-19-095055-317.
- PA DEP, July 2021, "PFAS Treatment Survey Response Summary." (Copy attached.)

Other States:

- Association of State Drinking Water Administrators (ASDWA), October 2020, "Per- and Polyfluoroalkyl Substances (PFAS) and State Drinking Water Program Challenges," www.asdwa.org/wp-content/uploads/2018/02/ASDWA-PFAS-2-Pager.pdf.

- California Water Boards, October 2020 "Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS)," www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/PFOA_PFOS.html.
- Connecticut Water, "What Are PFAS?" www.ctwater.com/water-quality/what-are-pfas.
- Massachusetts DEP, November 2020, "310 CMR 22.00: The Massachusetts Drinking Water Regulations," www.mass.gov/doc/310-cmr-2200-the-massachusetts-drinking-water-regulations.
- Michigan Administrative Code(s) for Environment, Great Lakes, and Energy – Drinking Water and Environmental Health Division, August 2020 updated, "Supplying Water to the Public," https://ars.apps.lara.state.mi.us/AdminCode/DeptBureauAdminCode?Department=Environment%2C%20Great%20Lakes%20and%20Energy&Bureau=Drinking%20Water%20and%20Environmental%20Health%20Division.
- Minnesota Department of Health, "Perfluoroalkyl Substances (PFAS)," www.health.state.mn.us/communities/environment/hazardous/topics/pfcs.html#safelevels.
- New Hampshire Department of Environmental Services, "New Hampshire Code of Administrative Rules," Parts Env-Dw 705, 707, 708, 712, 800, 2021, www.des.nh.gov/rules-and-regulatory/administrative-rules.
- New Jersey Department of Environmental Protection, March 2020, "Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS)," https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2022/October%2012,%202022/02_7-569_PFAS_Final/05f_7-569_PFAS_Final_NJ%20MCLs.pdf.
- New York State Department of Health, July 2020, "Maximum Contaminant Levels (MCLs)." https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2022/October%2012,%202022/02_7-569_PFAS_Final/05g_7-569_PFAS_Final_NY%20MCL.pdf.
- Ohio Department of Health and Ohio Environmental Protection Agency, December 2019, "Ohio Per- and Polyfluoroalkyl Substances (PFAS) Action Plan for Drinking Water," https://content.govdelivery.com/attachments/OHOOD/2019/12/02/file_attachments/1335154/PFAS%20Action%20Plan%2012.02.19.pdf.
- Post, Gloria B., August 2020, "Recent US State and Federal Drinking Water Guidelines for Per- and Polyfluoroalkyl Substances," *Environmental Toxicology and Chemistry*, Volume 40, Issue 3, pp. 550-563, https://setac.onlinelibrary.wiley.com/doi/full/10.1002/etc.4863.
- Vermont Agency of Natural Resources, Department of Environmental Conservation, Drinking Water and Groundwater Protection Division, March 2020 updated, "Environmental Protection Rules Chapter 21 Water Supply Rule," https://dec.vermont.gov/content/vermont-water-supply-rule.

Additional resources:

- Bartell, 2017, "Serum PFAS Calculator for Adults." https://www.ics.uci.edu/~sbartell/pfascalc.html
- Buck, R.C. et al., 2011, "Perfluoroalkyl and Polyfluoroalkyl Substance in the Environment: Terminology, Classification, and Origins," *Integrated Environmental Assessment and*

Management, Vol. 7, No. 4, pp. 513-541. https://setac.onlinelibrary.wiley.com/doi/10.1002/ieam.258.

- Fei, C., J. Olsen, 2011, "Prenatal exposure to perfluorinated chemicals and behavioral or coordination problems at age 7 years." Environ Health Perspect, 119(4): 573-578. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3080943/.
- Grandjean, P., et al., 2012, "Serum Vaccine Antibody Concentrations in Children Exposed to Perfluorinated Compounds." Journal of the American Medical Association, 307(4): 391-397. https://jamanetwork.com/journals/jama/fullarticle/1104903.
- Kaiser Family Foundation (KFF), 2022, "Health Care Expenditures per Capita by State of Residence in 2014." https://www.kff.org/other/state-indicator/health-spending-per-capita/ (accessed July 1, 2022).
- Kwiatkowski, C.F. et al., 2020, "Scientific Basis for Managing PFAS as a Chemical Class," *Environmental Science and Technology Letters*, Vol. 7, pp. 532-543. https://pubs.acs.org/doi/10.1021/acs.estlett.0c00255.
- Longsworth, Sarah Grace, 2020, "Processes and Considerations for Setting State PFAS Standards," Environmental Council of the States, www.ecos.org/documents/ecos-white-paper-processes-and-considerations-for-setting-state-pfas-standards.
- Maisonet, M., et al., 2012, "Maternal Concentrations of Polyfluoroalkyl Compounds during Pregnancy and Fetal and Postnatal Growth in British Girls." Environ Health Perspect, 120(10): 1432-1437. https://ehp.niehs.nih.gov/doi/10.1289/ehp.1003096.
- Malits, J., et al., 2018, "Perfluorooctanoic acid and low birth weight: estimate of US attributable burden and economic costs from 2003 through 2014." International Journal of Hygiene and Environmental Health, 221: 269-275. https://doi.org/10.1016/j.ijheh.2017.11.004.
- Nair, A., et al., 2021, "Demographic and exposure characteristics as predictors of serum per- and polyfluoroalkyl substances (PFAS) levels – A community-level biomonitoring project in Pennsylvania." International Journal of Hygiene and Environmental Health, 231:113631. https://doi.org/10.1016/j.ijheh.2020.113631.
- Nordic Council of Ministers, 2019, "The Cost of Inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS." https://www.norden.org/en/publication/cost-inaction-0.
- US EPA, May 2016, "Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)," EPA 822-R-16-005. Available at https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos.
- US EPA, May 2016, "Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)," EPA 822-R-16-004. Available at https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos.
- US EPA, May 2016, "Health Effects Support Document for Perfluorooctanoic Acid (PFOA)," EPA 822-R-16-003. Available at https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos.
- US EPA, May 2016, "Heath Effects Support Document for Perfluorooctane Sulfonate (PFOS)," EPA 822-R-16-002. Available at https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos.

- US EPA, January 2018, "UCMR 3 Occurrence Data by State." Available at https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3.
- US EPA, 2020, "The Standardized Monitoring Framework: A Quick Reference Guide," Office of Water (4606M), EPA 816-F-20-002. https://www.epa.gov/sites/default/files/2020-05/documents/smf_2020_final_508.pdf.
- US EPA, February 2020, "EPA PFAS Action Plan: Program Update." www.epa.gov/sites/default/files/2020-01/documents/pfas_action_plan_feb2020.pdf.
- US EPA, March 2021, "Announcement of Final Regulatory Determinations for Contaminants on the Fourth Drinking Water Contaminant Candidate List," *Federal Register*, Vol. 86, No. 40, pp. 12272-12291. www.federalregister.gov/documents/2021/03/03/2021-04184/announcement-of-final-regulatory-determinations-for-contaminants-on-the-fourth-drinking-water.
- US EPA, March 2021, "Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 5) for Public Water Systems and Announcement of Public Meeting," *Federal Register*, Vol. 86, No. 46, pp. 13846-13872. www.federalregister.gov/documents/2021/03/11/2021-03920/revisions-to-the-unregulated-contaminant-monitoring-rule-ucmr-5-for-public-water-systems-and.
- Wu, K., et al., 2012, "Association between maternal exposure to perfluorooctanoic acid (PFOA) from electronic waste recycling and neonatal health outcomes." Environmental International, 48:1-8. https://doi.org/10.1016/j.envint.2012.06.018.

(29) Include a schedule for review of the regulation including:

A. The length of the public comment period:	60 days
B. The date or dates on which any public meetings or hearings will be held:	March 21, 22, 23, 24 and 25, 2022
C. The expected date of delivery of the final-form regulation:	Quarter 4 2022
D. The expected effective date of the final-form regulation:	Upon publication in the *Pennsylvania Bulletin*
E. The expected date by which compliance with the final-form regulation will be required:	Upon publication in the *Pennsylvania Bulletin*
F. The expected date by which required permits, licenses or other approvals must be obtained:	January 2025

(30) Describe the plan developed for evaluating the continuing effectiveness of the regulations after its implementation.

The amendments will be reviewed in accordance with the Sunset Review Schedule published by the Department.

Review of Proposed Maximum Contaminant Levels for PFOA and PFOS in Drinking Water for the Commonwealth of Pennsylvania

By
The Drexel PFAS Advisory Group

Richard J Hamilton MD MBA

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July 2022

Summary: The proposed rule published by the Environmental Quality Board is predicted to have a significant economic benefit to Pennsylvania because it will reduce exposure to PFOA and PFOS in drinking water and subsequently reduce health care problems associated with PFAS. Annual health care costs in the state of Pennsylvania as a result of PFAS contamination of drinking water are estimated to range from $2.2 to $3.5 billion. The Proposed MCL for PFOA of 14 PPT and for PFOS of 18 PPT will provide health benefits to Pennsylvanians. The cost to mitigate PFAS contamination across Pennsylvania could be as high as $378 million per year. Determining the costs required to specifically meet the proposed MCL in drinking water across Pennsylvania requires further study.

1. **Health Care Benefits:**

To predict the value of those health care benefits, the DPAG used two approaches – the value transfer method and the counterfactual method. The value transfer method applies and scales quantitative estimates of health care impact costs from one study site to another. (Johnston 2015) The counterfactual method assumes that reduction in exposure to PFOA and PFOS from drinking water will result in a health care cost benefit equal to estimated health care costs attributable to the base exposures to PFOA and PFOS. Although each of these methods have their limitations, it is possible to create an estimate of projected savings from reducing exposure to PFOA and PFOS.

The health care analysis was broken down into three steps: 1) testing whether the selected MCL will result in hypothetical serum levels known to be associated with disease specific critical effects identified by the DPAG working group, 2) applying the counterfactual method to data derived from a study of a subpopulation of Pennsylvanians near a PFAS contaminated site to estimate health care benefits for that group, and 3) deriving a value transfer estimate from other health care impact studies.

1.A. Toxicokinetic modeling of PFOA and PFOS MCLs.

The Drexel PFAS Advisory Group had determined that the critical effect for PFOA was impairments of bone growth and neuromotor activity. Drexel (2021) A small number of studies have been able to identify human serum PFOA levels associated with an elevated risk for low birth weight which is a manifestation of this critical effect. Malits et al analyzed National Health and Nutrition Examination Survey data from 2003 to 2004 for exposure response relationship between PFOA level and low birth weight. (Malits 2018) The authors of that study selected a maternal serum level of 3.1 ng/mL as a reference level. Below this level, the adverse health effect on low-birth-weight infants would be reduced (sensitivity analysis: 1 to 3.9 ng/mL). The 3.1 ng/mL level represents the upper limit of the lowest tertile in the study by Maisonet and colleagues. (Maisonet 2012). To be clear, this does not represent (Bach 2015) a safe PFOA exposure level. Rather, it is the point above which statistically significant associations have been demonstrated when median serum or plasma levels during pregnancy were above approximately 3.1 ng/mL (Maisonet 2012; Fei 2007; Wu 2012). Note, one study with median levels above this level found no significant association (Darrow 2013).

It is possible to model PFOA and PFOS toxicokinetics in adults using a modified one-compartment exponential decay model with adjustment for background exposures

(Olsen et al. 2007; Bartell 2017) Bartlett (2017) published a JavaScript serum PFAS calculator, available at this site: https://www.ics.uci.edu/~sbartell/pfascalc.html. Using this calculator, one enters a proposed water PFOA or PFOS concentration and an initial serum concentration, and the web calculator returns results based on the modified one-compartment model for adults. For purposes of this report, the target population was set at "females, premenopausal or perimenopausal," since developmental effects and breast-feeding infants were the target populations for critical effects. The remaining pharmacokinetic parameters and background contribution to serum levels can be adjusted or set as per the suggested parameters.

Assuming the level of PFOA in consumed water was the MCLG of 8 PPT, this calculator developed by Bartell (Bartell 2017) predicts that a woman of childbearing age would reach a steady state PFOA serum level of 2.5 ng/mL. The same model predicts a steady state serum PFOA level of 3.1 ng/mL if the consumed water was at the proposed MCL of 14 PPT. (See figure 1) Only by reducing ongoing PFOA exposures outside of drinking water, the proposed MCL would result in a lower serum level (possibly as low as 1.6 ng/mL if all PFOA exposure outside of drinking water was eliminated). Given the elimination of PFOA from consumer products, reducing non-drinking water exposure to PFOA may not be an unreasonable assumption. Furthermore, the Bartell calculator confirms that the proposed MCL of 14 PPT would be a 90% improvement over the serum level predicted if the individual consumed water at the former EPA recommendation of 70 PPT (predicted serum level 8.9 ng/mL).

In a prior report, the DPAG determined that the critical effect for PFOS was diminished immune response. Grandjean (2012) reported their findings that elevated exposures to PFOS were associated with reduced humoral immune response to routine childhood immunizations in children aged 5 and 7 years. In that report, the geometric mean and inter quartile range (IQR) of the PFOS concentration for mothers was 27.3 ng/mL 23.2 to 33.1 mg/mL, respectively. For children age 5 they were 16.7 ng/mL and 13.5 to 21.1 ng/mL, respectively. Reductions in antibody response in the age 5 children were noted as PFOS levels rose above the lowest detected level of 6 ng/mL. The method developed by Bartell predicts that in women of childbearing age the PFOS MCLG of 14 PPT would result in a steady state serum level of 6.8 ng/mL and the proposed MCL of 18 PPT would result in a steady state serum level of 7.2 ng/mL. Note that if a woman of childbearing age was able to eliminate PFOS exposures from other sources and drank water with the proposed MCL of 18 PPT, she would ultimately have a steady state serum PFOS level of 2.1 ng/mL. Although the literature does not provide a reference level for PFOS and immune response, the Bartell model of the proposed MCL for PFOS predicts a serum level below the lower bound of IQR of the geometric mean in mothers in the Grandjean study.

In conclusion, only the MCLG is considered to be a level protective of health. Nonetheless, according to a toxicokinetic model, the proposed MCLs selected for PFOA and PFOS do not lie above thresholds that are known to model out to mean serum levels reported to be associated with adverse effects.

1.B. . Counterfactual estimate of health care costs associated with PFOA and low birthweight for one community in Pennsylvania.

Malits (2018) estimated that the total socioeconomic cost of PFOA-attributable low birthweight births in the United States from 2003 through 2014 was $13.7 billion.

The authors modeled reduction in observed low birth weight infants attributable to PFOA exposure. The authors relied on the meta-analysis performed by Johnson (2014), which estimated that a 1-ng/mL increase in serum or plasma PFOA was associated with a –18.9 g (95% CI: –29.8, –7.9) difference in birth weight. Applying this to the NHANES data, the authors were able to estimate the number of low-birth-weight infants attributable to PFOA. During the studied time period, PFOA serum levels dropped from a median of 3.3 to 1.6 ng/mL. The fall in PFOA levels and the concomitant reduction in the fraction of low-birth-weight infants attributable to PFOA provided a counterfactual estimate of the cost of exposure to PFOA. These costs included the direct hospital costs at the time of birth and lost economic productivity due to low birthweight births being associated with longer-term outcomes such as lower lifetime earning potential. To determine what this would mean in Pennsylvania, DPAG applied a value transfer method that assumes a scalable relationship between impacts of PFOA–attributable low birthweight births quantified by Malits in the total United States population. Since 4.0 % of the US population lives in Pennsylvania, the total costs due to low birth weight from PFOA exposure for the same period (2003 – 2014) are calculated to $548 million (approx. $637.58 million in 2022 dollars). This equates to $583 million in 2022 dollars if the population considered is only the 11.9 million served by community and nontransient, noncommunity public water systems.

In 2018, Nair (2021) from the Pennsylvania Department of Health studied communities near two former military bases in Pennsylvania that were exposed for several decades to PFAS through contaminated drinking water. The population in that community was estimated to be 84,000. Serum PFAS levels were compared with the national averages for 2013-2014 and their relationships with demographic and exposure characteristics were analyzed. The average levels of PFOA and PFOS among the study participants were 3.13, 10.24 ng/mL respectively. Overall, 75 and 81 % of the study participants had levels exceeding the national average for PFOA (1.94 µg/L), and PFOS (4.99 µg/L), respectively. This study places that 2018 community in the same broad category as the 2003 National Health and Nutrition Examination Survey (NHANES) data for the US population. A similar value transfer analysis suggests that the total health care costs associated with PFOA exposure in that community alone over a similar time period (11 years) would be $4.3 million in 2022 dollars. Assuming that PFAS levels fell in the community in the same manner that they fell nationally, the costs would average to $390,000 per year.

1.C. Total Health Care Costs

In 2019 the Nordic Council of ministers published a socio-economic analysis of environmental and health impacts linked to exposure in PFAS in the Nordic countries. (Goldenham 2019) The goal of the study was to establish a framework for estimating costs for society related to impacts on health and the environment associated with PFAS exposure and to provide monetary values and case studies. It was acknowledged that data is limited in the academic literature and that in some cases assumptions are required. Data from Nordic countries was employed when available, but the study also drew on cost data from European, US and Australia.

To calculate health related costs to society, the study group focused on PFAS related health impacts to the liver, increased serum cholesterol as a prequel to hypertension, immune response, thyroid disease, fertility, pregnancy induced hypertension, preeclampsia, low birthweight, and testicular and kidney cancer. Exposure levels were broken into three categories: occupational or high exposures, elevated or moderate exposures in communities near chemical plants or in communities with PFAS in their drinking water, and background or lower exposures due to exposure to PFAS in consumer products and other background levels. The health endpoints for occupational exposure was kidney cancer. Health endpoints for elevated exposures to communities with high PFAS levels in drinking water were all-cause mortality, low birth weight, and increased infections (decreased immune response) in children. The endpoint for background exposure was hypertension in adults as a consequence of elevated cholesterol.

In the study, the total population of the Nordic countries was 20.7 million. The annual monetized impact of elevated mortality due to PFA'S exposures ranged from €2.8 - €4.6 billion. Converting to dollars and adjusting for inflation in 2022 from 2019, this would result in $3.5 to $5.7 billion of annual health impact related cost of exposure to PFAS in the Nordic Countries. Adjusted for the 13 million population of Pennsylvania, this produces a value transfer estimate of $2.2 to $3.5 billion annual health care impact related cost. This may seem to be an excessive figure until it is compared to the $4.5 trillion dollars of annual health care spending in the US. The Kaiser Family Foundation (KFF 2022) estimated the 2014 Pennsylvania per capita spending on health care was $9258.00 which projects to $120 billion for the entire state annually without inflation adjustment. This suggests that PFAS contamination in drinking water may account for 2 to 3% of the annual health care costs in Pennsylvania. This seemingly large percentage is consistent with the model employed with predicts a high lifetime health care cost impact of low birth weight children and the ubiquitous impact of background exposure resulting in adult hypertension.

In conclusion, these projections are meant to guide regulation and not be explicit return on investment guarantees for mitigation of PFAS in drinking water. Nonetheless, health care is one of the most expensive commodities in society today, and the adverse impacts on health from a variety of sources have staggeringly high costs.

2. Non-health related costs

The non-health related costs include monitoring, health assessments, provision of water to replace contaminated supplies on a temporary basis, new pipelines, upgraded water treatment works, maintenance, and excavation and treatment of contaminated soils.

The US Chamber of Commerce estimates that across the US, private sector cleanup costs at Superfund sites alone for PFOA and PFOS are estimated to cost between $700 million and $800 million in annualized costs ($11.1 billion and $22 billion present value costs).

Not all of the non-health related costs will be borne by the private sector, but the cumulative numbers may be staggering. In Pennsylvania, the US Department of Defense has already spent $15 million at the Willow Grove military base; $16 million at Warminster for environmental investigations and clean-up and $762,500 on environmental investigations: $234,600 at Letterkenny Army Depot; $12,900 at North Penn U.S. Army Reserve Center; $43,700 at Harrisburg International Airport; $127,700 at Horsham; $171,800 each at Pittsburgh Air Force; and $171,800 at Pittsburgh Air Force Reserve Command.

The town of Ridgewood NJ will spend $3.5 million to treat drinking water for 62,000 customers and Garfield NJ has spent $2 million for 233,000 customers.

The Nordic Council of Ministers report examined the non-health environmentally related costs to society compiled from direct costs incurred by communities taking measures to reduce PFAS exposure through remediation of drinking water. Where no data were available estimates were employed. Total cost included monitoring, health assessments, provision of water to replace contaminated supplies on a temporary basis, new pipelines, upgraded water treatment works, maintenance, and excavation and treatment of contaminated soils. The total cost for Nordic countries was estimated to range between €46 million - €11 billion over a 20-year period which included the low and high outlier estimates. Adjusted for exchange rate, this is a total with a range of $51 million to $12.2 billion ($2.5 million to $610 million per year). Using a value transfer approach for Pennsylvania, this would equate to a 20-year cost with a range of $1.6 million to $378 million per year. Given the wide range, the Nordic Council study went on to develop a final, best estimate of aggregated costs by excluding the low and high outliers of approximately €1 billion ($1.1 billion) over a 20-year period or $55 million per year. This scales to $34 million per year for Pennsylvania.

EQB (2022) aggregated costs of water treatment to a total annual figure of $115 million per MGD plus $6 million in compliance costs (EQB 2022: Table 18). This was based on averages but did not eliminate the high and low estimates from granular activated charcoal (GAC) and anion exchange (IX) treatment costs. Point of use treatment was not considered and should be factored into the cost/benefit consideration where possible. Establishing an estimate across the state will require further information such as the number of consumers served by water supplies that exceed one or both of the proposed MCLs.

Alternative methods besides GAC and IX exist to treat PFAS contaminated water. Nanofiltration (NF) and reverse osmosis (RO) are pressure-driven separation processes that utilize semi-permeable, dense membranes to remove dissolved substances and fine (colloidal) particles from fluids. During membrane treatment of water, a portion of the incoming feed water is forced across the membrane generating a "cleaner" permeate (or produce) stream, while the remaining water is known as the concentrate, brine, retentate, or reject waters, which is concentrated in solutes that are "rejected" by the membrane. NF membranes have pore sizes around 0.001 micron, while RO membranes have pore sizes around 0.0001 micron. While RO membranes are typically more superior to NF membranes at removing solutes, such as PFAS (often achieving greater than 99% removal for RO membranes) Tang (2007), RO membranes require higher operating pressures (and thus higher energy costs) to achieve the same system recovery (which is defined as the ratio of the permeate flow to feed flow rate) as NF membranes. For example, transmembrane pressures for RO membranes typically range from 500 to 8000 kPa for RO membranes but only achieve system recoveries of approximately 60-90%, while transmembrane pressures for NF membranes range from 200 to 1500 kPa with system recoveries of approximately 75-90%. Because of the small pore sizes of NF and RO membranes, they are often prone to fouling due to inorganic, organic, biological, and colloidal impurities, which could also reduce limit their efficiency.

Wang (2015), Franke (2019) Therefore, efficient NF and RO membrane treatment for removal of PFAS may only be feasible for source waters with low organic matter and other impurities or where pre-treatment is implemented to remove these impurities prior to membrane separation. Although lab- and pilot-scale studies suggest that it is feasible for NF and RO processes to produce permeate streams with concentrations of PFAS below current regulatory and health advisory levels, their high energy costs and the generation of PFAS contaminated concentrate streams that need to be treated as hazardous waste make them less desirable options for treatment of PFAS. Patterson (2019) Despite these drawbacks of NF and RO membrane treatment of PFAS, commercially available RO membrane filtration systems have been shown to be effective at removing PFAS and the use of these membrane processes in combination with other treatment technologies are being investigated. Patterson (2019) Das (2022)

Home water treatment systems that reduce the levels of PFAS in drinking water should be considered as well. They can be installed the point of entry or at the point of use. Point of entry (POE) water treatment systems, or whole house treatment systems, treat all the water entering the household plumbing system. Point of use (POU) water treatment systems treat the water at a specific location within the house, typically the kitchen sink or primary source of water for drinking and cooking (some also provide water to the refrigerator). Pros and Cons exist for these systems. While they may greatly reduce the total volume of water that needs to be treated, they impose considerable burdens on water suppliers who become responsible for supporting the maintenance of a large number of household treatment devices. The economics are generally most favorable when the majority of exposure to the contaminant of concern is from direct ingestion of water, such that a single point of use treatment device that provide all the potable water for the household effectively reduces exposure. Additional devices can be used, for example to treat shower water for volatile compounds, but will tend to decrease any economic advantage of point of use treatment compared to centralized treatment. Past experience has been that point of use treatment generally does not dramatically alter the overall cost-effectiveness of standards but can play an important role in addressing affordability concerns in small systems where the number of treatment devices to be maintained is manageable.

Finally, other non-health care costs include diminished property values. In a study of the impact of PFAS groundwater contamination on property value in Oakdale Minnesota and other affected communities, Sunding (2017) found that the value of properties sold after PFAS contamination of groundwater decreased by 7.3% in Oakdale and 4.4% in other affected communities. The report calculated cumulative past (dating back to 1971), present, and future (out to 2050) lost home value in the affected communities. The total was $1.5 billion in total lost home value damages due to PFAS contamination in the East Metro area Minneapolis- St. Paul, MN.

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Figure 1: Steady state PFOA level predicted in females childbearing age consuming water with PFOA of 14 PPT

Serum PFAS Calculator for Adults

Enter the following values, then click on the "submit" button:

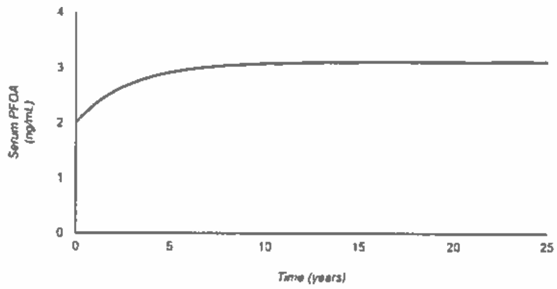
1. Select the chemical you want to model: PFOA

2. Starting serum PFOA concentration (µg/L, ng/mL, or ppb)
2 is a typical value for an adult with no PFOA in his or her water. 2

3. PFOA concentration in drinking water (ng/L, or ppt)
Enter 0 if drinking only bottled water, carbon-filtered water, or water treated by reverse osmosis 14

4. Biological sex and menstrual status (optional): Female, premenopause or perimenopause (still having periods)

Advanced options **Submit**



Starting serum PFOA concentration. 2 ng/mL
Water PFOA concentration. 14 ppt
Serum PFOA contribution from other ongoing exposures: 1.67 ng/mL
Water ingestion rate 16.6 ml/kg/d
Volume of distribution. 0.17 L/kg
Half-life of PFOA in serum: 2 years
Steady-state ratio for serum:water concentrations: 102.91
Predicted steady-state serum PFOA concentration: 3.11 ng/mL

Calculator Version 1.2 by Sherman Lu and Scott Bartell
Citation: Lu S, Bartell SM. Serum PFAS Calculator for Adults, Version 1.2, 2020, www.ics.uci.edu/~sbartell/pfascalc.html

THIS WEBSITE IS NOT INTENDED FOR THE PURPOSE OF PROVIDING MEDICAL ADVICE. All content is for informational purposes only and is not intended to serve as a substitute for the consultation, diagnosis, and/or medical treatment of a qualified physician or healthcare provider. Calculations are based on average values for adults (ages 20 and over); individual results may vary due to individual differences in water consumption, excretion of chemicals, and exposures from other sources. All calculations assume 16.6 mL/kg-day of water ingestion (EPA, 2019 adult consumers). Chemical-specific defaults:

Chemical	Volume of Distribution (L/kg)	Contribution from other sources (ng/ml)	Average half-life (years)
PFOS	0.23 (Thompson et al., 2010)	5.20 (CDC 2019)	3.4 (Li et al. 2018)
PFOA	0.17 (Thompson et al., 2010)	1.67 (CDC 2019)	2.3 (Bartell et al. 2010)
PFHxS	0.23 (Zhang et al., 2013)	1.30 (CDC 2019)	5.3 (Li et al., 2018)
PFNA	0.17 (Zhang et al., 2013)	0.60 (CDC 2019)	3.9 (Zhang et al., 2013 weighted average)

Figure 2: Steady state PFOA level predicted in females childbearing age consuming water with PFOA of 14 PPT

Serum PFAS Calculator for Adults

Enter the following values, then click on the "submit" button:

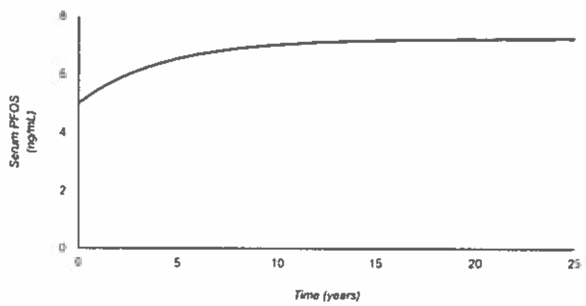
1. Select the chemical you want to model. PFOS

2. Starting serum PFOS concentration (µg/L, ng/mL, or ppb)
5 is a typical value for an adult with no PFOS in his or her water. 5

3. PFOS concentration in drinking water (ng/L, or ppt)
Enter 0 if drinking only bottled water, carbon-filtered water, or water treated by reverse osmosis. 18

4. Biological sex and menstrual status (optional): Female premenopause or perimenopause (still having periods)

Advanced options | Submit



Starting serum PFOS concentration: 5 ng/mL
Water PFOS concentration: 18 ppt
Serum PFOS contribution from other ongoing exposures: 5.2 ng/mL
Water ingestion rate: 16.6 ml/kg/d
Volume of distribution: 0.23 L/kg
Half-life of PFOS in serum: 3 years
Steady-state ratio for serum:water concentrations: 114.09
Predicted steady-state serum PFOS concentration: 7.25 ng/ml.

Calculator Version 1.2 by Sherman Lu and Scott Bartell.
Citation: Lu S, Bartell SM. Serum PFAS Calculator for Adults, Version 1.2, 2020. www.ics.uci.edu/~sbartell/pfascalc.html

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PFNA	0.17 (Zhang et al., 2013)	0.60 (CDC 2019)	3.9 (Zhang et al., 2013 weighted average)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

July 18, 2022

Mr. Ed Chescattie, Acting Director
Bureau of Safe Drinking Water
P.O. Box 8467
Harrisburg, PA 17105-8467

Re: Comments on the Draft-Final PFAS Rule revisions to Chapter 109

Dear Mr. Chescattie:

The Public Water System Technical Assistance Center (TAC) Board met on July 14, 2022 to review and discuss the Department's Draft-Final revisions to the safe drinking water regulations, specific to the PFAS Rule. The following comment was approved by the TAC Board:

> The Public Water System TAC Board approves the Draft-Final PFAS Rule as presented.

Thank you for the opportunity to comment.

Sincerely,

Serena A. DiMagno

Serena A. DiMagno
Chairperson

Treatment	Information Provided by	Source Information	Capital Cost per 1 MGD	Total Capital Cost	Capacity (MGD)	Annual O&M Cost per 1 MGD	Reported Annual O&M Cost	Notes
GAC	Vendor A	Vendor	$343,000	$3,430,000	10	$32,018		Capital cost (based on 10 MGD plant) does not include vessels, piping installation or tying into existing system. O&M includes only reactivation of spent GAC at 80,000 bed volumes.
GAC	Vendor B	Vendor	$535,000			$356,000		Capital cost does not include civil work. O&M does not include labor, electricity or testing. Includes expendable media only.
GAC	System A (2 GAC and 1 IX)	PWS	$3,125,000	$1,800,000	0.576	$107,007	$56,500	June through April sampling only cost reported for O&M
GAC	System B, Site 1	PWS	$1,675,347	$965,000	0.576	$121,528	$70,000	Sites 1 and 2 were designed and installed under single contract.
GAC	System B, Site 2	PWS	$2,454,259	$778,000	0.317	$220,820	$70,000	Sites 1 and 2 were designed and installed under single contract.
GAC	System B, Site 3	PWS	$2,433,333	$876,000	0.36	$194,444	$70,000	
GAC	System C	ASDWA	$9,250,000	$47,750	0.005225	unknown	unknown	
GAC	System D	ASDWA	$3,139,000	$660,000	0.72	unknown	unknown	
GAC	System E	ASDWA	$1,135,497	$2,623,000	2.31	unknown	unknown	$1,980,000 in 2006 dollars, which includes generator, clearwell, high speed pumps, and chemical feed facilities
GAC	System F	ASDWA	$4,444,444	$8,000,000	1.8	unknown	unknown	Includes cost of Fe/Mn filters installed prior to GAC
IX	Vendor A	Vendor	$357,000	$3,570,000	10	$59,361	$593,615	Cost includes incineration of resin.
IX	Vendor B	Vendor	$500,000			$175,000	$175,000	Capital cost does not include civil work. O&M does not include labor, electricity or testing. Includes expendable resin only.

Treatment	Information Provided by	Source Information	Capital Cost per 1 MGD	Total Capital Cost	Capacity (MGD)	Annual O&M Cost per 1 MGD	Reported Annual O&M Cost	Notes
IX	Vendor D	Vendor	No information	No information	1	$159,722	$125,925	Capital cost including construction power and maintenance estimated at 15 cents per 1000 gallons based on 100 MGD plant. O&M based on media installation and disposal raging from 8-53 cents per 1000 gallons.
IX	System G	PWS	$10,400,000	$3,000,000	0.288	unknown	unknown	Capital cost includes construction of new building for treatment units
IX	System H	ASDWA	$3,333,000	$250,000	0.075	unknown	unknown	
IX	System I	ASDWA	$634,900	$320,000	0.504	unknown	unknown	
IX	System J	ASDWA	$1,128,000	$3,250,000	2.88	unknown	unknown	
IX	System K	ASDWA	$925,900	$1,400,000	1.512	$132,275	$200,000	

Summary of Responses from Survey of Pennsylvania Accredited Laboratories for PFAS, May 2021

Lab Designation	Methods accredited?	Additional methods considered?	Maximum capacity?	% of max capacity?	MRLs?	Failure to meet QA/QC?	If >10%, considered higher MRL?	Average cost per sample?	Reduction in cost for fewer analytes?	Additional collection cost?	Additional charges, if any?
Lab A	NO RESPONSE										
Lab B	537.1	No	75 (?) (not indicated whether per day, week, or month)	20%	PQLs = 2 ng/L	2%	NA	265 (not indicated if includes FRB)	No reduction		no
Lab C	EPA Method 537.1	Yes, EPA Method 533	40 Samples/day, including Field Blanks (800/month)	75%	2.0 ng/L for all Analytes	< 5%	NA	$200 (DOES NOT INCLUDE FRB)	No reduction	NA – Our lab does not provide collection services	None
Lab D	NO RESPONSE										
Lab E	NO RESPONSE										
Lab F	NO RESPONSE										
Lab G	NO RESPONSE										
Lab H	537.1	533	120/day combined 537.1 and 533 (but not accredited in PA for 533); est. 1200/month for 537.1	50%	2 ppt	< 1%	NA	$750 (includes sample and FRB extraction and analysis)	yes	collection not offered	none
Lab I	537.1	533	45/day 212/week 900/month	80%	2 ng/L	10%	No, most appear to be related to matrix as noted by surrogate standard recoveries	$520 for 537.1, $750 for 533 (not accred.)	No reduction	depends on location	Depends on the added on items. For example, level IV data report may incur fees of $50 for each report
Lab J	EPA 533, EPA 537 1, and EPA 537 Revision 1.1	Yes as additional methods become available, we will evaluate and pursue certification for each.	Approximately 40,000 samples per month for all matrices	60%-80%	For most analytes, the reporting level is 2 ng/l	20% to 30% (includes failures for internal stds, surrogates, lab control stds, and method blanks)	Higher MRL would decrease % somewhat, but only for blank contamination situations; main issues is extraction standards/surrogates that fail due to high conc. of target compounds in sample	EPA 537.1 or EPA 537 v 1.1: $250-$275 EPA 533: $300 (DOES NOT INCLUDE FIELD BLANK)	Yes, in potable water samples if a client requests PFOA/PFOS only, we reduce the price accordingly	collection is $225 for the first sample collected and $100 for each additional sample collected at the same location	$100 extract and hold fee (if FRB analysis not needed, analysis cost is half plus 100), $15 for PFAS free water needed to fill the field blank
Lab K	537.1	533	40-80/day; est 1200/month	30-60%	2 ng/L for 537.1 and 533	10-15%	Yes, but keeping at 2 ppt for most analytes with focus on efforts to reduce QA/QC failures	537.1 = $600 (533 = $800; not accred.) (includes FRB)	No reduction	$75 per hour, portal to portal, plus mileage	Level IV data deliverable report is a 10% surcharge
Lab L	537 revision1.1 and EPA 537.1	EPA method 533	60/day 300/week 1200/month	75%	2 ng/L for all PFAS	< 5%	NA	EPA 537 rev 1.1 is $300; EPA 537.1 is $325; includes field blank analysis.	UCMR 3 list, 6 compounds at $250 per sample including field blank	collection not offered	Overnight shipping back to us. We ship supplies and coolers to client for free
Lab M	EPA 537.1, and EPA 537 Revision 1.1	currently applying for reciprocity for 533	20/day 100/week 400-500/month	30%	2 ng/L for most analytes	< 5%	NA	537 1 1 - 200.00; 537.1 - 220.00; 533 - 275 00 (not accred) - includes FRB?	YES	NA for PA - only collect locally	extract and Hold - $0.00 PFAS Free DI Water - 25.00 per gallon Rush fees available upon request 5% for Level 4 data packages
Lab N	Relinquished accreditation										
Lab O	Drinking Water: EPA Method 533, EPA Method 537 Revision 1.1, and EPA Method 537.1	NA	90 samples per day, 450 samples per week and 1,800 samples per month	50%	2 ng/L for most analytes	< 1%	NA	537R1.1= $480 537.1=$520 533=$600 (includes FRB)	Yes (e.g., PFOA and PFOS only is ~$225 per sample)	NA- sample collection not offered	electronic data deliverable (EDD), full data package, lab-provided PFAS-free water, and expedited sample container and cooler shipping are extra

CDL-1

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Independent Regulatory Review Commission

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Copy below is hereby approved as to form and legality. Attorney General

By:
(Deputy Attorney General)

DATE OF APPROVAL

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Copy below is hereby certified to be true and correct copy of a document issued, prescribed or promulgated by:

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

(AGENCY)

DOCUMENT/FISCAL NOTE NO. 7-569

DATE OF ADOPTION October 12, 2022

BY Ramez Ziadeh

TITLE RAMEZ ZIADEH, P.E.
ACTING CHAIRPERSON

EXECUTIVE OFFICER CHAIRPERSON OR SECRETARY

Copy below is hereby approved as to form and legality Executive or Independent Agencies

BY Addie A. Abelson

10/12/2022
DATE OF APPROVAL

(Deputy General Counsel)
(Chief Counsel - Independent Agency)
(Strike inapplicable title)

☐ Check if applicable. No Attorney General Approval or objection within 30 days after submission.

NOTICE OF FINAL RULEMAKING

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

Safe Drinking Water PFAS MCL Rule

25 Pa. Code Chapter 109

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Safe Drinking Water

COMMENT AND RESPONSE DOCUMENT

PFAS MCL Rule

25 Pa. Code Chapter 109
52 Pa.B. 1245 (February 26, 2022)
Environmental Quality Board Regulation #7-569
(Independent Regulatory Review Commission #3334)

Introduction

The Environmental Quality Board (Board) adopted the proposed per- and polyfluoroalkyl substances (PFAS) maximum contaminant level (MCL) rule at its November 16, 2021, meeting. On February 15, 2022, the Department of Environmental Protection (Department) submitted a copy of the proposed rulemaking to the Independent Regulatory Review Commission (IRRC) and to the Chairpersons of the Senate and House Environmental Resources and Energy Committees for review and comment in accordance with Section 5(a) of Pennsylvania's Regulatory Review Act (71 P.S. § 745.5(a)). On February 26, 2022, the Board published the proposed rulemaking in the *Pennsylvania Bulletin* (52 Pa.B. 1245) with provision for a 60-day public comment period and five public hearings to accept verbal comments on the proposed regulation. The Board proposed to amend Chapter 109 (relating to safe drinking water) to establish MCLs and MCL Goals (MCLGs) for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The proposed rulemaking also proposed to establish monitoring and reporting requirements for public water systems (PWSs) to demonstrate compliance with the MCLs, sampling and analytical requirements, and acceptable treatment technologies.

The public comment period opened on February 26, 2022, and closed on April 27, 2022. Five virtual public hearings were held on the proposed rulemaking as follows:

March 21, 2022, at 1 p.m.—2 p.m.
March 22, 2022, at 6 p.m.—8 p.m.
March 23, 2022, at 1 p.m.—2 p.m.
March 24, 2022, at 9 a.m.—11 a.m.
March 25, 2022, at 9 a.m.—11 a.m.

During the public comment period, the Board received more than 3,500 comments. Members of the General Assembly, the House Environmental Resources and Energy Committee, and the Independent Regulatory Review Commission (IRRC) submitted comments. Individuals representing the public, advocacy groups, and a variety of industries also provided comments on the proposed rulemaking.

The Board published notice of the public hearings in the *Pennsylvania Bulletin* and on the Department of Environmental Protection's website. The public hearings were held over a one-week period and were accessible via phone or internet connection. To maximize the public's access to, and participation in the hearings, the Board held one hearing each day of the week with start times in the morning, afternoon, and evening. All commentators who registered for the public hearings were able to testify. Over the five public hearings, the Board heard testimony from 29 individuals for a total of approximately five hours of testimony.

This document summarizes the written comments received during the public comment period and the testimony received at the public hearings. In assembling this document, the Department responded to all comments related to the PFAS MCL Rule proposed rulemaking. For the purposes of this document, comments of similar subject matter are grouped together and responded to accordingly. A list of the commentators, including name and affiliation, is provided in a separate document. The commentator list also includes identification numbers, which are referenced in parentheses following each comment in this document.

Copies of Comments

Copies of all comments received by the Board during the public comment period are posted on the Department's eComment website for this rulemaking:

https://www.ahs.dep.pa.gov/eComment/ViewComments.aspx?enc=DN064MT8R38NKyiRv2iU7Gugpg%2fnXc2%2f2obgquFY1IM%3d.

Additionally, copies of all comments received by the Board on this rulemaking are posted on IRRC's website at http://www.irrc.state.pa.us/regulations/RegSrchRslts.cfm?ID=3345.

Acronyms and Abbreviations used in this Comment and Response Document

ASDWA – Association of State Drinking Water Administrators
AWWA – American Water Works Association
ATSDR – Agency for Toxic Substances and Disease Registry
BAQ – Bureau of Air Quality
BAT – Best Available Technology
BCW – Bureau of Clean Water
BECB – Bureau of Environmental Cleanup and Brownfields
BIL – Bipartisan Infrastructure Law
BSDW – Bureau of Safe Drinking Water
BVRB – Bottled, Vended, Retail, and Bulk water systems
BWM – Bureau of Waste Management
CCR – Consumer Confidence Report
CDC – Centers for Disease Control
CDC MRL – CDC Minimal Risk Level
CDX – Central Data Exchange
CFR – Code of Federal Regulations
CWS – Community Water System
DBP – Disinfection Byproduct
DEP or Department – Pennsylvania Department of Environmental Protection
DOH – Pennsylvania Department of Health
DPAG – Drexel PFAS Advisory Group
DWELR – Drinking Water Electronic Lab Reporting
DWRS – Drinking Water Reporting System
DWSRF – Drinking Water State Revolving Fund
EJ – Environmental Justice
EJA – Environmental Justice Area
EJAB – Environmental Justice Advisory Board
EO – Executive Order
EP – Entry Point
EPA – United States Environmental Protection Agency
EQB – Environmental Quality Board
ERE – (House or Senate) Environmental Resources and Energy Committee
FRB – Field Reagent Blank
GAC – Granular Activated Carbon
GUDI – Groundwater Under the Direct Influence of Surface Water
HA – Health Advisory
HAL – Health Advisory Level
IIJA – Infrastructure Investment and Jobs Act
IRRC – Independent Regulatory Review Commission
IOC – Inorganic Chemical
IX – Anion Exchange
kg/L – kilograms per liter
LAP – Laboratory Accreditation Program
MCL – Maximum Contaminant Level

MCLG – Maximum Contaminant Level Goal
MDL – Method Detection Limit
MDH – Minnesota Department of Health
MDHHS – Michigan Department of Health and Human Services
mg/L – milligrams per liter
MGD – Million Gallons per Day
MRDL – Maximum Residual Detection Level
MRL – Minimum Reporting Level
µg/L – micrograms per liter
µg/mL – micrograms per milliliter
NAWC – National Association of Water Companies
ng/L – nanograms per liter
ng/mL – nanograms per milliliter
NOV – Notice of Violation
NPDWR – National Primary Drinking Water Regulation
NDWAC – National Drinking Water Advisory Council
NTNCWS – Nontransient Noncommunity Water System
O&M – Operation and Maintenance
PENNVEST – Pennsylvania Infrastructure Investment Authority
PFAS – Per- and polyfluoroalkyl substances
PFBA – Perfluorobutanoic acid
PFBS – Perfluorobutanesulfonic acid
PFHpA – Perfluoroheptanoic acid
PFHxA – Perfluorohexanoic acid
PFHxS – Perfluorohexanesulfonic acid
PFNA – Perfluorononanoic acid
PFOA – Perfluorooctanoic acid
PFOS – Perfluorooctanesulfonic acid
PFUnA – Perfluoroundecanoic acid
PN – Public Notice or Public Notification
ppt – Parts per Trillion
PSOC – Potential Source of PFAS Contamination
PUC – Public Utility Commission
PWS – Public Water System
RAA – Running Annual Average
RAF – Regulatory Analysis Form
RCRA – Resource Conservation and Recovery Act
RRA – Regulatory Review Act
SAB – Science Advisory Board
SDWA – Safe Drinking Water Act
SDWARS – Safe Drinking Water Accession and Review System
SMF – Standardized Monitoring Framework
SOC – Synthetic Organic Chemical
TAC – Public Water System Technical Assistance Center
TNCWS – Transient Noncommunity Water System
UCMR – Federal Unregulated Contaminant Monitoring Rule

UCMR3 – Third Federal Unregulated Contaminant Monitoring Rule
UCMR5 – Fifth Federal Unregulated Contaminant Monitoring Rule
VOC – Volatile (Synthetic) Organic Chemical

Independent Regulatory Review Commission, Legislative, and Federal Comments

1. **Comment:** IRRC noted that some commentators support regulating PFAS chemicals as a class, rather than individually. One commentator noted that numerous scientific institutions support grouping PFAS as a class given shared hazard traits and target the same health endpoint. One commentator stated that regulating PFAS "one at a time is not practical." Commentators pointed to the large number of compounds identified as PFAS as reason to regulate them as a class. IRRC requested that the Board explain the reasonableness of addressing PFOA and PFOS as individual compounds rather than as a class. (1, 34-38, 62, 92, 1107)

   Response: The Department acknowledges these comments, but, based on available data, has determined that regulating PFAS chemicals as individual compounds rather than as a class is reasonable, practical, and the preferred method. As noted in the preamble to the proposed rulemaking, the Department utilized the services of the Drexel PFAS Advisory Group (DPAG) through a toxicology services contract to: review other state and Federal agencies' work on MCLs; independently review the available data, science, and studies; and develop recommended MCLGs for select PFAS (EQB, 2022). As part of their review, DPAG noted that several states used a combined approach to regulating PFAS in drinking water; those states developed a drinking water standard that is a sum of several PFAS compounds. However, DPAG noted in their report that currently available scientific evidence does not appear to support a decision to use a cumulative or summative approach for regulating PFAS. Early in their review, DPAG determined that using a combined approach for a drinking water standard for PFAS appears to be a "shortcut based on a presumption that the agents all have similar health effects and endpoints" (DPAG, 2021). DPAG determined that it could not be assumed that all PFAS have shared hazard traits and target the same health endpoints, and that the best approach, which is most protective of public health, was to develop individual MCLGs for each PFAS requested by the Department, and the DPAG recommended that each PFAS compound be reviewed and MCLs determined individually. Furthermore, the occurrence data used by the Department in development of this rulemaking do not suggest a meaningful opportunity to regulate other PFAS compounds besides PFOA and PFOS, as explained in detail in Comment #25.

   Based on that determination and recommendation from DPAG, the Department moved forward with evaluating each PFAS individually to determine which to regulate and at what levels. The Department will also continue to review new information on other PFAS compounds as it becomes available and to consider whether to regulate additional PFAS in the future.

2. **Comment:** IRRC and some commentators noted PFAS limits were already established by other states. Some commentators stated that Pennsylvania should adopt those limits, particularly those of New Jersey. Several commentators also mentioned California's standards, and a few commentators mentioned other states' standards including Colorado, Connecticut, Massachusetts, Michigan, Minnesota, New Hampshire, New York, North Carolina, and Vermont. IRRC also noted that a commentator mentioned that Vermont, Maine, and Massachusetts all have MCLs for a sum of five or six different PFAS. (1, 5, 41, 45, 47, 56, 62, 94, 121, 148, 154, 157, 172, 2153)

   Response: The Department considered other states' limits when developing this rulemaking. As described in the preamble to the proposed rulemaking, the Department must follow a rigorous rulemaking process when setting an MCL. In Pennsylvania, an MCL rulemaking must be based on an independent review of available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022).

Under a contract with the Department, DPAG reviewed the most currently available scientific studies and data, including other states' research and existing and proposed PFAS standards from across the country to inform the initial phase of the rulemaking process for establishing Pennsylvania drinking water standards. DPAG used that information to recommend MCLGs, as described in their report (DPAG, 2021). The Department utilized the MCLG recommendations in the process of establishing MCLs (see the Department's response to Comment #11 for a full explanation of the process to establish the proposed MCLs). At the time of the proposed rulemaking, six states had set MCLs for one or more PFAS—Massachusetts, Michigan, New Hampshire, New Jersey, New York, and Vermont. In addition, a few other states have set guidance values, action levels, response levels, or notification levels, including California, Connecticut, Minnesota, and Ohio; however, these alternate levels are not regulatory and do not carry the same enforceability as an MCL. While the proposed MCLs for the Commonwealth are slightly different from those established in other states, they are within the range and of comparable magnitude as the other state standards. This indicates that while the Department was required to follow the rulemaking process established in this Commonwealth, the end result of that process was a proposed rulemaking that includes MCLs for PFOA and PFOS at levels that are very similar to standards established independently by other states.

Regarding the states that have an MCL for a sum of PFAS, see the Department's response to Comment #1 on regulating PFAS as a class.

3. **Comment:** IRRC, the House Environmental Resources and Energy (ERE) Committee and several commentators raised concerns regarding the timing and alignment of this regulatory package and the forthcoming federal regulation. The House ERE Committee also expressed this concern, noting that "EPA's far greater resources will allow them to more accurately estimate the health impacts of an MCL, more accurately assess the water treatment technologies available to address PFAS, and more accurately estimate the cost of various treatment and monitoring systems to our water providers throughout the Commonwealth." The House ERE urged the Board to "rethink their approach and to defer to the EPA's experience and expertise to provide certainty to the regulated community." Commentators expressed concern with confusion among regulated entities over the two rulemakings, potential differences in the regulated levels or requirements of the two rulemakings, and the precedent of moving ahead of EPA with the rulemaking process. IRRC noted that commentators raised questions, including:

   - Has the Board engaged the EPA regarding the nearly simultaneous development of MCLs for PFOA and PFOS at the federal and state levels?

- Has the Board considered delaying implementation to avoid conflicting requirements and duplicate sampling?
- How will the Board address a situation where EPA's drinking water standards for PFOA and/or PFOS are either more stringent or less stringent than the Board's corresponding final standards for PFOA and/or PFOS?

IRRC requested that the Board address implementation concerns regarding the promulgation of potentially overlapping and potentially differing state and federal regulations related to PFOA and PFOS. IRRC also requested that the Board work with all parties with an interest in this rulemaking to create a regulatory environment that is consistent with the intent of the General Assembly, is reasonable, provides certainty to the regulated community, and is protective of the public health, safety, and welfare. (1, 2, 15, 17, 18, 26, 30, 60, 65, 66, 80)

Response: The Department has been following EPA's updates closely, has engaged with the EPA, and will continue to do so. At the same time, the Department has a responsibility to protect Pennsylvania's drinking water.

Safe drinking water is vital to maintaining healthy and sustainable communities. Proactively addressing PFOA and PFOS contamination in drinking water can reduce the incidence of illness and reduce health care costs. Recent research suggests the Combined Lifetime Health Advisory Level (HAL) for PFOA and PFOS of 70 ng/L, established by EPA in 2016, is not sufficiently protective against adverse health effects. The EPA has started the process of setting more stringent standards for PFOA and PFOS in drinking water, but that process is expected to take years to complete. Although EPA has stated a goal of publishing a final rulemaking by the fall of 2023 (US EPA, 2021b), EPA may not be able to meet that self-imposed deadline. Even if EPA meets that goal, there will be delayed implementation of the federal rule to allow states to incorporate the final federal regulation; so, the Department estimates future federal standards would not be effectively in place until fall of 2026 at the earliest. Given that timeline for federal standards, it is important that the Board act now to set more protective standards for this Commonwealth to protect the health of residents in this Commonwealth. Proper investment in public water system infrastructure and operations helps ensure a continuous supply of safe drinking water, enables communities to plan and build future capacity for economic growth, and ensures their long-term sustainability for years to come.

As stated in the preamble to the proposed rulemaking (EQB, 2022):

- PFAS are considered emerging contaminants because research is ongoing to better understand the potential impacts PFAS pose to human and animal health and the environment. PFAS are potentially linked to a number of adverse health effects, including high cholesterol, developmental effects including low birthweight, liver toxicity, decreased immune response, thyroid disease, kidney disease, ulcerative colitis and certain cancers, including testicular cancer and kidney cancer.

- In the absence of Federal action to address PFAS, Governor Tom Wolf signed Executive Order 2018-08 (EO) on September 19, 2018. The EO created the PFAS Action Team, a multi-agency group tasked with, among other things, developing a comprehensive response to identify and eliminate sources of contamination, ensure drinking water is safe, manage environmental contamination, review gaps in data and oversight authority, and recommend actions to address those gaps. The PFAS Action Team released its Initial Report in December of 2019 to the Department's PFAS webpage. The report includes information about PFAS, challenges associated with managing contamination, actions taken to date and recommendations for future actions. Recommendations include additional funding for communities dealing with PFAS contamination and strengthened statutory authorities to adequately address PFAS.

- The amendments in this rulemaking are intended to protect public health by setting State MCLs for contaminants in drinking water that are currently unregulated at the Federal level. With these amendments, the Commonwealth would move ahead of EPA in addressing PFOA and PFOS in drinking water and join a group of states that have set MCLs for select PFAS in drinking water.

EPA has publicly stated its intent to publish a proposed PFAS National Drinking Water Regulation in December 2022, and final regulation in December 2023. While there are no guarantees EPA will publish a proposed rule as targeted in December 2022, when the proposed rule is published, the Department will review EPA's proposal and provide comments during the public comment period. As a basis for providing comments on a proposed federal rule, the Department will rely on the rigorous rulemaking process by which this rulemaking was developed, a process which demonstrates occurrence of PFAS in public water supplies and provides justification for the Department's proposed MCLs. Sometime after the closing of the comment period on EPA's proposed rulemaking, EPA will publish a final rule. Because a proposed federal rule has not yet been published, it is impossible to predict whether the EPA will adhere to its intended schedule and publish a final rule in December 2023. However, when a final federal rule is published, the regulations go into effect three years after they are finalized. During this three-year period, the Department will review the federal rule and evaluate the supporting documentation to determine how the federal rule compares to the Department's regulations. If the federal rule is more stringent, the Department will follow the Commonwealth's rulemaking process to revise its regulations to address any discrepancies and to ensure the Department's regulations meet at least the minimum federal requirements. If the final federal rule is less stringent than the Department's regulations, the Department will evaluate the federal rule and its supporting documentation to determine if any revisions are needed to the Department's regulations.

Setting MCLs ahead of EPA is expected to provide more timely protection of public health while imposing minimal additional regulatory requirements on the regulated community. Under this rulemaking, PWSs will be required to conduct monitoring for PFOA and PFOS earlier than may be required under federal regulations, and if levels are in violation of one or both MCLs, PWSs will be required to complete corrective actions sooner. If EPA ultimately sets MCLs that are less stringent, there may be some PWSs required to install treatment under this rule that would not have been required to under EPA's levels; however, through the rulemaking process, the Department has demonstrated that the MCLs in this rulemaking are in the interest of improved public health protection and reasonably balance costs and benefits. If EPA's MCLs are more stringent, there will likely be additional PWSs that will need to install treatment beyond those that exceed the MCLs in this rulemaking. For the PWSs that install treatment as a result of a violation of the MCLs in this rulemaking, that treatment will put those PWSs in a better position to comply with EPA's MCLs regardless of whether they are more or less stringent. The approved treatment technologies in this rulemaking are capable of treating PFOA, PFOS, and other PFAS to non-detectable levels. If EPA's MCLs are more stringent, those PWSs that have installed treatment as required by this rulemaking may need to make relatively minor operational adjustments, such as changing out the media more frequently, but large-scale design changes are not expected.

Regarding EPA engagement, the Department notes that, in a letter dated April 26, 2022, received during the public comment period for the proposed rulemaking, EPA Region 3 Drinking Water Section offered support for the Department's PFAS regulatory efforts and provided comments regarding the proposed rule. Those comments are addressed in this Comment and Response Document (see Department responses to Comment #17, Comment #32, Comment #33, and Comment #34).

This rulemaking is also consistent with intent of the General Assembly. As it declared in the Pennsylvania Safe Drinking Water Act (SDWA), "[i]t is the purpose of this act to further the intent of section 27 of Article I of the Constitution of Pennsylvania by establishing a State program to assure the provision of safe drinking water to the public by establishing drinking water standards and developing a State program to implement and enforce the standards." 35 P.S. § 721.2(b). To ensure the residents of Pennsylvania are guaranteed an "adequate supply of safe, pure drinking water," the General Assembly charged the Board with the duty to adopt the rules and regulations of the Department "as it deems necessary for the implementation of the provisions of this act," which included granting the Board the authority to "adopt maximum contaminant levels or treatment technique requirements for any contaminant that a maximum contaminant level or treatment technique requirement has not been promulgated under the national primary and secondary drinking water regulations." 35 P.S. §§ 721.2(a) and 721.4(a).

In summary, it is the Department's position that in the interest of improved public health protection, it is imperative to move forward with this rulemaking at this time and not delay implementation. It is also the Department's position that this rulemaking is reasonable, will provide certainty to the regulated community by implementing an enforceable standard, and is protective of public health, safety, and welfare, consistent with the findings of the General Assembly in the SDWA. The Department remains committed to following the rulemaking process established by Pennsylvania law, which includes review by the General Assembly's standing committees. The Department also notes that, as part of that rulemaking process established by Pennsylvania law, the General Assembly's standing committees are represented on the Environmental Quality Board.

4. **Comment:** IRRC and some commentators noted that sampling for the EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5) would occur simultaneously with initial monitoring requirements of this rulemaking. IRRC noted that commentators recommended that the Department allow UCMR5 monitoring data to be used for compliance with the initial monitoring period of the rulemaking. (1, 16, 17, 18, 28, 30)

Response: The Department agrees and has amended this final-form rulemaking. UCMR5 was published in the *Federal Register* on December 27, 2021 (US EPA, 2021c). The Department acknowledges the potential for duplicate sampling efforts for Pennsylvania's initial PFAS MCL compliance monitoring and UCMR5 sampling. To address this, the Department has amended the final-form rulemaking to include a clause in the initial monitoring requirements in § 109.301(16)(i) that allows for a modification of the timing of the initial monitoring period to coincide with UCMR5 monitoring.

It is important to note that it is the responsibility of the public water system (PWS) to ensure, if so desired by the PWS, that the schedules for Pennsylvania's initial PFAS MCL compliance monitoring and UCMR5 monitoring coincide, and to request a schedule change, if necessary, for either UCMR5 or Pennsylvania's initial PFAS MCL compliance monitoring, as described below. It is also important to note that not all water systems are required to conduct monitoring on a quarterly frequency for UCMR5, as is required for Pennsylvania's initial PFAS MCL compliance monitoring; it is the responsibility of the PWS to ensure that the minimum monitoring frequency is met.

For large water systems (>10,000 people), UCMR5 schedules can be modified in their CDX/SDWARS 5 account up to December 31, 2022, or by emailing UCMR_Sampling_Coordinator@epa.gov after December 31, 2022.

Small/medium water systems (≤10,000 people) conducting UCMR5 monitoring are required to use the laboratory predetermined by EPA for analysis, and EPA covers the cost of analysis, so no additional costs to small/medium water systems will be incurred if duplicate monitoring is conducted. Additionally, because EPA is the client of the laboratory for small/medium water systems under UCMR5, the lab may not be able to meet Pennsylvania reporting requirements to also report the data to the Department's Drinking Water Electronic Lab Reporting (DWELR) system for compliance monitoring. However, if a small/medium water system wishes to adjust their UCMR5 monitoring schedule, they must contact the EPA contractor for UCMR5 at UCMR5@glec.com or 1-800-949-1581 for schedule changes (before and/or after December 31, 2022).

For the same set of data to count toward both UCMR5 and Pennsylvania's initial PFAS MCL compliance monitoring, it must meet requirements of both rules. For Pennsylvania's initial PFAS MCL compliance monitoring, monitoring must be conducted according to all requirements in the rule (i.e., by a Pennsylvania accredited laboratory, using an approved method, reported appropriately and on time, etc.). For UCMR5, samples must be analyzed by the UCMR5-specified method by an EPA-approved laboratory for UCMR5 and must meet all requirements of the published UCMR5 (US EPA, 2021c). Therefore, if a PWS wishes to have the same data reported for both UCMR5 and Pennsylvania initial PFAS MCL compliance monitoring, it is the responsibility of the PWS to ensure that the monitoring schedules align, and that the lab conducting the analysis is both Pennsylvania accredited and UCMR5 approved, using an appropriate method, and is amenable to reporting the same data twice, including meeting Pennsylvania and UCMR5 reporting requirements.

As stated previously, the Department added a clause with the initial monitoring requirement in the final-form rule at § 109.301(16)(i) that allows a modification to the initial monitoring period to coincide with UCMR5 monitoring. This may allow some systems to realize cost savings by preventing duplicate analyses if they meet all requirements noted above to count as initial compliance monitoring. To modify the initial monitoring period, a PWS must request this change and the Department must approve it in writing. The Department will provide details on how to modify the initial monitoring schedule in guidance.

5. **Comment:** IRRC noted some commentators question whether there may be a shortage of certified laboratories to perform testing due to the overlap in timing of federal and state regulations. One commentator recommended the Department conduct "a more detailed logistical analysis … to ensure there is adequate lab capacity." The same commentator also recommended that the Department consider using the UCMR5 data for initial monitoring to alleviate concerns with lab capacity. IRRC requested that the Board provide information on the number and capacity of laboratories certified to perform required testing for implementation of the final regulation. (1, 17, 18, 30, 66)

   Response: Based on the Department's analysis, described below, there will be adequate laboratory capacity. Laboratory capacity for PFAS analysis was an important consideration in development of the rulemaking. There are three methods for PFAS analysis included in the rulemaking: EPA Method 533, EPA Method 537.1, and EPA Method 537 Version 1.1. As described in the preamble to the proposed rulemaking, the Department conducted a survey of laboratories accredited by Pennsylvania for analysis of PFAS by one or more of the three approved methods specified in the rule. The purpose of the survey was to collect data on laboratory capacity, services provided, analytical costs, and minimum reporting levels in order to assess the technical feasibility and analytical cost estimates of the rulemaking.

   The results of the survey conducted by the Department indicate more than sufficient capacity for compliance monitoring requirements of the PFAS MCL rule (PA DEP, 2021b). The Department requested information from 15 laboratories; of those, nine provided responses, five did not respond, and one responded that it had relinquished its accreditation. Of the nine that provided responses, no labs indicated that they are currently at capacity for accepting PFAS samples for analysis, meaning that they have capacity remaining to accept additional samples and not that they are operating at reduced capacity. Based on the responses, and considering each lab's maximum capacity for PFAS analyses and the percent of maximum capacity at which they were operating at the time of their response, remaining capacity for PFAS analysis by Pennsylvania-accredited laboratories was over 11,000 samples per month, or over 33,000 samples per quarter. Compliance monitoring under the rule will be required for 3,785 PWS entry points (EPs); even if the capacity calculations did not account for a field blank analysis for every sample, which would double the number of samples, survey results indicate more than sufficient capacity for every applicable EP to monitor quarterly, which is more monitoring than would be required at any one time. One of the nine laboratories alone indicated sufficient capacity for up to an additional 8,000 samples of all matrices per month for PFAS analysis. It is also important to note again that five laboratories did not respond to the survey; these five laboratories would likely provide additional capacity for PFAS analysis. Once this rulemaking is promulgated, it is also likely that more labs will seek Pennsylvania accreditation for one or more of the approved methods as a result of the increased demand for PFAS analysis, which would expand overall analytical capacity.

In addition, initial quarterly monitoring for CWS and NTNCWS serving a population of more than 350 persons begins January 1, 2024, and initial quarterly monitoring for CWS and NTNCWS serving 350 or fewer persons begins January 1, 2025. This population breakdown was selected to evenly split initial monitoring across two years in order to better manage laboratory capacity and allow small systems more time to prepare for compliance monitoring.

Regarding the overlap of UCMR5 with initial compliance monitoring requirements for Pennsylvania's PFAS MCL Rule and the exacerbation of laboratory capacity issues associated with this overlap, the Department acknowledges this concern and agrees that the concurrent monitoring requirements may increase the burden on state-accredited laboratories. The Department received numerous comments on the overlap of UCMR5 with initial monitoring under the proposed PFAS MCL rulemaking; concern with laboratory capacity from this overlap was just one aspect of the comments received. The Department added language to the final rule to allow a PWS to request to modify their initial monitoring schedule, with written approval from the Department, to coincide with their UCMR5 schedule. Systems can also request to modify their UCMR5 schedule to coincide with their Pennsylvania PFAS MCL initial compliance monitoring schedule. Sample results meeting certain criteria can be reported as both UCMR5 data and Pennsylvania PFAS MCL initial compliance monitoring results. For sample results to be reported as both, they must be analyzed by a laboratory that is both Pennsylvania accredited and EPA approved for UCMR5, using a method that is both an approved method per the final-form Pennsylvania PFAS MCL rule and the appropriate method for UCMR5 monitoring, and results must be reported correctly and in the appropriate timeframe to meet both Pennsylvania reporting requirements and UCMR5 reporting requirements. (See the Department's response to Comment #4 on the overlap with UCMR5 monitoring.) Therefore, while survey results indicate more than enough laboratory capacity, allowing appropriately analyzed and reported results to count for both Pennsylvania PFAS MCL initial compliance monitoring and UCMR5 may help alleviate some of the analytical burden on state accredited labs.

6. **Comment:** IRRC and several commentators questioned the Department's cost estimates. One commentator noted that the basis for the cost estimates is not fully explained and questioned whether the sources of funding identified in the proposal will be sufficient to enable PWSs to afford the costs and whether PWSs will need to make rate adjustments to accommodate the additional costs. Another commentator questioned which data formed the basis for assuming that treatment costs are expected to be proportional to treatment plant capacity. IRRC requested the Board address these concerns and provide clarity regarding the fiscal impacts of treatment and monitoring. (1, 13-17, 19, 24, 26, 30, 59, 60, 66, 80, 152, 173)

   Response: First, the Department's basis for the cost estimates is fully explained in this response. Second, there are several funding sources available for PFAS treatment costs. The Pennsylvania Infrastructure Investment Authority's (PENNVEST's) Per- and Polyfluoroalkyl Substances Remediation Program currently is available to remediate PFAS contamination or presence in the water supply of public drinking water supply systems which are not related to the presence of a qualified former military installation. More details on this program can be found on PENNVEST's website at: https://www.pennvest.pa.gov/Information/Funding-Programs/Pages/PFAS.aspx.

On November 15, 2021, the Infrastructure Investment and Jobs Act (IIJA) was signed into federal law. One component of the legislation is $4 billion nationally in Drinking Water State Revolving Fund (DWSRF) monies for projects to address emerging drinking water contaminants like PFAS and $5 billion nationally in grants to small and disadvantaged communities for projects addressing emerging drinking water contaminants like PFAS. Over five years, Pennsylvania's allocation of these IIJA funds is expected to be $116 million in DWSRF emerging contaminants funds and an additional $140.5 million in funding for projects addressing emerging drinking water contaminants in small and disadvantaged communities, for a total of $256.5 million. More details on this funding can be found on EPA's webpage at: https://www.epa.gov/infrastructure/fact-sheet-epa-bipartisan-infrastructure-law.

The estimates for capital costs of treatment installation and annual operation and maintenance (O&M) are explained in detail in the preamble to the proposed rulemaking. In summary, the average capital costs of the granular activated carbon (GAC) and anion exchange (IX) treatment is $3,370,735 per million gallons per day (MGD) per Entry Point (EP), with an average annual O&M costs $163,818 per MGD per EP (EQB, 2022).

Third, the data that formed the basis for assuming that treatment costs are expected to be proportional to treatment plant capacity came from a survey. Cost estimates are based on a survey of costs from vendors and systems that have installed PFAS treatment. The sizes of the treatment systems of respondents varied from 0.005 MGD to 2.88 MGD and costs for these systems ranged from approximately $47,000 to $3,250,000, respectively (PA DEP, 2021a). The survey provided information that showed generally lower capital and operational costs for smaller systems and increased costs as the volume of water treated increases; however, capital costs can vary greatly based on site-specific needs. Because of this variability and the limited cost information from available systems, a linear model for cost determination may not be accurate. Smaller systems may be more expensive to treat on a per gallon basis. Some systems may need infrastructure upgrades above and beyond the cost of the PFAS treatment, such as new well pumps, booster pumps, and buildings to house the treatment, whereas other systems may only need to purchase and install the PFAS treatment equipment and media. Estimating these costs more precisely would require essentially system-by-system analyses and assumptions about which systems will need to install PFAS treatment. Taking into account all these considerations, the Department believes that the cost estimates used in preparing this rulemaking are reasonable.

Any rate adjustments for ratepayers that PWSs make to recover costs associated with this rulemaking will depend on the specific costs for each PWS, as well as the type and availability of funding.

7. **Comment:** IRRC and a few commentators raised concerns regarding the byproducts of treatment technologies and disposal of the contaminants removed. IRRC requested that the

Board address implementation concerns related to byproducts of treatment technologies for PFAS removal. (1, 19, 30, 66)

Response: The Department considered three byproduct concerns when developing the proposed and final-form rulemaking. First, the Department requires a person to obtain a permit prior to constructing or modifying a public water system. This permitting process requires the water system to demonstrate it will properly dispose of any untreated PFAS-contaminated waters and spent media.

Second, industrial discharges, such as wastewater from drinking water treatment that contain PFAS wastes, would not be acceptable to discharge to an on-lot or municipal wastewater system. The Department's Clean Water Program is responsible for protecting and preserving the waters of the Commonwealth. This program includes requiring, and ensuring the effectiveness of, treatment systems that discharge to surface and ground water. Please refer to the Department's Bureau of Clean Water's wastewater management program webpage for more details:
https://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Pages/default.aspx.

Third, all spent media will need to be disposed of at an appropriate landfill or an incinerator. The Department's Bureau of Waste Management (BWM) manages the permitting and inspection of hazardous, municipal, and residual waste generation, transportation, storage, beneficial use and disposal facilities, and administration of the municipal solid waste planning program, recycling program, resource recovery development program, and household hazardous waste program. Through researching and establishing viable disposal options, BWM will curb the PFAS pollution cycle by appropriately directing solid wastes containing PFAS through the proper channels for disposal, which will curb the cycle and prevent further environmental harm. Please refer to the Department's Bureau of Waste Management program webpage for more details: https://www.dep.pa.gov/Business/Land/Waste/Services/Pages/default.aspx.

8. **Comment:** IRRC and some commentators raised concerns about the costs and benefits of the proposed regulation. Commentators noted the benefits were not quantified or estimated in the proposed rulemaking, that the benefits were overstated, and the costs understated, and that the cost-effectiveness analysis was flawed. Commentators requested clarification on the basis for 90% as a goal for benefits, and on the conclusion that the MCLs for PFOA and PFOS represent a 90% and 93% increase in public health protection, respectively. Commentators assert that the basis for these figures and assumptions are not adequately explained. One commentator asserts that the benefits of setting MCLs at levels equal to the recommend MCLGs would vastly exceed costs. IRRC asked whether the cost/benefit of setting MCLs at MCLG levels was considered. IRRC requested that the Board address these concerns regarding the cost/benefit analysis, including clarifying the basis for selection of 90% as a goal. IRRC also requested that the Board explain how increasingly stringent drinking water values affect health outcomes and provide supporting data. IRRC also requested that the Board provide data for and explain the reasoning behind the assumption of linear improvement in health effects. (1, 31, 39, 47, 58, 64, 65, 69, 73, 80, 173)

Response: The costs and benefits are further explained below and in the preamble to this final-form rulemaking. The Department does not agree that the cost estimates are understated. These estimates are based on the information available to the Department at the time of the proposed rulemaking. The Department acknowledges that actual costs are likely to vary based on site-specific needs. For example, some systems may need infrastructure upgrades, such as new well pumps, booster pumps, and buildings to house new treatment, whereas other systems may only need to purchase and install the PFAS treatment equipment and media.

The Department conducted several surveys to gather information to estimate monitoring and treatment costs for this rulemaking. Surveys were conducted of: laboratories accredited in Pennsylvania for one or more analytical methods for PFAS (PA DEP 2021b); systems in Pennsylvania with existing PFAS removal treatment installed (PA DEP 2021a); PFAS removal treatment manufacturers; and members of the Association of State Drinking Water Administrators (ASDWA). Cost estimates were also informed by the Department's review of a PFAS case study published by the American Water Works Association (AWWA). The Department used the information gathered from the lab survey to consider available analytical methods, minimum reporting levels, laboratory capacity and analytical costs. The information gathered from the other surveys was used to evaluate treatment technologies and costs of installation and maintenance of treatment options. This information was also used with the occurrence data to conduct the cost and benefit analysis. Cost estimates for treatment installation and operation and maintenance, as well as for compliance monitoring, are explained in detail in the preamble to the proposed rulemaking (EQB, 2022).

In evaluating costs and benefits, the Department used the occurrence data to estimate treatment costs at the MCLGs, the 2016 EPA HAL of 70 ppt, and several values in between, including the MCLs (EQB, 2022).

To evaluate benefits, the Department assumed a linear relationship between health benefits at various MCL levels considered. As described in the preamble to the proposed rulemaking, the selection of a 90% reduction in adverse health effects as a goal for improved public health protection was intended to be consistent with other existing drinking water standards, including the requirement to achieve at least a 90% inactivation of *Giardia* cysts using disinfection processes within a filtration plant. Using this assumption and goal, the Department estimated that the MCL of 14 ppt for PFOA represents a 90% improvement in health protection, and the MCL of 18 ppt for PFOS represents a 93% improvement in health protection (EQB, 2022).

The Department believes that the cost-benefit data in the proposed rule was adequate; however, the Department acknowledges that the benefits were not quantified or monetized in order to conduct the cost-benefit analysis in the preamble to the proposed rulemaking. The Department also acknowledges that the assumption of a linear relationship between health benefits at various MCL levels was just that: an assumption. To provide additional information to support the cost-benefit analysis, the Department extended the contract with Drexel University and charged DPAG with estimating monetized benefits expected to be realized from implementation of the MCLs. The DPAG concluded that the proposed MCLs are predicted to have a significant economic benefit to Pennsylvania because the MCLs will reduce health care problems associated with PFAS (DPAG, 2022).

To predict the value of health care benefits, the DPAG used two approaches – the value transfer method and the counterfactual method. The value transfer method applies and scales quantitative estimates of health care impact costs from one study site to another. The counterfactual method assumes that reduction in exposure to PFOA and PFOS from drinking water will result in a health care cost benefit equal to estimated health care costs attributable to the base exposures to PFOA and PFOS. Although each of these methods has their limitations, it is possible to estimate projected savings from reducing exposure to PFOA and PFOS.

The DPAG's health care analysis was broken down into three steps: 1) testing whether the selected MCL will result in hypothetical serum levels known to be associated with disease specific critical effects identified by DPAG; 2) applying the counterfactual method to data derived from a study of a subpopulation of Pennsylvanians near a PFAS contaminated site to estimate health care benefits for that group; and 3) deriving a value transfer estimate from other health care impact studies.

The DPAG reviewed several studies that examined the exposure response relationship between PFOA levels and low birthweight. The authors of the Malits study selected a maternal serum level of 3.1 ng/mL as a reference level (Malits, 2018); below this level, the adverse health effects on low-birthweight infants would be reduced. The 3.1 ng/mL level also represents the upper limit of the lowest tertile in the study by Maisonet and colleagues (Maisonet, 2012) and represents the point above which statistically significant associations have been demonstrated when median serum or plasma levels during pregnancy were above approximately 3.1 ng/mL (Maisonet, 2012; Fei, 2011; Wu, 2012).

The DPAG utilized a serum PFAS calculator developed by Bartell to estimate blood serum concentrations of PFOA, based on an initial serum concentration and proposed levels of PFOA (Bartell 2017). The DPAG found that the model predicts that a woman of childbearing age would reach a steady-state PFOA serum level of 3.1 ng/mL if the consumed water was at the proposed MCL of 14 ng/L. Furthermore, the Bartell calculator confirms that the proposed MCL of 14 ng/L for PFOA is protective and is consistent with the Department's analysis that the MCL represents a 90% improvement in blood serum levels compared to the serum level predicted at the 2016 EPA HAL of 70 ng/L (DPAG, 2022). DPAG conducted a similar analysis for PFOS using data from the Grandjean (2012) study. The method developed by Bartell predicts that in women of childbearing age, the PFOS MCL of 18 ng/L would result in a steady-state serum level of 7.2 ng/L, which is below the lower bound of interquartile range and the geometric mean in mothers in the Grandjean study (DPAG, 2022). DPAG's review of PFAS blood serum levels at various PFAS concentrations in drinking water correlate well with the Department's assessment of at least 90% improvement of public health at the proposed MCLs.

Regarding the estimate of health care benefits, the DPAG noted that Malits (2018) estimated the total socioeconomic cost of PFOA-attributable low-birthweight births in the United States from 2003 through 2014 (11 years) was $13.7 billion. These costs included the direct hospital costs at the time of birth and lost economic productivity due to low-birthweight births being associated with longer-term outcomes such as lower lifetime earning potential. To determine what this would mean in Pennsylvania, the DPAG applied a value transfer method that assumes a scalable relationship between impacts of PFOA-attributable low-birthweight births quantified by Malits in the total United States population. Since 4.0% of the United States population lives in Pennsylvania, the total costs for the entire statewide population due to low birthweight from PFOA exposure for the same period (2003 – 2014) are calculated to $548 million (approximately $637.58 million in 2022 dollars). To compare the costs and benefits to the Commonwealth's public water systems and the 11.9 million customers they serve, the DPAG estimated the total socioeconomic costs equate to $583 million in 2022 dollars. In other words, the PFOA MCL of 14 ng/L is estimated to result in health care cost savings of $583 million over a similar time period, or an average of $53 million annually.

Finally, the DPAG analyzed two additional studies to inform the estimated annual health care costs:

- In 2018, Nair studied communities near two former military bases in Pennsylvania that were exposed for several decades to PFAS through contaminated drinking water (Nair, 2021). The population in that community was estimated to be 84,000. Serum PFAS levels were compared with the national averages for 2013-2014 and their relationships with demographic and exposure characteristics were analyzed. The average levels of PFOA and PFOS among the study participants were 3.13 and 10.24 ng/mL, respectively. Overall, 75% and 81% of the study participants had levels exceeding the national average for PFOA (1.94 µg/L) and PFOS (4.99 µg/L), respectively. This study places these 2018 Pennsylvania communities in the same broad category as the 2003 National Health and Nutrition Examination Survey data for the United States population. A similar value transfer analysis suggests that the total health care costs associated with PFOA exposure in these Pennsylvania communities alone over a similar time period (11 years) would be $4.3 million in 2022 dollars. Assuming that PFAS levels fell in these Pennsylvania communities in the same manner that they fell nationally, the costs would average to $390,000 per year.

- A study by the Nordic Council of Ministers (2019) estimated the annual monetized impact of elevated mortality due to PFAS exposure ranged from $3.5 to $5.7 billion for a total population of 20.7 million people. Adjusted for the 11.9 million Pennsylvanian's served by public water, this produces a value transfer estimate of $2 to $3.3 billion. This suggests that PFAS contamination in drinking water may account for 2% to 3% of the annual health care costs in Pennsylvania, which are estimated by the Kaiser Family Foundation at $120 billion annually (KFF, 2022).

The Department does not agree that the benefits were overstated. The additional work conducted by DPAG clearly demonstrates the significant cost benefits from avoidance of adverse health effects expected from implementation of this rule. Utilizing the serum PFAS calculator developed by Bartell to estimate blood serum concentrations of PFOA and PFOS, the DPAG confirmed that the MCL of 14 ppt for PFOA would be a 90% improvement in blood serum levels compared to the serum level predicted at the 2016 EPA HAL of 70 ppt. DPAG's additional work also showed that blood serum levels would be expected to be lower from drinking water at the MCLG than at the MCL for both PFOA and PFOS (DPAG, 2022), which demonstrates that increasingly stringent drinking water values (i.e., lower concentrations of PFAS in drinking water) are expected to result in improved health outcomes.

9. **Comment:** IRRC stated that commentators noted "conflicting toxicology information from an evolving state-of-the-science" and pointed to the fact that various approaches to regulating PFAS point to disagreement on what the standards should be. Commentators noted "Inadequacy of the Selected Toxicity Studies" and "conflicting toxicology information from an evolving state-of-the-science," and wrote that the critical studies identified by DPAG are "deeply flawed." IRRC also pointed out commentator questions including:

    - Were there documents (e.g. health, toxicological, epidemiological) that the Board reviewed, but for some reason, chose not to include in its evaluation process?

    - Is the EPA HAL unsafe for public drinking water?

    - Does the Board plan to review additional information that may not have been available during the time that the regulation was being drafted as it prepares the final-form regulation?

    IRRC also noted commentator questions regarding the expertise of the members of the Drexel PFAS Advisory Group and their selection of toxicological studies, and question whether members of the DPAG have sufficient expertise in the toxicological properties of PFAS or with regulatory risk assessment. IRRC requested that the Board address concerns related to acceptable data, and explain how the data supporting the final regulation protects the public health, safety, and welfare. IRRC also requested that the Board explain how standards may be revised in the future based on improved scientific understanding about exposure, dose, and toxicology. IRRC also requested that the Board address concerns related to the source of data and basis for the MCL standards in the final-form regulation, and explain how the data provided as the basis for the final regulation is acceptable. (1, 18, 63, 64, 65)

    Response: The Department agrees that the scientific research, data, and studies on PFAS are continually evolving. The Department also agrees that there is inherent variability and uncertainty in the field of toxicology. There are numerous variables, including the selection of health-based endpoints and critical studies, different models for determining reference doses, assumptions in applying animal studies, estimating relative source contribution, and other uncertainty factors, that can lead to wide variability in calculated outcomes. However, the Department does not believe that this inherent variability or the evolving research means that it is not possible to develop an effective regulation that is scientifically derived and that will provide improved public health protection.

    As noted in the preamble to the proposed rulemaking, an MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022). See the Department's response to Comment #11 for a description of the MCL rulemaking process.

As explained in the preamble to the proposed rulemaking, the Department executed the Toxicology Services Contract with Drexel University in December 2019 to review current scientific studies and data on the health effects of PFAS and provide recommended maximum contaminant level goals (MCLGs), which are the basis for setting maximum contaminant levels (MCLs) (EQB, 2022). The Drexel PFAS Advisory Group (DPAG) is comprised of a group of medical toxicologists as well as experts in the fields of environmental engineering and public health. The DPAG includes three Board Certified Toxicologists and MDs in the College of Medicine, two PhDs from the College of Engineering, and three additional staff, including a PhD in the Academy of Natural Sciences, and MD in the College of Medicine, and an MSPH in the School of Public Health. Deliverables from the toxicology contract include the "Drexel PFAS Workbook" (PFAS Workbook) and the report "Maximum Contaminant Level Goal Drinking Water Recommendations for Per- and Polyfluoroalkyl Substances (PFAS) in the Commonwealth of PA" (MCLG Report). The credentials of the group's members are included in Appendix A of the MCLG Report (DPAG, 2021).

In determining recommended MCLGs, the DPAG used an evidence-based approach to independently review the available studies and to select critical health effects and critical studies for the PFAS evaluated. The scientific studies reviewed by the DPAG, including their strengths and weaknesses, are discussed fully and cited in the PFAS Workbook and MCLG Report (DPAG, 2020; DPAG, 2021). References reviewed by the Department, including the DPAG deliverables, are cited in the final-form rulemaking documents. DPAG provided substantial justification in the MCLG Report for the selection of critical health effects and critical studies, based on the extensive expertise of the group. Specifically, DPAG identified the target population for PFOA and PFOS as infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime exposure via drinking water. All scientific studies have some limitations, and the strengths and weaknesses of the selected studies are discussed fully in the MCLG Report (DPAG, 2021). The application of uncertainty factors is the method additionally used to offset uncertainties and limitations in the available scientific evidence.

The calculation of the MCLGs employed the transgenerational toxicokinetic model developed by Goeden and differs from the typical formula for adults or infants (DPAG, 2021). This model provided the best insight into the exposure pathways for the target population. The Department used the MCLG recommendations from the MCLG Report as the basis for development of MCLs.

In addition to the Toxicology Services Contract, the Department's Safe Drinking Water Program developed and implemented the PFAS Sampling Plan to prioritize PWS sites for PFAS sampling and generate statewide occurrence data (PA DEP, 2019; PA DEP, 2021c). That occurrence data was extrapolated across all applicable PWSs and EPs and was ultimately used to inform the decision on which PFAS to regulate and to estimate the number of PWSs that may potentially have levels of PFAS exceeding various MCL levels.

To assess the technical limitations such as available analytical methods and detection and reporting limits along with treatability and treatment technology considerations, the Department conducted several surveys to gather information. Surveys were conducted of laboratories accredited in Pennsylvania for one or more analytical methods for PFAS, systems in Pennsylvania with existing PFAS removal treatment installed, PFAS removal treatment manufacturers, and members of the ASDWA (PA DEP, 2021a; PA DEP, 2021b). Assessment of technical limitations was also informed by the Department's review of a PFAS case study published by the AWWA. The Department used the information gathered from the lab survey to consider available analytical methods, minimum reporting levels, laboratory capacity, and analytical costs. The information gathered from the other surveys and review of the AWWA-published case study was used to evaluate treatment technologies and costs of installation and maintenance of treatment options. This information was also used along with the occurrence data to conduct the cost and benefit analysis.

In summary, the rule is designed to improve public health protections for Pennsylvanians based on scientific studies and data available at the time the rulemaking was developed. Independent review of the available science and MCLG recommendations were provided by DPAG, a panel of experts in the fields of medical toxicology, public health, and environmental engineering. References reviewed and used by the Department in development of the proposed rulemaking are cited in Section D of the preamble to the proposed rulemaking. Current research indicates that the 2016 EPA Combined Health Advisory Level (HAL) of 70 ng/L for PFOA and PFOS is not sufficiently protective of public health. Implementing the MCLs will provide an increased measure of public health protection by resulting in lower levels of PFOA and PFOS in drinking water provided to PWS customers in Pennsylvania. Therefore, it is the Department's position that it is imperative to move forward at this time with this rulemaking in the interest of improved public health protection. The Department will continue to review and evaluate emerging science and recommendations from experts in the field of toxicology, including recommendations from EPA's Science Advisory Board, and the Department will consider future revisions to this rule as deemed necessary. If the Department determines that revisions to this rule are needed in the future, the Department will initiate and follow Pennsylvania's rulemaking process (see the Department's response to Comment #3 for additional information on how the Department may revisit this rule based on future EPA actions).

10. **Comment:** IRRC and a commentator questioned whether the Department sought additional independent peer review of the conclusions set forth in the proposed regulation. (1, 17)

    Response: As detailed below, the Department sought independent peer review from DPAG of the available science and the Department consulted with the Department's drinking water advisory committee at both the proposed stage and the final-form stage. As part of the Department's PFOA MCL rulemaking petition recommendation, the DPAG report and workbook were first made publicly available on June 1, 2021, when the meeting materials for the June 15, 2021 Board meeting were posted on the Board website. The DPAG report and workbook were included again in the proposed rulemaking when it was posted on the Board's website on November 2, 2021, for consideration at the Board's November 16, 2021 meeting. The DPAG report and workbook were discussed and cited prominently in the preamble to the proposed rulemaking, including links to the full reports, which provided additional opportunity for peer review during the 60-day public comment period, which began when the proposed rulemaking was published in the *Pennsylvania Bulletin* on February 26, 2022. The Department also followed the regulatory development process required by Pennsylvania law, which includes rigorous internal and external review stages. More detail about these steps is provided below.

The Department contracted with Drexel University to: review other state and Federal agency work on MCLs; independently review the data, science, and studies; and develop recommended MCLGs for select PFAS. MCLGs are the starting point for determining MCLs. The Drexel PFAS Advisory Group (DPAG) reviewed pertinent literature and work across the country and independently developed recommended MCLGs based on non-cancer endpoints. DEP also received input on setting appropriate MCLs from a toxicologist with the Pennsylvania Department of Health.

After developing the draft proposed rulemaking language, the Department shared it with the Department's drinking water advisory committee, the Public Water System Technical Assistance Center (TAC) Board on July 29, 2021. The TAC Board reviews and comments on proposed DEP regulations that affect public water systems. The TAC Board consists of representatives from various organizations, including the Pennsylvania Rural Water Association, the Pennsylvania Municipal Authorities Association, the AWWA – Pennsylvania Chapter, the Water Works Operators Association of Pennsylvania, the Pennsylvania Manufactured Housing Association, the Pennsylvania State Association of Township Supervisors, Rural Community Assistance Partnership, the Office of Consumer Advocate, the Pennsylvania Chapter of the National Association of Water Companies, and the Pennsylvania State Association of County Commissioners, as well as members from public interest and environmental organizations and members from building and land development interests. In a letter dated July 30, 2021, the TAC Board offered their support of the Department in the rulemaking process and recommended that the Department move forward with the rule to present to the Board as a proposed rulemaking.

The Department presented the proposed rulemaking to the Board at the November 16, 2021, meeting. After adoption by the Board, the proposed regulation was published in the *Pennsylvania Bulletin* on February 26, 2022, for a 60-day public comment period (EQB, 2022). During the public comment period, the Department hosted five public hearings on the proposed regulation during the week of March 21, 2021. The Department received testimony from 29 individuals during the hearings, which are addressed in this comment and response document along with comments the Department received from over 3,500 commentators, including several legislators, the House Environmental Resources and Energy committee, and the Independent Regulatory Review Commission (IRRC).

The Department reviewed all comments and testimony received during the comment period and developed responses to those comments, which are included in this comment and response document. In response to some comments, the Department revised the proposed rulemaking.

After incorporating revisions based on public comments, the Department consulted with the TAC Board draft final-form rulemaking on July 14, 2022. The TAC Board supported the Department moving forward to present the final-form rulemaking to the Board.

Also see the Department's response to Comment #9 for discussion of the public health benefits of moving forward with this rulemaking now and how the Department will continue to review and evaluate emerging science and recommendations and will consider future revisions to this rule as deemed necessary.

11. **Comment:** IRRC noted that several legislators and numerous commentators suggested the proposed MCLs should be lower, but did not cite to specific toxicological or scientific studies to support the lower numbers. Some of these commentators expressed a general request for lower MCLs, and some suggested specific lower numbers to consider, including zero; not detected; 1 ppt for total PFAS; 1ppt up to 6ppt for PFOA and no more than 5ppt for PFOS; below 6ppt for both PFOS and PFOA; 6 ppt for PFOA, 5 ppt for PFOS, and 13 ppt combined; and no higher than the recommended MCLGs (8 ppt for PFOA and 14 ppt for PFOS). Some commentators also noted that the reason for lower MCLs should be for the protection of infants and young children, who are the most vulnerable to the effects of PFAS. IRRC requested that the Board address these concerns and explain how it determined that the MCLs for PFOA and PFOS in the final regulation protect the health, safety, and welfare of children, particularly young children. (1, 4, 5, 10, 11, 22, 31, 41, 42, 46, 50, 51, 53-55, 58, 62, 67-79, 84, 88, 91, 93, 102, 108, 109, 112-115, 117, 123-125, 129-132, 140, 141, 143, 145-147, 151, 157, 158, 160, 162, 164, 165, 168, 174-1053, 1087-1090, 1092-1106, 1108-1121, 1123-2125, 2130, 2139, 2145, 2150, 3132-3560)

    Response: As explained in the preamble to the proposed rulemaking, the Department is required to follow a rigorous process when setting an MCL. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022).

    In addition to State requirements, the Department needs to consult the Federal Act and its implementing regulations. See 42 U.S.C.A. §§ 300f—300j-9; see also 40 CFR Parts 141, 142 and 143 (relating to National Primary Drinking Water Regulations; National Primary Drinking Water Regulations Implementation; and Other Safe Drinking Water Act Regulations). The EPA explains how the agency sets standards at the following link: www.epa.gov/sdwa/how-epa-regulates-drinking-water-contaminants. In establishing the MCLs in this rulemaking, the Department was informed by the EPA's procedure to establish an MCL. It is important for the Department to understand the EPA's process of setting an MCL, because similar criteria are required of the Department under the Commonwealth's RRA, and because the MCLs in this rulemaking are the first MCLs that the Department has set; every other MCL in effect in this Commonwealth was set by the EPA and incorporated by reference into the Department's Chapter 109 regulations. In addition, to retain primacy for implementing the Federal Act in this Commonwealth, the Department's standard setting process must be at least as stringent as the Federal process.

The first step in setting an MCL is determining an appropriate maximum contaminant level goal (MCLG). Once the MCLG is determined, the EPA sets an enforceable standard. In most cases, the standard is an MCL. The MCL is set as close to the MCLG as feasible. The EPA must take cost into consideration in determining the feasible MCL. As a part of the rule analysis, the Federal Act requires the EPA to prepare a health risk reduction and cost analysis in support of any standard. The EPA must analyze the quantifiable and nonquantifiable benefits that are likely to occur as the result of compliance with the proposed standard. The EPA must also analyze increased costs that will result from the proposed drinking water standard. In addition, the EPA must consider incremental costs and benefits associated with the proposed alternative MCL values. Where the benefits of a new MCL do not justify the costs, the EPA may adjust the MCL to a level that maximizes health risk reduction benefits at a cost that is justified by the benefits.

Proposed MCLGs for PFOA and PFOS

In December 2019, the Department's Safe Drinking Water Program executed a toxicology services contract with Drexel University to: review other state and Federal agency work on MCLs; independently review the data, science, and studies; and develop recommended MCLGs for select PFAS. Deliverables were completed in January 2021 and include the "Drexel PFAS Workbook" and "MCLG Drinking Water Recommendations for PFAS in the Commonwealth of PA" (MCLG Report). The MCLG Report was developed by the Drexel PFAS Advisory Group (DPAG)—a multidisciplinary team of experts in toxicology, epidemiology, drinking water standards and risk assessment. The DPAG reviewed pertinent literature and work across the country and independently developed recommended MCLGs based on non-cancer endpoints. The MCLG Report discusses relevant inputs and includes a summary table for each PFAS that documents the development of the recommended MCLG.

After a literature search and a review of the available evidence and recommendations from various agencies, the DPAG developed an MCLG recommendation for PFOA of 8 ng/L or ppt and for PFOS of 14 ng/L or ppt, based on non-cancer endpoints (DPAG, 2021). For PFOA, the DPAG determined that the most relevant inputs were from the EPA, ATSDR, Minnesota Department of Health (MDH), New Jersey Department of Environmental Protection, and Michigan Department of Health and Human Services (MDHHS). The DPAG selected Koskela, et al. (2016) and Onishchenko, et al. (2011) as the critical studies for PFOA, which identified developmental effects (including neurobehavioral and skeletal effects) as critical. For PFOS, the DPAG referenced inputs from the EPA, ATSDR, MDH, and MDHHS. The DPAG selected Dong, et al. (2011) as the critical study for PFOS, which identified immunotoxicity effects (including immune suppression) as critical. In summary, the DPAG recommended a chronic non-cancer MCLG for PFOA of 8 ng/L or ppt and for PFOS of 14 ng/L or ppt to protect breast-fed infants and throughout life. The MCLG recommendations for PFOA and PFOS of 8 and 14 ng/L or ppt, respectively, were included in the proposed rulemaking as proposed MCLGs and were the basis for development of the proposed MCLs (EQB, 2022).

PFOA — MCL of 14 ng/L

The MCL of 14 ng/L for PFOA is based on the health effects and MCLG, occurrence data, technical feasibility, and costs and benefits.

A review of occurrence data indicates that 25 EPs out of a total number of 435 EPs sampled exceeded the MCL for PFOA of 14 ng/ L (PA DEP, 2021c). This represents 5.7% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOA MCL exceedance rate (5.7%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 218 EPs will exceed the MCL of 14 ng/L.

In evaluating the costs and benefits, the Department compared costs for several possible values for the MCL, including the 2016 EPA combined HAL of 70 ppt, the MCLG, and several levels in between. Treatment cost estimates were determined based on a survey conducted of systems in this Commonwealth with existing PFAS treatment and of PFAS treatment manufacturers, an AWWA-published PFAS Case Study, and from information provided by members of the ASDWA. Treatment cost estimates are based on the costs to install and maintain treatment for a 1-MGD treatment plant. The actual costs would be expected to be less for a treatment plant with a smaller design capacity. Compared to the 2016 EPA HAL of 70 ng/L, the Department estimates that the MCL of 14 ng/L for PFOA would result in a 253% increase in annual costs (EQB 2022). See the preamble to the proposed rule for full explanation of cost estimates.

The Department's goal is to provide at least a 90% reduction in adverse health effects (a 90% improvement in health protection) when compared to the 2016 EPA HAL of 70 ng/L. This goal is consistent with several existing drinking water standards. As noted in the preamble to the proposed rule, the estimated benefits expected from the MCL for PFOA of 14 ng/L is 90% improvement in health protection as compared to the 2016 EPA HAL of 70 ppt (EQB, 2022).

The Department believes that the MCL for PFOA of 14 ng/L strikes an appropriate balance between the benefits (90% improvement in public health) and costs (253% increase in costs) when compared to the benefits and costs associated with meeting the HAL of 70 ng/L.

Regarding technical feasibility, it is the Department's assessment that analytical methods and laboratory capacity exist for water systems to be able to demonstrate compliance with the MCL for PFOA. With the minimum reporting level (MRL) of 5 ng/L in the rulemaking, the lowest MCL technically feasible would be 6.5 ng/L, which would allow for analytical error of +/- 30% in reported results. The MRL of 5 ng/L is based on a survey of laboratories accredited to analyze PFAS by the specified methods. The MRL is set at a level that is low enough to allow PWSs to demonstrate compliance with the MCL, but high enough that laboratories can consistently and accurately report results at or below that level. It is not feasible to set an MCL at "zero" or "not detected" as some commentators suggested, because limits of detection can vary from one laboratory to another, and because they can change over time as new analytical methods are developed. Treatment technologies also exist for water systems to attain compliance if PFOA levels exceed the MCL. Approved analytical methods and acceptable treatment technologies are included in this rulemaking.

PFOS—MCL of 18 ng/L

The MCL of 18 ng/L for PFOS is based on the health effects and MCLG, occurrence data, technical feasibility, and costs and benefits.

A review of occurrence data indicates that 22 EPs out of a total number of 435 EPs sampled exceeded the MCL for PFOS of 18 ng/L (PA DEP, 2021c). This represents 5.1% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOS MCL exceedance rate (5.1%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 191 EPs will exceed the MCL of 18 ng/L.

In evaluating the costs and benefits, the Department compared costs for several possible values for the MCL, including the 2016 EPA combined HAL of 70 ppt, the MCLG, and several levels in between. Treatment cost estimates were determined based on a survey conducted of systems in this Commonwealth with existing PFAS treatment and of PFAS treatment manufacturers, an AWWA-published PFAS Case Study and from information provided by members of the ASDWA. Treatment cost estimates are based on the costs to install and maintain treatment for a 1-MGD treatment plant. The actual costs would be expected to be less for a treatment plant with a smaller design capacity. Compared to the 2016 EPA HAL of 70 ng/L, the Department estimates that the MCL of 18 ng/L for PFOS would result in a 94% increase in annual costs (EQB, 2022). See the preamble to the proposed rule for full explanation of cost estimates.

The Department's goal is to provide at least a 90% reduction in adverse health effects (a 90% improvement in health protection) when compared to the HAL of 70 ng/L. This goal is consistent with several existing drinking water standards. As noted in the preamble to the proposed rule, the estimated benefits expected from the MCL for PFOS of 18 ng/L is 93% improvement in health protection as compared to the 2016 EPA HAL of 70 ppt (EQB, 2022).

The Department believes that the MCL for PFOS of 18 ng/L strikes a balance between the benefits (93% improvement in public health) and costs (94% increase in costs) when compared to the benefits and costs associated with meeting the HAL of 70 ng/L.

Regarding technical feasibility, it is the Department's assessment that analytical methods and laboratory capacity exist for water systems to be able to demonstrate compliance with the MCL for PFOS. With the minimum reporting level (MRL) of 5 ng/L in the rulemaking, the lowest MCL technically feasible would be 6.5 ng/L, which would allow for analytical error of +/- 30% in reported results. The MRL of 5 ng/L was based on a survey of laboratories accredited to analyze PFAS by the specified methods. The MRL was set at a level that is low enough to allow public water systems to demonstrate compliance with the MCL, but high enough that laboratories can consistently and accurately report results at or below that level. It is not feasible to set an MCL at "zero" or "not detected" as some commentators suggested, because limits of detection can vary from one laboratory to another, and because they can change over time as new analytical methods are developed. Treatment technologies also exist for water systems to attain compliance if PFOS levels exceed the MCL. Approved analytical methods and acceptable treatment technologies are included in this rulemaking.

State data

The Department also reviewed work done in other states to regulate PFAS in drinking water. At the time the proposed rulemaking was developed, six other states had set MCLs for select PFAS, including PFOA and PFOS, as summarized in the below table. The MCLs for the Commonwealth are of comparable magnitude as the other state standards.

State	NY	MI	NJ	NH	PA	MA	VT
PFOA MCL (ng/L)	10	8	14	12	14	20*	20*
PFOS MCL (ng/L)	10	16	13	15	18	20*	20*

*The MCLs for MA & VT are for a group of 5 (VT) or 6 (MA) PFAS, including PFOA and PFOS (not individual contaminants).

Protection of children and infants

The MCLG recommendations provided by DPAG in the MCLG Report were based on a literature search and a review of the available evidence and recommendations from various agencies. By definition in the National Primary Drinking Water Regulations in 40 CFR Part 141, an MCLG is "the maximum level of a contaminant in drinking water at which no known or anticipated health effect on the health of persons would occur, and which allows an adequate margin of safety" (§ 141.2 Definitions). As noted in the MCLG Report, the DPAG was charged with developing recommended MCLGs at concentrations that were focused solely on protection of human health. The DPAG identified the target population for PFOA and PFOS as infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime of exposure via drinking water. The calculation of the MCLG employed the transgenerational toxicokinetic model developed by Goeden and differs from the typical formula for adults or infants. This model provided the best insight into the exposure pathways for the target population. Thus, DPAG noted in the MCLG Report that the recommended MCLGs for PFOA and PFOS are at levels intended to "protect breastfed infants and throughout life" (DPAG, 2021).

As noted previously, to develop MCLs from these MCLGs, which are protective of infants and children, the Department was required to follow the strict regulatory process, which includes the cost-benefit analysis. While the MCLs are slightly higher than the MCLGs, the Department does not believe that the significantly higher cost estimates for lower MCLs were justified. The MCLs are of the same magnitude and within the range as other states' standards, and – consistent with several existing drinking water standards – they provide at least a 90% improvement in health protection compared to implementation of the 2016 EPA HAL. Further, when compared to other federal standards where the MCL is set higher than the MCLG, these MCLs are within the same range of increase from the MCLG. Infants and children will benefit from improved health protection from implementation of the MCLs compared to the 2016 EPA HAL.

The DPAG utilized a serum PFAS calculator developed by Bartell to estimate blood serum concentrations of PFOA, based on an initial serum concentration and proposed levels of PFOA (Bartell 2017). The DPAG found that the model predicts that a woman of childbearing age would reach a steady-state PFOA serum level of 3.1 ng/mL if the consumed water was at the proposed MCL of 14 ng/L. Furthermore, the Bartell calculator confirms that the proposed MCL of 14 ng/L for PFOA is protective and is consistent with the Department's analysis that the MCL represents a 90% improvement in blood serum levels compared to the serum level predicted at the 2016 EPA HAL of 70 ng/L (DPAG, 2022). DPAG conducted a similar analysis for PFOS using data from the Grandjean (2012) study. The method developed by Bartell predicts that in women of childbearing age, the PFOS MCL of 18 ng/L would result in a steady-state serum level of 7.2 ng/L, which is below the lower bound of interquartile range and the geometric mean in mothers in the Grandjean study (DPAG, 2022). DPAG's review of PFAS blood serum levels at various PFAS concentrations in drinking water correlate well with the Department's assessment of at least 90% improvement of public health at the proposed MCLs.

12. **Comment:** IRRC noted that legislators and many commentators suggested that the proposed MCLs should be lower in order to be more protective of children. Many of these commentators including some legislators point to a toxicological analysis and recommendations from Cambridge Environmental Consulting (CEC). These commentators would like the PFOA MCL to be 1 ppt but not to exceed 6 ppt, and the PFOS MCL no greater than 5 ppt, according to the CEC's recommendations. IRRC requested that the Board address these concerns, which seem to indicate that the Board's proposed levels would not be protective of children. (1, 9, 32-34, 37, 39, 40, 43-45, 47-49, 61, 70, 71, 73, 89, 92, 154, 164, 1050-1079, 2126-2129, 2131-2138, 2140-2144, 2146-2149, 2151-2776)

    Response: The recommendations from Cambridge Environmental Consulting cited by some commentators only considered health effects and did not consider the other factors required to be considered in setting an MCL, which are discussed in more detail below.

    The Drexel PFAS Advisory Group (DPAG) identified the target population for PFOA and PFOS as infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime of exposure via drinking water. The calculation of the MCLG employed the transgenerational toxicokinetic model developed by Goeden and differs from the typical formula for adults or infants. This model provided the best insight into the exposure pathways for the target population. All studies have some limitations, and the strength and weaknesses of the selected studies are discussed fully in the "Maximum Contaminant Level Goal Drinking Water Recommendations for Per- and Polyfluoroalkyl Substances (PFAS) in the Commonwealth of Pennsylvania" (MCLG Report), prepared by DPAG (DPAG, 2021). The application of uncertainty factors is the method additionally used to offset inadequacies in the evidence. See the Department's response to Comment #9 for a discussion of the scientific studies and data used in the rulemaking process.

As explained in the preamble, the Department is required to follow a rigorous process when setting an MCL. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022).

The MCLG recommendations provided by DPAG in the MCLG Report were the starting point for development of MCL. After consideration of all relevant factors as noted above, the Department determined that the MCLs strike an appropriate balance between the public health benefits and the implementation costs. See the Department's response to Comment #11 for a description of the MCL rulemaking process.

13. **Comment:** IRRC noted that legislators and many commentators assert that the final rulemaking should be implemented immediately upon finalization. Many commentators stated that water systems should be required to start sampling immediately because otherwise it will be another two to three years before verifiably clean drinking water is available. IRRC requested that the Board explain how it determined that the effective dates in the final regulation balance protection of the public, health, safety, and welfare with the economic impacts of implementation. (1, 7, 9, 11, 32, 33, 39, 40, 42, 43, 45-50, 53-55, 58, 70, 71, 74-79, 89, 102, 115, 125, 157, 160, 162, 174-182, 184-1049, 3132-3560)

    Response: According to the rule, initial compliance monitoring for systems serving a population of greater than 350 persons begins January 1, 2024; initial monitoring for systems serving a population of less than or equal to 350 persons begins January 1, 2025. While mandatory sampling under the rule may not require systems to begin sampling until 2024 or 2025, the MCLs will be effective upon publication of the final rule, expected in early 2023. Water systems may begin to sample for PFAS voluntarily at any point. Additionally, with the publishing of EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5), water systems may be required to sample for contaminants identified in UCMR5 (including 29 PFAS compounds) as soon as January 2023 as determined by EPA's schedule (US EPA, 2021c). More information on UCMR5 can be found at: https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule.

    The 2024 and 2025 initial compliance monitoring dates were selected to provide adequate time for water systems to plan for additional sampling that will be required at each entry point. Since the rule is not expected to be published as final until early 2023, water systems will have finalized their budgets for 2023 before the rule becomes final. This additional time from establishing an MCL until the start of initial monitoring will allow water systems to incorporate the cost of additional sampling and analysis into their 2024 or 2025 budgets.

    There are 3,785 entry points (EPs) in Pennsylvania that will be impacted by the monitoring requirements of this rule. Samples for compliance with the rule must be submitted to an accredited laboratory. Requiring all systems to begin monitoring immediately in 2023 would overwhelm sample capacity at accredited laboratories. The short time frames required by the approved methods would not be achievable if all systems submitted samples for analysis at the same time. In addition, the laboratories will also bear the burden of increased sample analysis through UCMR5. The phased sampling approach in the rule, which requires larger water systems to begin monitoring earlier, focuses on analyzing the drinking water of as many consumers as possible earlier in rule implementation.

In addition to laboratory considerations, a delay in initial monitoring until January 2024 will provide adequate time for water system personnel to learn the rule and train personnel. PFAS sample collection requires strict adherence to the method and trained samplers. The Department intends to conduct training in 2023 on rule implementation and sample collection techniques.

14. **Comment:** IRRC noted that legislators and many commentators assert that for systems with detections over the MCL, monthly monitoring should be required until levels are reduced below the MCL. Many commentators also support a more robust ongoing monitoring schedule than required by the proposed rule and stated that all water systems should conduct regular annual monitoring for PFAS. IRRC questioned whether a shorter monitoring timeframe following a detection was considered. IRRC requested that the Board explain how the frequency of monitoring required in the final regulation is reasonable and protects public health, safety, and welfare. (1, 7, 9, 11, 39, 42-45, 47, 48, 50-55, 61, 67, 70, 73, 76-78, 84, 89, 93, 100, 102, 112, 115, 117, 124, 125, 129, 130, 132, 141, 143, 145, 147, 160, 162, 174-179, 181, 182, 184-559, 561-1079, 1087-1089, 1091-1106, 1108-1121, 1123-2125, 3132-3560)

    Response: In the existing 40 CFR Part 141 National Primary Drinking Water Regulations and 25 Pa. Code Chapter 109 Safe Drinking Water regulations, there is a cohesive strategy for setting monitoring frequencies. For a specific contaminant, the monitoring frequency is set according to whether the contaminant is expected to cause potential adverse health effects from short-term acute exposure or long-term chronic exposure at concentrations likely to be detected in drinking water.

    The group of contaminants likely to cause acute health effects includes pathogens – such as viruses, bacteria, and protozoa – which are monitored via proxies or treatment techniques at frequencies ranging from continuously to monthly. Nitrate and nitrite are also in the acute group, but the most frequent routine monitoring required is quarterly. Short-term exposure to contaminants in the acute group can cause adverse health effects over a short duration (hours or days).

    The group of contaminants likely to cause chronic health effects is composed of everything else: volatile synthetic organic chemicals (VOCs), synthetic organic chemicals (SOCs), inorganic chemicals (IOCs), disinfection byproducts (DBPs), radionuclides, and lead and copper. Contaminants in the chronic group are monitored for compliance according to a schedule based on EPA's Standardized Monitoring Framework (SMF), with monitoring occurring quarterly or less frequently, based on previous results and whether treatment is installed for a particular contaminant (US EPA, 2020). Contaminants in the chronic group can impact health if consumed over a long duration (many years). The rulemaking adds two PFAS, PFOA and PFOS, which are chronic contaminants. Consistent with the EPA's SMF for chronic contaminants, the rulemaking does not require monthly compliance monitoring of PFOA and PFOS.

Chronic contaminants are not monitored at transient noncommunity water systems (TNCWS), such as restaurants, because public consumption of water at such facilities is only for the short term (US EPA, 1987). For community water systems (CWS) and nontransient noncommunity water systems (NTNCWS), the PFAS monitoring framework in the rule originated in existing monitoring requirements for the organic contaminants that already have maximum contaminant levels (MCLs), namely, the VOCs and SOCs.

Initial monitoring for VOCs, SOCs, and PFAS is based on EPA's SMF and consists of four consecutive quarterly samples. The SMF monitoring frameworks for VOCs and SOCs were written to include routes for this initial monitoring to be reduced in frequency or completely waived, respectively, depending on water system and entry point (EP) characteristics. The rule includes no such initial monitoring frequency reduction or waiver options for PFAS initial monitoring, which is more protective than the SMF monitoring frameworks for VOCs and SOCs (see the Department's response to Comment #15 for additional details on PFAS monitoring waivers). At every CWS and NTNCWS EP, four consecutive quarterly samples will be required for initial compliance monitoring. The quarterly initial monitoring period will produce results that are representative of each calendar quarter, thereby representing any seasonal variations that could potentially occur.

If PFOA and PFOS are not detected during the initial quarterly monitoring period at or higher than the minimum reporting level (MRL) of 5 ppt, then the monitoring frequency would be reduced to once in every three-year compliance period. This is the same as the existing monitoring frequency reduction schedule in use for SOCs. If PFOA and PFOS are not detected at specific EPs in any of the four quarters of initial monitoring in 2024 or 2025, there is an expectation that PFOA and PFOS will not later be introduced at these EPs. While PFOA and PFOS are mobile and persistent after being introduced to the environment, this does not mean that PFOA and PFOS will spread in detectable concentrations to all public water system (PWS) source waters that are an arbitrary distance from a point of introduction. While Pennsylvania clearly has some drinking water sources vulnerable to PFOA and PFOS contamination, there are other sources, which are primarily in more rural parts of the Commonwealth, supplied by heavily forested watersheds and located far from potential sources of PFAS contamination (PSOCs) where there are no apparent pathways for introducing PFAS such that they would be detectable in a water sample. During the implementation of the Department's PFAS Sampling Plan, the Department sampled at 40 EPs supplied by baseline sources, which are located in a watershed with at least 75% forested land and at least five miles from a PSOC. Examples include intakes sited at relatively high elevations surrounded by an isolated forest watershed accessed by very low traffic service roads where the likeliest route for exposure to PFAS would be atmospheric. Only two of the 40 baseline EPs sampled (5%) had results showing detections of PFOA or PFOS, and only one (2.5%) had a detection above the MRL threshold of 5 ng/L (PA DEP, 2021c). These EPs of PWS located in relatively remote and forested watersheds will most likely be the ones with no detections during initial monitoring where monitoring will reduce immediately from the initial quarterly to three-year monitoring.

If PFOA or PFOS or both are detected during initial compliance monitoring at a level greater than or equal to the MRL but less than or equal to their respective MCLs, then the compliance monitoring frequency will remain at quarterly for the detected PFAS. If this level of detection occurs at a later time when the monitoring frequency has already been reduced to annual or every three years, then the compliance monitoring frequency will increase to quarterly. In the rulemaking, quarterly compliance monitoring continues unless both PFOA and PFOS are reliably and consistently below the MCL for at least four consecutive quarters, after which the Department may decrease the monitoring frequency to annually. Requiring four consecutive quarters with monitoring results reliably and consistently below the MCL allows the Department to evaluate how steady or variable concentrations are through at least one full seasonal cycle. "Reliably and consistently below the MCL" is defined in the rulemaking for PFAS as "less than 80% of the MCL" for each sample result. Annual compliance monitoring continues in perpetuity until there is a reversion to quarterly monitoring after a detection as described above, or until a waiver is granted (see the Department's response to Comment #15 for a description of the considerations for granting PFAS monitoring waivers); this matches the current monitoring frameworks for VOCs and SOCs.

If PFOA or PFOS or both are detected at a level greater than their respective MCL, the monitoring response is the same as when one or both chemicals are detected between the MRL and MCL as described above: compliance monitoring is required quarterly. The only difference here is that compliance with the MCL must also be considered in accordance with 25 Pa. Code § 109.301(16)(ix). When sample results indicate a violation of one or both MCLs, follow-up actions are required, including one-hour notification to the Department, consultation with the Department on appropriate corrective actions, and Tier 2 public notification (PN) (see the Department's response to Comment #16 for more information on actions following a PFAS MCL exceedance or violation). Once an MCL violation occurs and a PWS issues Tier 2 PN and begins taking corrective actions to comply with one or both MCLs, there is no significant health or information benefit obtained from conducting compliance monitoring for these chronic contaminants at the entry point more frequently than quarterly.

When treatment for PFOA or PFOS is in place, the rule requires that the performance efficacy of the treatment is demonstrated through performance monitoring, conducted on a frequency of at least quarterly in perpetuity, according to 25 Pa. Code § 109.301(16)(vi). Performance monitoring frequency and locations are generally specified by permit special conditions to demonstrate treatment efficacy. The performance monitoring frequency and locations are specific to the treatment techniques to ensure the treatment is achieving the performance goals.

For bottled water, vended water, retail water, and bulk water systems (BVRBs), the PFAS monitoring framework originated in those existing for the organic contaminants that already have MCLs, namely, the VOCs and SOCs. For BVRBs there are a few notable differences from the compliance monitoring described above for the other types of systems. BVRBs that obtain finished water from another public water system are exempt from monitoring as long as the supplying system monitors at least annually. A typical example of this is a vended water system at a grocery store that adds treatment beyond compliance level to already consumable water supplied by a CWS. Another difference is that BVRB monitoring cannot be any less frequent than annual.

It is possible PFOA or PFOS could be newly introduced to the surface water or groundwater supplying a PWS at a level that would cause an EP detection above the MRL or respective MCL. If the Department becomes aware of such contamination, the Department may require special monitoring in addition to the initial and repeat compliance monitoring described above, in accordance with 25 Pa. Code § 109.302(a)-(b) and § 109.1003(i). That is, if there is reason to believe there is new PFOA or PFOS contamination, the Department may require a system to sample more frequently than its current compliance monitoring frequency.

The EPA made a final determination to regulate PFOA and PFOS at the federal level, and though a proposed federal regulation has not been published, there are indications about what the federal compliance requirements will be (US EPA, 2021). EPA is considering two monitoring approaches. First, EPA is considering using the SMF for SOCs, under which compliance monitoring schedules are based around the detection levels of the regulated contaminants, and state primacy agencies can also issue waivers for monitoring. The SMF does not require compliance monitoring more frequently than quarterly (US EPA, 2020). Second, an alternative monitoring approach would allow state primacy agencies to require monitoring at PWSs where information indicates potential PFAS contamination, such as proximity to facilities with historical or ongoing uses of PFAS. There is thus no expectation that the final federal rule will require monitoring to be more frequent than quarterly. Note that the EPA states "As the Agency promulgates the regulatory standard for PFOA and PFOS, EPA will continue to work to establish monitoring requirements in the rule that minimize burden while ensuring public health protection" (US EPA, 2021).

15. **Comment:** IRRC noted that legislators and many commentators urge the Board to amend the rulemaking to require all water systems to be monitored on at least an annual basis with no waivers being granted. IRRC requested that the Board explain how it determined that the granting of waivers will not negate the protection of the public health, safety, and welfare afforded by consistent testing. (1, 7, 9, 11, 39, 42-45, 47, 48, 50-55, 61, 67, 70, 73, 76-78, 84, 89, 93, 100, 102, 112, 115, 117, 124, 125, 129, 130, 132, 141, 143, 145, 147, 160, 162, 174-179, 181, 182, 184-559, 561-1079, 1087-1089, 1091-1106, 1108-1121, 1123-2125, 3132-3560)

    Response: The Board determined that the granting of waivers only under very specific conditions would decrease industry costs while continuing to protect the public health, safety, and welfare. For CWS and NTNCWS, the PFAS waiver framework follows the existing waiver framework for VOCs. The ability to waive monitoring for VOCs is significantly more limited than that for SOCs. Important conditions on waivers for PFAS in the rulemaking that should be considered include the following:

    - Under the rule, a PWS can only apply for a waiver after the PWS completes three consecutive years of quarterly or annual samples with no detection of PFOA or PFOS. This would only be done after an earlier detection because EPs that have never had a detection would move directly to monitoring every three years without needing a waiver application.

- The waiver does not allow a complete stop to monitoring as can occur with SOCs. With a waiver, PFAS compliance monitoring is still conducted once every three years at a minimum.

- Waivers are only available at EPs supplied by groundwater or groundwater under the direct influence of surface water (GUDI). EPs supplied by surface water will not be eligible for waivers because many CWS and NTNCWS do not have complete control over their surface water intake protection area (defined in 25 Pa. Code § 109.1).

- Waivers are only available after evaluating land use and the use of PFAS in wellhead protection area Zone II (defined in § 109.1). This includes consideration of storage, manufacturing, transport, and/or disposal.

- Granting waivers is at the Department's discretion. There is no guarantee that the Department will grant waivers for every application submitted. For example, it is reasonable that the Department may deny a waiver application for an EP with a previous MCL exceedance where the cause of the MCL exceedance is unknown.

- A waiver will not be granted for PFOS if there is treatment for PFOA and vice-versa.

The waiver process is a balance between requiring monitoring protective of public health and allowing a reduction in monitoring when a PFAS has an isolated appearance, has exited the system, decreases below the minimum reporting level, and there is no known use of it near the groundwater source. That is, monitoring is only reduced when there is no expectation a PFAS detection will recur. As listed above, there are a number of conditions that have to be met for a waiver to be granted, and the granting of waivers will not negate the protection of public health.

Waivers are not available for BVRBs, but there is a possible exemption from monitoring as described above for BVRBs supplied with finished water from another system.

See the Department's response to Comment #14 for an explanation of how monitoring frequencies were determined.

16. **Comment:** IRRC questioned whether a water system could remain in the state of repeat monitoring and never reach compliance following an MCL exceedance. Numerous commentators asserted that the Department should implement methods to decrease contamination if levels are above the MCLs for two consecutive quarters. IRRC requested that the Board explain how it will ensure that compliance is achieved by water systems. (1, 28, 39, 44, 53, 55, 63, 73, 82, 1050-1079, 1103)

    Response: Following an MCL exceedance, the Department will follow established procedures for ensuring the water system does not simply remain in the state of repeat monitoring, but ultimately reaches compliance, as described in this response. The rulemaking establishes MCLs for two PFAS: PFOA at 14 ppt and PFOS at 18 ppt. MCL compliance will be determined in accordance with 25 Pa. Code § 109.301(16)(ix) and will be based on a Running Annual Average (RAA) calculated quarterly as is the case with other currently regulated chronic contaminants, including volatile synthetic organic chemicals (VOCs), inorganic chemicals (IOCs), synthetic organic chemicals (SOCs), and Disinfection Byproducts (DBPs).

Under existing authorities in § 109.701(a)(3)(i), public water systems (PWSs) are required to notify the Department within one hour if any single sample result exceeds an MCL value or if the system is determined to be in violation of an MCL, according to § 109.301(16)(ix) for PFOA and PFOS. An initial consultation with the Department typically occurs during this notification regarding any immediate actions. When a PWS is in violation of an MCL, the Department issues a Notice of Violation (NOV), according to the Department's technical guidance document, *Guidelines for Identifying, Tracking and Resolving Violations for the Drinking Water Program* (383-4000-002). According to that guidance document, the NOV contains requested actions and associated timeframes, including a request for the PWS to consult with the Department to determine appropriate corrective actions (PA DEP, 2006a). In addition to issuing public notification, corrective actions may include additional monitoring, installation of treatment, using alternative sources, blending sources, or taking a source offline. PWSs are responsible for taking any and all corrective actions necessary to protect public health.

When systems fail to take corrective action and continue to be in violation of an MCL, the Department identifies the ongoing MCL violation as a significant deficiency which is defined in § 109.1 as "A defect in design, operation or maintenance, or a failure or malfunction of the sources, treatment, storage or distribution system that the Department determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers." The Department notifies the PWS of the ongoing MCL violation and the identification of the ongoing violation as a significant deficiency through an NOV. This NOV outlines the regulatory responsibilities of systems as stipulated in existing § 109.717 for responding to significant deficiencies. These responsibilities are:

(1) Within 30 days of receiving written notification, the public water supplier shall consult with the Department regarding appropriate corrective actions unless the Department directs the system to implement a specific corrective action.

(2) The public water supplier shall respond in writing to significant deficiencies no later than 45 days after receipt of written notification from the Department, indicating how and on what schedule the system will address significant deficiencies.

(3) Corrective actions shall be completed in accordance with applicable Department plan review processes or other Department guidance or direction, if any, including Department-specified interim measures.

(4) The public water supplier shall correct significant deficiencies identified within 120 days of receiving written notification from the Department, or earlier if directed by the Department, or according to the schedule approved by the Department.

The exact corrective actions in response to an MCL violation are not codified in regulation because they are case specific and may vary based on each individual situation and system specific considerations, including the level detected, any known or suspected source of contamination, other water sources available, and treatment processes already in place. Sufficient quarterly monitoring data may be necessary to evaluate whether there are seasonal variations in contaminant levels in order to identify the most appropriate corrective actions. The corrective action process required for significant deficiencies ensures the corrective actions occur within 120 days or upon an alternative schedule approved by the Department. As MCL corrective actions are almost always subject to the permitting process, the Department often enters into a Consent Order and Agreement with the system to formally extend the 120 due date while establishing other enforceable deadlines.

Public notification, when required, shall be delivered to the customers consistent with existing regulations.

17. **Comment:** IRRC noted that proposed § 109.301(16)(ii)(B) in the proposed rulemaking included the phrase "reliably and consistently below all MCLs for PFAS," which is inconsistent with the term defined in Section 109.1, "reliably and consistently below the MCL." EPA Region 3 noted that Section F of the preamble to the proposed rulemaking did not address the definition of "reliably and consistently below the MCLs" relevant to reduced frequency of repeat monitoring. IRRC requested that the Board amend the rulemaking to clarify this inconsistency. (1, 12)

    Response: The monitoring requirements in § 109.301 and § 109.1003 have been revised in the final-form rulemaking so that the required monitoring frequencies for PFOA and PFOS are determined independently. In conjunction with this, all instances of "reliably and consistently below all PFAS MCLs" have been revised to "reliably and consistently below the MCL," which is consistent with § 109.1. As EPA noted, this was not specifically defined in the preamble to the proposed rulemaking, but the existing definition in § 109.1 is edited in the rulemaking to include PFAS. As defined in § 109.1, "reliably and consistently below the MCL" indicates that "For VOC, SOCs, IOCs (with the exception of nitrate and nitrite), and PFAS, this means that each sample result is less than 80% of the MCL."

18. **Comment:** IRRC and a commentator noted that proposed § 109.301(16)(viii)(A) states "The Department may invalidate results of obvious sampling errors." IRRC questioned what the standards are for determining an "obvious" sampling error and how samples will be evaluated consistently. IRRC requested that the Board clarify implementation related to the invalidation of PFAS samples. (1, 18)

    Response: The language used in § 109.301(16)(viii) matches that already in use for the other groups of regulated organic chemicals, the volatile synthetic organic chemicals (VOCs) and synthetic organic chemicals (SOCs). As specified in § 109.304(f)(1), "Sampling and analysis shall be according to the following approved methods" which include EPA Method 533, EPA Method 537.1, or EPA Method 537 Version 1.1. Failure to follow the "Sample Collection, Preservation, and Storage" steps in the chosen method could result in sample invalidation. Decisions about sample invalidations will be based on available documentation. For example, if a sample is taken at a tap other than the entry point, that error would have to be determinable from documentation.

If PFOA or PFOS is detected in a field reagent blank (FRB) sample, it could be considered an obvious sampling error, if there is evidence that indicates PFOA or PFOS was introduced by the sampler. Alternatively, PFOA or PFOS could have a long-term presence in the area surrounding the sample tap for other reasons. According to the approved methods, the consequence of a substantial FRB detection is the same regardless of the reason for it:

- EPA 533: "If a method analyte found in the field sample is present in the FRB at a concentration greater than one-third of the MRL [minimum reporting level], then the results for that analyte are invalid for all samples associated with the failed FRB." (Rosenblum, 2019)

- EPA 537.1 and EPA 537 Version 1.1: "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed." (Shoemaker, 2009; Shoemaker, 2018)

Obvious sampling errors will be further addressed in guidance materials and in training, which will be provided by the Department after the final rule is promulgated.

19. **Comment:** IRRC and some commentators noted the compliance determination in proposed § 109.301(16)(ix)(A). IRRC requested that the Board clarify how the compliance determination will be implemented for systems that choose to monitor more frequently than required. Specifically, a few commentators requested clarification on the compliance determination for a system that is required to monitor quarterly but instead monitors monthly. (1, 13, 29)

Response: The clauses that specify how compliance determinations are dependent on monitoring frequency are:

- § 109.301(16)(ix)(A): "For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average of all samples taken at each entry point." The running annual average (RAA), as defined in 109.1, is the "average, computed quarterly, of quarterly arithmetic averages of all analytical results for samples taken during the most recent 4 calendar quarters." Therefore, individual monthly results will not be used directly for compliance; instead, the monthly results will be averaged within each calendar quarter to calculate a quarterly average, and then compliance is determined using that quarterly average.

- § 109.301(16)(ix)(B): "If monitoring is conducted annually or less frequently, the system is out of compliance if the level of a contaminant at any entry point is greater than the MCL. If a confirmation sample is collected as specified in subparagraph (v), compliance is determined using the average of the two sample results." Note that subparagraph (v) states, "A confirmation sample shall be collected and analyzed for each of the PFAS detected in exceedance of its MCL during annual or less frequent compliance monitoring." Confirmation samples should only be collected during annual or less frequent monitoring.

Compliance is determined based on the monitoring frequency in use and not on the monitoring frequency required. For example, if a system required to monitor annually is monitoring quarterly, an RAA will be calculated to determine compliance, as described in § 109.301(16)(ix)(A). As another example, if a system required to monitor quarterly is monitoring monthly, a quarterly average will be calculated with the monthly results each quarter and those quarterly averages will be used to calculate compliance according to § 109.301(16)(ix)(A).

20. **Comment:** IRRC and some commentators noted the compliance determination for quarterly monitoring in proposed § 109.301(16)(ix)(C) and requested clarification on implementation. Specifically, IRRC and commentators requested clarification on whether a determination of "out of compliance" will begin with the first sampling following the effective date of the regulation, and whether a system will be out of compliance if the first sample exceeds the MCL. (1, 13, 29)

Response: A system is not necessarily out of compliance if the first sample exceeds the MCL. In accordance with § 109.301(16)(ix)(A), during the initial year of quarterly compliance monitoring, compliance with each MCL will be determined by a running annual average (RAA) of all sample results for each of the regulated PFAS. The RAA, as defined in § 109.1, is the "average, computed quarterly, of quarterly arithmetic averages of all analytical results for samples taken during the most recent 4 calendar quarters." Note that the four calendar quarters are Q1 (January–March), Q2 (April–June), Q3 (July–September), and Q4 (October–December).

During the first year of monitoring, results will not exist for all four of the most recent calendar quarters until the result from Q4 is available. Until that point, results for quarters that have not yet occurred are assumed to be less than the minimum reporting level (MRL) and, thus, are entered as zero in the RAA calculation in accordance with § 109.301(16)(ix)(E). Therefore, for example, if a system is required to test in March 2024 (Q1) for the first time, the following three quarters (Q2 2024, Q3 2024, and Q4 2024) will be entered as zero.

Consider a PWS beginning initial PFAS compliance monitoring in Q1 2024. The concentration of a specific PFAS in the n[th] quarter of year yyyy is labeled *C*(Qn yyyy). As noted in the Department's response to Comment #19, if more than one sample is reported in a quarter, *C*(Qn yyyy) represents a quarterly average of all reported results. The concentrations for each quarter to be used in the RAA calculation would then be signified as follows:

Q1 2024	Q2 2024	Q3 2024	Q4 2024
C(Q1 2024)	*C*(Q2 2024)	*C*(Q3 2024)	*C*(Q4 2024)

In this scenario, the following table shows how the RAA will be determined during each quarter of 2024:

Most Recent Quarter	RAA
Q1 2024	*C*(Q1 2024) / 4
Q2 2024	(*C*(Q1 2024) + *C*(Q2 2024)) / 4
Q3 2024	(*C*(Q1 2024) + *C*(Q2 2024) + *C*(Q3 2024)) / 4
Q4 2024	(*C*(Q1 2024) + *C*(Q2 2024) + *C*(Q3 2024) + *C*(Q4 2024)) / 4

If a system fails to collect a sample in all quarters of the initial year of compliance monitoring, then, in accordance with § 109.301(16)(ix)(D), compliance with the MCL will be based on the total number of quarters in which results were reported. As an example from the above scenario, if the Q2 2024 sample is missed, but all others are taken, then the RAA calculations for the initial year of compliance monitoring would be:

Most Recent Quarter	RAA
Q1 2024	*C*(Q1 2024) / 4
Q2 2024	*C*(Q1 2024) / 4
Q3 2024	(*C*(Q1 2024) + *C*(Q3 2024)) / 4
Q4 2024	(*C*(Q1 2024) + *C*(Q3 2024) + *C*(Q4 2024)) / 3

Note that in subsequent years of quarterly compliance monitoring, the Q4 2024 RAA calculation would apply for years in which quarterly results do not exist for one quarter. In other words, using the RAA calculation, compliance will still be based on the total number of quarters in which sample results were reported.

Using the compliance calculations explained above, compliance will be calculated beginning with the first quarterly result of initial monitoring. According to § 109.301(16)(ix)(C), "If any sample result will cause the running annual average to exceed the MCL at any entry point, the system is out of compliance with the MCL immediately." In other words, if at any point a quarterly sample result yields an MCL exceedance using the compliance calculations described above, the system is out of compliance. For example, if the first quarterly result of initial compliance monitoring is more than four times the MCL, the system is out of compliance based on the compliance calculation for the first quarter of initial quarterly monitoring. However, if the first quarterly result is at a level that is over the MCL but not over four times the MCL, the system would not be out of compliance.

21. **Comment:** IRRC and a commentator noted the requirement in proposed § 109.301(a)(6)(ii), "Samples shall be collected by a person properly trained by a laboratory accredited by the Department to conduct PFAS analysis." One commentator requested clarification of this provision and noted several limitations to its implementation. IRRC requested that the Board amend the final rule to address commentators' concerns, including laboratory staff capacity, geographic availability, economic impacts of associated costs and training costs, and certification or documentation needed to verify training. (1, 18)

Response: In response to these comments, subparagraph § 109.303(a)(6)(ii) has been removed from the final-form rulemaking. This will instead be addressed in guidance materials and in training, which will be provided by the Department after the final rule is adopted.

22. **Comment:** IRRC and a commentator noted the analytical requirements included in the proposed rulemaking and questioned whether those requirements should be removed from the rulemaking and instead included in guidance or codified in the Department's Environmental Laboratory Accreditation regulations at 25 Pa. Code Chapter 252. IRRC requested that the Board explain the need for and reasonableness of retaining analytical requirements in the final regulation. (1, 18)

    Response: The existing analytical requirements have been established through § 109.304(a), which states "Sampling and analysis shall be performed in accordance with analytical techniques adopted by the EPA under the Federal act or methods approved by the Department." The analytical techniques adopted by the EPA under the Federal act are specified explicitly in the National Primary Drinking Water Regulations in 40 CFR Part 141 Subpart C - Monitoring and Analytical Requirements. The EPA has not yet adopted analytical techniques for PFAS in 40 CFR Part 141 Subpart C. Therefore, in accordance with § 109.304(a), the Department is responsible for approving methods for PFAS analysis. Updating 25 Pa. Code Chapter 252 would require a procedure equivalent to updating Chapter 109, so there would be no flexibility gained from listing the methods in Chapter 252 instead. By explicitly specifying these methods in § 109.304(f), the Department is following the EPA's convention.

23. **Comment:** IRRC and a commentator noted the list of approved treatment technologies for achieving compliance with the proposed PFAS MCLs included in proposed § 109.602(j)(1) and questioned whether a PWS would be able to move forward without piloting for one of the listed technologies, or whether pilot testing will be required prior to issuance of a construction permit. One commentator noted the additional cost of pilot testing and the availability of existing data for evaluation of performance. IRRC requested that the Board clarify whether piloting will be required for the approved treatment technologies listed in the proposed rulemaking, and, if so, to amend the final regulation and associated documents to take the additional costs and economic impacts into consideration. (1, 28)

    Response: The Department currently is not requiring PWSs to pilot all PFAS treatment projects. However, the Department retains the right to require piloting even if the technology is listed as approved in regulation, as the Department can for all types of treatment processes.

    Piloting provides real-world data that will allow for accurate sizing and operational cost of the treatment system that can be an overall net saving. A pilot study provides a site-specific basis for the development of loading rates, operational costs, and which technology or equipment manufacture is best suited for the project. Additionally, having the piloting data minimizes the overall risk to the project. Piloting costs vary depending on the length of the pilot, number of technologies tested, and the specifics of the raw water quality. There are multiple water quality parameters that can affect the sizing, cost, and operation of the treatment. Piloting costs generally are less than 5% of the total cost of the project.

The Department encourages piloting for the technology listed as approved for PFAS treatment to develop site-specific design requirements. For systems that have provided successful demonstration of a technology on similar water quality, the Department has not required a pilot study. The PWS is responsible for demonstrating similarity in water quality to the Department.

24. **Comment:** IRRC noted proposed § 109.602(j)(2), which states "Other treatment technologies may be approved by the Department if the applicant demonstrates the alternate technology is capable of providing an adequate and reliable quantity and quality of water to the public." IRRC questioned what standards would determine adequacy has been demonstrated and requested that the Board clarify how this provision will be implemented. (1)

    Response: This provision will be implemented in the same manner in which it would be for any other contaminant or any innovative treatment technology; it is addressed in Section I.C. of the Department's *Public Water Supply Manual Part II, Community System Design Standards* (383-2125-108), which states:

    > "The risk incurred in experimentation with innovative treatment processes must rest upon the proponent of the method rather than the public. Recent developments or new equipment may be acceptable if they meet at least one of the following conditions:
    >
    > - The treatment process has been thoroughly tested in full-scale comparable installations under competent supervision.
    > - The treatment process has been thoroughly tested in a pilot plant operation for a sufficient time to ensure the technology provides drinking water which meets DEP's drinking water standards under all conditions of raw water quality." (PA DEP, 2006b)

25. **Comment:** Legislators and numerous commentators stated that Pennsylvania should develop MCLs for more PFAS chemicals, in addition to the proposed levels of 14 ppt for PFOA and 18 ppt for PFOS in the proposed rulemaking or questioned whether the Department will address other PFAS. Some commentators asserted that all PFAS found in Pennsylvania should have MCLs; some commentators specifically mentioned including PFNA, PFHxA, PFHxS, PFHpA, and PFBS; and some commentators suggested including the 18 PFAS listed in EPA Method 537.1 in the rulemaking. One commentator who expressed support for the proposed rulemaking also urged the Department to "continue to examine other PFAS chemicals, which similarly have been shown to cause negative health impacts. This could include chemicals such as perfluorobutyrate (PFBA) and perfluorohexanoic acid (PFHxA)." (4, 5, 9, 11, 17, 31-33, 35-37, 39, 40, 42, 43, 45, 47-55, 58, 61, 62, 69, 70, 73-75, 77, 78, 81, 84, 87, 89, 92, 93, 102, 106, 109, 112, 113, 115, 117, 119, 124, 126-130, 132, 139, 141, 143, 145, 147, 148, 157, 160, 162, 164, 174-182, 184-1049, 1054-1114, 1116-1121, 1123-2125, 2777-2794, 2976-3560)

    Response: As explained in the preamble to the proposed rulemaking, the Department must follow a rigorous process when setting an MCL. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's

Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022).

In addition to State requirements, the Department needs to consult the Federal Act and its implementing regulations. See 42 U.S.C.A. §§ 300f—300j-9; see also 40 CFR Parts 141, 142, and 143 (relating to National Primary Drinking Water Regulations; National Primary Drinking Water Regulations Implementation; and other Safe Drinking Water Act Regulations). The EPA explains how EPA sets standards at the following link: www.epa.gov/sdwa/how-epa-regulates-drinking-water-contaminants. In establishing the MCLs in this rulemaking, the Department was informed by the EPA's procedure to establish an MCL. It is important for the Department to understand the EPA's process of setting an MCL because similar criteria are required of the Department under the Commonwealth's RRA and because the MCLs in this rulemaking are the first MCLs that the Department has set; every other MCL in effect in this Commonwealth was set by the EPA and incorporated by reference into the Department's Chapter 109 regulations. In addition, to retain primacy for implementing the Federal Act in this Commonwealth, the Department's standard setting process must be at least as stringent as the Federal process.

Once an MCLG is determined, the EPA sets an enforceable standard. In most cases, the standard is an MCL. The MCL is set as close to the MCLG as feasible. Taking cost into consideration, the EPA must determine the feasible MCL. As a part of the rule analysis, the Federal Act requires the EPA to prepare a health risk reduction and cost analysis in support of any standard. The EPA must analyze the quantifiable and nonquantifiable benefits that are likely to occur as the result of compliance with the proposed standard. The EPA must also analyze increased costs that will result from the proposed drinking water standard. In addition, the EPA must consider incremental costs and benefits associated with the proposed alternative MCL values. Where the benefits of a new MCL do not justify the costs, the EPA may adjust the MCL to a level that maximizes health risk reduction benefits at a cost that is justified by the benefits.

In 2019, the Department's Safe Drinking Water Program moved forward with its PFAS Sampling Plan, which was a key project to advance the program's knowledge of PFAS, specifically occurrence of PFAS in public water systems (PWSs) this Commonwealth. In the preamble to the proposed rule, Table 1. *Summary of PFAS Sampling Plan results* provides a summary of the results from the PFAS Sampling Plan; full results are available at www.dep.pa.gov/pfas (EQB, 2022). Of the 412 samples analyzed for PFOA, 112 (27%) resulted in detectable concentrations of PFOA; the remaining 300 samples resulted in no detectable concentrations of PFOA. Of the 412 samples analyzed, 103 samples (25%) resulted in detectable concentrations of PFOS; the other 309 resulted in no detectable concentrations of PFOS. At the sampling sites with detections, eight of the 18 PFAS included in EPA Method 537.1 were detected. The eight PFAS that were detected are: PFOA, PFOS, PFNA, PFHxS, PFHpA, PFBS, PFHxA, and perfluoroundecanoic acid (PFUnA). Of the eight PFAS detected, PFOA and PFOS were most common, detected at 112 (or 27%) and 103 (or 25%) sites, respectively. Results were non-detect at all 412 sites for the other ten PFAS that were analyzed (PA DEP, 2021c).

The Department is proposing not to move forward with an MCL for other PFAS at this time for multiple reasons, including the lack of occurrence data above the MCLG for other PFAS, incomplete cost/benefit data and analysis, reference dose not derived due to lack of evidence on toxicity, and lack of treatability data. For specific reasons by contaminant, refer to the preamble to the proposed rulemaking, Table 4. *Reasons for not moving forward with MCLs for other PFAS* (EQB, 2022).

In Table 4 in the preamble to the proposed rulemaking, the phrase "lack of occurrence data above the MCLG" was intended to mean "lack of *sufficient* occurrence data above the MCLG", not necessarily that the Department found *no* detections exceeding the recommended MCLG for a particular compound in the PFAS Sampling Plan results. The Department acknowledges that there was a small percentage of detections of PFBS, PFHpA, PFHxS, and PFNA in the occurrence data. However, the infrequency of detection of those PFAS compounds is small enough to not be indicative of a substantial likelihood that any of them will occur in PWSs at levels and frequencies of public health concern. The data do not suggest a meaningful opportunity to regulate other PFAS compounds besides PFOA and PFOS.

The decision to not move forward with MCLs for additional PFAS at this time is further supported by a review of co-occurrence data. This review considers the frequency with which individual PFAS detections co-occurred with other PFAS detections in the occurrence data set used for this rulemaking. PFAS are a large class of man-made synthetic chemicals, and because of their unique chemical structure, the treatment for PFOA and PFOS is the same, as is treatment for many other PFAS found in water sources. If MCLs for PFOA and PFOS are exceeded and treatment is the recommended option, this treatment would be PFAS removal treatment. Based on an analysis of co-occurrence data, only 3.7% of all sites (or 16 out of 435 sites) had detections of at least one other PFAS at a level greater than its recommended MCLG when PFOA or PFOS levels did not exceed the MCLs (PA DEP, 2021c). In other words, the PFOA and PFOS MCLs appear to be protective of other PFAS in up to 96.3% of PWSs with detectable concentrations of other PFAS. Therefore, PFAS removal treatment installed for PFOA and PFOS exceedances is expected to provide some protection against other PFAS contaminants in up to 96.3% of PWSs with treatment installed for PFOA or PFOS or both.

It is important to note that the PFAS Sampling Plan was a targeted sampling plan, with the intent of prioritizing PWS sources potentially affected by PFAS contamination to be sampled. Of the 412 sites sampled, 40 sites (approximately 10%) were located in a watershed with at least 75% forested land and at least five miles from a potential source of PFAS contamination (PSOC). These 40 sites served as a control group. The remaining 372 sites (approximately 90%) were located within 0.5 to 0.75 miles of a PSOC (PA DEP, 2019). For a full description of PSOCs identified and selection of potential sampling sites, the PFAS Sampling Plan is available at
https://files.dep.state.pa.us/Water/DrinkingWater/Perfluorinated%20Chemicals/BSDW%20PFAS%20Sampling%20Plan_Phase%201_April%202019.pdf. Because the sampling plan was predominantly targeted to PWS sources located in proximity to PSOC, the detection rates from the occurrence data may overestimate the detection rate for other PWSs in this Commonwealth that were not sampled.

The Department acknowledges that the science on PFAS is evolving. While the most recent scientific studies and data available at the time were used in development of the rulemaking, newer studies on the toxicity and health effects of several PFAS are on the horizon. The EPA is also in ongoing consultation with the EPA's Science Advisory Board in the evaluation of additional PFAS and groups of PFAS. The Department recognizes that there will be a need to continue to reevaluate the science and data relative to PFAS. However, the Department also considers this an important opportunity to move forward with this rulemaking that will increase public health protection for Pennsylvanians served by PWS from adverse health effects associated with exposure to PFOA and PFOS in drinking water.

26. **Comment:** Legislators and most commentators pointed out the large number of Pennsylvanians that receive their water from private water sources including private wells. These commentators expressed their concern that this large portion of Pennsylvanians will be left unprotected by this proposed rulemaking and requested that the Department include private water sources in the requirements of the proposed rule. (7, 9, 11, 17, 32, 33, 36, 37, 39, 42-55, 61, 67, 70, 72-74, 76-78, 85, 85, 89, 92, 93, 102, 105, 107, 109, 112, 115, 117, 119, 124-130, 132, 141, 143, 145, 147, 152, 160, 162, 170, 172, 174-1079, 1087-1098, 1100-1106, 1108-1114, 1116-1121, 1123-2129, 2131-2133, 2135-2776, 3132-3560)

    Response: These comments are outside the scope of this rulemaking, but the Department acknowledges them. Under Pennsylvania law, the Department does not have the authority to regulate private water sources. The Pennsylvania Safe Drinking Water Act (the Act) states that rules and regulations established by the Environmental Quality Board (Board) "shall apply to each public water system in the Commonwealth ..." (35 P.S. § 721.4(b)). The Act defines a public water system as "a system for the provision to the public of water for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year." (35 P.S. § 721.3).

    The Act grants authority for the Board to establish rules and regulations which govern only public water systems, not private water systems (which include privately owned water wells). The Act additionally grants authority to the Department to enforce only Federal and State regulations regarding well design and construction standards and drinking water standards. As Federal standards and state standards established by the Board govern only public water systems, DEP cannot enforce standards for public water systems on privately owned wells, seeps, and springs that do not meet the definition of a public water system; therefore, this comment is outside the scope of this rulemaking.

    Although the Department may not enforce public water system regulations on privately owned water systems, the Department often receives questions regarding privately owned wells. Information regarding well construction, drinking water testing and treatment, and other information are available on the Department's website at https://www.dep.pa.gov/Citizens/My-Water/PrivateWells/pages/default.aspx.

27. **Comment:** Legislators and numerous commentators referenced Article I, Section 27 of the Pennsylvania Constitution when suggesting that MCLs for PFOA and PFOS should be set lower than proposed or at zero detection, the MCLs should apply to private water supplies, MCLs

should be set for other PFAS in addition to PFOA and PFOS, and implementation of the regulation should start immediately without phasing in the compliance monitoring. Article I, Section 27 states "The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment." (5, 10, 45, 47, 49, 50, 58, 68, 70, 71, 73, 79, 113, 123, 140, 154, 164, 1105, 2133, 2791)

Response: The Pennsylvania Safe Drinking Water Act under section 2(b) has declared that the purpose of the act is to further the intent of Article I, Section 27 of the Pennsylvania Constitution by, among other things, establishing a state program to provide safe drinking water to the public. As part of that state program to provide safe drinking water to the public, this rulemaking is intended to protect public health by setting State MCLs for contaminants in drinking water that are currently unregulated at the Federal level. With these amendments to Pennsylvania's safe drinking water regulations, the Commonwealth would move ahead of the EPA in addressing PFOA and PFOS in drinking water. Safe drinking water is vital to maintaining healthy and sustainable communities. Proactively addressing PFOA and PFOS contamination in drinking water can reduce the incidence of illness and reduce health care costs.

As explained in the preamble to the proposed rulemaking, the Department must follow a rigorous process when setting an MCL. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022). See the Department's responses to Comment #11 for a description of the MCL rulemaking process, Comment #9 for a discussion of the scientific studies and data used in the rulemaking process, Comment #26 for an explanation why the rulemaking does not apply to private water supplies, Comment #25 regarding setting MCLs for PFAS other than PFOA and PFOS, and Comment #13 regarding the timing of compliance monitoring.

28. **Comment:** IRRC noted that a commentator states that drinking water facilities are passive entities that are subject to this regulation due to the action of others. The commentator further notes that "[m]ost, if not all, of these facilities were not designed to treat emerging contaminants such as PFAS." The commentator urges the Department to undertake regulatory initiatives that address, at a minimum, source control requirements related to PFAS to eliminate or substantially reduce, among other things, the costs of PFAS treatment, management, and monitoring that will be directly borne by the regulated community. The Board should address the impact of other regulatory initiatives related to PFAS source control requirements on the economic impacts of the final regulation. (1, 17)

Response: The Department acknowledges that PWSs are not responsible for releasing PFAS into the environment. Decades of widespread use of a wide variety of products containing PFAS has resulted in elevated levels of environmental pollution and exposure in some areas of Pennsylvania, and PFAS remain in the environment and cycle through various media (air, water, soil) depending on how and where the substances were released. Although these broader issues are outside the scope of this particular rulemaking, it is important to note that the Department has undertaken initiatives within its statutory authorities to address PFAS contamination holistically and to minimize further releases and exposures. As part of the multi-agency PFAS Action Team established by Governor Wolf, the Department is actively exercising its statutory authorities to implement regulatory and permitting initiatives to address PFAS contamination.

In November 2021, the Board promulgated regulatory provisions in 25 Pa. Code Chapter 250 Administration of the Land Recycling Program to address PFAS contamination in soil and groundwater. The regulatory provisions established soil and groundwater Medium Specific Concentrations (MSC) for PFOS, PFOA, and PFBS under the Statewide Health Standard. Through this regulatory update, remediators must demonstrate attainment of a standard provided by the Land Recycling and Environmental Remediation Standards Act (Act 2 of 1995) and obtain Act 2 liability relief for PFOA, PFOS, and PFBS. By law, the Department is required to review these standards every 36 months to ensure the MSCs reflect the most current science available to protect human health and the environment. Once a state or federal MCL is published, it will become the updated MSC as required by Act 2.

The Department also recently established a multi-pronged strategy to better characterize and control PFAS in permitted discharges to surface waters by implementing monitoring and other requirements in National Pollutant Discharge Elimination System (NPDES) permits. The Department's PFAS strategy for NPDES discharges includes: identifying industries likely to discharge PFAS; revising NPDES permit applications for these industries and for major sewage facilities receiving discharges from these industries to include PFOA and PFOS sampling requirements and, where relevant, source evaluations; and adding monitoring requirements for PFOA and PFOS to NPDES permits from facilities with identified elevated concentrations in their effluent and, where necessary, evaluating the need for effluent limits for those facilities.

As new science emerges and more data become available, the Department will continue to exercise its statutory authorities to regulate PFAS contamination across Department programs. Investigating the financial and economic impacts of regulating these substances, along with environmental and public health impacts, will remain central to the Department's regulatory process. In collaboration with the Commonwealth's multi-agency PFAS Action Team, the Department will continue to encourage sibling agencies to exercise their authorities to protect Pennsylvanians from the adverse health effects associated with exposure to these substances. The minimization or elimination of these substances from use in products in the consumer market will curtail downstream pollution, thereby relieving financial burdens associated with monitoring and treating PFAS borne by entities such as PWSs.

29. **Comment:** One member of the General Assembly provided comments relative to PFAS use in the oil and gas industry, objecting to exemptions for the oil and gas industry that allow PFAS to be used in drilling fluids. The legislator objects to the exemptions for the oil and gas industry that allow radium and PFAS to be unmeasured, unmonitored, and not tracked, and references a recent study by the Physicians for Social Responsibility that found that PFAS has been used in more than 1,200 wells in six states and comments that there is a lack of disclosure concerning chemicals used in fracking. (6)

Response: To the extent this comment is addressing exemptions in Federal law, this comment is outside the scope of this rulemaking. To the extent that the legislator seeks to address how well operators report chemical additives used in hydraulically fracturing oil and gas wells, this comment is also outside the scope of the rulemaking; however, in Pennsylvania, the 2012 Oil and Gas Act contains the applicable chemical disclosure requirements. See 58 Pa.C.S. §§ 3222—3222.1.

30. **Comment:** One member of the General Assembly expressed concern about the use of PFAS in drilling oil and gas wells. (5)

    Response: The Department has considered this comment; however, this comment is outside the scope of this rulemaking. See the Department's response to Comment #29 for related discussion.

31. **Comment:** One member of the General Assembly provided comments expressing concern about contamination from PFAS used in fracking fluids. The legislator is concerned that there is no way to know the extent of contamination related to PFAS used in fracking fluids because they are considered proprietary and the Solid Waste Management Act contains a "leachate loophole" excluding oil and gas companies from testing waste prior to disposal in landfills. The legislator objects to the practice of spreading oil and gas wastewater on dirt and gravel roads because there is no way to determine whether that wastewater contains PFAS. (7)

    Response: To the extent that the legislator is concerned about confidential proprietary information, this comment is outside the scope of the rulemaking; however, in Pennsylvania, the 2012 Oil and Gas Act contains the applicable chemical disclosure requirements. See 58 Pa.C.S. §§ 3222—3222.1. To the extent the comment addresses needed testing for waste prior to disposal, this comment is outside the scope of this rulemaking. To the extent that the legislator is concerned about road spreading activities, this comment is outside the scope of this rulemaking.

32. **Comment:** Legislators, EPA Region 3, and numerous other commentators expressed support for the proposed rulemaking. Some commentators simply stated that they were writing in support or in favor of the rule, or that they applaud the Department's efforts. Some comments in support of the proposed rulemaking included general statements about the harmful effects and persistence of PFAS and the urgency of adopting MCLs. Some comments included statements urging the EQB to act quickly to adopt the proposed MCLs. Many commentators who commented in support of the proposed rulemaking also included additional comments recommending changes to the proposed rule; those additional comments are addressed separately in this document. (3, 8, 12-16, 19, 20, 23, 25, 27, 29, 32, 35, 36, 41-43, 52-56, 58-61, 67, 70, 75, 76, 87, 95-104, 106-108, 11, 111, 113-116, 118, 120-122, 131, 133, 135, 137-139, 142, 155, 156, 159, 161, 163, 166, 167, 169, 171, 172, 174-1049, 1054-1806, 2777-3131)

    Response: The Department acknowledges these comments and appreciates the commentators' support.

33. **Comment:** EPA Region 3 noted that "The Consumer Confidence Report (CCR) provisions for community water systems and bulk water systems are consistent with Federal/current CCR data table requirements concerning how to present data, health effects and sources of the contaminant. The CCR health effects language is also consistent with the public notice health effects language requirements." (12)

    Response: The Department appreciates EPA's confirmation that the CCR provisions and health effects language in the rulemaking are consistent with Federal CCR requirements.

34. **Comment:** EPA Region 3 noted that "The Public Notification (PN) Rule provisions for community water systems and bulk water systems are consistent with Federal/current PN requirements regarding content, delivery, and timing of notice (§ 109.409 Tier 2 Public Notice). The PN health effects language is also consistent with the public notice health effects language requirements." (12)

    Response: The Department appreciates EPA's confirmation that the PN provisions and health effects language in the rulemaking are consistent with Federal PN requirements.

General Comments

35. **Comment:** A few commentators expressed concern that the PFAS Sampling Plan, which the Department used to gather occurrence data and inform the rulemaking process, was insufficient, and that the use of targeted sampling is unscientific and biased. Commentators stated that only a small percentage of public water systems were included in the sampling plan and that many additional water supplies need to be tested. (24, 32, 33, 35, 36, 52, 62, 64, 73, 152)

    Response: The Department disagrees with the implication that the sampling plan was unscientific and biased but acknowledges these comments. The purpose of the PFAS Sampling Plan was to provide data regarding the occurrence and distribution of PFAS in public water systems (PWSs) in Pennsylvania. The Sampling Plan was not intended to produce a full assessment of all PWSs in Pennsylvania in which PFAS might be detected if sampled. Sampling all PWSs in the Commonwealth for PFAS was not the purpose of this sampling program nor was funding available to do a comprehensive assessment of PFAS in all 8,373 PWSs in Pennsylvania. However, the Department does not agree that the limited, targeted sampling renders the results insufficient.

    To select and prioritize sites for sampling, the Department first narrowed the potential sampling pool to the 3,040 community and nontransient noncommunity water systems, due to the increased relative risk of exposure to consumers who regularly consume water from these systems. The Department then conducted a literature review to assess the relative risk from potential sources of PFAS contamination (PSOCs) from various industries and land uses, as described in the PFAS Sampling Plan. The Department used the literature review to conduct targeted sampling near those expected PSOCs, rather than sampling from PWS sources near known PSOCs.

Using a GIS project designed for this sampling plan, PWS sources within 0.5 miles from suspected PSOCs were identified; this was later expanded to 0.75 miles. The initial sampling pool included 493 PWS sources considered to be targeted sites due to their proximity to a PSOC. The sampling plan also identified baseline sources to serve as a control group. Baseline sources were located within a forested watershed and at least five miles from any know PSOCs. Baseline sites ultimately accounted for approximately 10% of the sites in the sampling pool. To minimize duplication of previous sampling efforts, any PWS sources within 0.5 miles of known PFAS contamination sites were excluded from the sampling pool if the sources were previously monitored and assessed for PFAS (PA DEP, 2019).

Along with data collected as part of this PFAS Sampling Plan, the Department also considered 23 results with PFAS detections from monitoring conducted by PWSs in Pennsylvania under the EPA's Third Unregulated Contaminant Monitoring Rule (UCMR3). Because the reporting limits used for UCMR3 were much higher than current reporting limits, the Department did not consider UCMR3 data that was not detected.

Ultimately, the Department considered results from a total of 435 sites (372 targeted sampling sites, 40 baseline sites, and 23 UCMR3 sites) representing 352 PWSs in the evaluation of occurrence data. The Department acknowledges that because the sampling plan included predominantly targeted sites near PSOCs, the occurrence data may overestimate the actual number of PWSs in Pennsylvania with PFAS detections.

Upon approval of the Safe Drinking Water PFAS MCL rule, all community and nontransient noncommunity PWSs, as well as bottled, vended, retail, and bulk water systems, will be required to conduct monitoring for the PFAS for which an MCL is established, according to the monitoring requirements in the rule. In addition, all community and nontransient noncommunity water systems serving a population of greater than or equal to 3,300, and a representative set of systems serving a population of less than 3,300 will be required to conduct monitoring for PFAS under the EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5) between 2023 and 2025. This monitoring will include 29 PFAS analyzed via EPA Methods 533 and 537.1 and will generate additional occurrence data for future consideration (US EPA, 2021c).

36. **Comment:** One commentator expressed concern that not only was the sampling plan biased and not representative of statewide occurrence of PFAS, but that, even so, the Department's PFAS occurrence data "show infrequent and low detections of the sampled PFOA and PFOS," and therefore the occurrence data do not support the Department's proposed MCLs. (64)

Response: As described in the PFAS Sampling Plan, the public water system (PWS) entry points (EPs) selected for sampling were based on a literature review of potential PFAS sources in this Commonwealth. Creating an inventory of all PFAS contamination statewide was not the purpose of this sampling program nor was funding available to do a comprehensive assessment of PFAS in all 8,373 PWSs in Pennsylvania.

The sampling plan specifically stated that "The purpose of this plan and the sampling to be performed as a result of this plan is to provide additional data regarding the occurrence of PFAS in PWSs in Pennsylvania" (PA DEP, 2019). To minimize duplication of previous sampling efforts, any PWS sources within 0.5 miles of known PFAS contamination sites were excluded from the sampling pool if the PFAS sources were previously monitored and assessed for PFAS. The sampling plan was based on a literature review of potential sources of contamination (PSOCs) rather than known sources. The Department used the literature review to conduct targeted sampling near those PSOCs. The sampling plan also included a control group (referred to as baseline sources). Results from the baseline samples demonstrated that PFAS were detected in only two out of 40 baseline samples.

Therefore, the PFAS analytical results from the PFAS Sampling Plan cannot be construed as comprehensive statewide PFAS data, but rather provide occurrence data used to inform the rulemaking process (see the Department's response to Comment #35 for related discussion on the PFAS Sampling Plan).

The occurrence data show that 5.1% of sites sampled exceeded the MCL for PFOS of 18 ppt, and 5.7% of sites sampled exceeded the MCL for PFOA of 14 ppt. Accounting for co-occurrence, a total of 7.4 % of the sites exceeded one or both MCLs (PA DEP, 2021c). Recent research suggests that the 2016 EPA Combined Lifetime Health Advisory Level (HAL) for PFOA and PFOS is not sufficiently protective against adverse health effects. Therefore, the Department believes it is imperative to move forward with the MCLs in order to improve public health protection for a significant number of Pennsylvanians.

37. **Comment:** A few commentators expressed concern that the Department developed MCLs that they believe are not based on scientific studies or cannot be supported by adequate research and supporting data. One commentator stated: "PA DEP has created an arbitrary number with these levels with no scientific research at all to justify the numbers" and "We would not be as concerned with the proposed numbers if PA DEP could actually scientifically back up the reason for the proposed numbers." Another commentator stated a new rule should be "implemented only after full consideration of scientifically based water quality and health review and studies, including the recommendations of water industry professionals, and rejecting any non-health and science-based influences" and expressed concern "when water quality standards are developed and imposed without adequate research and supporting data." (18, 19, 24, 62, 73)

    Response: The Department disagrees that the rulemaking is not supported by science and data. As explained in the preamble, the Department must follow a rigorous process when setting an MCL. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider health effects, occurrence data, technical limitations such as available analytical methods and detection and reporting limits, treatability of the contaminant and available treatment technologies, and costs and benefits (71 P.S. § 745.5b) (EQB, 2022).

    In developing the proposed rulemaking, the Department took numerous steps to make sure that it was following the required process, and appropriately using science and data to make decisions. In 2019, the Department's Safe Drinking Water Program moved forward with two key projects to advance its knowledge of PFAS—the PFAS Sampling Plan and PFAS Toxicology Services Contract. To scientifically consider health effects, the Department's Safe Drinking Water Program executed the PFAS Toxicology Services Contract with Drexel University in December 2019 to: review other state and Federal agency work on maximum contaminant levels (MCLs); independently review the data, science, and studies; and develop recommended maximum contaminant level goals (MCLGs) for select PFAS, which are the basis for setting MCLs. See the Department's response to Comment #9 for more information on the expertise of the members of the Drexel PFAS Advisory Group (DPAG) and their selection of critical endpoints and studies. To scientifically gather occurrence data for consideration, the Department's Safe Drinking Water Program developed and implemented the PFAS Sampling Plan, which was intended to prioritize PWS sites for PFAS sampling and generate Statewide occurrence data. That occurrence data was used to inform the decision on which PFAS to regulate and estimate the number of PWSs that may potentially have levels of PFAS in excess of MCL levels.

To assess the technical limitations such as available analytical methods and detection and reporting limits along with treatability and treatment technology considerations, the Department conducted several surveys to gather information. Surveys were conducted of laboratories accredited by Pennsylvania for one or more analytical methods for PFAS, systems in Pennsylvania with existing PFAS removal treatment installed, PFAS removal treatment manufacturers, and members of the ASDWA. Assessment of technical limitations was also informed by the Department's review of a PFAS case study published by the American Water Works Association (AWWA). The Department used the information gathered from the lab survey to consider available analytical methods, minimum reporting levels, laboratory capacity and analytical costs. The information gathered from the other surveys and review of the AWWA-published case study was used to evaluate treatment technologies, costs of installation, and maintenance of treatment options. This information was also used along with the occurrence data to conduct the cost and benefit analysis.

Monitoring requirements for PFAS in the rulemaking were based on the monitoring requirements for organic contaminants that already have MCLs. As described in the Department's response to Comment #14, this monitoring framework is based on the established strategy for setting monitoring frequencies for contaminants that cause chronic health risks from long-term exposure.

The Department acknowledges that the science on PFAS is evolving. However, in the interest of public health protection, it is the Department's viewpoint that it is imperative to move forward with this rulemaking at this time, which was based on the most recent scientific studies and data available at the time it was developed, and which took health effects, occurrence data, technical limitations, treatability, and costs and benefits into consideration. The Department recognizes that newer studies on the toxicity and health effects of several PFAS are on the horizon. The Department will continue to evaluate the emerging science and recommendations from experts in the field of toxicology. Also, as more water systems begin to conduct monitoring for PFAS, there will be more occurrence data to evaluate. The EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5) includes nationwide monitoring for 29 PFAS by water systems serving more than 3,300 persons between 2023 and 2025 (US EPA, 2021c). According to the

EPA PFAS Strategic Roadmap, the agency is planning on establishing a national primary drinking water regulation for PFOA and PFOS, with a proposed rule in the fall of 2022 and a final rule in the fall of 2023 (US EPA, 2021b). EPA is also in ongoing consultation with the EPA's Science Advisory Board in the evaluation of additional PFAS and groups of PFAS. The Department recognizes that there will be a need to continue to reevaluate the science and data relative to PFAS. At a minimum, as a primacy agency, the Department will need to evaluate a Federal rule once it is published to make sure our state rule is at least as stringent as the Federal rule, or make the necessary updates to our state rule.

38. **Comment:** A few commentators expressed concern with the compliance monitoring cost estimates included in the proposed rulemaking, and that actual costs will ultimately be higher than those estimates. One commentator stated that the Department "assumes that no public water system will be required to conduct quarterly sampling after the initial monitoring has been conducted during the first year" in calculating cost estimates. (15, 60, 65)

Response: To calculate compliance monitoring cost estimates, the Department conducted a survey of laboratories accredited by Pennsylvania to analyze samples via one of the three approved methods included in the rulemaking. As explained in the preamble to the proposed rulemaking, based on the results of that survey, the Department used an average cost of $616 per sample to calculate overall compliance monitoring costs. In response to the survey, the actual costs per sample varied greatly, ranging from $325 to $750 per sample (EQB, 2022; PA DEP, 2021b). Because the analytical methods all require collection and analysis of a field reagent blank (FRB), those costs included analysis of the associated FRB. An additional fee for sample collection was also figured into the overall average cost per sample, as described in the preamble. Therefore, the average cost of $616 per sample used in compliance monitoring cost estimate calculations is just that: an average. Some PWSs may pay more per sample and some may pay less. It will be up to each PWS to utilize the services of an accredited laboratory that meets their specific needs in terms of services provided, costs, etc.

As noted in the preamble to the proposed rulemaking, there are a few potential cost reduction opportunities which became apparent from the survey. Sample collection by the laboratory is an additional fee that was factored into the estimated cost per sample. A PWS that collects their own sample and delivers it to the laboratory will save the sample collection fee. Approximately half of the responding laboratories offer a cost reduction for reporting fewer analytes than included in the method, which would provide costs savings since monitoring and reporting is only required for two analytes (PFOA and PFOS) under the rulemaking. There is also potential cost saving for PWSs with no detections in the sample, since the analytical methods do not require the FRB to be analyzed in the event that there are no detections in the associated sample.

The Department disagrees with the comment that the compliance monitoring cost estimates did not include quarterly monitoring beyond the initial monitoring year. The Department used the occurrence data to estimate the percentage of public water systems (PWSs) that would have PFOA or PFOS detections and therefore be required to continue to conduct quarterly monitoring. Those percentages were applied to the number of entry points (EPs) required to conduct compliance monitoring under the rule, in order to include continued quarterly monitoring in the cost estimates. As noted in the preamble, based on the occurrence data, it is assumed that up to 34.9% of all EPs will have a detection of PFOA or PFOS, or both, at or above the relevant MRL; this equates to 658 EPs of the systems conducting initial monitoring in 2024 (year 1) that will need to continue quarterly repeat monitoring in year 2, and 663 EPs of the systems conducting initial monitoring in 2025 (year 2) that will need to continue quarterly repeat monitoring in year 3 (EQB, 2022). The remaining systems (1,227 EPs in year 1 and 1,237 EPs in year 2) were assumed to conduct annual repeat monitoring in each year following initial monitoring, but this overestimates the repeat monitoring requirements and costs after the initial monitoring because, for EPs where initial monitoring results do not detect PFOA or PFOS, the frequency of repeat monitoring is reduced to once every three years.

The Department also considered PWSs that may exceed one or both MCLs in the compliance monitoring cost estimates. Systems with EPs that exceed one or both MCLs may require treatment, which would require the system to conduct ongoing repeat compliance monitoring at least annually. Using the noncompliance rate of 7.4% from the occurrence data (as described in section D of the preamble), a total of 280 EPs are estimated to require ongoing repeat compliance monitoring: 139 EPs from initial year 1 and 141 EPs from initial year 2 (EQB, 2022). However, this is likely an overestimate because: (1) systems may have options other than installing treatment to address concentrations of PFOA or PFOS, or both, above the relevant MCL; and (2) the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination, so the exceedance rate in the occurrence data may overestimate the exceedance rate for other PWSs in this Commonwealth that were not included in the occurrence data. For total compliance monitoring cost estimates, the ongoing annual compliance monitoring for EPs where treatment is installed was assumed to begin in the third year of monitoring (year 3 or year 4 overall).

Table 15 in the preamble to the proposed rulemaking, copied below, summarizes the compliance monitoring cost estimates using the above assumptions and an estimated average cost of $616 per sample. As noted in the preamble, this table does not include cost estimates for performance monitoring which may be required per special permit condition for PWSs that install PFAS removal treatment. Performance monitoring costs are considered part of treatment operation and maintenance costs because performance monitoring is used to make operations decisions, such as when to change out treatment media.

	Total # EPs	Quarterly Initial EPs	Annual Repeat EPs	Quarterly repeat EPs	Quarterly compliance monitoring cost	Annual compliance monitoring cost	Total yearly compliance monitoring cost
Year 1	1885	1885	0	0	$4,644,640	$0	$4,644,640
Year 2	1900	1900	1227	658	$6,302,579	$755,915	$7,058,495
Year 3		0	3122	663	$1,633,878	$1,923,090	$3,556,969
Year 4		0	3785	0	$0	$2,331,560	$2,331,560

39. **Comment:** A few commentators requested that the Department consider limiting the requirement for a field reagent blank (FRB) with every sample collected for PFOA and PFOS analysis via one of the approved methods. Commentators noted the additional cost associated

with FRB analysis and that cost estimates must take that additional cost into account. Commentators also questioned the value of the FRB for a water system with known or expected PFAS detections or previously installed treatment. (13, 23, 29)

Response: Consistent with Federal standards, the Department included approved analytical methods for PFOA and PFOS in the proposed rulemaking at § 109.304(f). Normally the Department would incorporate approved methods specified by the EPA, however unless and until the EPA codifies approved methods for PFAS, it was necessary for the Department to do so (see the Department's response to Comment #22). The approved methods included in the rulemaking are EPA Methods 533, 537.1, and 537 version 1.1. All samples collected for compliance with the rulemaking must be analyzed by a laboratory accredited in Pennsylvania for at least one of these methods.

Each of the approved methods requires the collection of a field reagent blank (FRB) with every sample. An FRB is defined in Method 537.1, Section 3. Definitions, as "An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment" (Shoemaker, 2018). The other approved methods include equivalent FRB definitions (Rosenblum, 2019; Shoemaker, 2009). If analysis of the FRB shows detections of an analyte, it is an indication that cross contamination likely occurred at some point during sample collection, handling, transport, or analysis of the FRB, and may also be indicative of cross contamination of the corresponding sample.

While all three approved analytical methods include the requirement for collection of an FRB, they also all include a provision that analysis of the FRB is only required if the corresponding sample result is above the minimum reporting level (MRL) for any analytes. As stated in Method 537.1, "Analysis of the FRB is required only if a Field Sample contains a method analyte or analytes at or above the MRL" (Shoemaker, 2018). In other words, if the method analytes are not detected in the sample, there is no need to analyze the FRB. Since the purpose of the FRB is to ensure that sample results are not affected by inadvertent cross contamination, that purpose becomes unnecessary for a sample with no detections. The rulemaking includes MRLs of 5 ppt for PFOA and PFOS.

Laboratories accredited to conduct analyses using specific methods must demonstrate that they follow method requirements to maintain accreditation. Therefore, in accordance with method requirements, an FRB must be collected and submitted to an accredited laboratory with every sample collected for compliance with the proposed MCLs for PFOA and PFOS. However, in accordance with the approved methods, for samples with no detection of PFOA or PFOS above the proposed MRL of 5 ppt, the corresponding FRB would not need to be analyzed.

With regard to cost estimates for the rulemaking, the Department did include the additional cost of FRB analysis when calculating estimates for compliance monitoring costs. See the Department's response to Comment # 38 for more information about monitoring cost estimates for the rulemaking.

40. **Comment:** A few commentators expressed concern with laboratory and sampling errors and cross contamination during sampling and analysis for PFAS, particularly in the parts per trillion range. One commentator recommended that the Department develop "a regulatory scheme that accounts for the variability in and limits of current laboratory testing." Another commentator specifically expressed concern with potential laboratory and sampling inaccuracies relative to EPA Method 533 for PFOS and PFOA at levels in the parts per trillion range and referenced Table 12 in the method as evidence. The commentator stated that these potential inaccuracies "may cause undue concern and treatment costs by consumers of well water and municipal potable water suppliers." (66, 173)

Response: The Department acknowledges these comments but disagrees with the implication that laboratory and sampling error are significant enough to impact laboratories' ability to accurately measure and report PFAS at and above the MRL in the rulemaking. Any laboratory method has some level of variability. There are numerous sources of error that can introduce variability in laboratory data, including the sampling environment, sample matrix and water chemistry, the analyst, the instrumentation, and the laboratory environment. When a laboratory seeks to become accredited to conduct drinking water analysis and report data for compliance purposes, the laboratory must demonstrate proficiency with the specific methods for which they are seeking accreditation through the laboratory accreditation process, including a demonstration of precision and accuracy. Once accredited, in order to maintain accreditation, the laboratory must continue to demonstrate proficiency with the analytical methods. Public water systems (PWSs) are only permitted to utilize the services of an accredited laboratory for analysis of samples used for compliance purposes. In this way, the Department can be confident that analytical data submitted on behalf of a PWS by an accredited laboratory are accurate, precise, and legally defensible.

The inherent variability and error present in any analytical method is often exacerbated at very low levels of analyte concentration. The rulemaking includes a regulatory minimum reporting level (MRL) of 5 parts per trillion (ppt) for both PFOA and PFOS for each of the approved methods. In order to maintain accreditation, a laboratory must demonstrate that it can achieve accurate results at or below that level. Some laboratories may be able to accurately quantify at levels lower than the regulatory MRL. The reason for setting the MRL is to minimize the impact of inherent laboratory error on data submitted for compliance, particularly at very low levels.

The Department disagrees with the assessment that Table 12 in EPA Method 533 demonstrates that the method is subject to a level of inaccuracy that may result in increased treatment costs. Table 12 displays single laboratory precision and accuracy data for a drinking water matrix from a surface water source (Rosenblum, 2019). Precision and accuracy data for reagent water and finished ground water are presented separately in Tables 8 and 10 in the method, respectively. These tables present the mean percent recovery and percent relative standard deviation of samples fortified with PFAS at concentrations of 10 and 80 ng/L or ppt. The tables demonstrate that the laboratory was able to achieve data that were accurate and precise in a variety of sample matrices.

The Department also disagrees with the implication that potential inaccuracies may result in increased treatment costs. Since the MRL is 5 ppt and the MCLs are 14 ppt and 18 ppt for PFOA and PFOS respectively, any small amount of inherent error at a very low concentration could potentially result in a low-level detection but would not result in an MCL exceedance. Treatment would not generally be required for a PWS with detections of PFOA or PFOS below the MCL. (See the Department's response to Comment #16 for more on possible corrective actions as a result of an MCL exceedance.)

In response to the comment concerned with sampling inaccuracy in addition to laboratory inaccuracy, because PFAS are found in so many consumer products, sample collectors do need to be aware of the potential for cross contamination and take steps to mitigate that potential during sample collection. The Department intends to conduct training to educate sample collectors on ways to minimize the potential for cross contamination during sample collection. This training would need to occur in 2023, prior to initial compliance monitoring for systems serving more than 350 persons, which would begin on January 1, 2024.

41. **Comment:** A few commentators expressed concern with requiring water systems to report both the proposed MCL and MCLG for PFOA and PFOS in their annual Consumer Confidence Report (CCR) in addition to levels detected. Commentators are concerned that "confusion between the two sets of standards for consumers of public water systems is a possibility" and that it is inappropriate to require systems to report that they exceed the MCLG if they are in compliance with all regulatory requirements. (28, 65)

    Response: The Consumer Confidence Report (CCR) is an annual report intended to inform and educate consumers on the quality of their drinking water. CCR requirements are found in 40 CFR Part 141 and incorporated into § 109.416. However, at this time, there is no federal standard for PFAS and therefore no existing reporting requirements for PFAS in CCRs at the federal level. Therefore, in order to be consistent with federal standards, the Department must include CCR reporting requirements for PFAS in this rulemaking, and the language in the CCR with respect to PFAS must be equivalent to the language and requirements utilized for other contaminants.

    The standard reporting requirement is for the CCR to include both the MCLG and the MCL for each contaminant, which is intended to inform the consumer. Definitions are included in the CCR to explain the difference between MCL and MCLG to consumers (PA DEP, 2018a and 2018b). Because the CCR provides information on where drinking water comes from, what has been detected in the water, and how consumers can help protect their source of water, the CCR needs to include all detected results. Some of these results may be over the MCLG but not the MCL.

42. **Comment:** One commentator noted the health effects language for public notice, found in proposed § 109.411(e)(1)(ii) and (iii), and recommended that the health effects language be removed from the rulemaking and instead incorporated into a guidance document, given the evolving understanding of the health effects of PFAS. (18)

Response: The existing health effects statements for public notices, which are required after certain violations, are established through § 109.411(e)(1), which states "Public water systems shall include in each public notice appropriate health effects language. This subchapter incorporates by reference the health effects language specified in 40 CFR Part 141, Subpart Q, Appendix B (relating to standard health effects language for public notification), corresponding to each primary MCL, MRDL and treatment technique violation listed in 40 CFR Part 141, Subpart Q, Appendix A (relating to NPDWR [National Primary Drinking Water Regulations] violations and other situations requiring public notice), and for each violation of a condition of a variance or exemption, unless other health effects language is established by regulations or order of the Department."

Specific health effects language for each regulated contaminant is written into 40 CFR Part 141, Subpart Q, Appendix B, even though additional scientific research could result in changes to the established health effects. The table in 40 CFR Part 141, Subpart Q, Appendix B does not yet have entries for PFOA or PFOS, so in accordance with § 109.411(e)(1), the health effects language is instead established by the regulations of the Department, in § 109.411(e)(1)(ii) and § 109.411(e)(1)(iii). By specifying the health effects language in the rule itself, the Department is following the EPA's convention.

43. **Comment:** One commentator noted the health effects language for CCRs, found in proposed § 109.416(3.1)(ii), and recommended that the health effects language be removed from the rulemaking and instead incorporated into supplemental technical guidance, since the understanding of health effects for these compounds is constantly evolving. (18)

    Response: The existing health effects statements for public notices, which are required after certain violations, are established through § 109.416(3), which states "Except as noted in subparagraphs (i)–(v), the annual report that a community water system provides to its customers shall contain all of the information, mandatory language and optional text specified by the EPA under 40 CFR 141.153 and 141.154 (relating to content of the reports; and required additional health information), which are incorporated by reference, and under 40 CFR 141, Subpart O, Appendix A (relating to regulated contaminants), which is incorporated by reference, unless other information, mandatory language or optional text is established by regulations or order of the Department."

    According to 40 CFR 141.153(d)(6), when there is an MCL violation for a contaminant, a CCR must include the specific health effects language for that contaminant provided in 40 CFR 141, Subpart O, Appendix A. The table in 40 CFR Part 141, Subpart O, Appendix A does not yet have entries for PFOA or PFOS, so in accordance with § 109.416(3), the mandatory health effects language is instead established by the regulations of the Department in § 109.416(3)(3.1)(ii) by reference to § 109.411(e)(1)(ii) and § 109.411(e)(1)(iii). By specifying the health effects language in the rule itself, the Department is following the EPA's convention.

44. **Comment:** One commentator noted the requirement for representative sampling in proposed § 109.303(a)(6)(i) and recommends that the Department clarify requirements for water systems that routinely change their source combinations. (28)

Response: In the final-form rulemaking, proposed § 109.303(a)(6)(i) has been integrated into § 109.303(a)(6) after proposed § 109.303(a)(6)(ii) was removed in response to comments received regarding the need for properly trained sample collectors (see the Department's response to Comment #21).

The cited text in § 109.303(a)(6) matches exactly with existing text in § 109.303(a)(4) for contaminants that already have federal MCLs, so this requirement follows established requirements for other contaminants. Representative monitoring for PFOA and PFOS will not be different from representative monitoring for contaminants that currently have MCLs.

Monitoring for compliance with the PFOA and PFOS MCLs should also be done according to a public water system's comprehensive monitoring plan to ensure all sources are included in monitoring. Comprehensive monitoring plans were due to the Department by August 19, 2019. For more information on comprehensive monitoring plans, see § 109.303(i) and § 109.718 and guidance available at https://www.dep.pa.gov/Business/Water/BureauSafeDrinkingWater/DrinkingWaterMgmt/Regulations/Pages/Proposed%20General%20Update%20and%20Fees.aspx.

45. **Comment:** One commentator recommended that quarterly repeat monitoring for each PFAS only be required for each EP with a detection at or above 50% of the MCL. The commentator noted the current cost of sampling and analysis for PFAS as the reason for this recommendation. (21)

Response: In accordance with § 109.301(16)(ii), the Department considers a PFAS to be detected when it is "at a level equal to or greater than its corresponding MRL [minimum reporting level] as defined in § 109.304(f)." The MRLs defined in § 109.304(f) are 5 ng/L for both PFOA and PFOS. Individual laboratories may be able achieve lower MRLs, but whether or not results are considered detections will be based on the regulatory MRLs of 5 ng/L. Results should be rounded to the nearest ng/L before comparing them with the MRL.

Following a detection, quarterly monitoring for at least four consecutive quarters is the existing requirement for the other groups of regulated organic chemicals, the volatile synthetic organic chemicals (VOCs) and synthetic organic chemicals (SOCs) as written in § 109.301(5)(iii) and § 109.301(6)(ii), respectively. For VOCs, a detection occurs when a VOC is at a concentration equal to or greater than 0.0005 mg/L, as specified in 40 CFR 141.24(f). For SOCs, a detection occurs when an SOC is at a concentration greater than its detection limit specified by the EPA in 40 CFR 141.24(h)(18). Quarterly monitoring is done for at least four consecutive quarters and until a detected contaminant is shown to be reliably and consistently below the MCL, or until an MCL violation occurs, which would require additional follow up monitoring and corrective actions. For VOCs and SOCs, reliably and consistently below the MCL, as defined in § 109.1, means that each sample result is less than 80% of the MCL. For PFAS, if the necessity for repeat quarterly monitoring was based on 50% of the MCL instead of a reporting level or detection limit, then this would be a significant deviation from what is already being done for the other regulated organic chemicals.

The phrase "reliably and consistently below the MCL" hints at the purpose of quarterly monitoring following a detection. The purpose is to see if a detected contaminant will never be detected again, detected at a consistent concentration well below the MCL, or detected at a concentration close to or above the MCL. Although known sources of PFOA or PFOS can be established, their concentration in source water can fluctuate over time, and thus annual or less frequent monitoring is not sufficient to establish the range of concentrations within a reasonable timeframe.

46. **Comment:** One commentator noted that while the proposed rulemaking identifies the effective date of the rule, it does not list a compliance date. The commentator recommended including a statement in the proposed rulemaking to clarify that compliance will begin "after initial monitoring." (28)

    Response: In the interest of timely realizing the public health benefits of this rulemaking, public water systems (PWSs) shall comply with the MCLs for PFOA and PFOS beginning on the effective date that will be provided in § 109.202(a)(4)(i) in the final rule, which is expected to be a date in early 2023. Compliance with the MCLs will thus be required before initial monitoring starts in 2024 or 2025.

    In accordance with § 109.701(a)(3)(i), if a sample is taken on or after the effective date of the rule, and the result indicates an exceedance of a PFAS MCL, a public water supplier shall report it to the Department within one hour of discovery. One-hour reporting should be done whether or not the laboratory is accredited by the Department for EPA Method 533, EPA Method 537.1, or EPA Method 537 Version 1.1. Thus, after the effective date of this rule, if a PWS discovers that a sample taken for the EPA's Fifth Unregulated Contaminant Monitoring Rule (UCMR5) has a PFOA or PFOS result that exceeds the respective MCL, then the supplier shall report it to the Department within one hour of discovery.

    If, for any reason, a system is taking entry point samples on or after the effective date, but prior to its initial monitoring period, and these samples are being analyzed for PFOA and/or PFOS at a laboratory that *is* accredited by the Department, then compliance will be determined according to § 109.301(16)(ix). If these samples are being analyzed for PFOA and/or PFOS at a laboratory that *is not* accredited by the Department, then, in the event of an MCL exceedance, § 109.4 (General requirements) and/or § 109.302 (Special monitoring requirements) will be used to ensure there is safe drinking water at the entry point.

47. **Comment:** One commentator expressed concerns with supply chain issues and difficulties obtaining necessary supplies, and the potential impact to a water system that may need to install treatment to achieve compliance with the proposed PFAS MCLs. The commentator noted that delays in receiving equipment and materials may cause delays in meeting compliance schedules. (30)

    Response: The Department acknowledges the current supply chain issues and resulting hinderance on acquiring materials necessary for treatment installation. Availability issues for treatment technologies for other contaminants have been dealt with in the past and continue to factor into the permitting process when treatment installation is necessary.

Public water systems are responsible for taking all corrective actions necessary to protect public health. However, when corrective actions are required, timeframes for achieving compliance can be adjusted to accommodate unplanned issues in accordance with the Department's technical guidance document, *Guidelines for Identifying, Tracking and Resolving Violations for the Drinking Water Program* (383-4000-002) (PA DEP, 2006a).

48. **Comment:** One commentator expressed concern with compliance schedule constraints. The commentator noted that "time to attain compliance should factor in the necessary steps for installation of treatment, including issuance of a request for proposals, contract award and execution, detailed design, permitting, bid advertisement, bid award and contract execution, and construction." The commentator suggests that the Department consider revised compliance schedules in order to allow a reasonable time period to attain full compliance. (30)

    Response: Corrective actions for maximum contaminant level (MCL) exceedances are not codified in regulation because they are case specific and may vary based on each individual situation and system-specific considerations, including the level detected, any known or suspected source of contamination, other water sources available, and treatment processes already in place.

    Under existing authorities in § 109.701(a)(3)(i), a public water system (PWS) is required to notify the Department within one hour if the system is determined to be in violation of an MCL. An initial consultation with the Department typically occurs upon this notification regarding immediate actions. The Department then issues a notice of violation (NOV) for an MCL violation. The NOV contains requested actions, which may include further consultation on longer term corrective actions.

    If a PWS fails to take corrective actions, the Department identifies the ongoing MCL violation as a significant deficiency and notifies the PWS through an NOV, which outlines system responsibilities as stipulated in § 109.717 for responding to significant deficiencies, including required timeframes. However, the Department may approve an alternate schedule by entering into a Consent Order and Agreement with the system. See the Department's response to Comment #16 for more information on corrective actions and compliance schedules.

    The Department also acknowledges that supply chain issues have hindered PWSs abilities to acquire materials necessary for treatment installation. See the Department's response to Comment #47 regarding supply chain issues and adjustments to compliance schedules.

49. **Comment:** One commentator noted that there are other sources of PFAS besides drinking water and expressed concern with the fact that "reducing the levels in water will not eliminate exposure" to PFOA or PFOS. (26)

    Response: The Department acknowledges that Pennsylvanians can be exposed to PFAS via many exposure routes in addition to drinking water. Drinking water has been identified as a substantial source of PFAS exposure for many populations, particularly those living near contaminated sites (Sunderland et al., 2019). The Department acknowledges that full implementation of the rule will not eliminate Pennsylvanians' exposure to PFAS. However, the

Department's Bureau of Safe Drinking Water is authorized under Pennsylvania's Safe Drinking Water Act to address PFAS in drinking water. The MCLs for PFOA and PFOS will provide a measurable opportunity to protect public health. In the interest of public health protection, it is the Department's viewpoint that it is imperative to move forward with this rulemaking.

50. **Comment:** One commentator asked whether the Commonwealth has "conducted a study on human health impacts to residents within Pennsylvania, and if so, what are the results?" (62)

Response: The Department acknowledges this comment but notes that it is outside the scope of this rulemaking. However, the Department notes that in 2020, researches at RTI International, an independent nonprofit research institute, in partnership with the Pennsylvania Department of Health (DOH), Temple University, and Brown University, received a grant from the Agency for Toxic Substances and Disease Registry (ATSDR), a federal public health agency of the U.S. Department of Health, to study PFAS levels in adults and children living in the vicinity of the former Naval Air Station Joint Reserve Base Willow Grove. The target subjects of this study live in 11 municipalities in eastern Montgomery County and western Bucks County.

The RTI/DOH joint study began in 2021, intending to conduct a health study on 1,000 adults (aged 18 and older) and 300 children (aged 4-17) who resided in the geographic study area between 2005 and 2017. The health study of the area surrounding the Willow Grove base, referred to by the ASTDR as the "PA PFAS Multi-site Health Study" (https://papfas.rti.org/), is one of seven study areas in the nation included in the $7 million ATSDR program evaluating PFAS in adults and children residing around known PFAS hotspots.

The health parameters being investigated in the study's subjects are PFAS levels in blood, health measures like thyroid hormone levels, liver function, and medical history (including personal and family history of cancer). As of August 2022, the PA PFAS Multi-site Health Study was ongoing and had enrolled 737 adult participants (73% of goal) and 36 children (12% of goal).

51. **Comment:** A few commentators noted that PFAS contamination in drinking water is an environmental justice issue. One commentator stated that the Department should "assess whether people of color and low-income communities are disproportionately exposed to PFAS chemicals in drinking water." (32, 34, 59)

Response: The Department currently defines an Environmental Justice (EJ) Area as any census tract where 20% or more individuals live at or below the federal poverty line, and/or 30% or more of the population identifies as a minoritized population, based on data from the U.S. Census Bureau and the federal guidelines for poverty.

While not everyone whose drinking water contains PFAS lives in an EJ Area, if the rulemaking is published as final, all public water systems (PWSs) in Pennsylvania will be required to comply with the maximum contaminant levels (MCLs). The Federal Bipartisan Infrastructure Law of 2021 will make funding available for small- and medium-sized water utilities to upgrade their treatment plants to treat PFAS that has been or will be identified in their raw water. This funding will help make it possible for small- and medium-sized water utilities to upgrade their plants to treat for PFAS without passing the upgrade costs on to their consumers. This funding will also improve the tap water quality for millions of Americans without regard to their race or socioeconomic status, thus ensuring equal protection of drinking water leaving treatment plants for all consumers within the service areas of qualifying drinking water systems.

The proposed rule was published in the *Pennsylvania Bulletin* on February 26, 2022, for a 60-day public comment period. Every resident of Pennsylvania had the opportunity to comment on the proposed PFAS MCL rule. The MCLs will be protective of all Pennsylvanians. If published as final, any PWS in Pennsylvania that experiences an MCL violation will be required to take corrective actions to ensure compliance with the MCLs.

The Department's Safe Drinking Water Program conducted sampling based on the program's 2019 PFAS Sampling Plan. The goal of that sampling plan was to gather data on occurrences of PFAS across the state to ascertain the range of concentrations and their general distribution (PA DEP, 2019). Water systems that the Department sampled as part of the 2019 PFAS Sampling Plan were selected based on proximity to known or suspected sources of PFAS contamination. EJ Areas were not specifically targeted in this sampling plan; however, samples were collected at some treatment plants that serve portions of EJ Areas. In a spatial analysis of the sites selected for the Department's PFAS Sampling Plan, the Department included a mapped layer of EJ Areas in Pennsylvania against the mapped geographical locations of PSOCs. The Department reviewed the overlay to ensure that EJ Areas were not inadvertently excluded from the Sampling Plan and found that approximately 11.5% of the of the wells and intakes identified in the plan were located in EJ Areas.

52. **Comment:** One commentator asked the following question: "Has Commissioner Ralph V. Yanora- PUC's representative on the National Association of Regulatory Utility Commissioners (NARUC) Committee on Water been advised of this proposed PADEP regulation that will result in increased treatment costs for already proposed 6% increased water bill filings to the PUC throughout SE PA by AquaPA?" (173)

    Response: As noted in the Department's response to Comment #6, any rate adjustments for ratepayers that public water systems (PWSs) make to recover costs associated with this rulemaking will depend on the specific costs for each PWS as well as the type and availability of funding.

    Additionally, the Department notes that the Pennsylvania Public Utility Commission (PUC) is a member organization of the Department's drinking water advisory board, the Public Water System Technical Assistance Center (TAC) Board. The proposed rulemaking was presented to the TAC Board at the July 29, 2021 meeting; the materials for this meeting can be found at https://www.dep.pa.gov/PublicParticipation/AdvisoryCommittees/WaterAdvisory/TAC/Pages/2021-Meetings.aspx. The current TAC Board member and alternate member representing PUC were both present at that meeting via webinar. At that meeting, the TAC Board voted unanimously to support the Department moving forward with the proposed rulemaking. Additionally, in a letter dated July 30, 2021, the TAC Board expressed support for the proposed rulemaking that included the following statement: "The Public Water System TAC Board supports the Department moving forward in the rulemaking process to present a proposed PFAS

Rule to the Environmental Quality Board." The July 30, 2021 letter is part of the rulemaking documentation that was presented to the Environmental Quality Board during its November 2021 meeting. The Department also presented the draft final-form rulemaking to the TAC Board at the board's July 14, 2022 meeting, at which the PUC member and alternate member were both present, and at which the board again voted unanimously to support the Department moving forward with the final-form rulemaking; materials from that meeting are available at https://www.dep.pa.gov/PublicParticipation/AdvisoryCommittees/WaterAdvisory/TAC/Pages/2022-Meetings.aspx.

53. **Comment:** One commentator cited minimal risk levels for PFOA and PFOS from the CDC/ATSDR website (https://wwwn.cdc.gov/TSP/MRLS/mrlslisting.aspx) as evidence that the proposed MCLs are too high. The commentator stated that "the amount of PFOA an individual can eat, drink, or breathe each day without a detectable risk to health is only 3 ng/L per day" and "the amount of PFOS … is only 2 ng/L per day." The commentator also stated that "The levels proposed by the Department are much higher than the levels shown to provide a risk to health." (45)

Response: The Department disagrees with the intended implication that the Centers for Disease Control and Prevention minimal risk levels (CDC MRLs) are evidence that the MCLs are too high; the commentator has cited and interpreted the CDC MRLs incorrectly.

The commentator references the Agency for Toxic Substances and Disease Registry (ATSDR) MRLs on the CDC website: https://wwwn.cdc.gov/TSP/MRLS/mrlslisting.aspx. When accessed by the Department on June 27, 2022, the CDC MRLs List was dated February 2022. As listed in ATSDR's list, the CDC MRL for PFOA is:

Route	Duration	MRL	Factors	Endpoint	Draft/Final	Cover Date	CAS Number
Oral	Int.	3 ng/kg/day	300	Develop.	Final	03/2020	335-67-1

The CDC MRL for PFOS is:

Route	Duration	MRL	Factors	Endpoint	Draft/Final	Cover Date	CAS Number
Oral	Int.	2 ng/kg/day	300	Develop.	Final	03/2020	1763-23-1

The table columns can be defined as follows (ATSDR, 2021):

- Route: pathway of exposure to the substance, which here is oral (through the mouth)
- Duration: length of exposure time, which here is intermediate (15–364 days)
- MRL: estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse, noncancer health effects over a specified duration of exposure. CDC MRLs are derived when reliable and sufficient data exist to identify the target organ(s) of effect or the most sensitive health effect(s) for a specific duration for a given route of exposure. The CDC MRL is defined as a point of departure (POD expressed as human equivalent dose (HED)) divided by uncertainty factors (UFs). Potential PODs are no-observed-adverse-effect levels (NOAELs), lowest-observed-adverse-effect level (LOAELs), or the lower limit of the benchmark dose (BMDL).

- Factors: The total UFs used in determining the CDC MRL. ATSDR utilizes uncertainty factors to account for uncertainties associated with: (1) extrapolating from a LOAEL to a NOAEL; (2) extrapolating from animals to humans; and (3) to account for human variability. Default values of 10 are used for each of these categories of uncertainty factors; a value of 1 can be used if complete certainty exists for a particular uncertainty factor category. A partial uncertainty factor of 3 can be used when chemical-specific data decreases the uncertainty. On a case-by-case basis, ATSDR also utilizes modifying factors to account for CDC MRL-specific database deficiencies. Here the total uncertainty factors are 300 for both PFOA and PFOS.
- Endpoint: "Develop." here stands for a developmental endpoint. Developmental outcomes are broken into four categories: pregnancy outcome, birth outcome, neurodevelopment, and sexual maturation. CDC MRLs are generally based on the most sensitive substance-induced endpoint considered to be of relevance to humans.
- Draft/Final and Cover Date: As indicated by the toxicological profile document, the final CDC MRLs for PFOA and PFOS were released in May 2021 and last updated at the cover date of March 2020.
- CAS Number: The CAS Number is the Chemical Abstracts Service unique identification number.

Each HED is computed using HED = POD * DAF, where DAF is the dosimetric adjustment factor. The DAF, in turn, is computed from DAF = K_e * V_d, where K_e is the serum elimination rate constant and V_d is the apparent volume of distribution. K_e can be interpreted as the fraction of a contaminant that is eliminated from a human body per unit time and has units of day^{-1}. V_d can be interpreted as the mass of a contaminant in a human body (e.g., in units of mg) divided by the serum concentration of the contaminant (e.g., in units of mg/L) and then divided by the body mass in kg such that the units of V_d are L/kg. For our discussion here, an important point to recognize is that the kg unit in the denominator of the units for V_d comes from body mass, that is, the total mass of all body components (tissue, fluid, bone, etc.). The kg unit is not for a mass of consumed drinking water.

ATSDR only reports the CDC MRLs and does not make any statements about what an acceptable or goal concentration in drinking water should be. As explained by the ATSDR at https://www.atsdr.cdc.gov/mrls/index.html, "Exposure to a level above the CDC MRL does not mean that adverse health effects will occur" and "It is important to note that CDC MRLs are not intended to define clean up or action levels for ATSDR or other Agencies."

PFOA:

For PFOA, ATSDR (2021) used the LOAEL from a specific study (Koskela et al., 2016) for the POD. The LOAEL/POD is the predicted time weighted average (TWA) serum concentration of PFOA: 8.29 µg/mL = 8.29 mg/L (see p. A-25 and surrounding in ATSDR (2021)). K_e is set to 4.95×10^{-4} day^{-1} and V_d to 0.2 L/kg (see Table A-4 on p. a-13 in ATSDR (2021)). The resulting HED is HED = POD * K_e * V_d = 8.29 mg/L * 4.95×10^{-4} day^{-1} * 0.2 L/kg = 0.000821 mg/kg/day. The CDC MRL is then MRL = HED / UFs. = 0.000821 mg/kg/day / (10*3*10) = 2.74×10^{-6} mg/kg/day or 2.74 ng/kg/day, which rounds to 3 ng/kg/day.

The commentator indicates that the CDC/ATSDR "has estimated that the amount of PFOA an individual can eat, drink, or breathe each day without a detectable risk to health is only 3 ng/L per day," but this is incorrect because the CDC/ATSDR does not actually report such a concentration and it cannot be derived from the actual CDC MRL, which is 3 ng/kg/day. As discussed above, the kg in the denominator of the CDC MRL units is for body mass. It appears that the commentator incorrectly interpreted this kg as a mass of consumed water instead, and then used the fact that 1 L of water has a mass of 1 kg (exactly at 4 °C and slightly less mass at other naturally occurring water temperatures) to incorrectly convert the CDC MRL from 3 ng/kg/day to 3 ng/L/day. This seemingly small error has a significant impact on the interpretation of the CDC MRLs.

In developing the maximum contaminant level goal (MCLG) for PFOA in drinking water, the Drexel PFAS Advisory Group (DPAG) also used Koskela et al. (2016) in their MCLG Report (DPAG 2021), available at https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/June%2015/03_PFAS%20Petition/01a_App%201%20Drexel%20PFAS%20Report%20January%202021.pdf. As can be seen in DPAG's Table 3 for "Development of Non-Cancer MCLG for PFOA," DPAG used a somewhat larger value for K_e (8.25175×10^{-4} day^{-1}) than ATSDR and a slightly smaller value for V_d (0.17 L/kg) resulting in a HED of 8.29 mg/L * 8.25175×10^{-4} day^{-1} * 0.17 L/kg = 0.001163 mg/kg/day (DPAG, 2021). ATSDR and DPAG discuss their specific choices for the critical study and values for K_e and V_d. DPAG then computes a reference dose (RfD) which is defined as HED / UFs, so it can be thought of as comparable to the CDC MRL. "The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily human exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (US EPA, May 2016). DPAG computes the RfD using the same uncertainty factors as ATSDR, so RfD = 0.001163 mg/kg/day / (10*3*10) = 3.9×10^{-6} mg/kg/day or 3.9 ng/kg/day.

As explained in DPAG's MCLG Report, to arrive at a PFOA MCLG, which is expressed as a concentration of PFOA in drinking water, there is an additional step of implementing the Goeden model (DPAG, 2021). The MCLG is then used by the Department to determine the PFOA MCL as explained in the preamble to the proposed rule (EQB, 2022). It is incorrect to just take the CDC MRL or an RfD and then immediately make a claim about acceptable maximum drinking water concentrations. Additional steps such as using the Goeden model or scaling for body weight, daily drinking water intake, and relative source contribution (see US EPA, May 2016, Section 3.2.3) must be taken to arrive at a concentration.

PFOS:

For PFOS, ATSDR (2021) used the NOAEL from a specific study (Luebker et al., 2005a) for the POD. The NOAEL/POD is the predicted TWA serum concentration of PFOS: 7.43 µg/mL = 7.43 mg/L (see p. A-45 and surrounding in ATSDR (2021)). K_e is set to 3.47×10^{-4} day^{-1} and V_d to 0.2 L/kg (see Table A-4 on p. a-13 in ATSDR (2021)). The resulting HED is HED = POD * K_e * V_d = 7.43 mg/L * 3.47×10^{-4} day^{-1} * 0.2 L/kg = 0.000515 mg/kg/day. The CDC MRL is then MRL = HED / UFs. = 0.000515 mg/kg/day / (3*10*10) = 1.72×10^{-6} mg/kg/day or 1.72 ng/kg/day, which rounds to 2 ng/kg/day.

The commentator indicates that the "amount of PFOS that an individual can eat, drink, or breathe each day without a detectable risk is only 2 ng/L per day." Again, this is incorrect because the CDC/ATSDR does not actually report such a concentration, and, as discussed above, 2 ng/L cannot be derived from the actual MRL (2 ng/kg/day) by simply multiplying by the density of water (1 kg/L).

In developing the MCLG for PFOS in drinking water, DPAG used Dong et al. (2011) as their critical study (DPAG, 2021). As can be seen in DPAG's Table 4 for "Development of Non-Cancer MCLG for PFOS," DPAG used a lower serum concentration for the NOAEL/POD (2.36 µg/mL = 2.36 mg/L) than ATSDR, a somewhat larger value for K_e (5.58421×10^{-4} day^{-1}), and a slightly larger value for V_d (0.23 L/kg) resulting in a HED of 2.36 mg/L * 5.58421×10^{-4} day^{-1} * 0.23 L/kg = 0.000307 mg/kg/day (DPAG, 2021). ATSDR and DPAG discuss their specific choices for the critical studies and the values for K_e and V_d. DPAG then computes an RfD using a total uncertainty factor that differs from ATSDR's. One of ATSDR's factors is 10 for concern that immunotoxicity may be a more sensitive endpoint than developmental toxicity while DPAG has a database factor of 3. The resulting RfD is = 0.000307 mg/kg/day / 100 = 3.1×10^{-6} mg/kg/day or 3.1 ng/kg/day.

As explained in DPAG's MCLG Report, to arrive at a PFOS MCLG, which is expressed as a concentration of PFOS in drinking water, there is an additional step of implementing the Goeden model (DPAG, 2021). The MCLG is then used by the Department to determine the PFOS MCL as explained in the preamble to the proposed rule (EQB, 2022). Again, it is incorrect to just take the CDC MRL or an RfD and then immediately make a claim about acceptable maximum drinking water concentrations. Additional steps such as using the Goeden model or scaling for body weight, daily drinking water intake, and relative source contribution must be taken to arrive at a concentration.

54. **Comment:** One commentator noted that "the reference dosages seem to conflict with the proposed limits making the proposed MCLs look excessively stringent." The commentator calculated "what the reference dosages say is acceptable for the body" using a 70 kg adult consuming 2 L per day and a 19 kg child consuming 1 L per day as evidence. (26)

    Response: The Department acknowledges this comment but does not agree with the conclusions drawn. It is incorrect to use a reference dose and directly make a claim about maximum drinking water concentrations. As explained in the Drexel PFAS Advisory Group's (DPAG's) MCLG Report, to arrive at MCLGs for PFOA and PFOS, expressed as a concentration of PFOA or PFOS in drinking water, there is an additional step of implementing the Goeden model or scaling for body weight, daily drinking water intake, and relative source contribution. (DPAG, 2021). The MCLGs are then used by the Department to determine the MCLs as explained in the preamble to the proposed rule (EQB, 2022).

55. **Comment:** One commentator asked when the Department will "alert citizens they have or may have been drinking contaminated water?" Another stated that, "The public should be made aware of areas where water is not safe to drink." (62, 1090)

Response: Since 2016, the Department has been implementing EPA's HAL of 70 ppt combined for PFOA and PFOS. Any facility sampled as part of the Department's Safe Drinking Water Program PFAS Sampling Plan was notified if results were over the HAL of 70 ppt. Systems with levels exceeding the HAL were instructed to conduct confirmation sampling; if confirmation samples verified levels over the HAL, the system was required to provide Tier 2 public notification (PN) consistent with existing PN requirements.

The Department has been transparent with the Safe Drinking Water Program's PFAS Sampling Plan: the sampling plan is available on the Department's website at https://files.dep.state.pa.us/Water/DrinkingWater/Perfluorinated%20Chemicals/BSDW%20PFAS%20Sampling%20Plan_Phase%201_April%202019.pdf (PA DEP, 2019) and the results are available at https://files.dep.state.pa.us/Water/DrinkingWater/Perfluorinated%20Chemicals/SamplingResults/PFAS_Sampling_Final_Results_May_2021.pdf (PA DEP, 2021c).

The rulemaking sets MCLs for PFOA at 14 ppt and PFOS at 18 ppt and, once effective, the process for implementing public notification for a violation of an MCL will follow § 109.409 (relating to tier 2 public notice—categories, timing and delivery of notice). Upon discovery of an MCL exceedance, the system shall report the circumstance to the Department within one hour of discovery. For an MCL violation, a system shall provide the Tier 2 public notice as soon as possible, but no later than 30 days after the system learns of the violation. Systems shall follow § 109.411(e)(1)(ii) and § 109.411(e)(1)(iii), which outline the specific content of a public notice for PFOA and PFOS.

56. **Comment:** One commentator requested that the Comment and Response Document include a key or some other method that allows public commentators to identify their comments in the document. (63)

Response: This Comment and Response Document includes commentator numbers, which correspond to the list of commentators provided in a separate document.

57. **Comment:** Several commentators noted that they or family members, friends, neighbors, etc., have experienced specific health conditions and expressed concern that exposure to PFAS may have played a role in those illnesses. (33, 43, 62, 71, 116, 131, 136, 138, 140)

Response: The Department acknowledges these comments and concerns about the potential health effects from PFAS exposure. PFAS are considered emerging contaminants because research is ongoing to better understand the potential impacts PFAS pose to human and animal health and the environment. PFAS are potentially linked to a number of adverse health effects, including high cholesterol, developmental effects including low birthweight, liver toxicity, decreased immune response, thyroid disease, kidney disease, ulcerative colitis and certain cancers, including testicular cancer and kidney cancer. The Drexel PFAS Advisory Group

(DPAG) reviewed pertinent literature and work across the country and independently developed recommended maximum contaminant level goals (MCLGs) based on non-cancer endpoints. The DPAG's MCLG Report discusses relevant inputs and includes a summary table for each PFAS that documents the development of the recommended MCLG (DPAG, 2021). The MCLGs for PFOA and PFOS were the basis for developing maximum contaminant levels (MCLs), as described in detail in the preamble to the proposed rulemaking (EQB, 2022). The PFOA MCL is intended to be protective of developmental effects (including neurobehavioral and skeletal effects). The PFOS MCL is intended to be protective of immunotoxicity effects (including immune suppression). It is the Department's viewpoint that it is imperative to move forward with this rulemaking at this time in the interest of public health protection.

58. **Comment:** Several commentators provided comments on issues that are outside the scope of this proposed rulemaking. Many of these comments were regarding the following topics: concern about spreading of biosolids containing PFAS and uptake of PFAS by crops; holding polluters responsible for PFAS contamination; concerns about fracking and the use of PFAS; water pollution and water standards for PFAS; improper disposal of PFAS; remediation of PFAS contaminated sites; cleanup standards for PFAS; establishing PFAS as a hazardous substance; and banning PFAS chemicals. (5, 6, 7, 17, 18, 35, 36, 38, 39, 44, 45, 46, 47, 52, 56, 57, 58, 61, 62, 63, 73, 78, 85, 86, 88, 90, 95, 105, 108, 116, 144, 146, 149, 150, 152, 168, 177, 188, 291, 297, 1050-1079, 1112, 2153, 2789)

    Response: The Department acknowledges these comments; however, they are outside the scope of this rulemaking. With this rulemaking, the Department proposes to amend Pennsylvania's safe drinking water regulations, which are promulgated under the authority of the Pennsylvania Safe Drinking Water Act (SDWA). Pennsylvania's safe drinking water regulations are only applicable to facilities that meet the definition of a public water system (PWS), which is defined in 25 Pa. Code § 109.1 as follows: "A system which provide water to the public for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. The term includes collection, treatment, storage and distribution facilities under control of the operator of the system and used in connection with the system. The term includes collection or pretreatment storage facilities not under control of the operator which are used in connection with the system. The term also human consumption includes water that is used for drinking, bathing and showering, cooking, dishwashing or maintaining oral hygiene."

    There are other programs within the Department with their own statutory authorities and regulatory requirements to address pollution in the environment and require corrective actions. The Department's website for program involvement on PFAS has information on coordinated efforts from the various programs https://www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/DEP-Involvement.aspx.

    - The Bureau of Environmental Cleanup and Brownfields (BECB), Division of Site Remediation, oversees the Hazardous Sites Cleanup Program. The Hazardous Sites Cleanup Act (HSCA) provides the funding and authority to oversee remediation of known contamination sites. BECB's webpage can be accessed at https://www.dep.pa.gov/Business/Land/SiteRemediation/Pages/default.aspx.

- The Bureau of Clean Water (BCW) oversees National Pollutant Discharge Elimination System (NPDES) permitting for point source discharges, establishes water quality standards, and conducts water quality monitoring and assessments. BCW is also responsible for permitting and inspection of biosolids treatment and processing facilities. BCW's webpage can be accessed at https://www.dep.pa.gov/Business/Water/CleanWater/Pages/default.aspx.

- The Bureau of Waste Management (BWM) is responsible for permitting and inspection of hazardous, municipal, and residual waste generation, transportation, and storage, including beneficial use and disposal facilities. Involvement in the PFAS pollution cycle includes appropriately directing soil containing PFAS through the proper channels for disposal. BWM's website can be accessed at https://www.dep.pa.gov/Business/Land/Waste/Services/Pages/default.aspx.

- The Bureau of Air Quality (BAQ) oversees industrial air emissions, ambient air quality studies, air quality modeling, permitting activities, and risk assessment and risk management. BAQ's webpage can be accessed at https://www.dep.pa.gov/Business/Air/BAQ/Pages/default.aspx.

- The Office of Oil and Gas Management (OOGM) facilitates the safe exploration, development, and recovery of Pennsylvania's oil and gas reservoirs in a manner that will protect the commonwealth's natural resources and the environment. OOGM's webpage can be accessed at https://www.dep.pa.gov/Business/Energy/OilandGasPrograms/Pages/default.aspx.

Establishment of PFAS as a hazardous substance and banning PFAS chemicals would need to be considered on a national level, due to the wide variety of industries that use the chemicals. On October 18, 2021, the EPA announced its PFAS Strategic Roadmap, which is a comprehensive approach to addressing PFAS and can be accessed at https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024. According to the EPA's PFAS Strategic Roadmap, the EPA's approach includes three directives: *research* to increase understanding of PFAS; *restrict* to prevent PFAS from entering the environment; and *remediate* to cleanup PFAS contamination (US EPA, 2021b). Additionally, on October 26, 2021, EPA issued a press release announcing action to address PFAS contamination under the Resource Conservation and Recovery Act (RCRA) by initiating the process to propose adding four PFAS chemicals as RCRA Hazardous Constituents. The press release can be accessed at https://www.epa.gov/newsreleases/epa-responds-new-mexico-governor-and-acts-address-pfas-under-hazardous-waste-law.

59. **Comment:** Several commentators expressed general health concerns related to PFAS, as well as concerns with local water quality and associated general health concerns, including other contaminants identified in their drinking water. (39, 41, 43, 46, 52, 62, 69, 71, 75, 77, 82, 83, 86, 96, 104, 107, 108, 133, 134, 137, 140, 146, 150, 159, 167, 170, 171, 289, 293, 296, 299, 300, 301, 303, 2137, 2143, 2147, 2150, 2790)

Response: The Department acknowledges these comments; however, they are outside the scope of this rulemaking. Public water systems (PWSs) are required to provide annual water quality reports to their customers, known as the Consumer Confidence Report (CCR). The CCR contains information on monitoring conducted the previous calendar year, including detected results and whether those results are above drinking water standards.

The following are excerpts of required language from the CCR template:

> "Public water systems routinely monitor for contaminants in drinking water according to federal and state laws. All sources of drinking water are subject to potential contamination by constituents that are naturally-occurring or man-made. Those constituents can be microbes, organic or inorganic chemicals, or radioactive materials. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. In order to assure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food & Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health."
>
> "Sources of drinking water (both tap & bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the land surface or through the ground, it dissolves naturally occurring minerals (and in some cases radioactive material) and can pick up substances resulting from the presence of animals or human activity. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses & bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts & metals, can be naturally occurring or result from stormwater run-off, oil & gas production, mining or farming.
- Herbicides and pesticides may come from a variety of sources such as agriculture, stormwater run-off or residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, are by-products of industrial processes and petroleum production and can also come from gas stations, stormwater run-off or septic systems.
- Radioactive contaminants can be naturally occurring or be the result of oil & gas production or mining activities." (PA DEP, 2018a and 2018b)

PWS customers can also obtain monitoring results through the Department's Drinking Water Reporting System (DWRS) which can be found at http://www.drinkingwater.state.pa.us/dwrs/HTM/Welcome.html. Results of all monitoring conducted by PWSs and submitted to the Department are available on DWRS. DWRS is a searchable website that includes information on sources, monitoring requirements, sample results, and violation history. DWRS can be searched by individual water system (PWS ID# or name) or groups of water systems, such as by system type or size, by geographic area, etc.

60. **Comment:** One commentator expressed an interest in health monitoring and blood testing related to potential PFAS exposure. (140)

Response: The Department acknowledges these comments; however, they are outside the scope of this rulemaking. At the state level, the Pennsylvania Department of Health (DOH) oversees health-related concerns related to PFAS exposure. For more information, see DOH's website on PFAS projects at https://www.health.pa.gov/topics/envirohealth/Pages/PFAS.aspx.

61. **Comment:** Several commentators submitted comments on topics that are not relevant to the proposed rulemaking or the process of setting an MCL for PFOA or PFOS. These topics include: a copy of the Indigenous Peoples Kyoto Water Declaration; a photo of a pan with residue from evaporated water; a concern about using bottled water because of a chemical smell in water; concerns about waste management during the pandemic; a request to support a New Jersey Middle School's petition regarding unsafe drinking water in New Jersey; and an anecdote about an individual considered a whistleblower and the ramifications that followed. (95, 108, 110, 118, 153, 177)

Response: The Department acknowledges these comments; however, they are unrelated to the purpose and outside the scope of the rulemaking.

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Comment and Response Document

Appendix: List of Commentators

PFAS MCL Rule

25 Pa. Code Chapter 109
52 Pa.B. 1245 (February 26, 2022)
Environmental Quality Board Regulation #7-569
(Independent Regulatory Review Commission #3334)

*Commentators denoted with an asterisk provided testimony at one of the public hearings, but no written copy of their testimony was received during the public comment period. Please refer to the public hearing transcripts for a verbatim copy of their comments, available under Regulation #7-569 in eComment, https://www.ahs.dep.pa.gov/eComment/.

ID#	FIRST_NAME	LAST_NAME	AFFILIATION	CITY	STATE
1	David	Sumner	IRRC	Harrisburg	PA
2	Rep. Daryl	Metcalfe	House Environmental Resources & Energy Committee	Harrisburg	PA
3	Sen. Maria	Collett	Senate of Pennsylvania - 12th District	North Wales	PA
4	Sen. Carolyn	Comitta	Senate of Pennsylvania - 19th District	Harrisburg	PA
5	Sen. Carolyn	Comitta*	Senate of Pennsylvania - 19th District	Harrisburg	PA
6	Sen. Katie	Muth*	Senate of Pennsylvania - 44th District	Harrisburg	PA
7	Rep. Danielle	Friel Otten	PA House of Representatives - 155th District	Harrisburg	PA
8	Rep. Kristine	Howard	PA House of Representatives - 167th District	Harrisburg	PA
9	Rep. Ben	Sanchez	PA House of Representatives - 153rd Districh	Abington	PA
10	Rep. Madeleine	Dean	U.S. House of Representatives - 4th District	Washington	DC
11	Rep. Brian	Fitzpatrick*	U.S. House of Representatives - 1st District	Langhorne	PA
12	William	Richardson	EPA Region 3	Philadelphia	PA
13	Erik	Ross	NAWC PA Chapter	Harrisburg	PA
14	Erik	Ross	PA-AWWA	Harrisburg	PA
15	Erik	Ross	PRWA	Harrisburg	PA
16	Erik	Ross	WWOAP	Harrisburg	PA
17	Steven A.	Hann	Pennsylvania Municipal Authorities Association	Lansdale	PA
18	Marc	Cammarata	Philadelphia Water Department	Philadelphia	PA
19	Robert C.	Bender	North Wales Water Authority	North Wales	PA
20	Timothy	Hagey	Warminster Municipal Authority	Warminster	PA
21	Theresa	Funk	Plumstead Township, Bucks County, PA/Gilmore & Associates	New Britain	PA
22	William	Gildea-Walker	Horsham Township	Horsham	PA
23	Michael	Pickel	Horsham Water & Sewer Authority	Horsham	PA
24	Shane	Pepe	Borough of Emmaus	Emmaus	PA
25	Thomas	Petrucci	Plainfield Township Board of Supervisors	Nazareth	PA
26	James	Rieben Jr.	Lancaster City Water System	Lancaster	PA
27	Michael	DeBerardinis	Lower Mount Bethel Township	Martins Creek	PA
28	Teresa K.	Harrold	Pennsylvania American Water	Mechanicsburg	PA

29	Matthew	Miller	Aqua Pennsylvania, Inc.	Bryn Mawr	PA
30	Larry	Finnicum	Veolia Water Pennsylvania	Harrisburg	PA
31	Christopher D.	Ahlers	Clean Air Council	Philadelphia	PA
32	Steven	Hvozdovich	Clean Water Action	Pittsburgh	PA
33	Steven	Hvozdovich*	Clean Water Action	Pittsburgh	PA
34	Summer-Solstice	Thomas	Silent Spring Institute	Newton	MA
35	Makenzie	White	Environmental Health Project	McMurray	PA
36	Makenzie	White	Environmental Health Project	McMurray	PA
37	Talor	Musil	Women for a Healthy Environment	Pittsburgh	PA
38	Talor	Musil*	Women for a Healthy Environment	Pittsburgh	PA
39	Barbara	Brandom	Concerned Health Professionals of PA	Pittsburgh	PA
40	Sharon	Furlong	Bucks Environmental Action	Feasterville	PA
41	Sharon	Furlong	Bucks Environmental Action	Feasterville	PA
42	Joanne	Stanton	Co-Founder Buxmont Coalition for Safer Water	Harleysville	PA
43	Joanne	Stanton	Buxmont Coalition for Safer Water	Harleysville	PA
44	Gil	Freedman	Conodoguinet Creek Watershed Assn	Mechanicsburg	PA
45	Heather	Hulton VanTassel	Three Rivers Waterkeeper	Pittsburgh	PA
46	Eric	Harder*	Mountain Watershed Association	Melcroft	PA
47	Tracy	Carluccio	Delaware Riverkeeper Network	Bristol	PA
48	Tracy	Carluccio	Delaware Riverkeeper Network	Bristol	PA
49	Tracy	Carluccio	Delaware Riverkeeper Network	Bristol	PA
50	Tracy	Carluccio	Delaware Riverkeeper Network	Bristol	PA
51	Rachel	Rosenfeld	Sierra Club Pennsylvania Chapter	Harrisburg	PA
52	David Thomas	Roberts	Sierra Club Moshannon Group	Bellefonte	PA
53	Stephanie	Wein*	PennEnvironment	Philadelphia	PA
54	Emily	Rogers	U.S. PIRG	Bear Creek	PA
55	Emma	Horst-Martz	PennPIRG	Philadelphia	PA
56	Darree	Sicher	United Sludge Free Alliance	Kempton	PA
57	Hannah	Smith-Brubaker	Pasa Sustainable Agriculture	Harrisburg	PA
58	Rev. Sandra	Strauss	Pennsylvania Council of Churches	Harrisburg	PA
59	Elizabeth	Marx	CAUSE-PA	Harrisburg	PA
60	Mary	Gaiski	PA Manufactured Housing Assoc	New Cumberland	PA
61	Erica	Jackson	FracTracker Alliance	Pittsburgh	PA
62	Kevin	Ferrara	AFSO21 LLC	Lock Haven	PA

63	Loren	Anderson	MSC	Pittsburgh	PA
64	Megan M.	Withroder	3M	St. Paul	MN
65	Steve	Risotto	American Chemistry Council	Washington	DC
66	Jeffrey	Longsworth	PFAS Regulatory Coalition	Washington	DC
67	Lise	Bauman*		Southampton	PA
68	Joan L.	Farb*		Newtown	PA
69	Char	Magaro		Enola	PA
70	Ira	Josephs		Media	PA
71	Hope	Grosse		Lansdale	PA
72	Clara	Gomes-Silva		Philadelphia	PA
73	Tamela	Trussell		Carlisle	PA
74	Chris	Plehal		Philadelphia	PA
75	Kathie	Westman		Gibsonia	PA
76	Joe	Schreiber		Glenshaw	PA
77	Atticus	Hempel		Swarthmore	PA
78	Jared	Freddo	Excel Events	Levittown	PA
79	Kofi	Osei		Harleysville	PA
80	Abby	Foster		Harrisburg	PA
81	Eleanor	Skibo			PA
82	Lisa	Harbaugh		Cherry Tree	PA
83	Alan	Peterson, MD		Willow Street	PA
84	Kathryn	Westman		Gibsonia	PA
85	Brenda	Wolfe		Annville	PA
86	Marie	Carota		Doylestown	PA
87	Scott	Ensign		West Chester	PA
88	Jenna	Flohr		Pittsburgh	PA
89	Melissa	DelMonego		Chester Springs	PA
90	Kenneth	Hemphill		Glen Mills	PA
91	Garrett	Wassermann		Coraopolis	PA
92	Caitlin	Schroering		Pittsburgh	PA
93	Meredith	Stone		Philadelphia	PA
94	Stephen	Yachetti		Media	PA
95	Abigail	Bridi		Palmyra	PA
96	Leslie	Burzacki		Langhorne	PA
97	Rebekah	Robinson			PA
98	Louise	Evans		Wynnewood	PA
99	Lisa	Cellini		Maple Glen	PA
100	Brittany	Shannon		Shavertown	PA
101	Nadine	Frassetto		Wyncote	PA
102	Barbara	Arnold		Malvern	PA
103	Heather	Nelson		Douglassville	PA
104	Donna	Held		Pottstown	PA
105	Marguerite	Hope		East Stroudsburg	PA
106	Elliot	Lipeles		Philadelphia	PA
107	Antoinette	Fitch		Amity	PA
108	Joseph P.	McGrath Sr.	United States Air Force- Retired	Hatboro	PA

109	Lynnette	Saunders		Huntingdon Valley	PA
110	Thomas F.	Doyle			PA
111	Lynnette	Saunders		Huntingdon Valley	PA
112	Rosemarie	Kozdron		Rockton	PA
113	Stephanie	Carter		New Castle	PA
114	Donald	Gleiter		Warminster	PA
115	Christopher	Schoell		Croydon	PA
116	Marcie	McBride		Philadelphia	PA
117	Winifred	Helton-Harmon		Bethlehem	PA
118	Kim	Fetterolf		Langhorne	PA
119	Jason	Magidson	H-CAN	Ardmore	PA
120	Corey	Bourbonniere		Pittsburgh	PA
121	Jill	Hirt		Coopersburg	PA
122	Kristin	Collins		Eagleville	PA
123	Elizabeth	Killough		Glenside	PA
124	Sandy	Kuritzky		Blue Bell	PA
125	Boris	Kerzner		Elkins Park	PA
126	Annie	Duggan		Havertown	PA
127	Pamela	Magidson		Ardmore	PA
128	Peter	Stokes		Havertown	PA
129	Catherine	Poynton		Havertown	PA
130	Laura	Lupovitz		Pittsburgh	PA
131	Harry	Chess		Warrington	PA
132	Jeanne	Weber		Phoenixville	PA
133	Mary Ellen	Snyder		Zionsville	PA
134	Loren	Delaney		West Chester	PA
135	Marlene	Csandl-Cook			PA
136	Bob	Petrizzi			PA
137	Elisabeth	Carpenter		Bala Cynwyd	PA
138	Lois	Cala		Warminster	PA
139	Aubrie	Milich		Pittsburgh	PA
140	Kelly	Jameson		Sellersville	PA
141	Maryann	Richmond		Lititz	PA
142	Don	Hawkins		North Braddock	PA
143	Debra	Siefken		Orrtanna	PA
144	Patricia	Libbey			PA
145	Marion	Kyde		Ottsville	PA
146	David	Zlotowski, MBA, MD		Charlestown Township, Chester County	PA
147	Margaret	Hudgings		West Chester	PA
148	Ada	Miller			PA
149	Heath	Brown			PA
150	Eric	Klein		Coatesville	PA

151	Pam	Lynch		Langhorne	PA
152	James	Rice			PA
153	Richard	McNutt		Pipersville	PA
154	Wayne	Olson			PA
155	Ryan	Dodson		Lancaster	PA
156	Pat	Thompson		Willow Grove	PA
157	James	Sandoe		Ephrata	PA
158	Dagan	Bontrager		Pittsburgh	PA
159	Bob	Garrett		Audubon	PA
160	Catherine	Moran		West Chester	PA
161	Kathryn	Labrum		Wallingford	PA
162	Leah	Mullery		Nanticoke	PA
163	Charles C.	Walbridge		Blue Bell	PA
164	Andrew	Christy		Abington	PA
165	Andrew	Schwartz		Pittsburgh	PA
166	Christopher F.	Vota		Eastampton	NJ
167	Linda	Caprioli		Northampton	PA
168	Cathy	James		Drexel Hill	PA
169	Derek	DiMatteo		Erie	PA
170	Albert	Potts		Upper Southampton	PA
171	Lisa	Divincenzo			PA
172	Kevin	Hulburt		State College	PA
173	David	Beck		Melrose Park, Montgomery County	PA
174	Faith	Zerbe		Drexel Hill	PA
175	Aurora	Dizel		Havertown	PA
176	Michael	Schmotzer		York	PA
177	Richard	McNutt		Pipersville	PA
178	Ronald	Tokarchik		Butler	PA
179	Marie	Carota		Doylestown	PA
180	Thomas	Simonet		Yardley	PA
181	Michael	Schmotzer		York	PA
182	Judith	Hoechner		Morrisville	PA
183	Joanne	Guiniven		Yardley	PA
184	David	Butler		Philadelphia	PA
185	Laura	Michaels		Maple Glen	PA
186	Patricia	Kleiner		Yardley	PA
187	Sandra	Folzer		Philadelphia	PA
188	Gokhan	Seker		Drexel Hill	PA
189	Edward	Thornton		Swarthmore	PA
190	Lowell	Booth		Willow Grove	PA
191	Sandra	Lewis		Wyndmoor	PA
192	Linda	Granato		Philadelphia	PA
193	Jeanne	Held-Warmkessel		North Wales	PA

194	Bob	Gallagher		Philadelphia	PA
195	Greg	Navarro		Drexel Hill	PA
196	Aggie	Perilli		Lancaster	PA
197	Neil	Hoffmann		Bryn Mawr	PA
198	Arthur	Satter		Beach Lake	PA
199	Mary	McMahon		Philadelphia	PA
200	Trudy	Gerlach		Wyalusing	PA
201	Christopher	Minich		Lewis Run	PA
202	Jean	Olivett		Emporium	PA
203	Kelly	Zimmerman		Saylorsburg	PA
204	David	Head		Hatboro	PA
205	Susan	Babbitt		Philadelphia	PA
206	Christopher	Dunham		Feasterville	PA
207	Patricia	Libbey		Philadelphia	PA
208	Robert	Morgan		Dallas	PA
209	Thanice	Petrak		Philadelphia	PA
210	Joann	Puskarcik		Starlight	PA
211	Nicholas	Domiano		Ottsville	PA
212	Ruth Ann	Fenton		Philadelphia	PA
213	Boris	Kerzner		Elkins Park	PA
214	Sarah	Lynch		Havertown	PA
215	Allison	Kerzner		Elkins Park	PA
216	Rebecca	Williams		Bethel	PA
217	Aimee	Barry		Narberth	PA
218	Mark	Harris		Horsham	PA
219	Robert	Bohl		Southampton	PA
220	Barbara	Bohl		Southampton	PA
221	Edith	Ruiz		Gibsonia	PA
222	Jared	Freddo		Levittown	PA
223	Hope	Grosse		Lansdale	PA
224	Raymond	Shuster		Normalville	PA
225	KD	Ferrari		Champion	PA
226	Jan	Kiefer		Scottdale	PA
227	Lois E.	Bower-Bjornson		Scenery Hill	PA
228	Ben	Badger		Ogden	UT
229	Eric	Hulsey		Pittsburgh	PA
230	Samantha	Auxter		Pittsburgh	PA
231	Jacob	Hostetler		Pittsburgh	PA
232	Rob	Nadeau		Donegal	PA
233	Michelle	Doyon		Scottdale	PA
234	Michael	Lombardi		Levittown	PA
235	Lois	Dribin		Doylestown	PA
236	Kelly	Jameson		Sellersville	PA
237	Cheryl	Muller		Dresher	PA
238	Kim	Sellon		Scotrun	PA
239	Kenneth	Hemphill		Media	PA

240	Carlo	Popolizio		Estell Manor	NJ
241	Ronald	Gulla		Waukon	IA
242	Lorenz	Steininger		Stafford	VA
243	Shannon	Pendleton		New Hope	PA
244	Rusty	Eidmann-Hicks		Colts Neck	NJ
245	Janet	Cavallo		Secane	PA
246	Robert	Rossachacj		Glenolden	PA
247	Karen	Kirschling		San Francisco	CA
248	Norma Van	Dyke		Philadelphia	PA
249	Roberta	Takach		West Mifflin	PA
250	Cindy	Kunnas		Newtown	PA
251	Terrie	Balko		West newton	PA
252	Richard	McNutt		Pipersville	PA
253	Brian	Russo		North Haledon	NJ
254	Kristen	Ryan		Philadelphia	PA
255	Ronald	Wagner		Boyertown	PA
256	Helen	Tai		New Hope	PA
257	Robert	Gaynor		New hope	PA
258	Nancy	Sarvet-Haber		Penn Valley	PA
259	Norman	Starr		Beach Lake	PA
260	Holly	Wells		Mount Bethel	PA
261	Linda and Joe	Roe		Fairless Hills	PA
262	Garret	Wassermann		Coraopolis	PA
263	Lawrence	Stauffer		Malvern	PA
264	Kathleen	Stauffer		Malvern	PA
265	Patricia	Rossi		Levittown	PA
266	Nancy	Lloyd		Allentown	PA
267	Caroline	Ashurst		Philadelphia	PA
268	Deborah	Larson		Pittsburgh	PA
269	Carmelita	Carr		Levittown	PA
270	Bernard	Handler		Shohola	PA
271	Bonnie	Stoeckl		Pequea	PA
272	Jeffrey	Shuben		Philadelphia	PA
273	Leah	Sivieri Persson		Philadelphia	PA
274	Melissa	K		South Heights	PA
275	Michelle	Hoff		Allentown	PA
276	Susan	Moon		Landenberg	PA
277	Vincent	Prudente		Philadelphia	PA
278	Albert	Barney		Kunkletown	PA
279	Arthur	Anderson		Philadelphia	PA
280	Dennie	Baker		Warrington	PA
281	Dennis	Yaz		Lake Harmony	PA
282	Moira	McClintock		Solebury	PA
283	Steve	McGuinness		Hulmeville	PA
284	Walter	Goodman		Malvern	PA
285	Barry	Pounder		Sinking Spring	PA
286	Gail	Brunner		Damascus	PA

287	Ted	Evgeniadis	Lower Susquehanna Riverkeeper Association	Wrightsville	PA
288	Kari	Pohl		Aliquippa	PA
289	Rachel	Frankford		Philadelphia	PA
290	Ryan	Meanor		Pittsburgh	PA
291	Edward	Thornton		Swarthmore	PA
292	Andrew	Druckenbrod		Pittsburgh	PA
293	Laura	Horowitz		Pittsburgh	PA
294	Patricia	Harlow		Plymouth Meeting	PA
295	Kathie	Westman		Gibsonia	PA
296	Jennifer	Sherwood		Jenkintown	PA
297	Patricia	Libbey		Philadelphia	PA
298	Paul	Palla		Greencastle	PA
299	Lisa	Robertson		Duncannon	PA
300	Erin	Crump		Blue Bell	PA
301	Elaine	Cohen		Jenkintown	PA
302	Kari	Pohl		Aliquippa	PA
303	Darlene	Dech		Sewickley	PA
304	David	Kaufman		Bartonsville	PA
305	Hope	Grosse		Lansdale	PA
306	Eric	Pash		Indiana	PA
307	Randall	Tenor		Mechanicsburg	PA
308	Daniel	Salmen		Pittsburgh	PA
309	Craig	C		pittsburgh	PA
310	Eugene	Mariani		Bethel Park	PA
311	Sandra	Foehl		Philadelphia	PA
312	Ellen S	Cohen		Ardmore	PA
313	Hilary	Baum		Philadelphia	PA
314	Michael	McQuown		Philadelphia	PA
315	Cory	Reyman		Philadelphia	PA
316	James	Stoner		Monroeville	PA
317	Linda	Myers		Petersburg	PA
318	J	Fried		West Chester	PA
319	Kevin	Hartbauer		Pittsburgh	PA
320	Melody	Alexander		Coatesville	PA
321	Friends	McConnels-Mill		New Wilmington	PA
322	Beverly	Cyr		Athens	PA
323	Philomena	Easley		Fairless Hills	PA
324	Veronica	Liebert		Drexel Hill	PA
325	Thomas	Posey		Yardley	PA
326	Linda	Bescript		Langhorne	PA
327	William	Montgomery		Pottstown	PA
328	Ted	Evgeniadis		Wrightsville	PA
329	Wayne	Laubscher		Lock Haven	PA
330	Roberta	Camp		Philadelphia	PA

331	JoAnn	Sorrell		Collegeville	PA
332	Daniel	Scholnick		Philadelphia	PA
333	William	Anderson		Narberth	PA
334	Laurie	Heller		Pittsburgh	PA
335	Jenifer	Casey		Carbondale	PA
336	Darla	Kravetz		Lehighton	PA
337	Mitzi	Deitch		Feasterville Trevose	PA
338	Dave	Bindewald		Pittsburgh	PA
339	Rhonda	Sternowski		Bernville	PA
340	Melvin	Armolt		Chambersburg	PA
341	Saundra	Petrella		Beaver	PA
342	Richard	Tregidgo		Holtwood	PA
343	RoseMaria	Root		New Oxford	PA
344	Jaime	Filipek		Pittsburgh	PA
345	Loretta	Lehman		Duncannon	PA
346	Joseph	Magid		Wynnewood	PA
347	Janice	Peischl		Allison Park	PA
348	Brian	Eisenschmied		Norristown	PA
349	Katy	Ruckdeschel		Merion Station	PA
350	Jerri	Huber-Gibson		LANSDALE	PA
351	Rita	Gouse		Sharon Hill	PA
352	Kathleen	Miller		Wilkes Barre	PA
353	Stephen	Linenfelser		Pittsburgh	PA
354	Sister Mary Jessica	Terek		Beaver Falls	PA
355	Susan	Wessner		Kutztown	PA
356	Nancy	Pontone		Philadelphia	PA
357	Amy	Bursky		Wynnewood	PA
358	Kathleen	Espamer		Camp Hill	PA
359	Susan	Tobia		Philadelphia	PA
360	Shari	Johnson		Wyncote	PA
361	Jean	Kammer		Hawley	PA
362	Cassandra	Tereschak		Scranton	PA
363	Mark	Cohen		Havertown	PA
364	Kelly	Riley		Hatfield	PA
365	Judy	Knueven		Beaver Falls	PA
366	Susan	Saltzman		Philadelphia	PA
367	Doug	Grainge		Philadelphia	PA
368	Regina	Brooks		Pittsburgh	PA
369	Christine	Chesire		Aliquippa	PA
370	Kristin	Toscano		Narberth	PA
371	Joseph	Bonidie		Pittsburgh	PA
372	Robert	Smith		York	PA
373	Mary	McKenna		Philadelphia	PA
374	Chris	Stanton		Lansdowne	PA
375	Marilynn	Harper		Media	PA

376	James	Keenan		Lansdowne	PA
377	Kathy	Evans-Palmisano		PITTSBURGH	PA
378	Kathleen	Harr		Langhorne	PA
379	Brad	Rea		Pittsburgh	PA
380	Kerri	Allen		Pittsburgh	PA
381	Kathy	Lawless		Harleysville	PA
382	L	Bendict		Pittsburgh	PA
383	Patricia	Rossi		Levittown	PA
384	Greg	Curtin		Pittsburgh	PA
385	Carole	Mayers		King of Prussia	PA
386	Daniel Max	Behl		Glen Mills	PA
387	Erich	Freimuth Jr		Wayne	PA
388	Dorothea	Leicher		Columbia Cross Roads	PA
389	Clair	Hvozdovich		Pittsburgh	PA
390	Beatrice	Broughton		Avondale	PA
391	Laura	Fake		Womelsdorf	PA
392	Eileen	Shupak		Philadelphia	PA
393	Christopher	Kipp		Pittsburgh	PA
394	Marjorie	CurtisCohen		Abington	PA
395	Diana	Ames		Pittsburgh	PA
396	Mark	Mcgrosky		Pittsburgh	PA
397	Jean	Wiant		Glenolden	PA
398	Char	Esser		Villanova	PA
399	John	Margerum		Philadelphia	PA
400	Michael	Meyer		Blue Bell	PA
401	William	Tarbox		Emmaus	PA
402	Douglas	Kingsbury		Philadelphia	PA
403	Jason	Driesbaugh		Havertown	PA
404	Benita J.	Campbell		Burgettstown	PA
405	Barry	Cutler		Springfield	PA
406	Glenn	Wood		Coraopolis	PA
407	Robin	Gallagher		Philadelphia	PA
408	Leo	Kucewicz		Phoenixville	PA
409	Beverly	Rae		Hellertown	PA
410	Stamatina	Podes		Bensalem	PA
411	Keith	Portka		Cheswick	PA
412	Melanie	Cohick		Boiling Springs	PA
413	linda	flower		Pittsburgh	PA
414	Vincent	Prudente		Philadelphia	PA
415	Linde	Fiore		Newtown Square	PA
416	Diane	Krassenstein		Philadelphia	PA
417	Andrew	Bechman		Pittsburgh	PA
418	Manon	Roberge		Pottstown	PA
419	Stephanie	Ulmer		Pittsburgh	PA
420	John	Stofko		Allentown	PA

421	Melissa	K		South Heights	PA
422	Lois Ann	Griffiths		Harrisburg	PA
423	Karen Guarino	Spanton		Philadelphia	PA
424	Kay	Ludwig		New Kensington	PA
425	Eric	Potter		West Chester	PA
426	Dolores	Fifer		Pittsburgh	PA
427	David	Dzikowski		Canonsburg	PA
428	Libby	Anderson		Haverford	PA
429	Patricia	Miller		Manchester	PA
430	Roberta	Potsic		Newtown Square	PA
431	Leann	Turley		West Decatur	PA
432	Bonnie	Winter		Shrewsbury	PA
433	Laura	Chinofsky		Southampton	PA
434	Megan	Hess		Philadelphia	PA
435	Susan	Porter		Hawley	PA
436	Michael	Siwy		Whitehall	PA
437	Alan	Peterson		Willow Street	PA
438	Deb	Horan		Springfield	PA
439	Diane	Bastian		Liberty	PA
440	Mary Jean	Sharp		Altoona	PA
441	Patricia	Metzger		Brookhaven	PA
442	Marin	Richeson		Ardmore	PA
443	Elaine	Cohen		Jenkintown	PA
444	Anna	Tangi		Philadelphia	PA
445	Al	Luque		Philadelphia	PA
446	Lynne	Lucchino		Bethel Park	PA
447	Mary Jo	Knox		Millvale	PA
448	Rebecca	Ashkettle		Pittsburgh	PA
449	Amanda	Kreiss		Philadelphia	PA
450	Victoria	Switzer		Dimock	PA
451	Nancy	Bernstein		Pittsburgh	PA
452	John	Hahn		Shohola	PA
453	Barry	Blust		Glenmoore	PA
454	Lynn	Weihaus		Pittsburgh	PA
455	Patricia	Urban		Wallingford	PA
456	Robert	Rossachacj		Glenolden	PA
457	Donna	Logan		Erie	PA
458	Laura	Murillo		Glenside	PA
459	Lisa	Bryer		Richboro	PA
460	Patricia	Harlow		Plymouth Meeting	PA
461	Loraine	Richard		Glassport	PA
462	Frances	DeMillion		Kennett Square	PA
463	Susan	Thompson		Norristown	PA
464	Donna	Carswell		Huntingdon Valley	PA
465	Daphne	Murray		Chambersburg	PA

466	Liana	Lang		White Haven	PA
467	Barbara	Murock		Pittsburgh	PA
468	B	Soltis		Downingtown	PA
469	Jim	Black		Philadelphia	PA
470	David	Meiser		Pipersville	PA
471	Dianna	Holland		Philadelphia	PA
472	Harry	Zabetakis		Pittsburgh	PA
473	Rina	Malerman		Jenkintown	PA
474	Andrew	Wadsworth		Reading	PA
475	Paul	Pasles		Wayne	PA
476	Nancy	Lutz		Pittsburgh	PA
477	Jennifer	Harris		Pittsburgh	PA
478	Mark	Kohan		Pittsburgh	PA
479	Cynthia	Laub		Lansdale	PA
480	Katlyn	Connor		Philadelphia	PA
481	Martin	Fanrak		Upper Black Eddy	PA
482	Heather	Maltin		Gwynedd Valley	PA
483	Annie	Carrozza		Blue Bell	PA
484	Elizabeth	Omand		Elkins Park	PA
485	Nicole	Sims		Pittsburgh	PA
486	Ray	Solomon		Merion Station	PA
487	Joel	Turner		Havertown	PA
488	Joan	Formeister		Somers	CT
489	William	Wang		Wynnewood	PA
490	James	McCauley		Narberth	PA
491	Maureen	O'Leary		Narberth	PA
492	Ann Marie	Doll		Blue Bell	PA
493	Ezra	Sherman		Glenside	PA
494	Dan	Prince		Glenside	PA
495	Mark	Evans		Glenside	PA
496	Jennifer	Murray		Glenside	PA
497	Suzanne	Harmony		Glenside	PA
498	Angelo	Nivison		Glenside	PA
499	Sadie	Macklem		Glenside	PA
500	Ian	Leidovici		Glenside	PA
501	Dylan	Thomas		Glenside	PA
502	Mike	Lev		Glenside	PA
503	Christine	B		Gastonia	NC
504	AnnMarie	Sardineer		Trafford	PA
505	Brian	Lucas		Yardley	PA
506	Ann	Schmitz		Bethel Park	PA
507	John	Margerum		Philadelphia	PA
508	Jonathan	Walsh		Barrington	RI
509	Charles	Ulmann		Westchester	PA
510	Elizabeth	Campbell		Pittsburgh	PA
511	Ward	Chapman		Lansdale	PA
512	Sarah	Boldigowski		Bethel Park	PA

513	Cari	Freno		Elkins Park	PA
514	Carol	Auerbach		Elkins Park	PA
515	Marianne	Checchia		Elkins Park	PA
516	Kathleen	Silver		Elkins Park	PA
517	Pearl	Raz		Elkins Park	PA
518	Spencer	Stevens		Elkins Park	PA
519	Chris	Hallenbeck		Elkins Park	PA
520	Kevin	Kaufman		Elkins Park	PA
521	Lindsey	Anderson		Elkins Park	PA
522	Aliou	Diallo		Elkins Park	PA
523	Rebecca	Weiss		Elkins Park	PA
524	Robin	Naples		Elkins Park	PA
525	Mike	Duffey		Elkins Park	PA
526	Robert	Moyer		Elkins Park	PA
527	Victor	Goldberg		Elkins Park	PA
528	Ed	Budd		Elkins Park	PA
529	Jasmin	Lepir		Elkins Park	PA
530	Kathryn	Humphreys		Elkins Park	PA
531	Lyn	Tuckman		Elkins Park	PA
532	Justin	Whitmore		Elkins Park	PA
533	Karen	Manson		Elkins Park	PA
534	Victoria	Marinucci		Elkins Park	PA
535	Derrick	Howard		Elkins Park	PA
536	Casey	Turner		Elkins Park	PA
537	Bonnie	Taylor		Elkins Park	PA
538	Jennifer	Brier		Elkins Park	PA
539	Zach	Sammons		Elkins Park	PA
540	Jason	Fry		Elkins Park	PA
541	Patrick	Flynn		Elkins Park	PA
542	Colleen	Kreisel		Elkins Park	PA
543	Julia	Way		Elkins Park	PA
544	Liat	Shimoni		Elkins Park	PA
545	Tom	Israel		Elkins Park	PA
546	Kelton	Higgins		Elkins Park	PA
547	Doron	Avivi		Elkins Park	PA
548	Judith	Berg		Elkins Park	PA
549	Morgan	MacConaugha-Snyder		Anchorage	AK
550	Delores	Biddle		Cheltenham	PA
551	Mike	Genovese		Cheltenham	PA
552	Eleanor	Carroll		Wayne	PA
553	Joseph	Bayerl		Hatboro	PA
554	Jo	Firth		Monroeville	PA
555	Molly	Mehling		Pittsburgh	PA
556	John	Landis		Philadelphia	PA
557	Connie	McGeorge		Elkins Park	PA
558	Shane	Danielson		Elkins Park	PA

559	Ramona	Swaby		Elkins Park	PA
560	Corie	Slass		Elkins Park	PA
561	Alayah	Green		Elkins Park	PA
562	Kenneth	Scott		Elkins Park	PA
563	Megan	Rucket		Elkins Park	PA
564	Jason	Lourenco		Elkins Park	PA
565	Lisa	Marcus		Elkins Park	PA
566	Chris	Lynett		Elkins Park	PA
567	Lisa	Pellino		Elkins Park	PA
568	Melanie	Tudos		Elkins Park	PA
569	Paul	Bukovec		Elkins Park	PA
570	Joy	Greenwald		Elkins Park	PA
571	Sally	Levin		Elkins Park	PA
572	Sasha	Narine		Elkins Park	PA
573	Jonathan	Finch		Elkins Park	PA
574	Rachael	Fritz		Elkins Park	PA
575	Jill	Murray		Elkins Park	PA
576	Vi	Shenkman		Elkins Park	PA
577	Vanessa	DeTolla		Elkins Park	PA
578	Arlene	Spector		Elkins Park	PA
579	Betsy	Brawn		Elkins Park	PA
580	Kathleen	Noga		Elkins Park	PA
581	Lovelee	Polite		Elkins Park	PA
582	Laura	Colangelo		Elkins Park	PA
583	Ellen	Asam		Elkins Park	PA
584	Mariette	Matos		Elkins Park	PA
585	Lisa	Donahue		Elkins Park	PA
586	Jonathan	McGoran		Elkins Park	PA
587	Carisa	Townes		Elkins Park	PA
588	Beth	Cross		Elkins Park	PA
589	Edward	Schultz		Elkins Park	PA
590	Bernard	Spraker-Gomez		Morton	PA
591	Brittney	Peterson		Holyoke	MA
592	Steven	Kline		Jenkintown	PA
593	Matt	Mullan		Barrington	RI
594	Priscilla	Walski		Reading	PA
595	Brenda	Reedy		Temple	PA
596	Irene	Hurford		Jenkintown	PA
597	Nancy	McHenry		Yardley	PA
598	Michelle	Sinni		Philadelphia	PA
599	Joseph	Linnett		Melrose Park	PA
600	Carla	Davis-Cunningham		Melrose Park	PA
601	Mark	Freilich		Melrose Park	PA
602	Christina	Ager		Melrose Park	PA
603	Troy	Wynn		Melrose Park	PA

604	Dericka	Kohler		Elkins Park	PA
605	Iane	Clems		Melrose Park	PA
606	Franco	Lopez		Melrose Park	PA
607	Jesse	Austin		Melrose Park	PA
608	Samantha	Jones		Elkins Park	PA
609	Erin	Zivanoric		Cheltenham	PA
610	Linda	Snyder		Elkins Park	PA
611	Michael	Murphy		Elkins Park	PA
612	Andrew	Bickford		Elkins Park	PA
613	Amy	Warr		Elkins Park	PA
614	Auvel	McLaughlin		Elkins Park	PA
615	Mary	Cleary		Elkins Park	PA
616	Sean	Stone		Elkins Park	PA
617	Dorothy	Schenkel		Elkins Park	PA
618	Eitan	Laurence		Elkins Park	PA
619	Stew	Beltz		Cheltenham	PA
620	Christian De	Santo		Elkins Park	PA
621	Tyler	Gay		Elkins Park	PA
622	Jenna	Eagan		Elkins Park	PA
623	David	Lowing		Elkins Park	PA
624	Christine	Macaurther		Elkins Park	PA
625	Nat	Frassi		Elkins Park	PA
626	Mark	Perren		Elkins Park	PA
627	Vera	Lashchyk		Elkins Park	PA
628	Matthew	Kull		Elkins Park	PA
629	Rosemarie	Beier		Elkins Park	PA
630	Lisa	Moue		Elkins Park	PA
631	Matthew	Sherman		Elkins Park	PA
632	Eva	Misinraritch		Elkins Park	PA
633	Allison	Raieta		Elkins Park	PA
634	Dan	Regnolds		Cheltenham	PA
635	Benjamin	Kaplan		Elkins Park	PA
636	Ben	Werdmaller		Cheltenham	PA
637	Janet	Bilenly		Elkins Park	PA
638	Karen	Grassi		Elkins Park	PA
639	Ryan	Seifert		Elkins Park	PA
640	Natalie St.	Louis		Elkins Park	PA
641	Brian	Gralnick		Elkins Park	PA
642	Christine	Eberle		Elkins Park	PA
643	Mai	Ly		Elkins Park	PA
644	Chendo	Nexu		Elkins Park	PA
645	Jennifer	Bernard		Elkins Park	PA
646	Thomas	Romer		Swarthmore	PA
647	Charles	Allen		Philadelphia	PA
648	Joan	Huntley		Amherst	MA
649	Matthew	Heckendorf		Havertown	PA
650	Debra	Will		Glenside	PA

651	Theo	Uliam		Glenside	PA
652	Tessa	Holthenrichs		Glenside	PA
653	Robert	Panebianco		Glenside	PA
654	Joann	Feyley		Glenside	PA
655	David	Lembach		Glenside	PA
656	Jessica	Belmonte		Glenside	PA
657	Jodie	Taraborrelli		Glenside	PA
658	Diane	Hershberger		Glenside	PA
659	Andrew	Wunder		Glenside	PA
660	John	Simolike		Glenside	PA
661	Jake	Harris		Glenside	PA
662	JoAnn	Pucella		Glenside	PA
663	Nick	Semon		Glenside	PA
664	Dottie	Baumgarten		Glenside	PA
665	Cindy	Sharp		Glenside	PA
666	Kirsten	Lottier		Glenside	PA
667	Nick	Ruggiano		Glenside	PA
668	Sheila J	Stewart		Glenside	PA
669	Rob	Macnamara		Glenside	PA
670	Mike	Deegan		Glenside	PA
671	Alison	King		Glenside	PA
672	Julie	Tran		Glenside	PA
673	Thomas	Reynolds		Milton	MA
674	Kaianna	Roepcke		Wexford	PA
675	Kris	Esack		Jeannette	PA
676	Anthony	West		Philadelphia	PA
677	Debra	Duxbury		Marblehead	MA
678	Michael	Podlipsky		Pittsburgh	PA
679	James	Poisson		Wakefield	RI
680	Debby	Longman		Havertown	PA
681	Chris	Antal		Narberth	PA
682	Mark	Chelsvig		Narberth	PA
683	Tehseen	Khan		Narberth	PA
684	Debra	Taylor		Glenside	PA
685	Joy	Braunstein		Pittsburgh	PA
686	Olivia	D'Andrea		Blue Bell	PA
687	Steven	Levy		Wynnewood	PA
688	Michelle	Conner		Wynnewood	PA
689	Yuan	Liu		Wynnewood	PA
690	Irina	Murrazashvilli		Wynnewood	PA
691	Julia	Switzer		Wynnewood	PA
692	Vikas	Khanna		Pittsburgh	PA
693	Benjamin	Burrows		Elkins Park	PA
694	William	Young		Mt Lebanon	PA
695	Eva	Finney		Wyncote	PA
696	Donna	Dudly		Wyncote	PA
697	Ashley	Gibbs		Wyncote	PA

698	Mark	Trani		Wyncote	PA
699	Joel	Dimment		Cheltenham	PA
700	Rickey	Valentine		Cheltenham	PA
701	Eril	Bumbaca		Cheltenham	PA
702	David	Updike		Wyncote	PA
703	Toni	Vahlsing		Wyncote	PA
704	Kristen	Donato		Wyncote	PA
705	Steve	Ryan		Wyncote	PA
706	Edward	Moss		Wyncote	PA
707	Susan	Morgan		Wyncote	PA
708	Hannah	Reima		Wyncote	PA
709	Michelle	Marlin		Wyncote	PA
710	Wes	Burns		Wyncote	PA
711	Joe	Benhabib		Wyncote	PA
712	Robert	O'Brien		Wyncote	PA
713	Rebekah	Waggoner		Wyncote	PA
714	Sarah	Grady		Wyncote	PA
715	Patricia	Rich		Wyncote	PA
716	Chris	Hoyler		Wyncote	PA
717	Kia	Woodbridge		Wyncote	PA
718	Michael	Gordon		Wyncote	PA
719	Daniel	Mitchell		Wyncote	PA
720	Bob	Klebanoff		Wyncote	PA
721	Todd	Lustine		Wyncote	PA
722	Trish	Payes		Wyncote	PA
723	Peninah	Berdugo		Wyncote	PA
724	Lon	Thodde		Wyncote	PA
725	Elissa	Lewin-Rotman		Wyncote	PA
726	Nathalie	Peeters		Wyncote	PA
727	Nick	Ward		Wyncote	PA
728	Bryan	Margerum		Wyncote	PA
729	Gary	Mccormick		Narberth	PA
730	Kathleen	Chestnut		Narberth	PA
731	Catalina	Read		Lower Merion	PA
732	Amy	Reed		Wynnewood	PA
733	John	Webster		Wynnewood	PA
734	Michelle	Nunn		Warminster	PA
735	Keith	Brown		Wynnewood	PA
736	Barb	Alsko		Pittsburgh	PA
737	Heather	McReynolds		Philadelphia	PA
738	Kristin	Voegtli		Plymouth Meeting	PA
739	Lauren	Kocher		Pittsburgh	PA
740	Peter	Borghetti		Wyncote	PA
741	Huntley	Palmer		Wyncote	PA
742	Ajay	Singhal		Wyncote	PA
743	Randi	Axelrod		Wyncote	PA

744	Forrest	Haun		Wyncote	PA
745	Jamal	Bell		Wyncote	PA
746	Kim	Ford		Wyncote	PA
747	Rae	Whatley		Wyncote	PA
748	Shelly	Trea		Wyncote	PA
749	David	Halos		Wyncote	PA
750	Susan	Kershman		Wyncote	PA
751	Leah	Modigliani		Wyncote	PA
752	Ali	Michael		Cheltenham	PA
753	Adam	Miller		Cheltenham	PA
754	Steven	Glacter		Cheltenham	PA
755	Kevin	Ganz		Cheltenham	PA
756	William	Henry		Westfield	MA
757	Christine	Zelley		Yardley	PA
758	Bryan	Battaglia		Pittsburgh	PA
759	Nancy	Cavanaugh		Brookline	MA
760	Miki	Pay		Philadelphia	PA
761	Amy	Fanilli		Philadelphia	PA
762	Tea	Lee		Philadelphia	PA
763	Shama	Patel		Philadelphia	PA
764	Timothy	Fuzio		Glenside	PA
765	Karen	Sandler		Glenside	PA
766	Deborah	Fulton		Glenside	PA
767	Karen	Donahue		Glenside	PA
768	Melanie	Egger		Glenside	PA
769	Susan	Kelly		Glenside	PA
770	Zander	Owens		Glenside	PA
771	Aubrey	Keegan		Glenside	PA
772	Ashley	Lee		Glenside	PA
773	Chris	Beres		Pittsburgh	PA
774	Jason	Tost		Pittsburgh	PA
775	Lauren	Kudrick		Pittsburgh	PA
776	Bryce	Trosch		Pittsburgh	PA
777	Jane	Lehamenn		Gibsonia	PA
778	Amanda	Eighan		Jamaica Plain	MA
779	Melissa	Sill		Wynnewood	PA
780	Jamie	Bintliff		Yardley	PA
781	Loretta	Hess		Abington	PA
782	William	Mathes		Abington	PA
783	Bonnie	Klenk		Abington	PA
784	Patrick	Hurst		Glenside	PA
785	Anne	Filippone		Penn Valley	PA
786	Chris	Manchin		Narberth	PA
787	Rachel	Morgan		Narberth	PA
788	Brendan	Filippone		Penn Valley	PA
789	June	Lauer		Penn Valley	PA
790	Leigh	Brath		Penn Valley	PA

791	Grace	Wenzel		West Orange	NJ
792	James	Griffin		Glenside	PA
793	Lauren	McCartin		Abington	PA
794	Elizabeth	Killough		Glenside	PA
795	Howard	Jennings		Abington	PA
796	Grant	Evans		Glenside	PA
797	Mark	Smith		Glenside	PA
798	Mike	Mahoney		Glenside	PA
799	Estella	Clifford		Abington	PA
800	Emmett	Mcgowem		Glenside	PA
801	Jesse	Oberman		Glenside	PA
802	Maria	Hill		Glenside	PA
803	T	Muray		Abington	PA
804	Cathy	Carroll		Abington	PA
805	Gabrielle	Kelly		Glenside	PA
806	Todd	Belliner		Glenside	PA
807	David	Ferro		Glenside	PA
808	Rebecca	Storz		Glenside	PA
809	Max	Arnosky		Glenside	PA
810	Megan	Dawson		Glenside	PA
811	Jessica	Sandner		Glenside	PA
812	Michelle	Hoff		Allentown	PA
813	Edmund	LoPresti		Pittsburgh	PA
814	Carrie	Eisenhandler		Oreland	PA
815	George	DuPaul		Macungie	PA
816	Ed	Kuszajewski		Greensburg	PA
817	Joie	DeWolf		Gibsonia	PA
818	Francis	Olivieri		Narberth	PA
819	Darren	Strain		Brookhaven	PA
820	Heather	Gustafson		Collegeville	PA
821	Rebecca	Hartwell		Cheltenham	PA
822	Alesha	Bingham		Cheltenham	PA
823	Chris	Donnelly		Cheltenham	PA
824	Ryan	Murphy		Cheltenham	PA
825	Lisa	D		Cheltenham	PA
826	Gail	Post		Cheltenham	PA
827	Holly	Mengel		Cheltenham	PA
828	Romeo	Toledo		Cheltenham	PA
829	Elizabeth	Seltzer		Media	PA
830	Elizabeth	Barton		Cheltenham	PA
831	Donald	Wilson		Philadelphia	PA
832	John	Deegan		Villanova	PA
833	Ossi	Nussbaum		Wyncote	PA
834	Marilyn	Maurer		Wynnewood	PA
835	Paul	Palla		Greencastle	PA
836	Pamela	Hart		Wyncote	PA
837	Catherine	Raphael		Pittsburgh	PA

838	Joe	Kiefner		Jenkintown	PA
839	Richard	Keeler		Bensalem	PA
840	Nicola	Nicolai		Chester Springs	PA
841	Christopher	Dunham		Feasterville	PA
842	Joseph	Toner		Media	PA
843	George	Stradtman		Elkins Park	PA
844	Janice	Crum		Pittsburgh	PA
845	Steve	Didio		Elkins Park	PA
846	Michelle	Stockton		Narberth	PA
847	Chettay	Ciunci		Narberth	PA
848	Laura	Brown		Narberth	PA
849	William	Gordon		Darby	PA
850	Bryn	Hammarstrom, RN		Middlebury Center	PA
851	Martha	Evans		Buena Vista	PA
852	Jane	Srygley		Bethlehem	PA
853	Renee	Dolney		Pittsburgh	PA
854	Richard	Eynon		Villanova	PA
855	Amy	Carafa		Havertown	PA
856	Thomas	McCafferey		Abington	PA
857	Josh	Rudkin		Pittsburgh	PA
858	Layla	Ware		Wynnewood	PA
859	Alexandra	Manning		Downingtown	PA
860	Diane	Sunderlin		Pittsburgh	PA
861	Deb	Solomon		Weeki Wachee	FL
862	Jonathan	Tanner		Ambler	PA
863	Daniel	Dayton		Bensalem	PA
864	Cathy	Reardon		Wynnewood	PA
865	Bob	Sullivan		Wynnewood	PA
866	Elizabeth	Reilly		Wynnewood	PA
867	Lisa	Gau		Wynnewood	PA
868	Julie	Crowe		Lower Merion	PA
869	Marc	Hansroul		Wynnewood	PA
870	Ray	Migneco		Lower Merion	PA
871	William	Becker		Wynnewood	PA
872	Susan	Johnson		Wynnewood	PA
873	Mitchell	Rathorn		Lower Merion	PA
874	Casey	Dajao		Wynnewood	PA
875	Mary	Kaminstein		Lower Merion	PA
876	Emily Retief	Esquire		Wynnewood	PA
877	Nancy	Spinner		Wynnewood	PA
878	Evan	O'brien		Wynnewood	PA
879	Rex	Grubb		Quarryville	PA
880	Amy	Behrman		Wynnewood	PA
881	Melissa	Miketa		Philadelphia	PA
882	Robert	Weiner		Pittsburgh	PA
883	Kay	Reinfried		Lititz	PA

884	Michelle	Alvare		Havertown	PA
885	Chad	Hayes		Philadelphia	PA
886	Gary	Atcheson		Pittsburgh	PA
887	Cindy M.	Dutka		Philadelphia	PA
888	Derrick	Wu		Ardmore	PA
889	Darcie	Prestis		Bear Lake	PA
890	Richard	Metz		Erdenheim	PA
891	Joe	Comerford		Wyncote	PA
892	Robert	Benak		Wyncote	PA
893	Thomas	Aoamski		Wyncote	PA
894	Sydney	Henegan		Wyncote	PA
895	Johnny	Murillo		abington	PA
896	Mary Lou	Cole		Roseto	MA
897	Floyd	Miller		Ben Avon	PA
898	Brandon	Santangelo		Philadelphia	PA
899	Sierra	Hart		Glenside	PA
900	Allison	Levitt		Glenside	PA
901	Mame	McCormick		Glenside	PA
902	Jessica	Bolli		Abington	PA
903	Dianne	Henbent		Abington	PA
904	Pete	P		Abington	PA
905	Jennfer	Scaria		Abington	PA
906	Patricia	Shaw		Abington	PA
907	Alison	Manzinger		Abington	PA
908	AJ	Hufford		Abington	PA
909	John	Doe		Abington	PA
910	Joe	Sarsfield		Abington	PA
911	Charles	Case		Philadelphia	PA
912	Elizabeth	Moselle		Philadelphia	PA
913	Jill H	Snyder		Philadelphia	PA
914	Mary Jean	Cunningham		Philadelphia	PA
915	Nancy	Kelly		Pittsburgh	PA
916	Sandra	Pattinato		Pittsburgh	PA
917	Victor	Broyan		Huntingdon Valley	PA
918	Carter	Pugh		Philadelphia	PA
919	Maxine	Mysliwiec		Pittsburgh	PA
920	Ryan	Meanor		Pittsburgh	PA
921	Kay	Groff		Pottstown	PA
922	Barbara	Litt		Pittsburgh	PA
923	Michael	Hudson		Wayne	PA
924	Laura	Honig		Elkins Park	PA
925	Ann	Dressler		Newtown	PA
926	Michael	Davis		Oreland	PA
927	Marta	Guttenberg		Philadelphia	PA
928	Andrew	Gross		Abington	PA
929	Katharine	Dirksen		Abington	PA

930	Thomas	Croke		Abington	PA
931	Jennifer	Purtell		Abington	PA
932	Mike	Ginsberg		Abington	PA
933	Chris	Harley		East Falls	PA
934	Judene	Steyn		Newtown	PA
935	Mariam	Schakow		Narberth	PA
936	Avery	Pollack		Pittsburgh	PA
937	Marilyn	Bullock		Wallingford	PA
938	Deidre	Tunney		Pittsburgh	PA
939	Paul	Volz		Pittsburgh	PA
940	Cheryl	Banks		Cheltenham	PA
941	Steve	Buschbacher		Cheltenham	PA
942	Natasha	Gordon		Cheltenham	PA
943	Wallace	Amos		Elkins Park	PA
944	Greg	Burides		Elkins Park	PA
945	Ann	Maseley		Elkins Park	PA
946	Danny	Chion		Elkins Park	PA
947	Christopher	Johnson		Philadelphia	PA
948	Debra	Ponch		Elkins Park	PA
949	Chris	Young		Cheltenham	PA
950	Ty	Martin		Cheltenham	PA
951	Brian	James		Cheltenham	PA
952	Andrew	Marx		Cheltenham	PA
953	Alex	Paparella		Wyncote	PA
954	Damian	Bridges		Cheltenham	PA
955	Raymond	Jenkins		Wyncote	PA
956	Kevin	Wilson		Cheltenham	PA
957	Crosby	Falk		Wyncote	PA
958	Linda	Foggie		Cheltenham	PA
959	Shiray	Null		Wyncote	PA
960	Sergeg	Unzoni		Wyncote	PA
961	Janet Ohene	Frempong		Cheltenham	PA
962	Jared	Ickler		Wyncote	PA
963	Catherine	Bollers		Cheltenham	PA
964	Michael	McAllister		Jenkintown	PA
965	Erica	Barnes		Devon	PA
966	Joseph	Cordosi		Abington	PA
967	Val	Pendley		Abington	PA
968	Stephen	Ellner		Abington	PA
969	Chris	Johnson		Abington	PA
970	Scott	Willson		Abington	PA
971	Donna	Edler		Abington	PA
972	Robert	Hopfan		Abington	PA
973	Lexy	McDowell		Abington	PA
974	KC	Weir		Abington	PA
975	Eric	Fries		Abington	PA
976	Edward	Woltemate		Abington	PA

977	Jorhun	Jablonski		Abington	PA
978	El	Sowse		Abington	PA
979	Thoma	Trea		Abington	PA
980	William	Tighe		Abington	PA
981	Jason	Kurtz		Moon Township	PA
982	James	Wurster		Springfield	PA
983	William	Richardson		Pittsburgh	PA
984	Anna	Nicholaides		Glenside	PA
985	Karen	Earlich		Philadelphia	PA
986	John	Till		McMurray	PA
987	Leslie	Brush		Bala Cynwyd	PA
988	Tara	Quinn		Philadelphia	PA
989	Nancy	Spier		Jenkintown	PA
990	Cynthia	Tuite		Murrysville	PA
991	Jason	Sicher		Pittsburgh	PA
992	Diane	Pilch		Ambler	PA
993	Muhammad	Pointer		Glenside	PA
994	Heidi	Wittles		Glenside	PA
995	Anne	Imekus		Pittsburgh	PA
996	Amber	Boller		Coatesville	PA
997	Connie	Thompson		Philadelphia	PA
998	Colleen	McCauley		Philadelphia	PA
999	Victor	Castro		West Chester	PA
1000	Jeanne	Holt Brabson		Oreland	PA
1001	Lisa	Flaiz		Lafayette Hill	PA
1002	Laura	Daniels		Pittsburgh	PA
1003	Jean	Scholz		Wayne	PA
1004	Dick	Whiteford		West Chester	PA
1005	Quinn	Pendred		Pittsburgh	PA
1006	Andrea	Gore		Chesterbrook	PA
1007	Michael	Rencurello		Pittsburgh	PA
1008	Michelle	Bender		Monroeville	PA
1009	Celeste	Wetzel		Warwick	PA
1010	Luana	Goodwin		Philadelphia	PA
1011	Landon	Chandler		Wyndmoor	PA
1012	Nancy	Waugaman		Pittsburgh	PA
1013	Marita	Baginski		Glenshaw	PA
1014	Barry	Scott		Philadelphia	PA
1015	Rita	Anstee		Philadelphia	PA
1016	Toni	Edwards		Gibsonia	PA
1017	Emmy	DeGregorio		Pittsburgh	PA
1018	Haleigh	Besecker		Philadelphia	MA
1019	Tamela	Trussell		Carlisle	PA
1020	Memory	Derthick		Pittsburgh	PA
1021	Jen	McNeill		Philadelphia	PA
1022	John	Todd		Phoenixville	PA
1023	Nathan	Spencer		Sharon	MA

1024	Michael	Fry		Philadelphia	PA
1025	Javier	Torres		Lackawaxen	PA
1026	Amote	Garvin		Swissvale	PA
1027	Katherine	Echeverra		Media	PA
1028	Teddy	Jennings		Philadelphia	PA
1029	Suzanne	Lahti		Kalamazoo	MI
1030	Diane	Stackhouse		Phoenixville	PA
1031	Nancy	Delpresto		Pittsburgh	PA
1032	Patricia	Keresey		West Hartford	CT
1033	Kristopher	Babcock		Ardmore	PA
1034	Nancy	Elfant		Glenside	PA
1035	Karen	Bonitatibus		Ambler	PA
1036	Karen	Joslin		Philadelphia	PA
1037	Helene	Langlamet		Philadelphia	PA
1038	Eric	Moore		Philadelphia	PA
1039	John	Carlos		Pittsburgh	PA
1040	Cindy	Rack		Bethel Park	PA
1041	Mike	Anderson		Pittsburgh	PA
1042	Nicole	Formica-Defrancesco		Duncansville	PA
1043	Nancy	Koerbel		Pittsburgh	PA
1044	Gwendolyn	Torres		Wyncote	PA
1045	Patricia	Wilkinson		Sylvan Lake	MI
1046	Lauren	Ellenberg		Glenside	PA
1047	Karen	Hutcheson		Wyndmoor	PA
1048	Lisa	Kerber		Lafayette Hill	PA
1049	Reed	Forden		Wyndmoor	PA
1050	Gail	Landers		Williamsport	PA
1051	Mark	Berg	Watershed Alliance of Adams County	York	PA
1052	Daniel	Berman		Carlisle	PA
1053	Karen	Elias		Lock Haven	PA
1054		Susang-Talamo Family		Export	PA
1055	Beth	Darlington		Poughkeepsie	NY
1056	Tracey	Smallwood		Waldorf	MD
1057	Donna	Logan		Erie	PA
1058	David	Adams		Penn Valley	CA
1059	Liana	Lang		White Haven	PA
1060	Les	Paul		Marietta	OH
1061	Saundra	Petrella		Beaver	PA
1062	Isabel	Tadmiri		New York	NY
1063	Stephanie	Ulmer		Pittsburgh	PA
1064	Angelica	Aguilar		Columbus	OH
1065	Krista	Kontzamanys		Chester Springs	PA
1066	Eugene	Mariani		Pittsburgh	PA
1067	James	Molnar		Mechanicsburg	PA

1068	Tom	Westman		Gibsonia	PA
1069	Eleanor	Weisman		Knox	ME
1070	John	Scanlon		Pittsburgh	PA
1071	Dave	Ringle		Macungie	PA
1072	Regina	Brooks		Pittsburgh	PA
1073	Wesley	Silva		Marianna	PA
1074	Ronald	Gulla		Waukon	IA
1075	Michael	Cosentino		Pittsburgh	PA
1076	Martina	Jacobs		Pittsburgh	PA
1077	Sandy	Field		Lewisburg	PA
1078	Teena	Halbig		Louisville	KY
1079	Erica	Jackson		Pittsburgh	PA
1080	Ravi	Sheth		Philadelphia	PA
1081	Philip	Nelson	Univ of Pennsylvania	Philadelphia	PA
1082	Noah	Gans-Pfister		Philadelphia	PA
1083	Francesca	Gans-Pfister		Philadelphia	PA
1084	Debra	Kossman		Philadelphia	PA
1085	Scott	Weinstein		Philadelphia	PA
1086	Mary-Angela	Papalaskari	Villanova University	Philadelphia	PA
1087	Louise	Grim		Wyomissing	PA
1088	Patricia	Laffey		Pittsburgh	PA
1089	Jim	Sandoe		Ephrata	PA
1090	Teresa	Speicher		Palmyra	PA
1091	David	Low		Flourtown	PA
1092	Lynne	Hurd		Hanover	PA
1093	Cynthia	Boyd		Malvern	PA
1094	Teri	Dignazio		Oxford	PA
1095	Paul	Palla		Greencastle	PA
1096	D.	Burnett		Spring City	PA
1097	Myra	Kazanjian		Bethel Park	PA
1098	Megan	Whitmer		Parker	PA
1099	Daryl	Rice		Perkasie	PA
1100	Donna	McKee		Lederach	PA
1101	Kathleen	Miller		Wilkes-Barre	PA
1102	Carolyn	Lange		Saylorsburg	PA
1103	Don	Naragon		Sewickley	PA
1104	Amy	McCready		Lewisburg	PA
1105	Paul	Roden		Yardley	PA
1106	Lisa	Lapp		West Chester	PA
1107	John	Dziak		State College	PA
1108	Paul	Brown		Pittsburgh	PA
1109	Mark	Hirschman		Lititz	PA
1110	Patricia	Larason		Chalfont	PA
1111	Donna	Gayer		New Tripoli	PA
1112	Ransome	Weis		Doylestown	PA
1113	Gale	Reid		Lansdale	PA
1114	Randall	Wambold		Bethlehem	PA

1115	Nathan	Fogel		Wind Gap	PA
1116	Kay	Gering		Feasterville Trevose	PA
1117	Justin	Sandherr		Pittsburgh	PA
1118	Joseph	Bridy		Philadelphia	PA
1119	Jan	Hughes		Reading	PA
1120	Anne	Jackson		Birdsboro	PA
1121	Katie	Hammer		Pittsburgh	PA
1122	Aubrey	Sawyer		Effort	PA
1123	Macklyn	Hutchison		Philadelphia	PA
1124	Katelyn	Haas-Conrad		Pittsburgh	PA
1125	Peter	Mayes		Narberth	PA
1126	John	Trout		West Chester	PA
1127	Christopher	Gaddess		Canadensis	PA
1128	Phillip	Chiodo		McKees Rocks	PA
1129	Al	Luque		Philadelphia	PA
1130	Janis	Millu		Franklin	PA
1131	Diane	Krassenstein		Philadelphia	PA
1132	William	Palmer		Spring Mills	PA
1133	Carolyn	Hughes		Hanover	PA
1134	Debbie	Adams		Philadelphia	PA
1135	Jeffrey	Wentzel		Downingtown	PA
1136	Dan	Volpatti		Pittsburgh	PA
1137	Clare	Novak		Chester Springs	PA
1138	Terri	Yeager		Glenshaw	PA
1139	Joseph	Hedekker		Milanville	PA
1140	Steve	James		Gettysburg	PA
1141	Roger	Latham		Rose Valley	PA
1142	Rick	Newsome		Horsham	PA
1143	Jennifer	Clark		Media	PA
1144	Dan	Pepin		Cranberry Township	PA
1145	Michael	Belmonte		Pittsburgh	PA
1146	Marc	Henry		State College	PA
1147	Bettina	Wilkinson		Valencia	PA
1148	Joseph	Sayre		Downingtown	PA
1149	Robert	Depew		Newtown	PA
1150	Virginia	Zajac		Pittsburgh	PA
1151	Lynn	Cox		Morrisville	PA
1152	Sanford	Leuba		Pittsburgh	PA
1153	Marilyn	Fritz		Bethlehem	PA
1154	Howard	Filtz		Pittsburgh	PA
1155	Carol	Smith		Conshohocken	PA
1156	Donna	Ingenito		Mount Joy	PA
1157	Timothy	Murray		Ringgold	PA
1158	Victoria	Cox		Pottstown	PA
1159	Nuala	Carpenter		Wayne	PA

1160	Ruth	Seeley		Philadelphia	PA
1161	Megan	Taylor		Erie	PA
1162	Marcela	Gonzalez		Pittsburgh	PA
1163	Eva	Goll		Reinholds	PA
1164	Lela	Betts		Wyndmoor	PA
1165	Ronnie	Begosa		Carson	PA
1166	Carole	Soskis		Bala Cynwyd	PA
1167	Wesley G.	Finkbeiner		Womelsdorf	PA
1168	John	Flynn		Millville	PA
1169	Lois	Campbell		Pittsburgh	PA
1170	Lisa	Weathers		Media	PA
1171	Barbara	Achey		Union Dale	PA
1172	Deborah	Cooper		Cranberry Township	PA
1173	Mark	Henry		Philadelphia	PA
1174	Shannon	Baudoin-Rea		Conshohocken	PA
1175	George	Stradtman		Elkins Park	PA
1176	Marilyn	Burke		Pittsburgh	PA
1177	Joe	Evans		Lansdale	PA
1178	Rev. J. Howard	Cherry		Pittsburgh	PA
1179	Darrin	Britting		Philadelphia	PA
1180	Katherine	Christensen		Essington	PA
1181	Kathy	Testoni		Pittsburgh	PA
1182	John	Gricas		North Charleroi	PA
1183	Daniel	Dunn		Newtown	PA
1184	Nicola	Nicolai		Chester Springs	PA
1185	Edward	Sykes		Camp Hill	PA
1186	Bo	Alexander		Coatesville	PA
1187	Lynne	Lucchino		Bethel Park	PA
1188	Anne Marie	Smith		Rose Valley	PA
1189	Elizabeth	Shober		Lafayette Hill	PA
1190	Christopher	Dunham		Feasterville	PA
1191	Barbara	Bradshaw		Springfield	PA
1192	Melissa	Benson		North Abington Township	PA
1193	Dawn	Eagle		Bath	PA
1194	Elizabeth	Hollar		Lititz	PA
1195	Katherine	Hovde		Philadelphia	PA
1196	Enrique	Garcia		Philadelphia	PA
1197	Nancy	McCullough		Drexel Hill	PA
1198	Francis	Fedoroff		Philadelphia	PA
1199	Jennifer	Hoffman		Harrisburg	PA
1200	Bennett	Helm		Lancaster	PA
1201	Julie	Carll		Chambersburg	PA
1202	Susanna	Throop		Collegeville	PA
1203	Michael	Giansiracusa		Philadelphia	PA
1204	Linda	Castagna		Philadelphia	PA

1205	Jeffrey	Bartholomew		Easton	PA
1206	Kathleen	Reifke		Pottstown	PA
1207	Paul	Lyons		Pittsburgh	PA
1208	Amber	M		Phoenixville	PA
1209	Nuiko	Wadden		Pittsburgh	PA
1210	Joe	Schiavo		Philadelphia	PA
1211	Ruth	Schmidt		New Kensington	PA
1212	Thomas	Flynn		Malvern	PA
1213	Diane	Leos		State College	PA
1214	Jane	Eisenstein		Philadelphia	PA
1215	Paz	Paulsen-Sacks		Norristown	PA
1216	Daniel R.	Festog		Bobtown	PA
1217	Deborah	Polk		Pittsburgh	PA
1218	Kamila	Novicki		Girard	PA
1219	James	McKeon		Yardley	PA
1220	Mary Jo	Knox		Pittsburgh	PA
1221	Jeb	Jungwirth		Pittsburgh	PA
1222	Ellen S	Cohen		Ardmore	PA
1223	Glenn	Gawinowicz		Oreland	PA
1224	Liana	Lang		White Haven	PA
1225	Mark	White		Pittsburgh	PA
1226	Elaine	Dellande		Fountain Hill	PA
1227	Sharon	Rigatti		Pittsburgh	PA
1228	Elizabeth	Rotz		Bethel Park	PA
1229	Ann	McGaffey		Pittsburgh	PA
1230	Keya	Gibbons		White Oak	PA
1231	Raymond	Smith		Apollo	PA
1232	Stephanie	Papale		Phoenixville	PA
1233	George	Busse		Waynesboro	PA
1234	Donna	Delany		Chester Springs	PA
1235	Andrew	Kalan		Bryn Mawr	PA
1236	Richard	Tregidgo		Holtwood	PA
1237	Harriet	Gomon		Jenkintown	PA
1238	Nancy	Kenepp		Wynnewood	PA
1239	Joan	Betesh		Bala Cynwyd	PA
1240	Michael	Liebman		Kennett Square	PA
1241	Raymond	Coccia		Greensburg	PA
1242	Robert	Werner		Elkins Park	PA
1243	Heidi	Fimognari		Pittsburgh	PA
1244	Carl	Ruzicka		Newtown	PA
1245	Tom	Gauntt		Bensalem	PA
1246	Darren	Strain		Brookhaven	PA
1247	Kathryn	Bagley		Philadelphia	PA
1248	Andrew	Sharp		Altoona	PA
1249	Nancy	Boxer		Havertown	PA
1250	Ann	Eynon		Villanova	PA
1251	Matthew	O'Donnell		Oreland	PA

1252	Kathryn	Stevens		Pittsburgh	PA
1253	Helen	Robinson		Kennett Square	PA
1254	Patricia	Libengood		Erie	PA
1255	Elisabeth	Simpson		Easton	PA
1256	William	Montgomery		Pottstown	PA
1257	John	Ginty		Glenside	PA
1258	Carol	Stanton		Pittsburgh	PA
1259	Douglas	Kingsbury		Philadelphia	PA
1260	Peter	Scupelli		Pittsburgh	PA
1261	Rosalie	Garrett		Havertown	PA
1262	Marian	Huq		Pittsburgh	PA
1263	Karen	Taussig-Lux		Media	PA
1264	Karen	Michalczyk		Philadelphia	PA
1265	Melody	Farrin		Pittsburgh	PA
1266	Jim Mc	Graw		Malvern	PA
1267	Lynn	Hartle		Media	PA
1268	James	Staszewski		Pittsburgh	PA
1269	Victoria	Beechler		Philadelphia	PA
1270	Ira	Josephs		Media	PA
1271	John	Dimoff		Finleyville	PA
1272	Cindy	Beckler		Pottstown	PA
1273	Christina	Penrose		Philadelphia	PA
1274	Thom	Franz		Pittsburgh	PA
1275	Rozalyn	Landisburg		Philadelphia	PA
1276	Mathew	Turner		Philadelphia	PA
1277	Valerie	Monick		Dallas	PA
1278	John	Cooke		Haverford	PA
1279	Barbara	Kucan		Monroeville	PA
1280	Dori	Tighe		Milford	PA
1281	Christine	Razler		Yardley	PA
1282	Michael	Balsai		Philadelphia	PA
1283	Brian	Cooke		Philadelphia	PA
1284	James	Farrell		Philadelphia	PA
1285	Bill	Edwards		Glenside	PA
1286	Suzanne	Roose		Media	PA
1287	Cheryl	Wanko		Coatesville	PA
1288	Ian	Notte		Philadelphia	PA
1289	Madeline	Miller		Philadelphia	PA
1290	Allen	Prindle		Swarthmore	PA
1291	Greg & Jane	Cook		Bethlehem	PA
1292	Randall	Tenor		Mechanicsburg	PA
1293	Jeanne	Voronin		Doylestown	PA
1294	Mickey	Wolk		Havertown	PA
1295	Deanne	O'Donnell		Derry	PA
1296	Marshall	Hamilton		Media	PA
1297	Rita	Pesini		North Wales	PA
1298	Daniel	Papa		Philadelphia	PA

1299	Niecy	McGough		PITTSBURGH	PA
1300	Paul	Hagedorn		Philadelphia	PA
1301	Peter	Adams		Pittsburgh	PA
1302	Sarah	Collier		St Davids	PA
1303	Cindy M.	Dutka		Philadelphia	PA
1304	Brenda	Norris		Brookhaven	PA
1305	Pauline	Rosenberg		Philadelphia	PA
1306	Harry	Robbins		Drums	PA
1307	Donald	Ament		Leola	PA
1308	Chrissa	Pedersen		Philadelphia	PA
1309	Carrie	Swank		Sinking Spring	PA
1310	Susan	Fineman		Pittsburgh	PA
1311	Vicki	Jenkins		Philadelphia	PA
1312	Randall	Couch		Philadelphia	PA
1313	Brittany	Vegso		Malvern	PA
1314	Donald	Park		Newtown Square	PA
1315	Diane	Fries		Allentown	PA
1316	Roberta	Camp		Philadelphia	PA
1317	Peter	Lynch		Berwyn	PA
1318	James	Keenan		Lansdowne	PA
1319	Harry	Zabetakis		Pittsburgh	PA
1320	Glenn	Schlippert		Etters	PA
1321	Sara	Ream		Conestoga	PA
1322	Susan	Saltzman		Philadelphia	PA
1323	Carol	Montague		Carversville	PA
1324	Cindy	Sproat		Dauphin	PA
1325	Priscilla	Mattison		Bryn Mawr	PA
1326	Don	Hawkins		North Braddock	PA
1327	Mark	Terwilliger		York	PA
1328	Louis	Blau		Brownsville	PA
1329	Terry	Antonacci		Horsham	PA
1330	Denise	Foehl		Royersford	PA
1331	Charles	Ogle		Kunkletown	PA
1332	Adele Bon	Shannon		Center Valley	PA
1333	Holly	Tyson		Philadelphia	PA
1334	Marilyn	Maurer		Wynnewood	PA
1335	David	Ringle		Macungie	PA
1336	Randall	Shupp		Conshohocken	PA
1337	Evan	Dull		Wexford	PA
1338	Loretta	Ottinger		Breinigsville	PA
1339	Doug	Krause		Philadelphia	PA
1340	Mary	Kupferschmid		Bethlehem	PA
1341	Jason	Lubar		East Norriton	PA
1342	Valerie	Klauscher		Crescent	PA
1343	Mary Anne	Morefield		Mechanicsburg	PA
1344	Wendy	Smith		Camp Hill	PA
1345	David	Kutish		Chalfont	PA

1346	Allison	Duncan		Malvern	PA
1347	Tim	Herman		Hershey	PA
1348	Molly	Grace		Ligonier	PA
1349	Jennifrr	Hetrick		Doylestown	PA
1350	LaMoyne	Darnall		Pittsburgh	PA
1351	Tina	Durakov		Bethlehem	PA
1352	Marylyle	McCue		Philadelphia	PA
1353	David	Fiedler		Bensalem	PA
1354	Michael	Zuckerman		Philadelphia	PA
1355	Robert	Smith		York	PA
1356	Ann-Marie	Christopher		Pittsburgh	PA
1357	Lisa Uzzo	Brady		Philadelphia	PA
1358	Rebecca	Gagliano		Philadelphia	PA
1359	Scott	Eaby		Ephrata	PA
1360	Anne	Keys		Collegeville	PA
1361	Fred	Florian		Gibsonia	PA
1362	Laurie	Cressman		Muncy	PA
1363	Oren	Helbok		Bloomsburg	PA
1364	Kathleen	McGinnis		Moosic	PA
1365	Joyce	Friedman		West Chester	PA
1366	Daniel	Sutton		Wynnewood	PA
1367	Carolin	Schellhorn		Ardmore	PA
1368	James	Morrow		State College	PA
1369	Steve	Sears		Hatboro	PA
1370	Thomas	Josephi		Monongahela	PA
1371	Phyllis	Blumberg		Bala Cynwyd	PA
1372	Christopher	Lankenau		Philadelphia	PA
1373	Dave	Bindewald		Pittsburgh	PA
1374	Emma	Sabin		Philadelphia	PA
1375	Lisa	Windheim		Damascus	PA
1376	Cory	Reyman		Philadelphia	PA
1377	Mark	Levin		Plymouth Meeting	PA
1378	Oleg	Zvonarov		Philadelphia	PA
1379	Susanne	Hewitt		Newtown	PA
1380	Richard	Baron		Lititz	PA
1381	Linda	Porter		Bristol	PA
1382	Hope	Punnett		Philadelphia	PA
1383	Al	Cohen		Hummelstown	PA
1384	Robert	Errett		Greensburg	PA
1385	Jo Ann	Jablon		Glenside	PA
1386	Madeline	Sambuchino		Erie	PA
1387	Marilyn	Barry		Kennett Square	PA
1388	Vic	Compher		Philadelphia	PA
1389	Laura	Murillo		Glenside	PA
1390	Lauren	Lareau		Langhorne	PA
1391	Sid	Amster		Philadelphia	PA

1392	Laurie Pisarcik	Connolly		Middletown	PA
1393	James	Castellan		Media	PA
1394	Marilynn	Harper		Media	PA
1395	Phyllis	Terwilliger		York	PA
1396	Meg	Fagan		Spring City	PA
1397	Jeanne	Held-Warmkessel		North Wales	PA
1398	Barbara	Leinbach		Reading	PA
1399	Marcia	Hepps		West Chester	PA
1400	Kaylene	Schultz		Phoenixville	PA
1401	Dorothy	Maurer		Blue Bell	PA
1402	Juan	Llarena		Erie	PA
1403	Suzanne	Bates		Baden	PA
1404	Thomas	Campanini		York	PA
1405	Valerie	Ogden		Philadelphia	PA
1406	Anne	Peniazk		Lansdale	PA
1407	Morgan	Folger		Ardmore	PA
1408	Matthew	Quinn		Norristown	PA
1409	Kathy	Erndl		Pittsburgh	PA
1410	Sydney	Meyer		Philadelphia	PA
1411	Dennis	Schaef		Meadville	PA
1412	Katherine	Wynn		Wayne	PA
1413	Sandra	Foehl		Philadelphia	PA
1414	Sabina	Tannenbaum		Philadelphia	PA
1415	Kate	Benson		Jenkintown	PA
1416	Peter	Kabatek		Harrisburg	PA
1417	Rob	McClimon		Pottstown	PA
1418	Neil	Hartman		Doylestown	PA
1419	Melody	Alexander		Coatesville	PA
1420	Sally	Kapner		Havertown	PA
1421	Natalie	Batovsky		Hanover	PA
1422	Kaitlyn	Ave'Lallemant		Philadelphia	PA
1423	Veronica Eronica	Litras		Lehman	PA
1424	Mike	James		Haverford	PA
1425	Fonda	Hollenbaugh		Pittsburgh	PA
1426	Miah	Hornyak		Bensalem	PA
1427	John	Scanlon		Pittsburgh	PA
1428	Melissa	K		South Heights	PA
1429	Gregory	Burgdorf		Hummelstown	PA
1430	Sharon	Levin		Elkins Park	PA
1431	John	Furlong		Trevose	PA
1432	Glenn	Wood		Moon Township	PA
1433	Marian	Nasuti		Philadelphia	PA
1434	Susan	Clarke-Mahoney		Thornton	PA
1435	Mary Virginia	Stieb-Hales		Gwynedd	PA

1436	Kathleen	Wilhelm		Gwynedd	PA
1437	Forrest	Wright		Philadelphia	PA
1438	Pamela	Jumet		Albrightsville	PA
1439	Rebecca	Lieberman		Lansdale	PA
1440	David	Roberts		Bellefonte	PA
1441	Joseph	Pinto		Newtown Square	PA
1442	Patrick	Traphagen		Erie	PA
1443	Katy	Ruckdeschel		Merion Station	PA
1444	Julie	DiCenzo		Sewickley	PA
1445	Joanna	Robinson		Newville	PA
1446	Elizabeth	Keech		Wynnewood	PA
1447	Karen	Elias		LOCK HAVEN	PA
1448	Judith	Gruswitz		Dover	PA
1449	Cindy	March		Dallas	PA
1450	John	Oriente		Havertown	PA
1451	Desiree	Carbone		Pittsburgh	PA
1452	Howard	Sherman		Lansdowne	PA
1453	Jessica	Stephenson		Pittsburgh	PA
1454	Robert	Benvin		Newville	PA
1455	Agnes	Tavani		Lebanon	PA
1456	Della	Cowall		Lansdowne	PA
1457	Geneva	Butz		Philadelphia	PA
1458	Kevin	McClay		Washington Crossing	PA
1459	Harli	Strauss-Cohn		Allentown	PA
1460	Mary	Butash		Jenkintown	PA
1461	David	Somers		York	PA
1462	James	Hicks		Falls Creek	PA
1463	Ross	Mann		Philadelphia	PA
1464	Todd	Morris		Spring City	PA
1465	Alexander	Poplawsky		Pittsburgh	PA
1466	Rory	Mosko		Bensalem	PA
1467	Beth	Dreyer-DeGoede		Mount Joy	PA
1468	Sam	Simon		Philadelphia	PA
1469	Mandy	Tshibangu		Devon	PA
1470	Barbara	Clifford		Montrose	PA
1471	Robert	DuPlessis		Philadelphia	PA
1472	Peter	Syre		Abington	PA
1473	Katherine	Chatel		Philadelphia	PA
1474	Edna	Scheifele		Emmaus	PA
1475	Mike	DellaPenna		Malvern	PA
1476	Caroline	Cotugno		Croydon	PA
1477	Betty	Pierce		West Mifflin	PA
1478	William	Granche		Ridgway	PA
1479	Kelly	Riley		Hatfield	PA
1480	Mitzi	Deitch		Langhorne	PA

1481	Kevin	Cochrane		Easton	PA
1482	David	Kenosian		Berwyn	PA
1483	Kelli	Parsons		Elkins Park	PA
1484	Suzan	Ragan		Pittsburgh	PA
1485	Beverly	Rae		Hellertown	PA
1486	Stephanie	Mory		Clarks Summit	PA
1487	Martha	Sawyer		State College	PA
1488	Paul	Weinstein		Doylestown	PA
1489	Michele	Johnson		Altoona	PA
1490	Stacey	Dembele		Chesterbrook	PA
1491	John	Spinella		Philadelphia	PA
1492	Rocco	Malerbo		Pittsburgh	PA
1493	Diane	Rusch		Canonsburg	PA
1494	Patrick	Mccloskey		Havertown	PA
1495	Howard and Arlene	Leiter		Langhorne	PA
1496	Joyce	Durkin		Mountville	PA
1497	Elizabeth	Warner		Equinunk	PA
1498	Kenneth	Bickel		Pittsburgh	PA
1499	Will	Willis		Mercersburg	PA
1500	Barbara	Vanhorn		Duncannon	PA
1501	Heidi	Needleman		Doylestown	PA
1502	George	Mostoller		Philadelphia	PA
1503	Dominica Lo	Bianco		Aston	PA
1504	Bernard	Lizak		Northampton	PA
1505	Tom	Moser		Murrysville	PA
1506	Barbara	Sonies		Narberth	PA
1507	Jonathan	Turban		Pittsburgh	PA
1508	Sarah	Puleo		Philadelphia	PA
1509	Jesse	Hare		Jamison	PA
1510	Julio Paz Y.	Mino		Havertown	PA
1511	Lisa	Marcucci		Pittsburgh	PA
1512	Diane	Bastian		Liberty	PA
1513	T.	Foster		Hummelstown	PA
1514	Dianne	Carroll		Pittsburgh	PA
1515	David	Nichols		Havertown	PA
1516	Nancy	Tate		Riegelsville	PA
1517	Steven	Lubin		Philadelphia	PA
1518	Donna	Carswell		Huntingdon Valley	PA
1519	Janice	Peischl		Allison Park	PA
1520	Rhonda	Patterson		Kutztown	PA
1521	Rich	Matusz		Washington Crossing	PA
1522	Suzanne	Connolly		Enola	PA
1523	Lee	Bible		Abbottstown	PA
1524	Linda	Granato		Philadelphia	PA

1525	Ann	Kuter		Warrington	PA
1526	Diane	Alexanderson		Doylestown	PA
1527	John	McDermott		State College	PA
1528	Gina	LoBiondo		Havertown	PA
1529	Susan	Buda		State College	PA
1530	Ron	Wexler		North Wales	PA
1531	Kathleen	Lucas		Ellwood City	PA
1532	Carolyn	Shaffer		Erie	PA
1533	Linda	Reichert		Chester Springs	PA
1534	Julianne	Gould		East Stroudsburg	PA
1535	Michael	Siwy		Whitehall	PA
1536	Shannon	Smith		Johnstown	PA
1537	Patricia	Libbey		Philadelphia	PA
1538	David	Clemens		Milton	PA
1539	Daniel	Salmen		Pittsburgh	PA
1540	M.	Higgins		Kunkletown	PA
1541	Joan	Pelc		Newtown Square	PA
1542	Wayne	Albright		Swissvale	PA
1543	Genevieve	Santalucia		Philadelphia	PA
1544	David	Lischner		Allentown	PA
1545	Shirley and Rick	Stark		Lemoyne	PA
1546	Silvio	Fittipaldi		Philadelphia	PA
1547	Daniel	Safer		Philadelphia	PA
1548	Suzanne	Staggenborg		Squirrel Hill	PA
1549	Joyce	Bell		Springfield	PA
1550	Michael	Parke		Springfield	PA
1551	Maurice	Samuels		Pittsburgh	PA
1552	Rob	Sackett		Erie	PA
1553	Al	Guarente		Media	PA
1554	Matthias	Hess		Lancaster	PA
1555	Donna	Holloway		Kennett Square	PA
1556	Erin	Reagan		Philadelphia	PA
1557	Sarah	Deer		Allison Park	PA
1558	Susan	Babbitt		Philadelphia	PA
1559	Lisa	Steckhouse		Pennsburg	PA
1560	Emily	Pitner		Washington	PA
1561	Linda/Joe	Roe		Fairless Hills	PA
1562	Heather	Wiggins		Levittown	PA
1563	Ann	Chadwell		Camp Hill	PA
1564	Barbara	Parker		Sarver	PA
1565	Dorothy	Briscoe		Wayne	PA
1566	Ann	Schwartz		Langhorne	PA
1567	Helen	Navaline		Philadelphia	PA
1568	Peter	Hirsch		Bala Cynwyd	PA
1569	Greg	Pasquarello		Phoenixville	PA
1570	Dan	Schwartz		Bath	PA

1571	Angela	Leventis		Philipsburg	PA
1572	John	Smith		Philadelphia	PA
1573	Eric	Pavlak		Oaks	PA
1574	Tina	DeCarla		Telford	PA
1575	Barry	Weiss		Philadelphia	PA
1576	Barry	Cutler		Springfield	PA
1577	Benjamin	Chaffee		Lake City	PA
1578	Ann	Peters		Philadelphia	PA
1579	Marie	Allsman		Media	PA
1580	W. Bruce	Dunkman		Radnor	PA
1581	Theodore	Burger		Bethlehem	PA
1582	Melvin	Armolt		Chambersburg	PA
1583	Larissa	Smith		Mercersburg	PA
1584	Sharon	Hoffman		Pittsburgh	PA
1585	Pam	Komm		Chesterbrook	PA
1586	Teresa	Baumgardner		Aliquippa	PA
1587	Kimberly De	Woody		Wayne	PA
1588	Edward	Drinkwater		Malvern	PA
1589	Donna	Smith		Havertown	PA
1590	Carol	Troisi		Unityville	PA
1591	Dennie and Carol	Baker		Warrington	PA
1592	Kathy	Turner		Clearfield	PA
1593	Lou Ann	Pacocha		Coal Township	PA
1594	Matthew	Ford		Nazareth	PA
1595	Joseph	Deasey		Morton	PA
1596	Jack	Miller		Lewisburg	PA
1597	Patricia	Savadove		New Hope	PA
1598	John	Stofko		Allentown	PA
1599	Amy	Morrisroe		Folsom	PA
1600	Pamela	Moore		Erie	PA
1601	Diane	Cicco		Pittsburgh	PA
1602	Eric	Dougherty		Perkiomenville	PA
1603	Mary	McMahon		Philadelphia	PA
1604	Ellis	Coleman		Kennett Square	PA
1605	John	Lawson		Penn Valley	PA
1606	Wilbur	Amand		West Chester	PA
1607	Brenda	Hartman		Reading	PA
1608	Brian	Earley		Lancaster	PA
1609	Erika	Seibel		Eighty Four	PA
1610	Santiago	Bobadilla		Lancaster	PA
1611	Ann	Callahan		Lahaska	PA
1612	Barbara	Kilgallon		Silverdale	PA
1613	Stephanie	Stern		Narberth	PA
1614	Arthur	Satter		Beach Lake	PA
1615	Melinda	Geiger		Freedom	PA
1616	Regina	Brooks		Pittsburgh	PA

1617	Naomi	Miller		Philadelphia	PA
1618	Simone	Kereit		Macungie	PA
1619	Jeff	Sommers		Doylestown	PA
1620	Bobby	McElroy		Easton	PA
1621	Leo	Kucewicz		Phoenixville	PA
1622	Constantina	Hanse		Pittsburgh	PA
1623	Heidi M.	Hess		Glenside	PA
1624	Kathryn	Gabig		Easton	PA
1625	Mary	More		Flourtown	PA
1626	Rex	Grubb		Quarryville	PA
1627	Brett	Schultz		Wernersville	PA
1628	Karen Guarino	Spanton		Philadelphia	PA
1629	Glenn	Davis		Apollo	PA
1630	Youping	Xiao		Doylestown	PA
1631	Michael	Fratangelo		Pleasant Gap	PA
1632	Laura	Prushinski		Larksville	PA
1633	Kelsey	Smolen		Exton	PA
1634	Miriam	Harlan		Philadelphia	PA
1635	Sheila	Erlbaum		Philadelphia	PA
1636	Frances	Raab		Quakertown	PA
1637	Laura	Chinofsky		Southampton	PA
1638	Shirley	Neff		Blue Bell	PA
1639	Kathleen	Nicholas		Pittsburgh	PA
1640	Jenny	Ruckdeschel		Bryn Mawr	PA
1641	Leann	Turley		West Decatur	PA
1642	Michael	Lombardi		Levittown	PA
1643	Patricia	Barrow		Harrisburg	PA
1644	Christopher	Minich		Lewis Run	PA
1645	Barbara	Nadel		Milford	PA
1646	Thomas	Morrow		Finleyville	PA
1647	Eileen	Shupak		Philadelphia	PA
1648	Deborah	Lubonovich		Franklin	PA
1649	Greg	Curtin		Pittsburgh	PA
1650	Elizabeth	Karpinski		Norristown	PA
1651	Lynn	Glielmi		Lancaster	PA
1652	Patricia	Miller		Manchester	PA
1653	Richard	McNutt		Pipersville	PA
1654	Brandon	Redfearn		Chester	PA
1655	Donna	Bookheimer		Douglassville	PA
1656	Denise	Costello		Philadelphia	PA
1657	Linda	Myers		Petersburg	PA
1658	Jennifer A	Holmes		Philadelphia	PA
1659	Mary Jean	Sharp		Altoona	PA
1660	Eugene	Mariani		Bethel Park	PA
1661	Ilyse	Kazar		Harrisburg	PA
1662	Lorraine	Kittner		Feasterville Trevose	PA

1663	Joyce	Morrison		Norwood	PA
1664	Victoria	Chemerys		Langhorne	PA
1665	Steven	Weinberg		Elkins Park	PA
1666	Jennifer	Hotaling		Philadelphia	PA
1667	Douglas	Mohr		Sellersville	PA
1668	Michelle	Strasberg		Spring City	PA
1669	Nancy	Chernett		Wynnewood	PA
1670	David	Meade		Apollo	PA
1671	Karen	Berry		Bethlehem	PA
1672	Sherley	Young		Philadelphia	PA
1673	Hannah	Lucey		Philadelphia	PA
1674	Kristine	Hunt		Pittsburgh	PA
1675	Harrison	Mace		Philadelphia	PA
1676	Mary	Gray		Sewickley	PA
1677	Ryan	Joyce		Aspinwall	PA
1678	Bridget	Irons		Philadelphia	PA
1679	Kathleen	Setash		Lansdale	PA
1680	Gary	Tuma		Mechanicsburg	PA
1681	Marnie	Henretig		Philadelphia	PA
1682	Shan	Griffin		Philadelphia	PA
1683	Earl	Baldwin		Flourtown	PA
1684	Andrea	Schultz		Pittsburgh	PA
1685	Judy	Meyer		Downingtown	PA
1686	Gary	Ryan		Doylestown	PA
1687	James	Pugliese		Glen Mills	PA
1688	Sue	Bialostosky		Pittsburgh	PA
1689	Greg	Skutches		Bethlehem	PA
1690	Thomas	Magin		Southampton	PA
1691	June	Bricker		Mifflintown	PA
1692	Elizabeth	Seltzer		Media	PA
1693	Alfred	Klosterman		Philadelphia	PA
1694	Laura	Orsini		Coatesville	PA
1695	Joetta	Venneman		Pittsburgh	PA
1696	Amy	Guskin		Malvern	PA
1697	Brian	Garvin		Ambler	PA
1698	Taylor	Lamborn		Reading	PA
1699	Susan	Anderson		Fredericksburg	PA
1700	William	Henry		Clinton	PA
1701	Robert	Gibb		Homestead	PA
1702	Susan	Porter		Lords Valley	PA
1703	John	McGinley		Cochranville	PA
1704	Judith	Bohler		Ephrata	PA
1705	David	Harris		Harrisburg	PA
1706	Colleen	Wood		Chalfont	PA
1707	Don St.	John		Peach Bottom	PA
1708	Sabrina	Wojnaroski		Pittsburgh	PA
1709	Jill M	Podczaski		Oil City	PA

1710	John	Deegan		Villanova	PA
1711	Srijan	Velamuri		Devon	PA
1712	Judy	Zimbardi		Doylestown	PA
1713	Michelle	Johnson		Scottdale	PA
1714	David	Platt		Halifax	PA
1715	Elliot	Ross		Union Dale	PA
1716	John	Gallagher		Bethlehem	PA
1717	Jason	Crawford		Lancaster	PA
1718	Tracy	Whitman		Wayne	PA
1719	Edward	Jasiewicz		Pittsburgh	PA
1720	William	Wekselman		Pittsburgh	PA
1721	Jim	Black		Philadelphia	PA
1722	Aimee	Douglas		Riegelsville	PA
1723	Eric	Pash		Indiana	PA
1724	Sherry	McNeil		Butler	PA
1725	Nora	Nash		Aston	PA
1726	Patricia	Franz		Pittsburgh	PA
1727	Mackenzie	McAlpin		Philadelphia	PA
1728	Barry	Blust		Glenmoore	PA
1729	Anna	Tangi		Philadelphia	PA
1730	Alison	Heiser		Camp Hill	PA
1731	Jim	Burtt		Willow Grove	PA
1732	Samantha	Sword		Harrisburg	PA
1733	Elaine	Mazakas		Lancaster	PA
1734	Olivia	Perfetti		Pittsburgh	PA
1735	Mark	Barbash		Philadelphia	PA
1736	Jeanne	Cebasek		Finleyville	PA
1737	Katherine	Urbaniak		Philadelphia	PA
1738	Kristina	Morris		Doylestown	PA
1739	Wendy	Roberts		Ardmore	PA
1740	Bruce	Kiesel		Southampton	PA
1741	Kathryn	LeSage		Skippack	PA
1742	Gillian	Graber		Harrison City	PA
1743	Christine	Chesire		Aliquippa	PA
1744	Alyce	Callison		Havertown	PA
1745	Edith B	Naveh		Pittsburgh	PA
1746	Beverly	Williamson-Pecori		McKees Rocks	PA
1747	Deborah	Kinney		Bethany	PA
1748	Elizabeth	Brensinger		New Tripoli	PA
1749	Lynne	Heritage		Bellefonte	PA
1750	Linda	Russo		Pipersville	PA
1751	Libby (Elizabeth)	Anderson		Haverford	PA
1752	Brian	Lucas		Bethlehem	PA
1753	Wayne	Grgurich		Pittsburgh	PA
1754	Ben	Mainwaring		Philadelphia	PA

1755	Dale	Harris		Lansdowne	PA
1756	Valerie	Sarris		Haverford	PA
1757	Glenn	Wagner		Richboro	PA
1758	Lori	Geraci		Pittsburgh	PA
1759	Michael	Swanson		Lancaster	PA
1760	Alison	Purcell		Philadelphia	PA
1761	Jeffrey	Shuben		Philadelphia	PA
1762	Laurie	Zepka		Drexel Hill	PA
1763	Wanda	Washington		Collingdale	PA
1764	Kelly	Wong		Merion Station	PA
1765	Kimberly	Egresits		King Of Prussia	PA
1766	Allan	Freedman		Elkins Park	PA
1767	Anne	W.		State College	PA
1768	Debra	Orben		Springtown	PA
1769	Paul	Paluba		Newtown Square	PA
1770	Robin	Schaufler		Swarthmore	PA
1771	Veronice	Plewinski		Reading	PA
1772	Janet	Cavallo		Secane	PA
1773	Karen	Sharrar		Philadelphia	PA
1774	John	Belch		Pittsburgh	PA
1775	Marjorie	Greenfield		Philadelphia	PA
1776	Claudette	Kulkarni		Pittsburgh	PA
1777	Deb	Horan		Springfield	PA
1778	Lee	Simon		Wyncote	PA
1779	Kathleen	Davis		Chalfont	PA
1780	Nathan Van	Velson		Lancaster	PA
1781	Dorothy	Dunlap		Pittsburgh	PA
1782	Mary Ann	Haggerty		Emmaus	PA
1783	Garth	Dellinger		Pittsburgh	PA
1784	Alexandra	Asal		Philadelphia	PA
1785	Kathryn	Conrad		Duncannon	PA
1786	Alan	Peterson		Willow Street	PA
1787	Kim	Holbrook		Birdsboro	PA
1788	Sharon	Lee		Philadelphia	PA
1789	Joanna	Branch		Havertown	PA
1790	Joan	Nikelsky		Upper Darby	PA
1791	Katherine	Volin		Philadelphia	PA
1792	Susan	Randle		West Chester	PA
1793	Bob	Harmon		Yardley	PA
1794	Patricia R	Wendell		Jeannette	PA
1795	Crystal	Gornati		Kersey	PA
1796	J. Allen	Feryok		Monessen	PA
1797	Craig	Fausnacht		Uniontown	PA
1798	Bonnnie	Winter		Shrewsbury	PA
1799	Beatrice	Zovich		Philadelphia	PA
1800	Suzanne	Lang		Philadelphia	PA
1801	Zane	Cannon		Pittsburgh	PA

1802	Michelle	Sheridan		Allentown	PA
1803	Robert	Bosiljevac		Gibsonia	PA
1804	Dianna	Holland		Philadelphia	PA
1805	Nancy	Malone		Pittsburgh	PA
1806	Zsuzca	Palotas		Warrington	PA
1807	Bronwen	Hartranft		Lancaster	PA
1808	Dan	Sherman		Boyertown	PA
1809	Stephen P	Carlisle		Mechanicsburg	PA
1810	Daniel	Mink		Lancaster	PA
1811	Peggy	Greenfeld		Penn Valley	PA
1812	Marta	Guttenberg		Philadelphia	PA
1813	Sarah	Newman		Chester Springs	PA
1814	Clara	Steege		Devon	PA
1815	Kristin	Roehl		Perkasie	PA
1816	Barbara	Michalski		Penndel	PA
1817	Jean	Kammer		Hawley	PA
1818	Melanie	Aloi		Pittsburgh	PA
1819	Ann	Lee		Whitehall	PA
1820	Paula	Daley		Jeffersonville	PA
1821	John	Ramirez		Paoli	PA
1822	Cynthia	Skema		Philadelphia	PA
1823	Wayne	Olson		Manheim	PA
1824	Jay	McCahill		Lansdowne	PA
1825	Hannah	Salvatore		Robesonia	PA
1826	Trina	Gribble		Harrisburg	PA
1827	Barbara	Brigham		Philadelphia	PA
1828	Susan	Babbitt		Philadelphia	PA
1829	Jakob	Radovic		Clairton	PA
1830	Adrian	Seltzer		Wynnewood	PA
1831	Kimberly	Woodson		Philadelphia	PA
1832	Karey	Kluesner		Pittsburgh	PA
1833	Edmond	Fullman		Wyncote	PA
1834	Terrie	Balko		West Newton	PA
1835	Sharon	Kessler		Rochester	PA
1836	Onnolee	Jansen		Carlisle	PA
1837	Gabrielle	Corson		Pittsburgh	PA
1838	Nancy	Ranieri		Collegeville	PA
1839	David	Ledermann		New Cumberland	PA
1840	Michele	Fisk		Henryville	PA
1841	Amy	Bruckner		Downingtown	PA
1842	Riley	Knavish		Pittsburgh	PA
1843	Sean	Connell		Pittsburgh	PA
1844	Naomi	Ullendorff		Pittsburgh	PA
1845	James	Cowan		Pittsburgh	PA
1846	Ian	Sawyer		Pittsburgh	PA
1847	Kaiser	Shahid		Pittsburgh	PA
1848	Sean	Wolfgang		Pittsburgh	PA

1849	Daniel	Kehm		Pittsburgh	PA
1850	Michael	Polios		Pittsburgh	PA
1851	Jonathan	Silverstein		Pittsburgh	PA
1852	Eric	Oh		Pittsburgh	PA
1853	Laura	Fleming		Pittsburgh	PA
1854	Emily	Zeng		Pittsburgh	PA
1855	Kyle	Young		Pittsburgh	PA
1856	Morgan	McMullen		Pittsburgh	PA
1857	Hamza	Khalid		Pittsburgh	PA
1858	Matthew	Benusa		Pittsburgh	PA
1859	Jacob	Zyrek		Pittsburgh	PA
1860	Genevieve	Jones		Pittsburgh	PA
1861	Tee	Aory		Pittsburgh	PA
1862	Stephen	Wittek		Pittsburgh	PA
1863	Jasmine	Johnson		Pittsburgh	PA
1864	Elina	Hoffmann		Pittsburgh	PA
1865	Jordan	Barone		Pittsburgh	PA
1866	William	Taylor		Pittsburgh	PA
1867	Rou	Martin		Pittsburgh	PA
1868	Ravi	Prabaph		Pittsburgh	PA
1869	Celia	Hayes		Pittsburgh	PA
1870	Anggie	Gabriel		Pittsburgh	PA
1871	Branden	Giraud		Pittsburgh	PA
1872	Samay	Sahoo		Pittsburgh	PA
1873	Anirud	Durani		Pittsburgh	PA
1874	Madeline	Rose		Pittsburgh	PA
1875	Hemang	Amin		Pittsburgh	PA
1876	Layla	Blahney		Pittsburgh	PA
1877	Nevil	Abraham		Pittsburgh	PA
1878	Marsey	Maver		Pittsburgh	PA
1879	Michaela	Marincic		Pittsburgh	PA
1880	Anna	Savych		Pittsburgh	PA
1881	Christine	Karpinski		King of Prussia	PA
1882	Alex	Thorniley		Pittsburgh	PA
1883	Allen	Krantz		Philadelphia	PA
1884	Martha	Christine		Bethlehem	PA
1885	Andrew	Kohn		Pittsburgh	PA
1886	Marc	Henry		State College	PA
1887	Patricia	Risso		Middleburg	PA
1888	Christine	Larson		Pittsburgh	PA
1889	Maureen	Miller		Glenside	PA
1890	Carol	Huber		Erie	PA
1891	Juliana	Alderfer		Philadelphia	PA
1892	Robert	Stevenson		Lebanon	PA
1893	Susan	Weinman		Philadelphia	PA
1894	Benita J.	Campbell		Burgettstown	PA
1895	Michael	McQuown		Philadelphia	PA

1896	Tricia	Satifka		Washington	PA
1897	Ann	Trondle-Price		McMurray	PA
1898	Robert	Buncher		Pittsburgh	PA
1899	Roger	Latham		Rose Valley	PA
1900	Eric	Selvage		Philadelphia	PA
1901	Susan	Kovaleski		Lititz	PA
1902	Joseph	Belcastro		Shermans Dale	PA
1903	Nora	Nelle		Collegeville	PA
1904	Lydia r.	Savadove		Philadelphia	PA
1905	Christi	Marshall		West Chester	PA
1906	Suzanne	Day		Philadelphia	PA
1907	Lynne	Katz		Pocono Lake	PA
1908	Felicia	Lewis		Philadelphia	PA
1909	Emory	Michau		Starrucca	PA
1910	Marissa	Rapone		Allison Park	PA
1911	Sylvia	Gardner		New Tripoli	PA
1912	Karen	Pearlstein		Exton	PA
1913	Whitney	Jackson		West Chester	PA
1914	Michele	Clarke		Pittsburgh	PA
1915	Alan	Horowitz		Pittsburgh	PA
1916	Cynthia	Seiler		Blue Bell	PA
1917	Jill	Beech		Coatesville	PA
1918	Daniel	Olivieri		Narberth	PA
1919	Roberta	Brunner		Huntingdon Valley	PA
1920	Frank	Bartell		Phila.	PA
1921	Louise	Reardon		Lancaster	PA
1922	James	Haglund		Philadelphia	PA
1923	Karen	O'Neill		Collegeville	PA
1924	Bruce	Dickie		Royersford	PA
1925	Ron	Bartosh		Pittsburgh	PA
1926	Bryan	Latkanich		Fredericktown	PA
1927	Karen	Williams		York	PA
1928	Michael	Lawrence		Harrison City	PA
1929	Kimberly	Nolf		Pittsburgh	PA
1930	Marguerite	Kazalas		Pittsburgh	PA
1931	Allan	Rubin		Philadelphia	PA
1932	Michelle	Alvare		Havertown	PA
1933	Peter	Fitzpatrick		Franklin	PA
1934	Lauren	Sufrin		Pittsburgh	PA
1935	Carol	ONeil		Lansdowne	PA
1936	Al	Nagy		Lititz	PA
1937	Jo	C		Philadelphia	PA
1938	aaliyah	Williams		Tobyhanna	PA
1939	Jill	Fackenthal		Pottsville	PA
1940	Russell	Elliott		Philadelphia	PA
1941	Elizabeth	Janoski		Coatesville	PA

1942	Diane	Brown		Lewisberry	PA
1943	Janice	Crum		Pittsburgh	PA
1944	Jean	Wiant		Glenolden	PA
1945	Erin	Landis		Ambler	PA
1946	Joanna	Ward		Philadelphia	PA
1947	Dan	Cush		Aspinwall	PA
1948	Patricia	Pearce		Philadelphia	PA
1949	Cory	Davis		Easton	PA
1950	Jack	McBride		McKees Rocks	PA
1951	Charles	Treher		Shippensburg	PA
1952	Sanford	Leuba		Pittsburgh	PA
1953	Catherine	Folio		Effort	PA
1954	Mike	Patterson		Swarthmore	PA
1955	Frank	Ferguson		Gibsonia	PA
1956	Josephine	Fitts		Bryn Mawr	PA
1957	Sara	Michelsen		Merion Station	PA
1958	Kathleen	Harr		Langhorne	PA
1959	Michael	Schmotzer		York	PA
1960	Leigh	Cressman		Philadelphia	PA
1961	Judith	Parker		Philadelphia	PA
1962	Therese	Derita		Newtown Square	PA
1963	Jeff	Munchak		Chalfont	PA
1964	Beth	Brennan		Bloomsburg	PA
1965	Elowyn	Corby		Philadelphia	PA
1966	Donna	Logan		Erie	PA
1967	Megan	Guy		Pittsburgh	PA
1968	Holly	Deiaco-Smith		Barto	PA
1969	Kathleen	Sharpe		Radnor	PA
1970	William Benton	Hoskins		Lewisburg	PA
1971	Suzanne	Hall		Mont Alto	PA
1972	Jane	Popko		Palmyra	PA
1973	Paula	Brown		West Chester	PA
1974	Dana	Spano		Pittsburgh	PA
1975	Bernadette	Flinchbaugh		York Haven	PA
1976	Gary	Coller		Reading	PA
1977	Cheryl	Killion		Quakertown	PA
1978	Kathleen	Doctor		Kittanning	PA
1979	Susan	Habecker		Lebanon	PA
1980	Jeff and Maureen	Devlin		Downingtown	PA
1981	Richard	Cole		Eagleville	PA
1982	Robert	Curley		Philadelphia	PA
1983	Todd	Waymon		Newtown	PA
1984	Paul	Otruba		Mansfield	PA
1985	Bryan	Hutchinson		West Chester	PA
1986	Sharon	Green		Pittsburgh	PA
1987	Tony	Kerzmann		Pittsburgh	PA

1988	Jennie	Niedelman		Pittsburgh	PA
1989	William P.	White		Bryn Mawr	PA
1990	Alex	Minishak		Mechanicsburg	PA
1991	Wilford	Vaulx-Smith		Indiana	PA
1992	Dana	Hunting		Newtown	PA
1993	Polly	Bech		Swarthmore	PA
1994	Devin	Wachs		Ardmore	PA
1995	Donna	Engle		Towanda	PA
1996	Steve	Kelly		Philadelphia	PA
1997	Barbara	Drew		Newtown	PA
1998	Alisa	Shargorodsky		Holland	PA
1999	Anne Marie	Cohen		Emmaus	PA
2000	Jerene	Schroeder		Philadelphia	PA
2001	John	Matthews		Chester Springs	PA
2002	Stephen	Burns		Wyncote	PA
2003	Maryanne	Tobin		Philadelphia	PA
2004	Lois	Oleksa		Durham	PA
2005	Ruth	Anthony-Gardner		Bensalem	PA
2006	Mary	Kelchak		Monroeville	PA
2007	Elaine	Cohen		Jenkintown	PA
2008	Emily	Mansfield		Tafton	PA
2009	Holly	Altenderfer		Reading	PA
2010	Donna	Meyers		Pottstown	PA
2011	Larry	Lloyd		Mohnton	PA
2012	John	Crum		Upper Black Eddy	PA
2013	Dora	Ion		Pittsburgh	PA
2014	Judi Chiolo	Pressman		Lafayette Hill	PA
2015	Shayna	Flynn		Philadelphia	PA
2016	Patti	Ferry		Bloomsburg	PA
2017	Ms.	Clarke		New Hope	PA
2018	Thomas	Posey		Yardley	PA
2019	Edward	Suchy		Hatboro	PA
2020	Jeremy	Haymaker		Reading	PA
2021	Liane	Sher		Elkins Park	PA
2022	Clinton	Walker		Bethlehem	PA
2023	Brian	Ohare		Kennett Square	PA
2024	Tom	Trok		Pittsburgh	PA
2025	James and Joanne	Smoker		York	PA
2026	Tom	Miller		Dillsburg	PA
2027	Karen	Reever		Doylestown	PA
2028	Jody	Halbedl		Imperial	PA
2029	Billie	Williams		Wellsboro	PA
2030	Joseph	McCullough		Woodlyn	PA
2031	Jean	Dermott		Sewickley	PA

2032	Randy and Lydia	Stettler		Mount Bethel	PA
2033	Charmayne	Holze		Erie	PA
2034	Judith	Ruszkowski		Pittsburgh	PA
2035	Mary Ann	Rotondo		Schwenksville	PA
2036	James	Eisenstein		Boalsburg	PA
2037	Jennifer	Breen		Media	PA
2038	Kaileigh	Murphy		Philadelphia	PA
2039	Krista	Kontzamanys		Chester Springs	PA
2040	George	Plummer		Downingtown	PA
2041	Frank	Sabatini		Exeter	PA
2042	Renate	Brosky		Whitehall	PA
2043	Roslyn	Taylor		Bryn Athyn	PA
2044	Ruth	Fauman-Fichman		Pittsburgh	PA
2045	Andrew M.	Wilson		Philadelphia	PA
2046	Carol	Moore		Elkins Park	PA
2047	Linda	Messatzzia		Southampton	PA
2048	Evrim	Artman		Royersford	PA
2049	John	George		Chester Springs	PA
2050	Robert	Staurowsky		Mertztown	PA
2051	Philomena	Easley		Fairless Hills	PA
2052	Arianne	Allan		Wallingford	PA
2053	Jessica	Cahail		Wallingford	PA
2054	John	Bush		Coatesville	PA
2055	George	Malcolm		Doylestown	PA
2056	L. David	Leverenz		Eagles Mere	PA
2057	Mark	Leeson		Orwigsburg	PA
2058	Natalie	Kerr		Philadelphia	PA
2059	Cj	Glennan		Berwick	PA
2060	Diane	Nissen		Haverford	PA
2061	Randi	Forman		Newtown	PA
2062	Donna	Hoffman		Pittsburgh	PA
2063	Beverly	Smalley		Feasterville Trevose	PA
2064	Elizabeth	McCue		Yardley	PA
2065	Sandra	Clark		Erie	PA
2066	Brittany	Graham		Pittsburgh	PA
2067	Stephen	Starr		Ambler	PA
2068	Alan	Wright		West Chester	PA
2069	Christine	Saul		Easton	PA
2070	Robert	Matcovich		King Of Prussia	PA
2071	Ashley	Kopeck		Wilkes-Barre	PA
2072	Kenneth	Nealon		Factoryville	PA
2073	Rich	Surdyk		Pittsburgh	PA
2074	Chad	Laker		Pipersville	PA
2075	Donna	Morgan		Bangor	PA

2076	Eleanor	Laubner		Allentown	PA
2077	Don	Murtaugh		Malvern	PA
2078	Otto	Lehrbach		Alburtis	PA
2079	Linda	Leghart		Jacobs Creek	PA
2080	Ivana	Seric		Philadelphia	PA
2081	Scott	Mann		York	PA
2082	Margie	Fischman		Philadelphia	PA
2083	Norman	Koerner		Philadelphia	PA
2084	Jim	Lewis		Nottingham	PA
2085	Joan	Schooley		Sweet Valley	PA
2086	Lynnette	Yoder		Lenhartsville	PA
2087	Pat	Howell		Fairview	PA
2088	Gwen	Gilens		Gladwyne	PA
2089	Diana	Goslin		Chicora	PA
2090	Ieva	Berzins		Bethel Park	PA
2091	Ellen	Poist		Philadelphia	PA
2092	John	McLaughlin		Shamokin Dam	PA
2093	John	Confer		California	PA
2094	Amy	Cohen		Pittsburgh	PA
2095	Alice	Mcafee		Newfoundland	PA
2096	Natalie	Winter		Chambersburg	PA
2097	Phyllis	Scott		Mansfield	PA
2098	Kathleen	Hendricks		McConnellsburg	PA
2099	Kenneth	Baumert		Emmaus	PA
2100	Kathleen	Howe		Saylorsburg	PA
2101	Carol	Carmon		Media	PA
2102	Alan	Peterson		Willow Street	PA
2103	Leslie	Patrick		Mifflinburg	PA
2104	Pat	Lynch		Wexford	PA
2105	Eveline	Grant		Pen Argyl	PA
2106	Anita	Maximo		New Hope	PA
2107	Michelle	Hoff		Allentown	PA
2108	Cathie	Forman		Southampton	PA
2109	Liz	Feinberg		Paoli	PA
2110	Jennifer	Unger		York	PA
2111	Lauren	Bruce		Philadelphia	PA
2112	Evangelina	Barrow		Philadelphia	PA
2113	Flora	Cardoni		Philadelphia	PA
2114	Jen	Bentzel		Hanover	PA
2115	Charlene	Young		North East	PA
2116	Steve	Beebee		Phoenixville	PA
2117	Andrea	Lanzetta		Media	PA
2118	Carolyn	Peters-Eckel		Newtown	PA
2119	Sandy	Kavoyianni		Athens	PA
2120	Charlayne	Putek		Wind Gap	PA
2121	Austin	Tarman		Red Lion	PA
2122	Victoria	Mars		Newtown Square	PA

2123	Mary	McKenna		Philadelphia	PA
2124	Judith	Roberts		State College	PA
2125	David	Skellie		Erie	PA
2126	Eva	Piatek		Philadelphia	PA
2127	Marla	Costanzo		Pittston	PA
2128	Mark	Hartman		Shippensburg	PA
2129	Scott	Fenstermaker		Alburtis	PA
2130	Kellee	Van Aken		Pittsburgh	PA
2131	Joe	Magid		Wynnewood	PA
2132	Edward	Engler		Sewickley	PA
2133	Steve	Olshevski		Philadelphia	PA
2134	Alexandra	Klinger		Wyndmoor	PA
2135	Winifred	Lutz		Huntingdon Valley	PA
2136	Tanya	Richter		Elizabethtown	PA
2137	Douglas	Hazlett		West Middlesex	PA
2138	Joan	Russo		Hawley	PA
2139	Marjorie	Reagan		Wind Gap	PA
2140	Carol	Poleno		New Castle	PA
2141	Kay	Gering		Feasterville Trevose	PA
2142	Yvonne	LeFever		Prospect Park	PA
2143	Joyce	Moore		Emmaus	PA
2144	Joe	Rattman		Stroudsburg	PA
2145	Susan	Eckert-Foley		Littlestown	PA
2146	E. K.	Worthington		Greencastle	PA
2147	Ellen C.	Jantzen, MD		Phoenixville	PA
2148	Jude	Speicher		Pittsburgh	PA
2149	Anne	Jackson		Birdsboro	PA
2150	Anita	Behrman		Ambler	PA
2151	Mary A.	Uliana		Pen Argyl	PA
2152	Robert	Wasilewski		Wilkes Barre	PA
2153	Sally	Warren		Landenberg	PA
2154	Deane	Mairotti		Devon	PA
2155	Giacomo	DeAnnuntis		Philadelphia	PA
2156	Paulina	Mastryukov		Bryn Mawr	PA
2157	Alexandra	Manning		Downingtown	PA
2158	Daniel	Mink		Lancaster	PA
2159	Kathleen	Riordan		Philadelphia	PA
2160	Curtis	Dunn		Ambler	PA
2161	Matthew	Holmes		Hummelstown	PA
2162	Karla	McNamara		Baden	PA
2163	Pat	Northeimer		Coudersport	PA
2164	David	Meade		Apollo	PA
2165	Stamatina	Podes		Bensalem	PA
2166	Kathleen	Johnson		Bloomsburg	PA
2167	Marilyn	Kellar		Elverson	PA

2168	Sharon	Yates		Coatesville	PA
2169	Nancy	Bellers		Easton	PA
2170	Judith	Ruszkowski		Pittsburgh	PA
2171	Tina	Horowitz		Philadelphia	PA
2172	Douglas	Kingsbury		Philadelphia	PA
2173	Mary	Motz		Sewickley	PA
2174	James	Keenan		Lansdowne	PA
2175	Bob	Smith		East York	PA
2176	Paul	Grady		Tobyhanna	PA
2177	Felicia	Lewis		Philadelphia	PA
2178	Andrea	Bertram		Johnstown	PA
2179	David	Doorn		West Chester	PA
2180	Robert	Schulz		Landenberg	PA
2181	Michael	McGinnis Jr		Duryea	PA
2182	Nancy	Bergey		New Wilmington	PA
2183	Miah	Hornyak		Bensalem	PA
2184	Geoffrey	Thulin		Cashtown	PA
2185	Patricia	Skabla		Bensalem	PA
2186	Marc	Karasek		Media	PA
2187	Dolores	Fifer		Pittsburgh	PA
2188	Matthew	Feldman		Philadelphia	PA
2189	Mark	Feder		East Stroudsburg	PA
2190	Steven	Zimmerman		Pine Grove	PA
2191	John	Limkes		Leechburg	PA
2192	Richard and Alison	Rupert		Hughesville	PA
2193	Sean	Murphy		Collegeville	PA
2194	MaryAnn	Linehan		Wayne	PA
2195	William	Montgomery		Pottstown	PA
2196	Wendy	Smith		Camp Hill	PA
2197	Robbin	McCarthy		Philadelphia	PA
2198	Melanie	Cohick		Boiling Springs	PA
2199	Anna	Haughwout		White Oak	PA
2200	Joanne	Tosti-Vasey		Bellefonte	PA
2201	James	Coffey		Pennsburg	PA
2202	Katherine	Wilde		Lafayette Hill	PA
2203	Lisa	H		Pittsburgh	PA
2204	David	Way		Pottstown	PA
2205	Wilford	Vaulx-Smith		Indiana	PA
2206	Jane	Popko		Palmyra	PA
2207	Robert	Turnbach		Summit Hill	PA
2208	Maggie	Kearns		Harrisburg	PA
2209	Shannon	Bearman		Haverford	PA
2210	Pamela	Greenwood		Newville	PA
2211	Keiko	Greenberg		West Chester	PA
2212	Michael	Siwy		Whitehall	PA
2213	Len	Fennessy		Levittown	PA

2214	Joan	Kolessar		Oneida	PA
2215	Tom	Gauntt		Bensalem	PA
2216	Berte	Rosin		Garnet Valley	PA
2217	Thomas	Josephi		Monongahela	PA
2218	Gary	Ryan		Doylestown	PA
2219	Eric	Pash		Indiana	PA
2220	Chris	Striegel		Philadelphia	PA
2221	Brian	Murray		Philadelphia	PA
2222	Irene	Souder-Coyle		Lansdale	PA
2223	Joan	Nikelsky		Upper Darby	PA
2224	Walter	Bass		Philadelphia	PA
2225	Thomas	Graves		Holtwood	PA
2226	Sherry	McLain		Dauphin	PA
2227	Katelyn	Haas-Conrad		Pittsburgh	PA
2228	Jamie	Brambley		Breezewood	PA
2229	Robert	Sheets		Mountain Top	PA
2230	Louise	Giugliano		Narberth	PA
2231	Whitney	Wandelt		Philadelphia	PA
2232	Richard	Johnson		Curwensville	PA
2233	Sharon	Meyers		Verona	PA
2234	Grace	Lambert		Nazareth	PA
2235	John	Lawson		Penn Valley	PA
2236	Susan	Wendling		Allentown	PA
2237	Anne	Markowitz		Southampton	PA
2238	Arlana	Gottlieb		Havertown	PA
2239	Debby	Moore		Clarks Hill	SC
2240	Evan	Dull		Wexford	PA
2241	Judith	Fitch		Philadelphia	PA
2242	Judy	Lepore		Lancaster	PA
2243	Mary	Albanesi		Pittsburgh	PA
2244	Mary	More		Flourtown	PA
2245	Patricia	Harper		Irwin	PA
2246	R	Richter		Murrysville	PA
2247	Sharpn	Hornyak		Walnutport	PA
2248	Tom	Mastrilli		Harmony	PA
2249	Joseph	Sinchak		California	PA
2250	David	Bressler		West Chester	PA
2251	Eric	Pavlak		Oaks	PA
2252	Carol Ann	Kell		Upper Black Eddy	PA
2253	Carrie	Swank		Reading	PA
2254	Cynthia	Sheikh		West Chester	PA
2255	William	Johnson		Narberth	PA
2256	David	Fiedler		Bensalem	PA
2257	Bob	Young		Schwenksville	PA
2258	James	Pugliese		Glen Mills	PA
2259	Tim	Wetzel		Carlisle	PA
2260	Cheryl	Rampelt		Sewickley	PA

2261	Emily	Petrucci		Media	PA
2262	Alex	Bomstein		Philadelphia	PA
2263	Alexandra	Brandt		Elkins Park	PA
2264	Charles	Beard		Palmyra	PA
2265	Linda	Bescript		Langhorne	PA
2266	Melissa	Krauss		Reading	PA
2267	Daniel	Taroli		Dallas	PA
2268	Katherine	Baker		Harrisburg	PA
2269	William	Anderson		Narberth	PA
2270	Franklin	Pennell		Collegeville	PA
2271	R.A.	Dayton		Pittsburgh	PA
2272	Leona	Oleaga		Levittown	PA
2273	M.	Struble		Philadelphia	PA
2274	Rev. David Wesley	Brown		Philadelphia	PA
2275	Doug	Herren		Philadelphia	PA
2276	Barry	Kipnis		Warminster	PA
2277	Carolin	Schellhorn		Ardmore	PA
2278	Garry	Taroli		Dallas	PA
2279	James	Staszewski		Pittsburgh	PA
2280	Philip	Iacone		Bala Cynwyd	PA
2281	Dipesh	Pandya		Collegeville	PA
2282	Tim	Herman		Hershey	PA
2283	Tom	Fulmer		Lititz	PA
2284	Shawn	Patton		Aston	PA
2285	Stephen	Scott		Pittsburgh	PA
2286	John	Ryan		Newtown	PA
2287	William	Malcom		State College	PA
2288	Mari	McShane		Pittsburgh	PA
2289	Mary Jean	Cunningham		Philadelphia	PA
2290	Karen	Elias		Lock Haven	PA
2291	Bruce	Bekker		Glenside	PA
2292	Michael	Halick		Susquehanna	PA
2293	Arlene	Taylor		Harrisburg	PA
2294	Joshua	Rettenmayer		Gettysburg	PA
2295	Cheryl	Lorditch		Port Allegany	PA
2296	Faye	Zeigler		Harleysville	PA
2297	Susan	Wallner		Perkasie	PA
2298	Rebecca	Gagliano		Philadelphia	PA
2299	Melvin	Armolt		Chambersburg	PA
2300	Kent	Coburn		Townville	PA
2301	Thomas	Posey		Yardley	PA
2302	Iwona	Burek		Macungie	PA
2303	Beth	Dennis		Howard	PA
2304	Catherine	Raymond		Penn Valley	PA
2305	Kimberly	Seger		Kittanning	PA
2306	Al	Luque		Philadelphia	PA

2307	Christopher	Lankenau		Philadelphia	PA
2308	Bryn	Hammarstrom, RN		Middlebury Center	PA
2309	Maryann	Fyler		Upper Chichester	PA
2310	Glenn	Schlippert		Etters	PA
2311	Mark	Vendel		Conneautville	PA
2312	Bob	Steininger		Phoenixville	PA
2313	Ron	Richter		Bethlehem	PA
2314	Dan	McCauley		Clifton Township	PA
2315	Anthony	Coulter		Pittsburgh	PA
2316	Deborah	Krotec		Pittsburgh	PA
2317	Susan	Murphy		Spring City	PA
2318	Veronica	Liebert		Drexel Hill	PA
2319	Lisa	Mell		Philadelphia	PA
2320	Brenda	Uhler		Landisburg	PA
2321	Cory	Reyman		Philadelphia	PA
2322	Susan	Thompson		Audubon	PA
2323	Regina	Brooks		Pittsburgh	PA
2324	Joan	Vaughan		Newtown Square	PA
2325	Lisa	Heinz		Lawrence	PA
2326	Rhonda	Anderson		Kennett Square	PA
2327	Susan	Underwood		Radnor	PA
2328	Manon	Roberge		Pottstown	PA
2329	Edward	Kuszajewski		Greensburg	PA
2330	Susan	Carroll		Lake Ariel	PA
2331	Jeff	Bartholomew		Easton	PA
2332	Nancy	Crane		State College	PA
2333	Peter	Tafuri		Fleetville	PA
2334	Rhonda	Mulroy		Indiana	PA
2335	Ellis	BoB		Philadelphia	PA
2336	Frank	Sabatini		Exeter	PA
2337	Sharon	Liebhaber		Wynnewood	PA
2338	Steve	Stales		Philadelphia	PA
2339	Michael	Sveda		Albrightsville	PA
2340	Ronald	Void		Philadelphia	PA
2341	Jesse	Bagwell		Orangeville	PA
2342	Debra	Siefken		Orrtanna	PA
2343	Ryan	Joyce		Aspinwall	PA
2344	Donna	Gensler		Pittsburgh	PA
2345	Mark	Leeson		Orwigsburg	PA
2346	Brian	Earley		Lancaster	PA
2347	Manny	Feris		Emmaus	PA
2348	Mark	Wagner		Bechtelsville	PA
2349	Deanne	ODonnell		Derry	PA
2350	Linta	Bryant		Harrisburg	PA
2351	Osvaldo	Rivera		Allentown	PA
2352	William	Ewing		Philadelphia	PA

2353	Amber	Trophy		Plano	TX
2354	Susan	Habecker		Lebanon	PA
2355	Patricia	Wendell		Jeannette	PA
2356	Larry	Seymour		Factoryville	PA
2357	Kevin	Hartbauer		Pittsburgh	PA
2358	Sharon	Wushensky		Kennett Square	PA
2359	Eric	Christiansen		Exton	PA
2360	A Lawrence	Liquori		Kings Park	NY
2361	Jodi	Benjamin		Maple Glen	PA
2362	Cassandra	Tereschak		Scranton	PA
2363	Zachary	Sapienza		McConnellsburg	PA
2364	Edna	Patterson		Downingtown	PA
2365	Michael	McQuown		Philadelphia	PA
2366	Jay and Cathy	Harter		Susquehanna	PA
2367	Mary	Thorpe		Presto	PA
2368	Glenn	Gawinowicz		Oreland	PA
2369	Carole	Mayers		King of Prussia	PA
2370	Kathleen	Miller		Wilkes Barre	PA
2371	Kelly	Riley		Hatfield	PA
2372	Richard	Weiss		Emmaus	PA
2373	Gene	Parsons		Sewickley	PA
2374	Leslie	Zuverink		Export	PA
2375	Ricki	Hurwitz		Harrisburg	PA
2376	Ahmed	Nasus		Carlisle	PA
2377	Maryanne	Tobin		Philadelphia	PA
2378	Tracy	Tellep		Union Dale	PA
2379	Robert	Errett		Greensburg	PA
2380	RoseMaria	Root		New Oxford	PA
2381	Carolyn	Biglow		Pittsburgh	PA
2382	Eileen	Brick-Cammarata		Pittsburgh	PA
2383	Kristin	Toscano		Narberth	PA
2384	Allison	Kiser		Camp Hill	PA
2385	Rudolph	Keller		Boyertown	PA
2386	Suzanne	Shaffer		Spring Grove	PA
2387	Glenn	Moyer		Souderton	PA
2388	Loretta	Ottinger		Breinigsville	PA
2389	Howard and Arlene	Leiter		Langhorne	PA
2390	Margaret	Tattersall		Collingdale	PA
2391	Martina	Jacobs		Pittsburgh	PA
2392	Laura	Murillo		Glenside	PA
2393	Robin	McFall		Hermitage	PA
2394	Jack	Roberts		Lancaster	PA
2395	Mark	Levin		Plymouth Meeting	PA
2396	Kenneth	Bickel		Pittsburgh	PA

2397	Bogdan	Ion		Pittsburgh	PA
2398	Tammy	Williams		Canonsburg	PA
2399	Teresa	McClure		Philadelphia	PA
2400	Richard	Whiteford		West Chester	PA
2401	Michele	Fisk		Henryville	PA
2402	Perry	Kendall		Glenside	PA
2403	William	Harbin		Hellertown	PA
2404	Katelyn	Braune		Philadelphia	PA
2405	Bill	S.		Pittsburgh	PA
2406	Amy	Bruckner		Downingtown	PA
2407	Haze	Ember		Cresco	PA
2408	Chris	More		Bangor	PA
2409	Mike	DellaPenna		Malvern	PA
2410	Phyllis	Chambers		Pottstown	PA
2411	Jill	Turco		Philadelphia	PA
2412	William	Bader		Bethlehem	PA
2413	Tracey	Mangus		Ford City	PA
2414	Margaret	Ellis		State College	PA
2415	Lisa	Wetherby		Secane	PA
2416	Philomena	Easley		Fairless Hills	PA
2417	Wayne	Fisher		Newtown	PA
2418	George	Erceg		Natrona Heights	PA
2419	Loretta	Calise-Simmons		Manchester	PA
2420	Diane	DiFante		West Decatur	PA
2421	Francesca	Keltner		Media	PA
2422	Doug	Ross		Gwynedd	PA
2423	James	Langenhahn		Pittsburgh	PA
2424	Saundra	Petrella		Beaver	PA
2425	Mary	Kleinbach		Mertztown	PA
2426	Andrew	Wadsworth		Reading	PA
2427	Margie	Hall		Lititz	PA
2428	Valeri	Fornagiel		Wellsboro	PA
2429	William	Calhoon		Cornwall	PA
2430	J.T.	Smith		Sellersville	PA
2431	Patricia	Harlow		Plymouth Meeting	PA
2432	Alyssa	Wankewicz		Perkasie	PA
2433	Dianna	Holland		Philadelphia	PA
2434	Joseph	Kenosky		Mount Pocono	PA
2435	Allen	Terrill		Huntingdon	PA
2436	Michael	Kenosky		Mount Pocono	PA
2437	Dianne	Kenosky		Mount Pocono	PA
2438	Jack	Miller		Lewisburg	PA
2439	Emily	Pitner		Washington	PA
2440	Janet	Powers		Gettysburg	PA
2441	Susan	Porter		Lords Valley	PA

2442	Philip	Seo		Fort Washington	PA
2443	Patricia	Bennett		Royersford	PA
2444	Brenda	Norris		Brookhaven	PA
2445	Bob	McCreight		Mercer	PA
2446	John	Rohrer		New Cumberland	PA
2447	Susan	Proietta		Philadelphia	PA
2448	Jon	Levin		Emmaus	PA
2449	Sherlene	Evans		Reading	PA
2450	Michelle	Savage		Slickville	PA
2451	letizia	balsamo		Catasauqua	PA
2452	Joyce	Bell		Springfield	PA
2453	Gillian	Graber		Trafford	PA
2454	Kevin	Long		Marysville	PA
2455	Wayne	Kessler		Norristown	PA
2456	Susan	Babbitt		Philadelphia	PA
2457	Linda	Blythe		Philadelphia	PA
2458	June E	Bricker		Mifflintown	PA
2459	David	Casker		Johnstown	PA
2460	Patricia	Daly		Brookhaven	PA
2461	Mary Carol	Kennedy		Pittsburgh	PA
2462	Lori	Kachmar		Reading	PA
2463	Constantina	Hanse		Pittsburgh	PA
2464	Al	Ferrucci		Pittsburgh	PA
2465	Heather	Gustafson		Trappe	PA
2466	Joyce	Ciotti		Pittsburgh	PA
2467	Barbara	Johnson		King Of Prussia	PA
2468	Jean	Kammer		Hawley	PA
2469	Timothy	Dunleavy		State College	PA
2470	Doug	Metzler		Turtle Creek	PA
2471	Mel reader	Reader		York	PA
2472	Kathy	lawless		Harleysville	PA
2473	Daniel	Safer		Philadelphia	PA
2474	Yolanda	Winfield		Philadelphia	PA
2475	Karen Guarino	Spanton		Philadelphia	PA
2476	John	Gaadt		Chadds Ford	PA
2477	Beth	Dzwil		Glenside	PA
2478	Kathy	Turner		Clearfield	PA
2479	Michael	Lombardi		Levittown	PA
2480	Joanne	Luongo		Doylestown	PA
2481	Theresa	Kochert		Chambersburg	PA
2482	Michelle	Dugan		Upper Darby	PA
2483	Jacqueline	Pickering		Exton	PA
2484	Brian	Brown		Lewisburg	PA
2485	Linda	Myers		Petersburg	PA
2486	Pat	Bontinen		Lewisburg	PA
2487	Muse	Bedri		West Chester	PA
2488	Phyllis	Leaman		Lancaster	PA

2489	Joseph Folino	Gallo		Coraopolis	PA
2490	Henry	Berkowitz		Sabinsville	PA
2491	John	Stofko		Allentown	PA
2492	Barry	Cutler		Springfield	PA
2493	Unci	Masden		Mifflinburg	PA
2494	Jim and Judy	Platt		Derry	PA
2495	Michelle	Doyon		Scottdale	PA
2496	Anna	Tangi		Philadelphia	PA
2497	Mary Jean	Sharp		Altoona	PA
2498	Otto	Lehrbach		Alburtis	PA
2499	Richard Van	Aken		Southampton	PA
2500	Adam	Cotchen		Johnstown	PA
2501	Suzanne	Lamborn		Nottingham	PA
2502	Jerry	Duffy		Warminster	PA
2503	Joe	Kiefner		Jenkintown	PA
2504	Tara	Eng		Jenkintown	PA
2505	Susan	McNamara		Bethlehem	PA
2506	John	Holmes		Paoli	PA
2507	Judith	Mueller		York	PA
2508	Christine	Dolle		Swarthmore	PA
2509	Richard	Schonwald		Newtown Square	PA
2510	Angel	Recchia		Philadelphia	PA
2511	Andrea	Saunders		Sellersville	PA
2512	Karol	Judy		Clinton	PA
2513	Karen	Kirk		Williamsport	PA
2514	Jamilee	Hoffman		Chalfont	PA
2515	Fayten	El-Dehaibi		Pittsburgh	PA
2516	Debra	Murphy		New Hope	PA
2517	Jesse	Hare		Jamison	PA
2518	Donna	Logan		Erie	PA
2519	Linda	Russo		Pipersville	PA
2520	Shannon	Elliott		Bensalem	PA
2521	Saralyn	Sarandis		Kunkletown	PA
2522	Kelli	Gottemoller		Glenside	PA
2523	Alaina	Carney		Uniontown	PA
2524	Deborah	Hansen		Swarthmore	PA
2525	David	Citron		Martinsburg	PA
2526	Anne	Young		Revere	PA
2527	Jackie	Neuman		Media	PA
2528	Brenda	Webber		Mechanicsburg	PA
2529	Elliot	Ross		Union Dale	PA
2530	William	McKenna		Paoli	PA
2531	Laura	Chinofsky		Southampton	PA
2532	Jennifer	Clark		Media	PA
2533	Jennifer	Unger		York	PA
2534	Margie	Fischman		Philadelphia	PA
2535	Thomas	Dunlap		Latrobe	PA

2536	James	Kobelak		Pittsburgh	PA
2537	Renee	Dolney		Pittsburgh	PA
2538	Peter	Bentivegna		Media	PA
2539	Carole	Ackelson		Erie	PA
2540	Hadley	Littell		Bensalem	PA
2541	Karen	Hartley		Collegeville	PA
2542	Alan	Peterson		Willow Street	PA
2543	Alana	Balogh		Revere	PA
2544	Alice	McAfee		Newfoundland	PA
2545	Ann Marie	Judson		Mechanicsburg	PA
2546	Anne	Hartford		Philadelphia	PA
2547	Art	Leopold		Erie	PA
2548	Ashlee	Caul		Clinton	PA
2549	Ashley	Rinker		Walnutport	PA
2550	Barbara	Mina		Media	PA
2551	Barbara	Smith		Perkasie	PA
2552	Barry	Grimecy		Quarryville	PA
2553	Beckie	Wood		Washington	PA
2554	Bill	Kellner		Palmerton	PA
2555	Brittney	Locicero		Philadelphia	PA
2556	Carly	Hein		Northampton	PA
2557	Carol	Furtak		Conshohocken	PA
2558	Charles	Taormina		Johnstown	PA
2559	Christa	Hein		Northampton	PA
2560	Christopher	Smith		Birdsboro	PA
2561	Cindy M.	Dutka		Philadelphia	PA
2562	Clifford	Johnston		Morrisdale	PA
2563	Crystal	Harris		East Stroudsburg	PA
2564	Daniel	Dayton		Bensalem	PA
2565	Darla	Brunnquell		Rockton	PA
2566	David	Anderson		Chesterbrook	PA
2567	David	Skellie		Erie	PA
2568	Dean	M		East Stroudsburg	PA
2569	Deborah	Marchand		Gibsonia	PA
2570	Dennis	Coffman		Harrisburg	PA
2571	Diana	Husanu		Philadelphia	PA
2572	Donald	Azuma		Philadelphia	PA
2573	Donald	Imler		Duncansville	PA
2574	Donna	Honigman		Lehighton	PA
2575	Doreen	Shumsky		Havertown	PA
2576	Douglas	Mohr		Sellersville	PA
2577	Ed	Paski		Berwyn	PA
2578	Edward	Kelly		Royersford	PA
2579	Eleanor	Day		Philadelphia	PA
2580	Ellie	Harding		White Haven	PA
2581	Florence	Lewis		Pittsburgh	PA
2582	Gregory	Hill		Stroudsburg	PA

2583	Helene	McGuire-Hein		Northampton	PA
2584	Howard	Sherman		Lansdowne	PA
2585	Issy	Lawrie		Girard	PA
2586	Jacqueline	Moore		Ambler	PA
2587	Jan	Kropczynski		North Versailles	PA
2588	Jason	Farabaugh		North Wales	PA
2589	Jeff	Lewin		Wallingford	PA
2590	Joan	Fenza		Landenberg	PA
2591	Joan	Zimmer		Centre Hall	PA
2592	John	Butler		Exton	PA
2593	John	Vanco		Erie	PA
2594	Judith	Bohler		Ephrata	PA
2595	Judith	Bohne		Womelsdorf	PA
2596	Judith	McGovern		Quakertown	PA
2597	Judith	Tanner		Mapleton Depot	PA
2598	Julie	Jones		Philadelphia	PA
2599	Justine	Palmer		Emporium	PA
2600	Karen	Weinberg		Richboro	PA
2601	Karen	Williams		York	PA
2602	Katherine	Pritchett		Camp Hill	PA
2603	Kay	Reinfried		Lititz	PA
2604	Kris	Hasson		Folsom	PA
2605	Leann	Turley		West Decatur	PA
2606	Linda	Johnson		Fairless Hills	PA
2607	M	Freiberg		Penn Valley	PA
2608	Margaret	Klem		Wilkes Barre	PA
2609	Marguerite	Pedersen		Wayne	PA
2610	Marian	Shearer		Reading	PA
2611	Mark	Kern		Elverson	PA
2612	Mark	Ricard		Monroeville	PA
2613	Martin	Karl		Pittsburgh	PA
2614	Maryann	Loughry		Broomall	PA
2615	Matthew	Diamond		Southampton	PA
2616	Maureen	McGranaghan		Pittsburgh	PA
2617	Maureen	Santina		Upper Black Eddy	PA
2618	Michelle	Hoff		Allentown	PA
2619	Myra	Mann		Pittsburgh	PA
2620	Nancy	Chernett		Wynnewood	PA
2621	Neil	Fegley		Pennsburg	PA
2622	Norman	Koerner		Philadelphia	PA
2623	Olivia	Dandrea		Blue Bell	PA
2624	Patti	Ferry		Bloomsburg	PA
2625	Patti	Grabowski		Lancaster	PA
2626	Paul Michael	Bergeron		Fairless Hills	PA
2627	Rachel	Herrmann		Chambersburg	PA
2628	Randal	Beck		Newtown	PA
2629	Rebecca	Stumpf		Uniontown	PA

2630	Richard	Burrill		York	PA
2631	Robbie	Cross		Williamsport	PA
2632	Roberta	Camp		Philadelphia	PA
2633	Rose	Paddison		Philadelphia	PA
2634	Sarah	Brown		Downingtown	PA
2635	Sherri	Smith		Lancaster	PA
2636	Stacy	Rohrer		Carlisle	PA
2637	Stephanie	Snyder		Lititz	PA
2638	Susan	Porter		Avondale	PA
2639	Susan	Soraruf		Kennett Square	PA
2640	Ted	Evgeniadis		Mount Wolf	PA
2641	Teresa	Baker		Waynesboro	PA
2642	Thomas	McCartney		Pittsburgh	PA
2643	Timothy	Hayes		Dublin	PA
2644	William	Kellner		Lehighton	PA
2645	Taryn	Schlitzer		Bryn Mawr	PA
2646	Chad	Greenlee		Dillsburg	PA
2647	Carol	Weston-Young		New Britain	PA
2648	Eugene	Mariani		Bethel Park	PA
2649	Christopher	Dunham		Feasterville Trevose	PA
2650	Judith	Henckel		Mount Bethel	PA
2651	Daniel	Salmen		Pittsburgh	PA
2652	Michael	Vasger		Philadelphia	PA
2653	Lindsay	Friedman		Philadelphia	PA
2654	Christine	Hegarty		New Cumberland	PA
2655	Larry	Ramsey		Spring Mills	PA
2656	Martin	Beech		Kennett Square	PA
2657	Susan	Wessner		Kutztown	PA
2658	Siobhan	Murphy		Lake Ariel	PA
2659	Sammy	Eang		Brookhaven	PA
2660	Jacqueline	Morrill		Jenkintown	PA
2661	Mark	Beard		Sinking Spring	PA
2662	Richard	Ortolano		Kennett Square	PA
2663	Gregory	Garman		Reading	PA
2664	Melinda	Shirk		Hanover	PA
2665	Jacqueline Q	Palmer		Holland	PA
2666	Dan	Pepin		Cranberry Township	PA
2667	Nancy	Lo		Philadelphia	PA
2668	John	Nickey		Hanover Township	PA
2669	Dewey	Odhner		Horsham	PA
2670	Thomas	Accordino		Easton	PA
2671	Jennifer	Tobin		Philadelphia	PA
2672	Alan	Peck		King Of Prussia	PA
2673	Berte	Rosin		Garnet Valley	PA

2674	Jesse	Crouse		West Chester	PA
2675	L	C		Warrington	PA
2676	Kenneth	Koerber		Chalfont	PA
2677	Karla	Shaffer		Doylestown	PA
2678	Kenneth	Yonek		Canonsburg	PA
2679	Saul	Bendersky		Pittsburgh	PA
2680	Frances	Morris		Flourtown	PA
2681	Vageesh	Sharma		Royersford	PA
2682	Jennifer	Loch		Factoryville	PA
2683	Nancy	Lonsdale		Doylestown	PA
2684	Jean Marie	Holup		Danville	PA
2685	Philip	Witmer		Radnor	PA
2686	Nancy	Daniels		Stroudsburg	PA
2687	Alexandra	Wisser		Harleysville	PA
2688	John H	Nickey		Hanover Township	PA
2689	Eileen	Bing		Langhorne	PA
2690	Jean	Wiant		Glenolden	PA
2691	Edward	Wrenn		Pittsburgh	PA
2692	Brian	Wagner		Nazareth	PA
2693	David	Perlman		Bala Cynwyd	PA
2694	Dennis	McAndrew		Elizabeth	PA
2695	Carrie	Bell		Lansdale	PA
2696	Marian	Keegan		Rowland	PA
2697	Mary Ann	Tatara		Camp Hill	PA
2698	Tiarra	Watson-Black		Philadelphia	PA
2699	William	Palmer		Spring Mills	PA
2700	Shirley	Sword		Harrisburg	PA
2701	Stacey	Marchig		Upper Chichester	PA
2702	Diane	Osgood		Hollidaysburg	PA
2703	Rand	Tenor		Mechanicsburg	PA
2704	MaryAnn	Rotondo		Schwenksville	PA
2705	Will	Fraser		Philadelphia	PA
2706	Caryl	Waggett		Meadville	PA
2707	Richard	Schauer		Erie	PA
2708	Judith	Drasin		Philadelphia	PA
2709	J. Howard	Cherry		Pittsburgh	PA
2710	Amber	Moran		Phoenixville	PA
2711	Mitzi	Deitch		Feasterville Trevose	PA
2712	Gary	Metzger		State College	PA
2713	Kristina	Lunney		Bridgeville	PA
2714	Bob	Curley		Philadelphia	PA
2715	John	Schaninger		Upper Black Eddy	PA
2716	Lisa J	Burick		Glenside	PA
2717	Jane D	Todd		Norristown	PA
2718	Kevin	Smith		Havertown	PA

2719	A.	Kocis		Allentown	PA
2720	Karen	Belli		Dallas	PA
2721	Gary	Platt Sr		Pittsburgh	PA
2722	Charles	Rinehart		New Freedom	PA
2723	Leonard	Mooney		Bangor	PA
2724	Thomas	Sessions		Philadelphia	PA
2725	Barbara	Rhodes		Cornwall	PA
2726	Robin	Santhouse		Pittsburgh	PA
2727	Julie	Carll		Chambersburg	PA
2728	Lauren	Shaak		Gettysburg	PA
2729	Robert	Brobst		Pottstown	PA
2730	Samantha	Nathan		Wynnewood	PA
2731	Tim	Kauffman		Lancaster	PA
2732	Courtney	Chaudry		Harrisburg	PA
2733	Scott	Franco		Bethlehem	PA
2734	Gregory	Burgdorf		Hummelstown	PA
2735	Jody	Halbedl		Imperial	PA
2736	Susan A	Reinhart		New Providence	PA
2737	Mary Ann	Brown		Swarthmore	PA
2738	Donna	Menn		Plains	PA
2739	Phoebe	Vallapureddy		Doylestown	PA
2740	Ronald	Farrell		Philadelphia	PA
2741	Sue	Remaley		New Castle	PA
2742	Sidney	Amster		Philadelphia	PA
2743	John	Leifholt		Coatesville	PA
2744	Marilynn	Harper		Media	PA
2745	Aggie	Perilli		Lancaster	PA
2746	Donald	Davis Sr		Crucible	PA
2747	Jessica	Davis		Pittsburgh	PA
2748	Michael	Molchan		Whitehall	PA
2749	Bernard	Lizak		Northampton	PA
2750	G.	Lockwood		Chester Springs	PA
2751	Paul	Ranello		Hawley	PA
2752	Caroline	Corugno		Croydon	PA
2753	Karen	Giles		Portage	PA
2754	Sarah	Marley		Philadelphia	PA
2755	Kim	Heyman		Wynnewood	PA
2756	Linda	Winchester		Norristown	PA
2757	Scott	Mathias		Williamsport	PA
2758	Wayne	Clark		Fairchance	PA
2759	Rachel	Stahlman		York	PA
2760	Cerise	jJsephs		Pittsburgh	PA
2761	Scott	Adler		Langhorne	PA
2762	Tom	Yatsky		Pottstown	PA
2763	Aly	Robb		Chesterbrook	PA
2764	Ann Marie	McDonnell		Scranton	PA
2765	Donna	Ingenito		Mount Joy	PA

2766	S David	Wakulchik		Phoenixville	PA
2767	Monica	Depaul		Lancaster	PA
2768	Don	Dixon		Pittsburgh	PA
2769	Agnes	Bahm		Bensalem	PA
2770	Susan	Dendinger		Exton	PA
2771	Rachelle	Leese		Glenside	PA
2772	Bonnie	Stoeckl		Pequea	PA
2773	Sharon	Creighton		Wind Gap	PA
2774	Michelle	Giles		King Of Prussia	PA
2775	Joyce	Sommerfeld		Wynnewood	PA
2776	Pam	Albright		Melrose Park	PA
2777	Joan	Gabrie		Perkasie	PA
2778	Joan	Russo		Hawley	PA
2779	Bethany	Narajka		Pittsburgh	PA
2780	Joan	Vondra		Pittsburgh	PA
2781	Laura	Yim		Wayne	PA
2782	Terrie	Baumgardner		Aliquippa	PA
2783	William	Gordon		Collingdale	PA
2784	Mykie	Reidy		Pittsburgh	PA
2785	Elaine	Cohen		Jenkintown	PA
2786	Paul	Palla		Greencastle	PA
2787	Vonny	Eckman		Carlisle	PA
2788	Andrea	Bertram		Johnstown	PA
2789	Joseph	Inslee		Coatesville	PA
2790	Sarah	Caspar		Downingtown	PA
2791	Marianna	Sokol		Benton	PA
2792	Jack	Ludwig		Jamison	PA
2793	Linda	Blythe		Philadelphia	PA
2794	Melissa	McSwigan		Pittsburgh	PA
2795	Spencer	Koelle		Philadelphia	PA
2796	David	Gibson		Philadelphia	PA
2797	Eireann	Young		Philadelphia	PA
2798	Robert	Sims		Yardley	PA
2799	Henry	Frank		Philadelphia	PA
2800	Alan	Peterson MD		Willow Street	PA
2801	Regina	Brooks		Pittsburgh	PA
2802	Timothy	Duncan		Philadelphia	PA
2803	William	Haegele		philadelphia	PA
2804	Ann	Barnes		Russell	PA
2805	Jess	Walcott		Langhorne	PA
2806	Patti	Miller		Manchester	PA
2807	Bonnie	Eisenfeld		Philadelphia	PA
2808	Sebastian	Peleato		Pittsburgh	PA
2809	Katy	Ruckdeschel		Merion Station	PA
2810	Leo	Kucewicz		Phoenixville	PA
2811	Alexa	Manning		Downingtown	PA
2812	Carolin	Schellhorn		Ardmore	PA

2813	David	Fiedler		Bensalem	PA
2814	William	Montgomery		Pottstown	PA
2815	Joseph	Werzinski		New Hope	PA
2816	James	Keenan		Lansdowne	PA
2817	Suzanne	Staggenborg		Pittsburgh	PA
2818	Adrienne	Gallagher		Sellersville	PA
2819	Richard	Headley		Pittsburgh	PA
2820	Doug	Ross		Bryn Mawr	PA
2821	Jon	Wilson		Swissvale	PA
2822	Victoria	English		Villanova	PA
2823	Susan Porter and Howard	Snyder		Hawley	PA
2824	Gary	Lewis		Phoenixville	PA
2825	David	Zappulla		Coopersburg	PA
2826	Allan	Freedman		Elkins Park	PA
2827	Francis	Fedoroff		Philadelphia	PA
2828	Nora	Nelle		Collegeville	PA
2829	Peter	Adams		Pittsburgh	PA
2830	David	Kaufman		Bartonsville	PA
2831	Vincent	Prudente		Philadelphia	PA
2832	Edward	Ruszkowski		Pittsburgh	PA
2833	David	Schogel		Philadelphia	PA
2834	Serena	Levingston		Philadelphia	PA
2835	Nan	Davenport, Esq.		Harrisburg	PA
2836	Richard	Eynon		Villanova	PA
2837	Leslie	Nyiri		Dresher	PA
2838	Cassidy	Boulan		Philadelphia	PA
2839	Tina	Horowitz		Philadelphia	PA
2840	Thomas	Brenner		Hollidaysburg	PA
2841	Joanne	Kellar		Springfield	PA
2842	Mark	Fichman		Pittsburgh	PA
2843	Jason	Crawford		Lancaster	PA
2844	Brian	Resh		Pequea	PA
2845	Kelly	Finan		Hop Bottom	PA
2846	Jane	Popko		Palmyra	PA
2847	Leslie	Patrick		Mifflinburg	PA
2848	Mari	McShane		Pittsburgh	PA
2849	Lee	Tracy		Philadelphia	PA
2850	Amy	Sommer		Philadelphia	PA
2851	Miichael	Lombardi		Levittown	PA
2852	Jason	Volpe		Philadelphia	PA
2853	Marian	Harvey		Philadelphia	PA
2854	Sandra	Brubaker		Philadelphia	PA
2855	Kelsey	Wallace		Stevens	PA
2856	John	Margerum		Philadelphia	PA
2857	Beverly A	Rolfsmeyer		Philadelphia	PA

2858	Frank	Sabatini		Exeter	PA
2859	Kenneth	Bickel		Pittsburgh	PA
2860	Barbara	Nadel		Milford	PA
2861	Barbara	Sonies		Narberth	PA
2862	Eric	Larson		Phoenixville	PA
2863	Daniel	Safer		Philadelphia	PA
2864	Ronald	Richter		Bethlehem	PA
2865	Pat	Eagon		Carnegie	PA
2866	Don	Hawkins		North Braddock	PA
2867	Linda	Schmidt		Pittsburgh	PA
2868	Margaret	Reiter		Saylorsburg	PA
2869	Philip	Pegan		Upper Chichester	PA
2870	Stephanie	Alarcon		Philadelphia	PA
2871	Eileen	Shupak		Philadelphia	PA
2872	Margaret	Cristofalo		Narberth	PA
2873	Stephanie	Ulmer		Pittsburgh	PA
2874	Lynn	Glorieux		Pittsburgh	PA
2875	Jason	Curtis		Philadelphia	PA
2876	Emily	Willner		Pittsburgh	PA
2877	Janis	Kinslow		Aston	PA
2878	Tom	Vernon		Philadelphia	PA
2879	Norma	Kline		Meadville	PA
2880	Daniel	Palmer		Philadelphia	PA
2881	Boris	Dirnbach		Philadelphia	PA
2882	Barbara	Ritzheimer		Pine Grove	PA
2883	Carolyn	Healy		Philadelphia	PA
2884	Matthew E	Feldman		Philadelphia	PA
2885	Merian	Soto		philadelphia	PA
2886	John	Lizak		Northampton	PA
2887	Lynn	Manheim		Factoryville	PA
2888	Nancy	Bergey		New Wilmington	PA
2889	Gabriel	Hohag		Philadelphia	PA
2890	Frank	Ayers		Altoona	PA
2891	Carol	McGrath		Narvon	PA
2892	Julie	Shapiro		Philadelphia	PA
2893	Jan	Peischl		Allison Park	PA
2894	Bryan	Mills		Pittsburgh	PA
2895	Paul	Hagedorn		Philadelphia	PA
2896	Daniel	Salmen		Pittsburgh	PA
2897	Henry	Berkowitz		Sabinsville	PA
2898	Roberta	Camp		Philadelphia	PA
2899	Susan	Babbitt		Philadelphia	PA
2900	Judith	Bohler		Ephrata	PA
2901	Arlene	Weiner		Pittsburgh	PA
2902	Barry	Cutler		Springfield	PA
2903	Tim	Herman		Hershey	PA
2904	Michele	Johnson		Altoona	PA

2905	Melissa	K		South Heights	PA
2906	Karen	McGovern		Philadelphia	PA
2907	Fayten	El-Dehaibi		Pittsburgh	PA
2908	Jason	Driesbaugh		Havertown	PA
2909	W. Andrew	Stover		Chambersburg	PA
2910	Thomas	Nelson		Lansdowne	PA
2911	Michael	Miller Jr		Philadelphia	PA
2912	Jill	Turco		Philadelphia	PA
2913	K	Danowski		Pittsburgh	PA
2914	Anne	Hodapp		Pitcairn	PA
2915	Francine A	Cohen		Philadelphia	PA
2916	Annie	Fox		Chesterbrook	PA
2917	Walter	Tsou		Philadelphia	PA
2918	Diane	Kokowski		Pittsburgh	PA
2919	Michael	McQuown		Philadelphia	PA
2920	Karla	McNamara		Baden	PA
2921	Susan	Davis		Bala Cynwyd	PA
2922	Danielle	Lion		Upper Black Eddy	PA
2923	Andy	Middleton		Mechanicsburg	PA
2924	Katelyn	Haas-Conrad		Pittsburgh	PA
2925	Lily	Swartz		New Hope	PA
2926	Robert W.	Rhodes, III		Mercersburg	PA
2927	Mary	Garrett		Annville	PA
2928	Patricia	Libbey		Philadelphia	PA
2929	Dorothy	Dunlap		Pittsburgh	PA
2930	Barry	Pounder		sinking spring	PA
2931	Larry	Seymour		Factoryville	PA
2932	Barbara	Bradshaw		Springfield	PA
2933	Howard and Arlene	Leiter		Langhorne	PA
2934	JoAnn	Sorrell		Collegeville	PA
2935	Janet	Cavallo		Secane	PA
2936	Sherlene	Evans		Reading	PA
2937	Karen	Kirk		Williamsport	PA
2938	Barbara	Nigrini		Reading	PA
2939	Mike	McCampbell		Pittsburgh	PA
2940	James	Thompson		Knox	PA
2941	Mike	Roome		Thompson	PA
2942	Jeanne	Weber		Phoenixville	PA
2943	Arlene	Taylor		Harrisburg	PA
2944	Cindy M.	Dutka		Philadelphia	PA
2945	Theresa	Sable		Munhall	PA
2946	Sue	Brubaker		Philadelphia	PA
2947	Thomas	Diehl		Stroudsburg	PA
2948	Theresa	Heinsler		Philadelphia	PA
2949	Anna	Tangi		Philadelphia	PA
2950	Charles	Leiden		Altoona	PA

2951	Donna	Delany		Chester Springs	PA
2952	Scott	Trees		Aliquippa	PA
2953	James	Castellan		Media	PA
2954	Elizabeth	Shober		Lafayette Hill	PA
2955	Phyllis	Blumberg		Bala Cynwyd	PA
2956	Susan	Saltzman		Philadelphia	PA
2957	Ray	Applegate		Bloomsburg	PA
2958	Maryjane	Allen		Reno	PA
2959	Frances	Chiquoine		Exton	PA
2960	Berte	Rosin		Garnet Valley	PA
2961	Theresa	Knapp		Towanda	PA
2962	Annette	Ballard		Philadelphia	PA
2963	Jane	Cease		Allentown	PA
2964	Priscilla	Mattison		Bryn Mawr	PA
2965	Robert	DuPlessis		Philadelphia	PA
2966	Vicki	Jenkins		Philadelphia	PA
2967	Thomas	Geinzer		Irwin	PA
2968	MaryAnne	Steinert		Northampton	PA
2969	Susan	Nauhaus		Pittsburgh	PA
2970	Al	Ferrucci		Pittsburgh	PA
2971	Bob	Steininger		Phoenixville	PA
2972	Marin	Richeson		Ardmore	PA
2973	Judy	Scriptunas		Chambersburg	PA
2974	Anne	Brennan		Philadelphia	PA
2975	Joan	Gordon		Pittsburgh	PA
2976	Renee	Grant		Pen Argyl	PA
2977	Matthew	Nemeth		Allison Park	PA
2978	Virginia	Kelly		Clairton	PA
2979	Robert	Steffes		Aliquippa	PA
2980	Robert	Buncher		Pittsburgh	PA
2981	Allison	Duncan		Immaculata	PA
2982	Kelly	Riley		Hatfield	PA
2983	Nancy	Green		Philadelphia	PA
2984	David	Clemens		Milton	PA
2985	Jasmine	Kurjakovic		Pittsburgh	PA
2986	Nancy	Tate		Riegelsville	PA
2987	Cheryl	Whittaker		Kennett Square	PA
2988	Jaquelin	Camp		King of Prussia	PA
2989	James	Curtis		Port Matilda	PA
2990	Carol	Etheridge		Lehighton	PA
2991	Elizabeth	Seltzer		Brookhaven	PA
2992	Sara	Kortesluoma		Philadelphia	PA
2993	Nancy	Weissman		Gwynedd	PA
2994	Ross	Carmichael		Pittsburgh	PA
2995	Susan	Thompson		Norristown	PA
2996	Joyce	Bell		Springfield	PA
2997	Linda	Grutzmacher		Philadelphia	PA

2998	Judith	Tanner		Mapleton Depot	PA
2999	Stephanie	Mory		Clarks Summit	PA
3000	Carole	Matthews		Pittston Twp.	PA
3001	Terrie	Balko		West Newton	PA
3002	Linda	Granato		Philadelphia	PA
3003	Jessica	Krow		Philadelphia	PA
3004	Eugene	Mariani		Bethel Park	PA
3005	Fred	Rothman		Philadelphia	PA
3006	Carol	Hauptfuhrer		Philadelphia	PA
3007	Sandra Skies	Ludwig		Hanover Township	PA
3008	Laura	Fake		Womelsdorf	PA
3009	Constantina	Hanse		Pittsburgh	PA
3010	Dale	Harris		Lansdowne	PA
3011	Joseph	McCullough		WOODLYN	PA
3012	Rex	Grubb		Quarryville	PA
3013	Peggy	Acosta		Womelsdorf	PA
3014	Ray	Acosta		Womelsdorf	PA
3015	Russ	Allen		Jenkintown	PA
3016	Ed	Dunn		Drexel Hill	PA
3017	Herbert	Elwell		Lawrenceville	PA
3018	Neena	Deibler		Upper Chichester	PA
3019	Jessica	Bellwoar		Philadelphia	PA
3020	B	Soltis		Downingtown	PA
3021	Susanne	Hewitt		Newtown	PA
3022	Louise	Giugliano		Narberth	PA
3023	Jim	Black		Philadelphia	PA
3024	Ellen	Reese		Bala Cynwyd	PA
3025	Sister Veronice	Plewinski		Reading	PA
3026	Carl	Gershenson		Philadelphia	PA
3027	Myra	Kazanjian		Bethel Park	PA
3028	Jennifer	Goeckeler-Fried		Pittsburgh	PA
3029	John	Johnson		Philadelphia	PA
3030	Beatrice	Zovich		Philadelphia	PA
3031	Megan	LeCluyse		Philadelphia	PA
3032	Meagan	Cusack		Philadelphia	PA
3033	Mary	McKenna		Philadelphia	PA
3034	Susan	Thompson		Philadelphia	PA
3035	Brandon	Robilotti		Philadelphia	PA
3036	Zsuzsa	Palotas		Warrington	PA
3037	Jerry	Davies		Harrisburg	PA
3038	Sherry	McNeil		Butler	PA
3039	Joe	Ferry		Springfield	PA
3040	Michelle	Pepitone		Pittsburgh	PA
3041	Janice	Blanock		Cecil	PA
3042	Theodore	Burger		Bethlehem	PA

3043	Susan	Tremel		Rydal	PA
3044	Jeannie	Fissinger		Levittown	PA
3045	Karen	Elias		Lock Haven	PA
3046	Brent	Groce		Philadelphia	PA
3047	Nicole	Deter		Du Bois	PA
3048	Bobby	Hughes		Shavertown	PA
3049	Wiley	Wos		Pittsburgh	PA
3050	Sandra	Folzer		Philadelphia	PA
3051	Jane	Kauer		Philadelphia	PA
3052	Donald	Ament		Leola	PA
3053	Debra	Orben		Springtown	PA
3054	Rob	Ade		Glenmoore	PA
3055	Joanna	Ward		Philadelphia	PA
3056	Ryan	Gallagher		Berwyn	PA
3057	David	Nichols		Havertown	PA
3058	Charles	Hollister		Columbia Cross Roads	PA
3059	Jennifer	Venar		Pittsburgh	PA
3060	William	Ewing		Philadelphia	PA
3061	Kevin	Gallen		Yardley	PA
3062	Robert	Gibb		Homestead	PA
3063	Lisa	Marshall		Spring Mills	PA
3064	Cheryl	Feldman		Philadelphia	PA
3065	Philip	Pandolfi		Glenshaw	PA
3066	Deborah	Krupp		Huntingdon Valley	PA
3067	Ira	Josephs		Media	PA
3068	Diana	Dakey		Dalton	PA
3069	Miriam	Murray		Aston	PA
3070	Jolynn	Davis		Trout Run	PA
3071	Elizabeth	Warner		Equinunk	PA
3072	Loretta	Lehman		Duncannon	PA
3073	Louis	Iatarola		Philadelphia	PA
3074	Megan	White-Marley		Havertown	PA
3075	Marielle	Lerner		Philadelphia	PA
3076	Mikayla	Cortese		Pittsburgh	PA
3077	Barbara	Drake		Havertown	PA
3078	Hope	Punnett		Philadelphia	PA
3079	Glenn	Gawinowicz		Oreland	PA
3080	Richard	Cole		Norristown	PA
3081	Jeanne	Sheats		Pittsburgh	PA
3082	Mark	Fichman		Pittsburgh	PA
3083	Peg	Schmidt		Pittsburgh	PA
3084	Alice	Stehle		Butler	PA
3085	Emily	Petrucci		Media	PA
3086	Alexandra	Napoleon		Morrisville	PA
3087	Peter	Wolanin		Philadelphia	PA

3088	Mary	Kupferschmid		Bethlehem	PA
3089	Suzanne	Hall		Mont Alto	PA
3090	Cindy	Veloric		Gladwyne	PA
3091	Margaret	Baker		Ardmore	PA
3092	Daniel	Natt		Towanda	PA
3093	Robert	Rossachacj		Glenolden	PA
3094	Sidne	Baglini		Malvern	PA
3095	Marilynn	Harper		Media	PA
3096	Rachel	Meyer		Aliquippa	PA
3097	Ann	Reynolds		Wyndmoor	PA
3098	William	Haegele		Philadelphia	PA
3099	Timothy	Duncan		Philadelphia	PA
3100	Richard	Kleiner		Merion Station	PA
3101	Patricia	Walters		Glenside	PA
3102	Jon	Nadle		Pittsburgh	PA
3103	Judith	Marvin		Lewisburg	PA
3104	Marcia	Lehman		Ambridge	PA
3105	Catherine	Talarico		Yardley	PA
3106	Matthew	Gordon		Philadelphia	PA
3107	Dina	Rosenblum		Media	PA
3108	Harry	Hochheiser		Pittsburgh	PA
3109	Sandra	Moore		Glenshaw	PA
3110	Maria	Bajzek		Pittsburgh	PA
3111	Brandon	Schooley		Cheswick	PA
3112	Michael	Dellapenna		Malvern	PA
3113	Lisa	Mell		Philadelphia	PA
3114	Julie	Smith		Media	PA
3115	Deirdre	DeVine		Philadelphia	PA
3116	Sheila	Siegl		Philadelphia	PA
3117	William	Goldsmith		Philadelphia	PA
3118	Nancy	Bernstein		Pittsburgh	PA
3119	Michael	Lawrence		Harrison City	PA
3120	Maurice	Samuels		Pittsburgh	PA
3121	Christine	Durst		Glen Mills	PA
3122	Beverly	Williamson-Pecori		McKees Rocks	PA
3123	Rita	Nordquist		Pittsburgh	PA
3124	Margaret	Sayvetz		Philadelphia	PA
3125	Kelly	King		Mt. Pleasant	PA
3126	Cindy	Mehallow		Newtown Square	PA
3127	Michael	Ostrosky		New Kensington	PA
3128	Mark Frog	Harris		Philadelphia	PA
3129	Nancy	Chernett		Wynnewood	PA
3130	Sheila	Erlbaum		Philadelphia	PA
3131	Pouné	Saberi		Philadelphia	PA
3132	Alex	Calzi		Glenside	PA
3133	Cathy	Knasiak		Glenside	PA

3134	Jerry L.	Golden		Glenside	PA
3135	Paul	Woolf		Jenkintown	PA
3136	Paul	Olsho		Cheltenham	PA
3137	Nisaa	DuFour		Cheltenham	PA
3138	Carlette	Brookert		Cheltenham	PA
3139	John	Deaten		Cheltenham	PA
3140	Deborah	Dolnick		Glenside	PA
3141	Peg	Gaddess		Glenside	PA
3142	Kathryn	Dwyer		Glenside	PA
3143	Tom	Clark		Glenside	PA
3144	Harold	Gouger		Glenside	PA
3145	Michelle	Feiller		Glenside	PA
3146	Laura	Mullelly		Glenside	PA
3147	John	Spangler		Glenside	PA
3148	Pat	Nolan		Glenside	PA
3149	Cathy	Kress		Glenside	PA
3150	Anna	Brnich		Glenside	PA
3151	Heather	Olson		Elkins Park	PA
3152	Jessica	Deleon		Elkins Park	PA
3153	David	Heitler-Klovas		Cheltenham	PA
3154	Jenny	Heitler-Klovas		Cheltenham	PA
3155	Carol E.	Godfrey		Jenkintown	PA
3156	Richard D.	Bruce		Rydal	PA
3157	Julian	Ai		Philadelphia	PA
3158	Valerie	Welsh		Elkins Park	PA
3159	Pamela	Albright		Cheltenham	PA
3160	Julian	Turner		Cheltenham	PA
3161	Jonathan	Vandergrift		Glenside	PA
3162	Robert	Scenna		Glenside	PA
3163	Tammara	Shipley		Cheltenham	PA
3164	Tanya	Milano		Cheltenham	PA
3165	Eric	Slade		Elkins Park	PA
3166	Lamin	Sidibeh		Elkins Park	PA
3167	Jen	Reid		Glenside	PA
3168	Joe	Hignett		Glenside	PA
3169	Jasmine	Williams		Cheltenham	PA
3170	Jatasha	Jean		Cheltenham	PA
3171	Lamar	Ebron		Elkins Park	PA
3172	Christina	Ewan		Elkins Park	PA
3173	Erika	Acevedo		Cheltenham	PA
3174	Kim	Kennedy		Cheltenham	PA
3175	Denise	Brown		Cheltenham	PA
3176	Zac	Campbell		Jenkintown	PA
3177	Brett	Bernstein		Jenkintown	PA
3178	Steve	Delcarlino		Glenside	PA
3179	Ellen	Rogovin Hart		Elkins Park	PA
3180	Joanne	Eisensmidts		Melrose Park	PA

3181	Dave	Posmontier		Elkins Park	PA
3182	Bernadette	Cabry		Abington	PA
3183	Ryan	Hollingsworth		Glenside	PA
3184	John	Peech		Glenside	PA
3185	Kevin	McCabe		Glenside	PA
3186	Cameron	Renzelli		Glenside	PA
3187	Maureen	Marinucci		Glenside	PA
3188	Laura	Cappetti		Glenside	PA
3189	Tina	Baquero		Glenside	PA
3190	Jane	Turk		Abington	PA
3191	Mark	Hildebrand		Glenside	PA
3192	Chris	Johnson		Glenside	PA
3193	John	Doherty		Glenside	PA
3194	Michele	Harbism		Glenside	PA
3195	Julia	Joyce		Glenside	PA
3196	Andrea	Soo		Glenside	PA
3197	Joan w.	Kelly		Glenside	PA
3198	Steve	Rosenthal		Glenside	PA
3199	Iris	Tompkins		Glenside	PA
3200	Patricia	Kempf		Glenside	PA
3201	Reed	Rapine		Glenside	PA
3202	Michael	Good		Glenside	PA
3203	Grace	Good		Glenside	PA
3204	Mia	Link		Jenkintown	PA
3205	Susan	DeMatteo		Jenkintown	PA
3206	Joseph	Delzingro		Glenside	PA
3207	Mike	Fink		Jenkintown	PA
3208	Allison	DeMatteo		Jenkintown	PA
3209	Teresa	Gwardyak		Jenkintown	PA
3210	Matthew	Camunas		Jenkintown	PA
3211	Russ	Allen		Jenkintown	PA
3212	Neil	O'Connor		Jenkintown	PA
3213	Jeanne	Medwid		Jenkintown	PA
3214	Tenley	Ammerman		Jenkintown	PA
3215	Julie	Copeland		Jenkintown	PA
3216	Suzanne	de Gizzo		Jenkintown	PA
3217	G	McGarvey		Jenkintown	PA
3218	Clint	Verome		Jenkintown	PA
3219	Brendan	Duffey		Jenkintown	PA
3220	Flo	Gallagher		Jenkintown	PA
3221	Mary Ellen	McSherry		Jenkintown	PA
3222	Emanuel O.	Agyare		Cheltenham	PA
3223	Valesia	Desei		Cheltenham	PA
3224	Genevieve	Leddy		Cheltenham	PA
3225	Gladys	Robinson		Cheltenham	PA
3226	B.	Mincmal		Cheltenham	PA
3227	Charles	King		Cheltenham	PA

3228	Tim	Farley		Cheltenham	PA
3229	Marco	Iannarelli		Cheltenham	PA
3230	John E.	Miller		Rydal	PA
3231	Patti	Ortiz		Rydal	PA
3232	Scott	Maccoll		Rydal	PA
3233	Sam	Giampietro		Jenkintown	PA
3234	James	Goodman		Glenside	PA
3235	Miriam	Beck		Jenkintown	PA
3236	Ann	LaRose		Jenkintown	PA
3237	Michael	Pisko		Glenside	PA
3238	Tarryne	Coleman		Glenside	PA
3239	Gracie	Fox		Cheltenham	PA
3240	Roneil	Francis		Cheltenham	PA
3241	Mary	DeFranco		Cheltenham	PA
3242	Nakia	Shepherd		Elkins Park	PA
3243	Kevin	Hartman		Melrose Park	PA
3244	Michele A.	Davis		Elkins Park	PA
3245	Lawrence	Garnett		Elkins Park	PA
3246	Jessica	Goss		Jenkintown	PA
3247	Michael	Barry		Abington	PA
3248	Sarah	Wolf		Jenkintown	PA
3249	Fiola	Alexis		Elkins Park	PA
3250	Stacy	Shields		Melrose	PA
3251	Anne Marie	Burns		Glenside	PA
3252	Sue	Nedbal		Glenside	PA
3253	Jessica	Copeland		Cheltenham	PA
3254	Michael A.	Ince		Cheltenham	PA
3255	Robert	Hayes		Cheltenham	PA
3256	Gregory	Louridas		Jenkintown	PA
3257	Josh	Bardige		Jenkintown	PA
3258	Jennifer	Crumley		Jenkintown	PA
3259	Deb	Hochwind		Jenkintown	PA
3260	Blair	Roman		Rydal	PA
3261	Eric	Wexler		Rydal	PA
3262	Kristen	Prentiss		Rydal	PA
3263	Amy	Bender		Rydal	PA
3264	Bryan	McGee		Jenkintown	PA
3265	Amanda	Hirsch		Jenkintown	PA
3266	Michael A.	Brown		Jenkintown	PA
3267	Jerry	Caine		Jenkintown	PA
3268	Brenda	Hartman		Rydal	PA
3269	Lisa	Guy-Britt		Elkins Park	PA
3270	Virginia	Kramer		Rydal	PA
3271	Elizabeth	Ferleger		Wyncote	PA
3272	Lee	Ifill		Abington	PA
3273	Kathy	Torbit		Wyncote	PA
3274	Jose	Vega		Jenkintown	PA

3275	Steve	Cattie		Rydal	PA
3276	Michael	O'Connor		Rydal	PA
3277	Rich	Rogers		Jenkintown	PA
3278	Laura	Lutell		Rydal	PA
3279	Mark	Weiss		Rydal	PA
3280	Karen	Bachman		Glenside	PA
3281	Michael E.	Wiener		Jenkintown	PA
3282	Rachel	Fitzpatrick		Glenside	PA
3283	T	Henninger		Glenside	PA
3284	Jan	Stroh		Jenkintown	PA
3285	Jackie	Kuzimir		Jenkintown	PA
3286	Nick	Brown		Glenside	PA
3287	Janis	Siravo		Rydal	PA
3288	Brianna	Smith		Glenside	PA
3289	Victoria	Horvath		Abington	PA
3290	Cassie	Donohue		Abington	PA
3291	James	Holt		Abington	PA
3292	Deborah	Ounan		Elkins Park	PA
3293	Dave	Smith		Abington	PA
3294	Noreen	Mcaleer		Glenside	PA
3295	Rick	Fennell		Abington	PA
3296	Lauren	Watkins		Glenside	PA
3297	Janet	Boff		Glenside	PA
3298	April	Dean		Glenside	PA
3299	Mary	Robinson		Glenside	PA
3300	Mary	Robinson		Glenside	PA
3301	Arthur	Mignogna		Glenside	PA
3302	Tori	Watt		Glenside	PA
3303	Wis	Noquera		Glenside	PA
3304	Orsana	Gorska		Abington	PA
3305	Sam	Watkins		Abington	PA
3306	Chris	Phillips		Abington	PA
3307	Mike	DeChristofano		Abington	PA
3308	K	Smith		Abington	PA
3309	John	Gray		Abington	PA
3310	Steve	Lakeau		Abington	PA
3311	R	Hines		Abington	PA
3312	Russell	Bishop Jr.		Abington	PA
3313	Eugene	Filosa		Abington	PA
3314	Elizabeth	Patterson		Abington	PA
3315	Lara	Karlson		Abington	PA
3316	Zach	Beo		Jenkintown	PA
3317	Matt	Tarditi		Abington	PA
3318	Martin	Murphy		Abington	PA
3319	Heather	Schumm		Jenkintown	PA
3320	Henry	Michell		Jenkintown	PA
3321	Judith	Bishop		Jenkintown	PA

3322	Pippa	Wood		Jenkintown	PA
3323	John	Rocco		Jenkintown	PA
3324	Melinda	Spuerl		Jenkintown	PA
3325	Heather	Henner		Jenkintown	PA
3326	Jennifer	Ulney		Philadelphia	PA
3327	Sean	M		Philadelphia	PA
3328	John	Lusky		Philadelphia	PA
3329	Casey	Carney		Philadelphia	PA
3330	Donn	NA		Jenkintown	PA
3331	Suzanne	Kaly		Philadelphia	PA
3332	AShley	Trannen		Philadelphia	PA
3333	Mark	R		Jenkintown	PA
3334	Clinton	Mikledky		Philadelphia	PA
3335	David	Fonda		Philadelphia	PA
3336	Nora	Creisen		Philadelphia	PA
3337	Joel	Hernandez		Philadelphia	PA
3338	John	S		Philadelphia	PA
3339	Kathleen	Worstenhome		Philadelphia	PA
3340	Mary	Novalski		Philadelphia	PA
3341	Nicole	Wakeman		Philadelphia	PA
3342	Bob	Obracht		Elkins Park	PA
3343	Anne	Sandy		Cheltenham	PA
3344	Kimberly	S		Elkins Park	PA
3345	Matt	Meyer		Elkins Park	PA
3346	Stephen	Lungren		Abington	PA
3347	Susan	Nocan		Abington	PA
3348	Kelly	Tomlinson		Abington	PA
3349	Erin	Pugh		Abington	PA
3350	Chyle	Nimmons		Elkins Park	PA
3351	Roberta	Devlin		Elkins Park	PA
3352	Michael	Krause		Elkins Park	PA
3353	Karen	Levine		Elkins Park	PA
3354	V	Smith		Elkins Park	PA
3355	Hunter	Jackson		Elkins Park	PA
3356	Jessica	Smith		Philadelphia	PA
3357	Jan	Alter		Elkins Park	PA
3358	E	Crovse		Elkins Park	PA
3359	Susannah	Grubb		Elkins Park	PA
3360	Ben	Farr		Jenkintown	PA
3361	Rob	Razzi		Jenkintown	PA
3362	Lydia	Parke		Elkins Park	PA
3363	Siobhan	G		Jenkintown	PA
3364	BK	B		Elkins Park	PA
3365	Whitney	Saintfleur		Elkins Park	PA
3366	Josue	Saintfleur		Elkins Park	PA
3367	Rena	Woody		Elkins Park	PA
3368	Elisa	Macklin		Elkins Park	PA

3369	H	NA		Cheltenham	PA
3370	Daniel	Boykis		Jenkintown	PA
3371	Elizabeth	Sherlon		Jenkintown	PA
3372	Rachel	Penny		Jenkintown	PA
3373	Gerry	Harnst		Jenkintown	PA
3374	Gregory	NA		Jenkintown	PA
3375	Frederick	Baer		Jenkintown	PA
3376	Amy Amanda	Knoll		Jenkintown	PA
3377	Bianca	Blese		Jenkintown	PA
3378	Judith	Field		Jenkintown	PA
3379	Mara	Wai		Jenkintown	PA
3380	Ken	Lynch		Jenkintown	PA
3381	Pattie	Remmey		Jenkintown	PA
3382	Steve	Schwartz		Jenkintown	PA
3383	Herb	Schechter		Jenkintown	PA
3384	Kylin	Virgilio		Jenkintown	PA
3385	Nicole	Batdorf		Jenkintown	PA
3386	Frank	Connor		Jenkintown	PA
3387	Darnell	Rowland		Elkins Park	PA
3388	Anita	Conner		Elkins Park	PA
3389	Erin	Carpenter		Elkins Park	PA
3390	Earlene	Gaskins		Elkins Park	PA
3391	Maryanne	Peace		Elkins Park	PA
3392	A	Dobbs		Elkins Park	PA
3393	Mosho	Ko		Elkins Park	PA
3394	Khan	Dao		Elkins Park	PA
3395	C	Smith		Elkins Park	PA
3396	Michael	Davis Jr.		Abington	PA
3397	Todd	Bauder		Glenside	PA
3398	Corey	Romano		Glenside	PA
3399	George	Snyder		Glenside	PA
3400	Amy	Skarberk		Glenside	PA
3401	Markeesha	Wyne		Glenside	PA
3402	William	McCall		Glenside	PA
3403	Jack	Kligerman		Glenside	PA
3404	Christine	Kou		Wyngate	PA
3405	Emily	Benedict		Jenkintown	PA
3406	Jessica	Martin		Glenside	PA
3407	Jennifer	Gregorio		Glenside	PA
3408	Guy	Eosso		Glenside	PA
3409	Rachel	Ditoro		Glenside	PA
3410	Marketta	Reich		Elkins Park	PA
3411	Jay	Vowles		Jenkintown	PA
3412	Dany	Bate		Jenkintown	PA
3413	James	Fiorella		Jenkintown	PA
3414	Patrick	Donahue		Glenside	PA
3415	Erin	Jones		Glenside	PA

3416	Ruthanne	Hoover		Glenside	PA
3417	Jeffrey	Hojnowski		Glenside	PA
3418	Bill	Ryan		Roslyn	PA
3419	Abby	Capitole		Abington	PA
3420	David	Conway		Abington	PA
3421	Tiana	Moragne		Roslyn	PA
3422	Sergio	Aviles		Glenside	PA
3423	Jaclyn	Perozze		Glenside	PA
3424	John	Anderson		Abington	PA
3425	Christine	Rhoades		Glenside	PA
3426	John	Burns		Glenside	PA
3427	Chris	Kushner		Glenside	PA
3428	Catherine	Davis		Cheltenham	PA
3429	Daniel	Turner		Jenkintown	PA
3430	Jeff	Perkins		Wyncote	PA
3431	Ashley	Holton		Wyncote	PA
3432	Marnie	Barnhart		Wyncote	PA
3433	Ronald	Block		Jenkintown	PA
3434	Tom	Reber		Elkins Park	PA
3435	Bill	Gura		Elkins Park	PA
3436	W	Hogue		Elkins Park	PA
3437	Lori	Hippel		Elkins Park	PA
3438	Oluseyi	Akinnaso		Elkins Park	PA
3439	Max	Azuelos		Elkins Park	PA
3440	Randolph	C		Elkins Park	PA
3441	Andrea	Hagan		Elkins Park	PA
3442	Shannon	Teller		Elkins Park	PA
3443	Joe	Vaccaro		Glenside	PA
3444	Gregory	Howard		Elkins Park	PA
3445	Robert	Finks		Elkins Park	PA
3446	Jackie	Bailey		Glenside	PA
3447	Igli	Nako		Elkins Park	PA
3448	Diana	Kleaver		Glenside	PA
3449	Patricia	Honnher		Elkins Park	PA
3450	Guye	Truman		Philadelphia	PA
3451	Gwen	Watson		Elkins Park	PA
3452	Nanci	Compson		Wyncote	PA
3453	Sophie	Adams		Elkins Park	PA
3454	Dacy	Boyd		Cheltenham	PA
3455	A.	Beasley		Elkins Park	PA
3456	Shira	Newberger		Wyncote	PA
3457	Elaine	Dorsey		Elkins Park	PA
3458	Julie	Mann		Wyncote	PA
3459	Marian	Eidell		Elkins Park	PA
3460	Ed	Byrnes		Wyncote	PA
3461	John	Kolla		Rydal	PA
3462	Maureen	Mullen		Glenside	PA

3463	Jason	Tociren		Jenkintown	PA
3464	Marguerite	DeLguidice		Jenkintown	PA
3465	Andrew	Peters		Rydal	PA
3466	Diane	McManus		Wyncote	PA
3467	Michelle	M		Rydal	PA
3468	Ernest	Cohen		Wyncote	PA
3469	Kristin	Carey		Jenkintown	PA
3470	Evan	Baum		Wyncote	PA
3471	Heather	Rich		Glenside	PA
3472	Karin	Sargrad		Glenside	PA
3473	Kevin	Feeney		Glenside	PA
3474	Renee	Gilliam		Glenside	PA
3475	Thomas	Och		Glenside	PA
3476	Don	Bosworth		Wyncote	PA
3477	Julia	Hilger		Glenside	PA
3478	Jim	Hopf		Glenside	PA
3479	Amanda	Webb		Glenside	PA
3480	Brian	Wood		Glenside	PA
3481	Ed	Doogan		Glenside	PA
3482	Elizabeth	Moss		Glenside	PA
3483	Sandra	Stabler		Abington	PA
3484	David	K		Abington	PA
3485	Bry	Sura		Glenside	PA
3486	John	Garrity		Abington	PA
3487	Susan	Garrity		Abington	PA
3488	Karen	Beal		Glenside	PA
3489	Phillip	Murray		Abington	PA
3490	Alan	Stack		Glenside	PA
3491	Chad	Wagner		Glenside	PA
3492	Karen	Schultz		Glenside	PA
3493	Greg	Schultz		Glenside	PA
3494	M	Toroni		Glenside	PA
3495	Elin	Ja		Abington	PA
3496	Cheryl	Dorsey		Glenside	PA
3497	Kathleen	Chandler		Abington	PA
3498	Matt	Brooke		Glenside	PA
3499	Alex	Stillman		Glenside	PA
3500	Melissa	Dye		Abington	PA
3501	Catherine	Seeders		Abington	PA
3502	Cyndi	Judge		Glenside	PA
3503	David	Becker		Abington	PA
3504	Jessica	Ross		Abington	PA
3505	William	M		Glenside	PA
3506	Mary	Fannon		Glenside	PA
3507	Elyssa	H		Glenside	PA
3508	Bernadette	Dougherty		Glenside	PA
3509	John	O'Brien		Glenside	PA

3510	Sarah	Bicley		Glenside	PA
3511	Tess	Eichenberger		Glenside	PA
3512	Kristin	R		Jenkintown	PA
3513	Debbie	Byrne		Glenside	PA
3514	Renee	Winegrad		Jenkintown	PA
3515	Michael	R		Glenside	PA
3516	Mary Ann	Goss		Wyncote	PA
3517	Wayne	Lewis		Glenside	PA
3518	Mary	Van Allen		Glenside	PA
3519	Brian	Walsh		Glenside	PA
3520	Darren	M		Rydal	PA
3521	Daniel	Deck		Glenside	PA
3522	Alec	Corbin		Abington	PA
3523	Robert	Mongrandi		Abington	PA
3524	Kelley	Burton		Abington	PA
3525	Silvia	Silveria		Abington	PA
3526	Stephanie	Cornell		Abington	PA
3527	Jennifer	Delfore		Abington	PA
3528	Andy	Peckiconis		Abington	PA
3529	Virgina	Duffy		Abington	PA
3530	Kathleen	Praybylousk		Abington	PA
3531	Eileen	Landgraf		Abington	PA
3532	Emily	Landgraf		Abington	PA
3533	Tracey	Long		Elkins Park	PA
3534	Ideleen	Keiser		Abington	PA
3535	Walter	Dickerson		Elkins Park	PA
3536	Linda	Putnam Erat		Jenkintown	PA
3537	Amy	Cleam		Rydal	PA
3538	Chelsea	Gyplicki		Rydal	PA
3539	R	Wome		Rydal	PA
3540	Jane	M		Rydal	PA
3541	Alyson	Schwartz		Rydal	PA
3542	Mary	Golden		Jenkintown	PA
3543	Stashi	Keiman		Jenkintown	PA
3544	Amila	Kleiman		Jenkintown	PA
3545	Melissa	Guilletin		Rydal	PA
3546	Andrea	Giodan		Rydal	PA
3547	Martha	Coe		Rydal	PA
3548	Jane	Cheiroth		Rydal	PA
3549	Mara	Wilkes		Glenside	PA
3550	Matthew	Walsh		Abington	PA
3551	John	McCabe		Glenside	PA
3552	Joseph	Rozall		Abington	PA
3553	Mia	Thomsen		Glenside	PA
3554	Brian	Welsh		Glenside	PA
3555	Matthew	Lennertz		Wyncote	PA
3556	John	Simms		Glenside	PA

3557	Katie	Viets		Glenside	PA
3558	Ann	Holland		Wyncote	PA
3559	Ryan	Whites		Glenside	PA
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FINAL-FORM RULEMAKING
ENVIRONMENTAL QUALITY BOARD
[25 PA. CODE CH. 109]

Safe Drinking Water PFAS MCL Rule

The Environmental Quality Board (Board) by this order amends Chapter 109 (relating to safe drinking water) to read as set forth in Annex A. This final-form rulemaking will improve public health protection by setting maximum contaminant level goals (MCLG) and maximum contaminant levels (MCL) for two per- and polyfluoroalkyl substances (PFAS)—perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS).

PFAS are considered emerging contaminants because research is ongoing to better understand the potential impacts PFAS pose to human and animal health and the environment. PFAS are potentially linked to a number of adverse health effects, including high cholesterol, developmental effects including low birth weight, liver toxicity, decreased immune response, thyroid disease, kidney disease, ulcerative colitis and certain cancers, including testicular cancer and kidney cancer.

This final-form rulemaking will protect public health by setting State MCLs for contaminants in drinking water that are currently unregulated at the Federal level. With this final-form rulemaking, the Commonwealth has moved ahead of the United States Environmental Protection Agency (EPA) in addressing PFOA and PFOS in drinking water and joins a small group of states that have set regulatory limits for select PFAS in drinking water. Currently, seven states have set MCLs or other regulatory limits for one or more PFAS—Massachusetts, Michigan, New Hampshire, New Jersey, New York, Vermont, and Washington.

Safe drinking water is vital to maintaining healthy and sustainable communities. Proactively addressing PFOA and PFOS contamination in drinking water can reduce the incidence of illness and reduce health care costs. Although the EPA has started the process of setting more stringent standards for PFOA and PFOS in drinking water, that process is expected to take years to complete. For that reason, these more protective standards for this Commonwealth will better protect the health of residents in this Commonwealth. Proper investment in public water system infrastructure and operations helps ensure a continuous supply of safe drinking water, enables communities to plan and build future capacity for economic growth, and ensures their long-term sustainability for years to come.

The PFOA and PFOS MCLs will apply to all 3,117 community, nontransient noncommunity, bottled, vended, retail and bulk water systems in this Commonwealth. Of these, 1,905 are community water systems, serving a combined population of approximately 11.4 million residents in this Commonwealth; another 1,096 are nontransient noncommunity water systems serving approximately 507,000 persons.

This final-form rulemaking also includes minor amendments to address incorrect cross-references and citations, delete duplicated text and update language to be consistent with revisions made in the 2018 General Update of the Chapter 109 regulations. These minor amendments are a codification of existing practices and will have no change from current practice.

This final-form rulemaking was adopted by the Board at its meeting of October 12, 2022.

A. *Effective Date*

This final-form rulemaking will be effective upon publication in the *Pennsylvania Bulletin*. Initial compliance monitoring for community and nontransient noncommunity water systems serving a population of greater than 350 persons and all bottled, vended, retail and bulk hauling water systems begins January 1, 2024; initial monitoring for community and nontransient noncommunity water systems serving a population of less than or equal to 350 persons begins January 1, 2025.

B. *Contact Persons*

For further information, contact Edgar Chescattie, Acting Director, Bureau of Safe Drinking Water, P.O. Box 8467, Rachel Carson State Office Building, Harrisburg, PA 17105-8467, (717) 787-9633; or Leda J. Lacomba, Assistant Counsel, Bureau of Regulatory Counsel, P.O. Box 8464, Rachel Carson State Office Building, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the Pennsylvania Hamilton Relay Service at (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This final-form rulemaking is available on the Department of Environmental Protection's (Department) web site at www.dep.pa.gov (select "Public Participation," then "Environmental Quality Board" and then navigate to the Board meeting of October 12, 2022).

C. *Statutory Authority*

This final-form rulemaking is being made under the authority of section 4 of the Pennsylvania Safe Drinking Water Act (act) (35 P.S. § 721.4), which grants the Board the authority to adopt rules and regulations governing the provision of drinking water to the public, and section 1920-A of The Administrative Code of 1929 (71 P.S. § 510-20), which authorizes the Board to promulgate rules and regulations necessary for the performance of the work of the Department.

D. *Background and Purpose*

PFAS are a large class of man-made synthetic chemicals that were created in the 1930s and 1940s for use in many industrial and manufacturing applications. It is estimated that the PFAS family includes more than 6,000 chemical compounds. PFAS have been widely used for their unique properties that make products repel water, grease and stains, reduce friction and resist heat. PFAS are found in industrial and consumer products such as clothing, carpeting, upholstery, food packaging, non-stick cookware, fire-fighting foams, personal care products, paints, adhesives, metal plating, wire manufacturing and many other uses. Because of their unique chemical structure, PFAS readily dissolve in water and are mobile, are highly persistent in the environment and bioaccumulate in living organisms over time.

Decades of widespread use of products containing PFAS has resulted in elevated levels of environmental pollution and exposure in some areas of the State. PFAS remain in the environment and cycle through various media (air, water, soil) depending on how and where the substances were released. The primary means of distribution of PFAS throughout the environment has been though the air, water, biosolids, food, landfill leachate and fire-fighting activities. For a diagram showing the PFAS cycle and its exposure pathways, refer to the Department's PFAS webpage at www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/DEP-Involvement.aspx. As noted previously, PFAS are potentially linked to a number of adverse health effects, including high cholesterol, developmental effects including low birth weight, liver toxicity, decreased immune response, thyroid disease, kidney disease, ulcerative colitis and certain cancers, including testicular cancer and kidney cancer.

The Department's Safe Drinking Water Program first became aware of PFAS as emerging contaminants in 2013 when the EPA included six PFAS in its Third Unregulated Contaminant Monitoring Rule (UCMR3). The six PFAS included in UCMR3 monitoring are PFOA, PFOS, perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), perfluoroheptanoic acid (PFHpA) and perfluorobutanesulfonic acid (PFBS). The UCMR rules are Federal direct-implementation rules that are updated every 5 years to require monitoring for up to 30 unregulated contaminants to generate National occurrence data and inform the Federal regulatory determination process. Public water systems (PWS) serving more than 10,000 people and a select number of smaller PWSs were required to monitor for PFAS and other contaminants during 2013—2015 for UCMR3. In this Commonwealth, a total of 175 systems conducted monitoring; of these systems, PFAS was detected at six systems above the 2009 Provisional Health Advisory Levels (HAL) for PFOA and PFOS of 400 nanograms per liter (ng/L) or parts per trillion (ppt) and 200 ng/L, respectively. The Department worked closely with the EPA and the PWSs to address the elevated levels of PFAS found during the UCMR3 monitoring.

In 2016, the Department began implementing the EPA's 2016 Final Combined Lifetime HAL of 70 ng/L for PFOA and PFOS using existing authority under the act and Chapter 109 regulations. PWSs that exceed the 2016 EPA HAL are required to conduct follow-up and corrective actions to protect public health, including the following actions:

- One-hour reporting of sample results to the Department to ensure timely consultation and oversight regarding investigative and corrective actions (§ 109.701(a)(3)(iii) (relating to reporting and recordkeeping)),
- Collection of confirmation samples (§ 109.302 (relating to special monitoring requirements)),
- Issuance of Tier 2 Public Notice to consumers (§ 109.409 (relating to Tier 2 public notice—categories, timing and delivery of notice)),
- Quarterly monitoring at the entry point (EP) to track levels of contamination (§ 109.302), and
- If levels continue to exceed the HAL, taking additional actions as needed to protect public health such as taking contaminated sources off-line or installing treatment (§ 109.4 (relating to general requirements)).

PFAS Action Team

In the absence of Federal action to address PFAS, Governor Tom Wolf signed Executive Order 2018-08 (EO) on September 19, 2018. The EO created the PFAS Action Team, a multi-agency group tasked with, among other things, developing a comprehensive response to identify and eliminate sources of contamination, ensure drinking water is safe, manage environmental contamination, review gaps in data and oversight authority and recommend actions to address those gaps. The PFAS Action Team released its Initial Report in December of 2019 to the Department's

PFAS webpage at www.dep.pa.gov/pfas. The report includes information about PFAS, challenges associated with managing contamination, actions taken to date and recommendations for future actions. Recommendations include additional funding for communities dealing with PFAS contamination and strengthened statutory authorities to adequately address PFAS.

In 2019, the Department's Safe Drinking Water Program moved forward with two key projects to advance its knowledge of PFAS—the PFAS Sampling Plan and PFAS Toxicology Services Contract.

PFAS Sampling Plan

The PFAS Sampling Plan was developed and posted to the Department's PFAS webpage in April of 2019. The plan prioritized PWS sites for PFAS sampling to generate Statewide occurrence data. Several factors were considered in developing the targeted plan, including:

- Identification of "potential sources of PFAS contamination" (PSOC) based on a literature review,
- Identification of PWS sources located within 0.5 to 0.75 miles from PSOCs, and
- Selection of PWS sources to serve as a control or baseline group.

The selection process involved a combination of spatial analysis and programmatic review. The spatial analysis included the creation of a Geographic Information System (GIS) project using ArcMap 10.4.1 that focused on PWS source locations and information about PSOCs. The sampling pool was prioritized based on relative risk and included community water systems and nontransient noncommunity water systems. To prioritize sampling, the selection process included an assessment of the potential risk from nearby PSOCs. Several layers containing locational and other information specific to PSOCs were created or otherwise included in the GIS. These layers include the following industries and land uses:

- Military bases
- Fire training schools/sites
- Airports
- Landfills
- Manufacturing facilities (apparel, chemicals, electronics, fabricated metal, paper products, textiles and leather, upholstered furniture)
- State Hazardous Sites Cleanup Act sites, the EPA Superfund sites and other known PFAS-contamination sites

The sampling plan includes details about the sources of GIS data and multiple maps that indicate the locations and prevalence of the PSOCs and the locations of the targeted and baseline sampling sites.

Based on the compilation of PSOCs, PWS sources were selected that are located within 0.5 to 0.75 miles of a PSOC. The initial sampling pool included 493 PWS sources. The sampling pool contained a mix of PWS types and sizes and provided a good spatial distribution across the State. Based on available funding of $500,000, the Department proposed sampling at 360 targeted and 40 baseline EP sites. Baseline sources are located in a HUC-12 watershed (a watershed assigned a 12-digit hydrologic unit code, or HUC, by the United States Geological Survey) with at least 75% forested land and at least 5 miles from a PSOC. Ultimately, samples were collected from 412 EPs including 372 targeted sites and 40 baseline sites. Note that an EP to the distribution system may include water from more than one source of supply.

Sampling and analysis by EPA Method 537.1 was completed at the end of March 2021, and the final sample results were posted to the Department's PFAS webpage in June 2021. Table 1 includes a summary of the results from the PFAS Sampling Plan for the same six PFAS that were sampled under UCMR3.

Table 1. Summary of PFAS Sampling Plan results. Full results available at www.dep.pa.gov/pfas.

Summary of PFAS Sampling Plan Results							
	PFOA	**PFOS**	**PFNA**	**PFHxS**	**PFHpA**	**PFBS**	**Units**
Total No. Samples	412	412	412	412	412	412	--
Average	2.0	2.5	0.4	1.4	0.7	1.1	ng/L
Median	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	ng/L
Minimum	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	ng/L
Maximum	59.6	187.1	18.1	140.0	32.6	64.0	ng/L
No. and % of Detects	112 (27%)	103 (25%)	23 (6%)	52 (13%)	49 (12%)	66 (16%)	--
Avg Detect Value	7.5	9.9	7.2	10.9	6.1	7.0	ng/L
Med Detect Value	5.3	6.5	5.6	4.5	4.5	4.2	ng/L
Min Detect Value	1.7	1.8	1.8	1.9	1.8	1.7	ng/L
Max Detect Value	59.6	187.1	18.1	140.0	32.6	64.0	ng/L

For example, of the 412 samples analyzed for PFOA, 112 (27%) resulted in detectable concentrations of PFOA. The remaining 300 samples resulted in no detectable concentrations of PFOA. For the 112 samples in which PFOA was detected, the average detected value was 7.5 ng/L, the median detected value was 5.3 ng/L, the minimum detected value was 1.7 ng/L, and the maximum detected value was 59.6 ng/L.

At the sampling sites with detections, eight of the 18 PFAS included in EPA Method 537.1 were detected. The eight PFAS that were detected are: PFOA, PFOS, PFNA, PFHxS, PFHpA, PFBS, perfluorohexanoic acid (PFHxA) and perfluoroundecanoic acid (PFUnA). Of the PFAS detected, PFOA and PFOS were most common, detected at 112 (or 27%) and 103 (or 25%) sites, respectively. Of the 412 total samples, two of the results were above the 2016 EPA HAL of 70 ng/L for the combined concentrations of PFOA and PFOS. Results were non-detect (ND) at all 412 sites for the other ten PFAS that were tested.

Additionally, there are 23 results with detections from UCMR3 monitoring that were also included in the occurrence data evaluation. Because the reporting limits used for UCMR3 monitoring (40 ng/L for PFOA and 20 ng/L for PFOS) were much higher than current reporting limits (which are generally below 5 ng/L), the Department did not include UCMR3 data that was below the UCMR3 reporting limits.

Therefore, the Department used results from a total of 435 sampling sites in the evaluation of occurrence data.

PFAS Toxicology Services Contract

In December 2019, the Department's Safe Drinking Water Program executed a toxicology services contract with Drexel University to review other state and Federal agency work on MCLs; independently review the data, science and studies; and develop recommended MCLGs for select PFAS. MCLGs are nonenforceable, developed solely based on health effects, and do not take into consideration other factors, such as technical limitations and cost. MCLGs are the starting point for determining MCLs.

Deliverables were developed by the Drexel PFAS Advisory Group (DPAG)—a multidisciplinary team of experts in toxicology, epidemiology, and drinking water standards and risk assessment—and were completed in January 2021. These deliverables are the "Drexel PFAS Workbook" and "MCLG Drinking Water Recommendations for PFAS in the Commonwealth of PA" (MCLG Report), available at the following links: Workbook, https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/June%2015/03_PFAS%20Petition/01b_App%202%20Drexel%20PFAS%20Workbook%20January%202021.pdf and Report, https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/June%2015/03_PFAS%20Petition/01a_App%201%20Drexel%20PFAS%20Report%20January%202021.pdf.

The DPAG reviewed pertinent literature and work across the country and independently developed recommended MCLGs based on non-cancer endpoints. In the "Drexel PFAS Workbook", the DPAG explains how threshold levels (such as advisory levels, MCLGs, MCLs) are generally determined, although each state's process can vary. The MCLG Report discusses relevant inputs and includes a summary table for each PFAS that documents the development of the recommended MCLG. Table 2 includes the Reference Dose and recommended Chronic Non-Cancer MCLG for each PFAS that was reviewed.

Table 2. DPAG Reference Dose and Recommended Chronic Non-Cancer MCLGs.

DPAG Reference Dose and Recommended Chronic Non-Cancer MCLGs		
PFAS	**Reference Dose (ng/kg/day)**	**MCLG (ng/L or ppt)**
PFOA	3.9	8
PFOS	3.1	14
PFNA	2.2	6
PFHxS	4.0	20

PFHpA	None derived*	8
PFBS	39	55
GenX (HFPO-DA)	75	108

*Reference dose was not derived due to a lack of evidence on its toxicity. Recommended MCLG is based on its chemical structure.

As the DPAG explains in its MCLG Report, it "reviewed a number of recommendations made by EPA and State agencies that chose to create a summative approach to PFAS, combining multiple minimal risk levels or advisory levels into one cumulative drinking water value. No clear consensus exists on this approach and the use of the summative approach was clearly designed to be a shortcut based on a presumption that the agents all have similar health effects and end points. While this approach may work for other toxins such as dioxins, furans, and coplanar polychlorinated biphenols, it does not appear to be based on evidence available for PFAS. The DPAG therefore committed early in the process to developing an individual MCLG for each of the requested PFAS." (DPAG, January 2021)

The DPAG further describes in the MCLG Report that "For each of the PFAS studied, the DPAG identified points of departure (POD) and rationale for selection from risk assessments published by other States, the EPA and the Agency for Toxic Substances and Disease Registry (ATSDR). The DPAG then assessed the underlying critical studies driving the selection of the POD. Every effort was made to use the experience and published findings from other agencies and build and refine on these as much as possible into a best practice approach." (DPAG, January 2021)

The PFAS Toxicology Services Contract was renewed in 2021 so that the DPAG could provide additional detail on the health benefits and cost savings achieved by these MCLs. Section G of this preamble presents information on the costs and benefits of this final-form rulemaking.

MCL Rulemaking Process

The Department followed a rigorous process when setting the MCLs in this final-form rulemaking. An MCL rulemaking must be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (Federal Act) (42 U.S.C.A. §§ 300f—300j-27) and the Commonwealth's Regulatory Review Act (RRA), (71 P.S. §§ 745.1—745.14). Among other things, the Department must consider the following:

- Health effects,
- Occurrence data,
- Technical limitations such as available analytical methods and detection and reporting limits,
- Treatability of the contaminant and available treatment technologies, and
- Costs and benefits. (71 P.S. § 745.5b).

In addition to State requirements, the Department needs to consult the Federal Act and its implementing regulations. See 42 U.S.C.A. §§ 300f—300j-9; see also 40 CFR Parts 141, 142, and 143 (relating to National Primary Drinking Water Regulations; National Primary Drinking Water

Regulations Implementation; and Other Safe Drinking Water Act Regulations). The EPA explains how the agency sets standards at the following link: www.epa.gov/sdwa/how-epa-regulates-drinking-water-contaminants. In establishing the MCLs in this final-form rulemaking, the Department was informed by the EPA's procedure to establish an MCL. It is important to understand the process of setting an MCL because similar criteria are required of the Department under the RRA. In addition, to retain primacy for implementing the Federal Act in this Commonwealth, the Department's standard setting process must be at least as stringent as the Federal process.

After reviewing health effects data, the EPA sets an MCLG. MCLGs are nonenforceable public health goals. MCLGs consider only public health and not the limits of detection and treatment technology effectiveness. Therefore, MCLGs sometimes are set at levels which water systems cannot meet because of technical limitations.

Once the MCLG is determined, the EPA sets an enforceable standard. In most cases, the standard is an MCL. The MCL is set as close to the MCLG as feasible. Taking cost into consideration, the EPA must determine the feasible MCL.

As a part of the rule analysis, the Federal Act requires the EPA to prepare a health risk reduction and cost analysis in support of any standard. The EPA must analyze the quantifiable and nonquantifiable benefits that are likely to occur as the result of compliance with the proposed standard. The EPA must also analyze increased costs that will result from the proposed drinking water standard. In addition, the EPA must consider incremental costs and benefits associated with the proposed alternative MCL values. Where the benefits of a new MCL do not justify the costs, the EPA may adjust the MCL to a level that maximizes health risk reduction benefits at a cost that is justified by the benefits.

This final-form rulemaking sets new MCLGs and MCLs for PFOA and PFOS. The rulemaking also establishes the provisions necessary to comply with the MCLs, including requirements for monitoring and reporting, public notification, consumer confidence reports, best available treatment technologies and analytical requirements.

PFOA – DPAG Development of MCLG

After a literature search and a review of the available evidence and recommendations from various agencies, the DPAG developed an MCLG recommendation for PFOA of 8 ng/L or ppt based on non-cancer endpoints. The DPAG determined that the most relevant inputs were from the EPA, ATSDR, Minnesota Department of Health (MDH), New Jersey Department of Environmental Protection (NJDEP) and Michigan Department of Health and Human Services (MDHHS).

The DPAG selected Koskela, et al. (2016) and Onishchenko, et al. (2011) as the critical studies, which identified developmental effects (e.g. neurobehavioral and skeletal) as critical. The DPAG adopted the ATSDR's estimated Point of Departure (POD) of 8.29 mg/L. The DPAG followed the approaches used by MDHHS, MDH and ATSDR to select and determine the Human Equivalent Dose (HED), Uncertainty Factors (UF), Reference Dose (RfD), Relative Source Contribution (RSC), and recommended MCLG. Table 3 provides a summary of the DPAG's derivation of the MCLG for PFOA.

Table 3. DPAG Derivation of PFOA MCLG (DPAG, January 2021)

PFOA	
Drexel PFAS Advisory Group (DPAG) 2021	
Dose Response Modeling Method	LOAEL
POD	The average serum concentration was estimated in the mice (8.29 mg/L) using a three-compartment pharmacokinetic model (Wambaugh et al. 2013) using animal species, strain, sex-specific parameters. (ATSDR 2018)
HED = POD x DAF (mg/kg/d)	DAF = Ke x Vd Ke = 0.000825175 (8.2 x 10-4) based on a human serum half-life of 840 days (Bartell et al. 2010) Vd = 0.17 L/kg (Thompson et al. 2010) $HED_{LOAEL} = POD_{LOAEL}$ x DAF $HED_{LOAEL} = POD_{LOAEL}$ x Ke x Vd HED_{LOAEL} = 8.29 mg/L x 0.0000825175 x 0.17 L/kg HED_{LOAEL} = 0.001163 mg/kg/d or 1.163 x 10^{-3} mg/kg/d
Uncertainty Extrapolation	
Human Variability (UFH)	10 (standard)
Animal to Human (UFA)	3 (DAF applied)
Subchronic to Chronic (UFS)	1 (Chronic effect studied)
LOAEL to NOAEL (UFL)	10 (standard)
Database (UFD)	1
Total Composite (UFT)	300
RfD = HED/UFT (mg/kg/d)	RfD = 0.001163 mg/kg/d/300 RfD = 3.9 ng/kg/day (3.9 x 10^{-6} mg/kg/d)
THSV = POD / UFT	THSV= 8.29 mg/L/ 300 THSV= 0.028 mg/L
Receptor	Infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime of exposure via drinking water. Protective for short-term, subchronic and chronic. (also protective of formula fed infant). Goeden Model Parameters: Placental transfer of 87% and breastmilk transfer of 5.2% (MDH (2020 PFOA)). The Human Serum half-life is set at 840 days (Bartell et al. 2010). The Volume of distribution of 0.17 L/kg (Thompson et al. [2010]) Other factors include, 95th percentile drinking water intake, consumers only, from birth to more than 21 years old. Upper percentile (mean plus two standard deviations) breast milk intake rate. Time-weighted average water ingestion rate from birth to 30-35 years of age is used to calculate maternal serum concentration at delivery. (Goeden et al. [2019]) A Relative Source Contribution of 50% (0.5) is applied and based on studies which showed that infants RSC is similar to NHANES 95th percentiles for 3-11 (2013-2014) and over 12 years old (2015-2016) participants. (CDC 2019)
Chronic Non-Cancer MCLG	The model produces a Chronic Non-Cancer MCLG of 8 ng/L (ppt). This protects health during the growth and development of a breast fed infant.

In summary, the DPAG recommended a chronic non-cancer MCLG for PFOA of 8 ng/L to protect breast-fed infants and throughout life.

The Board is setting the MCLG for PFOA at the DPAG recommended level of 8 ng/L.

PFOA – Occurrence Data

Table 4 is a summary of occurrence data for PFOA. The data includes 412 results from the PFAS Sampling Plan and detect data from 23 sites under UCMR3 for a total of 435 sample results.

Table 4. PFOA Occurrence Data > MCLG of 8 ng/L

PFOA Occurrence Data > MCLG of 8 ng/L	
# of sites (of 435) > MCLG	46
% of sites > MCLG	10.6%
Estimated # of EPs (of 3785) > MCLG	400

A review of occurrence data indicates that 46 EPs out of a total number of 435 EPs sampled exceeded the MCLG for PFOA of 8 ng/L. This represents 10.6% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOA MCLG exceedance rate (10.6%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 400 EPs will exceed the MCLG of 8 ng/L.

PFOA – MCL of 14 ng/L

The Board is setting an MCL of 14 ng/L for PFOA. The MCL is based on the health effects and MCLG, occurrence data, technical feasibility, and costs and benefits.

Table 5 is a summary of occurrence data for PFOA when compared to the MCL of 14 ng/L.

Table 5. PFOA Occurrence Data > MCL of 14 ng/L

PFOA Occurrence Data > MCL of 14 ng/L	
# of sites (of 435) > MCL	25
% of sites > MCL	5.7%
Estimated # of EPs (of 3785) > MCL	218

A review of occurrence data indicates that 25 EPs out of a total number of 435 EPs sampled exceeded the MCL for PFOA of 14 ng/L. This represents 5.7% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOA MCL exceedance rate (5.7%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 218 EPs will exceed the MCL of 14 ng/L.

PFOS – DPAG Development of MCLG

After a literature search and a review of the available evidence and recommendations from various agencies, the DPAG developed an MCLG recommendation for PFOS of 14 ng/L or ppt based on non-cancer endpoints. The DPAG referenced inputs from the EPA, ATSDR, MDH and MDHHS.

The DPAG selected Dong, et al. (2011) as the critical study, which identified immunotoxicity effects (such as immune suppression) as critical. The DPAG determined that a POD of 2.36 mg/L is appropriate. The DPAG followed the approaches used by MDHHS, MDH and the EPA to select and determine the Human Equivalent Dose (HED), Uncertainty Factors (UF), Reference Dose (RfD), Relative Source Contribution (RSC) and recommended MCLG. Table 6 provides a summary of the DPAG's derivation of the MCLG for PFOS.

Table 6. DPAG Derivation of PFOS MCLG (DPAG, January 2021)

PFOS	
Drexel PFAS Advisory Group (DPAG) 2021	
Dose Response Modeling Method	NOAEL
POD	2.36 µg/mL (or 2.36 mg/L)
HED = POD x DAF (mg/kg/d)	Toxicokinetic Adjustment based on Chemical- Specific Clearance Rate (Li et al 2018, MDH 2020 PFOS) DAF = Vd (L/kg) x (Ln2/Half-life, days) DAF = 0.23 L/kg x (0.693/1241 days) = DAF = 0.00013 L/kg/d HED = POD x DAF (mg/kg/d) HED = 2.36 mg/L x 0.00013 L/kg/d HED = 0.000307 mg/kg/d
Uncertainty Extrapolation	
Human Variability (UFH)	10
Animal to Human (UFA)	3 (DAF applied)
Subchronic to Chronic (UFS)	1
LOAEL to NOAEL (UFL)	1
Database (UFD)	3
Total Composite (UFT)	100
RfD = HED/UFT (mg/kg/d)	RfD = HED/UFT (mg/kg/d) RfD = 0.000307 mg/kg-d/100 RfD = 3.1 ng/kg/d or 3.1x 10^{-6} mg/kg-d
THSV = POD/UFT	ITSHV = 2.36 mg/L/100 ITSHV = 0.024 mg/mL
Receptor	Infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime of exposure via drinking water. Protective for short-term, subchronic and chronic. The 95th percentile water intake rates (Table 3-1 and 3-3, USEPA 2019) or upper percentile breastmilk intake rates (Table 15-1, USEPA 2019) were used. Breast-fed infant, which is also protective of a formula-fed infant using Minnesota Department of Health Model based on Goeden (2019). Placental transfer of 40% (MDH 2020 PFOS). Breastmilk transfer of 1.7% (MDH 2020 PFOS). Human Serum half-life of 1241 days (Li et al. 2018) Volume of distribution of 0.23 L/kg (USA EPA 2016c) 95th percentile drinking water intake, consumers only, from birth to more than 21 years old (Goeden [2019]) Upper percentile (mean plus two standard deviations) breast milk intake rate (Goeden [2019]) Time-weighted average water ingestion rate

	from birth to 30-35 years of age (to calculate maternal serum concentration at delivery) (Goeden [2019])
Chronic Non-Cancer MCLG	The model produces a Chronic Non-Cancer MCLG of 14 ng/L (ppt). This protects health during the growth and development of a breast fed infant.

In summary, the DPAG recommended a chronic non-cancer MCLG for PFOS of 14 ng/L to protect breast-fed infants and throughout life.

The Board is setting the MCLG for PFOS at the DPAG recommended level of 14 ng/L.

PFOS – Occurrence Data

Table 7 is a summary of occurrence data for PFOS. The data includes 412 results from the PFAS Sampling Plan and detect data from 23 sites under UCMR3 for a total of 435 sample results.

Table 7. PFOS Occurrence Data > MCLG of 14 ng/L

PFOS Occurrence Data > MCLG of 14 ng/L	
# of sites (of 435) > MCLG	23
% of sites > MCLG	5.3%
Estimated # of EPs (of 3785) > MCLG	200

A review of occurrence data indicates that 23 EPs out of a total number of 435 EPs sampled exceeded the MCLG for PFOS of 14 ng/L. This represents 5.3% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOS MCLG exceedance rate (5.3%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 200 EPs will exceed the MCLG of 14 ng/L.

PFOS – MCL of 18 ng/L

The Board is setting an MCL of 18 ng/L for PFOS. The MCL is based on the health effects and MCLG, occurrence data, technical feasibility, and costs and benefits.

Table 8 is a summary of occurrence data for PFOS when compared to the MCL of 18 ng/L.

Table 8. PFOS Occurrence Data > MCL of 18 ng/L

PFOS Occurrence Data > MCL of 18 ng/L	
# of sites (of 435) > MCL	22
% of sites > MCL	5.1%
Estimated # of EPs (of 3785) > MCL	191

A review of occurrence data indicates that 22 EPs out of a total number of 435 EPs sampled exceeded the MCL for PFOS of 18 ng/L. This represents 5.1% of all EPs sampled. This exceedance rate may overestimate the exceedance rate for other PWSs in this Commonwealth that were not sampled because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. However, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Applying the occurrence data PFOS MCL exceedance rate (5.1%) to the total number of EPs for all applicable PWSs (3,785 EPs), it is estimated that 191 EPs will exceed the MCL of 18 ng/L.

State Data

Currently, seven other states have set regulatory limits for select PFAS, including PFOA and PFOS, as summarized in Table 9. The MCLs for the Commonwealth are of comparable magnitude as the other state standards.

Table 9. PFOA and PFOS MCLs from Seven Other States

	NY	MI	NJ	NH	PA	MA	VT	WA
PFOA	10	8	14	12	**14**	20*	20*	10
PFOS	10	16	13	15	**18**	20*	20*	15

*The MCL for MA & VT is for a group of five (VT) or six (MA) PFAS, including PFOA and PFOS (not individual contaminants).

Advisory Board review

The Public Water System Technical Assistance Center (TAC) Board—the primary advisory board for the Department's Safe Drinking Water Program—reviewed the draft proposed rulemaking on July 29, 2021, and unanimously supported the draft proposed rulemaking as it was presented. The TAC Board also expressed support for the draft proposed rulemaking in a letter dated July 30, 2021.

The TAC Board reviewed the draft final-form rulemaking on July 14, 2022, and unanimously supported the draft final-form rulemaking as it was presented. The TAC Board also expressed support for the draft final-form rulemaking in a letter dated July 18, 2022.

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E. *Summary of Final-Form Rulemaking and Changes from Proposed to Final-Form Rulemaking*

§ 109.1. Definitions

A definition for the acronym "CASRN—Chemical Abstracts Service Registry Number" is added because the CASRN numbers are included for each of the individual PFAS compounds included in the regulation.

A definition for "GAC—Granular Activated Carbon" is added because GAC is one of the treatment technologies considered acceptable for PFAS removal.

A definition for "MCLG—Maximum Contaminant Level Goal" is added. The definition is from 40 CFR 141.2 (relating to definitions) with added text referencing MCLGs established under both the Federal and State acts.

The acronym "MDL" is added to the existing definition "Method detection limit" with the amended definition alphabetically reordered. The definition for "Method detection limit" is also amended to be consistent with the current definition in the Federal regulations at 40 CFR Part 136 Appendix B (relating to definition and procedure for the determination of the method detection limit—revision 2).

A definition for "MRL—Minimum reporting level" is added.

Definitions for the following acronyms are added: "PFAS," "PFOA" and "PFOS." Definitions for individual compounds include the CASRN number to eliminate confusion as to the specific chemical form that is included in the regulation.

A definition for "Performance Evaluation Sample" is added to be consistent with Federal language.

The existing definition for "Reliably and consistently below the MCL" is amended to add "PFAS" defined as less than 80% of the MCL.

No change is made to this section from proposed to final-form rulemaking.

§ 109.202. State MCLs, MRDLs and treatment technique requirements

Subsection (a)(4) for "Other MCLs" adds MCLs and MCLGs for PFOA and PFOS, with an effective date of the publication of this final-form rulemaking. The MCLs and MCLGs are listed in both milligrams per liter (mg/L), which are the traditional units for MCLs, as well as in nanograms per liter (ng/L) for clarity, because the numbers are so low.

No change is made to this section from proposed to final-form rulemaking.

§ 109.301. General monitoring requirements

The duplicated text in paragraph (2)(iv) through (iii) regarding performance monitoring for unfiltered surface water and groundwater under the direct influence of surface water (GUDI), which was inadvertently added following the last regulatory update at 48 Pa.B. 4974 (August 18, 2018), is deleted.

Paragraph (6)(vii)(A)(I) and (II) are amended for consistency with existing definitions that were amended in 2018 and to clarify that the Zone I and Zone II wellhead protection areas and the Zone A and Zone B surface water intake protection areas are defined in § 109.1 (relating to definitions). The amendments will apply to waivers issued for synthetic organic chemicals (SOCs).

Paragraph (8)(iii) is amended to clarify that consecutive water systems may be exempt from PFAS monitoring, in addition to volatile synthetic organic chemicals (VOCs), SOCs, inorganic chemicals (IOCs) and radionuclides.

Paragraph (9) is amended to clarify monitoring requirements for point-of-entry (POE) devices. A POE device is installed on the service line to a house, building or other facility for the purpose of reducing contaminants in the water distributed to that property and is used as an alternative to centralized water treatment. POE devices must meet design and construction standards and may only be used as a treatment option by very small PWSs that serve 100 or fewer people for treating sources that were permitted prior to 1992; the POE device must be installed on every connection unless the PWS can demonstrate that water provided to a service connection meets water quality standards. See § 109.612 (relating to POE devices). As a result, POE devices are often not cost effective and currently there are no PWSs in this Commonwealth that have a permit for POE devices. However, the Commonwealth is required to maintain requirements for POE devices to comply with Federal safe drinking water requirements. Consequently, monitoring requirements for POE devices are added for PFAS, as well as additional contaminants, as applicable, to correct the omission of paragraphs (10)—(15) and Subchapter K (relating to lead and copper). These requirements should have been added in previous rulemakings but were mistakenly overlooked due to no PWSs in this Commonwealth having a permit for POE devices.

Paragraph (11) is amended to clarify that for EPs that do not provide water continuously, monitoring for PFAS is not required during quarters when water is not provided to the public.

Paragraph (15)(i) and (ii) are amended to clarify monitoring for PFAS for reserve EPs and EPs that receive water from a reserve source.

No changes are made to paragraphs (2)—(15) from proposed to final-form rulemaking.

Paragraph (16) describes new monitoring requirements for PFAS for community water systems and nontransient noncommunity water systems. Throughout paragraph (16), the provisions utilize terms of art and phrasing that mirror Federal safe drinking water regulations and are consistent with language used throughout the Department's safe drinking water regulations in Chapter 109.

Paragraphs (16)(i)(A) and (B) specify the initial monitoring requirements for PFAS and, for this final-form rulemaking, are amended to improve readability by removing the phrase "for the PFAS listed in § 109.202(a)(4)(ii)(A) and (B)" because this cross reference is already stated in paragraph 16.

For this final-form rulemaking, proposed paragraph (16)(i)(C) is renumbered as (16)(i)(D) and a new paragraph (16)(i)(C) is added in response to public comments to allow PWSs to request to modify the initial monitoring period required under paragraph (A) or (B) to coincide with monitoring required under the Fifth Unregulated Contaminant Monitoring Rule (UCMR5). Water systems may adjust their UCMR5 schedule to coincide with their initial monitoring begin date or submit a request to the Department to adjust their initial monitoring begin date to coincide with their UCMR5 schedule.

Paragraph (16)(i)(D) specifies initial monitoring for new EPs permitted after the dates specified in clauses (A) and (B).

Paragraph (16)(ii) specifies the repeat monitoring frequency for PFAS that are detected during initial monitoring and, for this final-form rulemaking, is amended to improve readability and to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (16).

Paragraphs (16)(ii)(A)—(C) are amended in this final-form rulemaking to be consistent with the definition for "reliably and consistently below the MCL" in response to public comments, to improve readability, to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (16), and to clarify that repeat monitoring is for the detected PFAS, not for both PFOA and PFOS, signifying that monitoring requirements for PFOA and PFOS are independently determined, consistent with existing requirements for SOCs.

Paragraph (16)(iii) specifies the repeat monitoring frequency for PFAS that are not detected during initial monitoring and, for this final-form rulemaking, is amended to improve readability, to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (16), and to clarify that reduced repeat monitoring applies to the PFAS that is not detected.

Paragraph (16)(iv) specifies the repeat monitoring frequency for PFAS that are detected above the MCL value and, for this final-form rulemaking, is amended to be consistent with the definition for reliably and consistently below the MCL in response to public comments, to improve readability, to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (16), and to clarify that repeat quarterly monitoring is required for the PFAS exceeding its respective MCL.

Paragraph (16)(v) requires collection of confirmation samples for each PFAS detected in exceedance of its MCL and the timing for collection of confirmation samples.

Paragraph (16)(vi) specifies the repeat and performance monitoring requirements for EPs with PFAS removal treatment and, for this final-form rulemaking, is amended in response to public comments to clarify that performance monitoring may be required more frequently than quarterly, to improve readability, to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (16), and to clarify that where treatment is installed for removal of a PFAS, performance monitoring (and annual compliance monitoring) is required for the PFAS for which treatment has been installed.

Paragraph (16)(vii) describes the process by which systems may be able to obtain a monitoring waiver for PFAS and, for this final-form rulemaking, is amended to improve readability, to remove the cross-references to § 109.202(a) because that cross reference is already stated in paragraph (16), and to clarify that the waiver application is specifically for the PFAS monitored under paragraph (16)(ii) or the previously detected PFAS.

Paragraph (16)(viii) specifies when PFAS samples may be invalidated and utilizes the term "obvious sampling errors" consistent with 40 CFR 141.24(f)(13) and (h)(9) (relating to organic chemicals, sampling and analytical requirements).

Paragraph (16)(ix) specifies how compliance with the PFAS MCLs is determined.

§ 109.303. Sampling requirements

Subsection (a)(4) is amended to delete an incorrect cross reference to § 109.302(f) regarding special monitoring requirements. The special monitoring requirements under § 109.302(f) relate to groundwater under the direct influence of surface water and are taken from the collection facilities (raw source water) and not the EP to the distribution system.

Subsection (a)(6)(i) specifies where samples are to be collected. For this final-form rulemaking, it is deleted and the language is moved to subsection (a)(6) because subsection (a)(6)(ii) is deleted.

Subsection (a)(6)(ii) is deleted in this final-form rulemaking in response to public comments requesting clarification on proper training for persons collecting PFAS samples. The Department did not intend to require extensive training or certification for sample collectors; the training conducted by accredited laboratory staff was intended to educate sample collectors on the preparation needed to minimize cross contamination of samples. The Department has determined that this information can be made available to sample collectors through guidance, so this requirement has been deleted.

§ 109.304. Analytical requirements

Subsection (f) specifies the analytical requirements for the PFAS with an MCL.

Subsection (f)(1) specifies acceptable analytical methods and MRLs. The MRLs for PFOA and PFOS are set at 5 ng/L. This level was determined through the survey conducted by the Department of laboratories accredited by this Commonwealth for PFAS analysis. It was determined using the Department's experience with laboratories finding a balance between reporting to a low level and still meeting all method required quality control.

Subsection (f)(2) specifies the requirement that analysis must be conducted by a laboratory accredited by the Department.

Subsection (f)(3) specifies the requirement for laboratories to determine MDLs for each analyte.

Subsection (f)(4) specifies the requirements for laboratories to analyze performance evaluation samples at least annually.

Subsection (f)(5) requires that the MRL must be contained within the range of calibration.

No change is made to this section from proposed to final-form rulemaking.

§ 109.411. Content of a public notice

Subsection (e)(1) is amended for formatting purposes to place the existing requirement to use the health effects language for fluoride in each Tier 2 public notice into a separate subparagraph.

Subsection (e)(1)(i) includes the relocated requirement to use the health effects language for fluoride, which was previously included in § 109.411(e)(1) (relating to content of a public notice).

Subsection (e)(1)(ii) and (iii) add the requirement to include the health effects language for PFOA or PFOS in each Tier 2 public notice for violation of the respective primary MCL, and includes the health effects language that must be used.

No change is made to this section from proposed to final-form rulemaking.

§ 109.416. CCR requirements

Paragraph (3) is amended to update the cross-reference to § 109.411(e)(1)(i), which contains the specific health effects language for fluoride required in a Tier 2 public notice.

Paragraph (3.1) adds consumer confidence report (CCR) reporting requirements for PFAS with an MCL.

Paragraph (3.1)(i)(A)—(G) specify the information on detected results that must be reported.

Paragraph (3.1)(ii) requires that the respective health effects language in § 109.411(e)(1)(ii) and (iii) must be included for violation of a primary MCL for PFOA or PFOS.

No change is made to this section from proposed to final-form rulemaking.

§ 109.503. Public water systems construction permits

Subsection (a)(1)(iii)(D)(XIV.1) adds new source sampling requirements for PFAS. No change is made to this section from proposed to final-form rulemaking.

§ 109.602. Acceptable design

Subsection (j) identifies treatment technologies considered acceptable by the Department for compliance with the PFAS MCLs. No change is made to this section from proposed to final-form rulemaking.

§ 109.701. Reporting and recordkeeping

Subsection (a)(3)(ii) is amended to clarify that 1-hour reporting is required when a sample result requires collection of a confirmation or check sample. The word "confirmation" is added because the terms "check" and "confirmation sample" are often used interchangeably but each are used in different locations in § 109.301. Under § 109.301(16)(v), a confirmation sample shall be collected when PFAS is detected in exceedance of its respective MCL. No change is made to this section from proposed to final-form rulemaking.

§ 109.1003. Monitoring requirements

The provisions for this section utilize terms of art and phrasing that mirror Federal safe drinking water regulations and are consistent with language used throughout the Department's safe drinking water regulations in Chapter 109.

Subsection (a)(1)(xv) identifies the PFAS monitoring requirements for bottled, vended, retail and bulk (BVRB) water systems. Compliance monitoring for all BVRB systems begins January 1, 2024.

Subsection (a)(1)(xv)(A) identifies the PFAS monitoring exemption for BVRB systems that obtain finished water from another permitted public water system.

Subsection (a)(1)(xv)(B) identifies the initial PFAS monitoring requirements for BVRB systems. Initial monitoring consists of 4 consecutive quarters at each EP.

Subsection (a)(1)(xv)(C)(I) and (II) identify the repeat PFAS monitoring requirements for BVRB system and, in this final-form rulemaking are amended to be consistent with the definition for "reliably and consistently below the MCL" in response to public comments, to improve readability, to remove the cross-reference to § 109.202(a) because that cross reference is already stated in paragraph (1)(xv), and to clarify that the repeat monitoring frequency is determined independently for each individual PFAS.

Subsection (a)(1)(xv)(D) identifies the confirmation sampling requirements for PFAS monitoring for BVRB systems that detect a PFAS in exceedance of its MCL during annual monitoring.

Subsection (a)(1)(xv)(E) identifies the repeat and performance PFAS monitoring requirements for BVRB systems with PFAS removal treatment. In this final-form rulemaking, this clause is amended in response to public comments to clarify that performance monitoring may be required more frequently than quarterly in a permit special condition.

Subsection (a)(1)(xv)(F)(I) and (II) specify when PFAS samples may be invalidated for BVRB systems and utilize the term "obvious sampling errors" consistent with 40 CFR 141.24(f)(13) and (h)(9).

Subsection (a)(1)(xv)(G) identifies how compliance with the PFAS MCLs is determined for BVRB systems.

Subsection (b)(3) is amended to clarify that sampling and analysis for PFAS must be in accordance with the requirements in § 109.304. No change is made to subsection (b)(3) from proposed to final-form rulemaking.

Subsection (b)(6) was proposed to be amended to delete language that is also in subsection (b)(3), and to add the requirement that compliance monitoring samples for PFAS for BVRB systems must be collected by a properly trained sample collector. However, in this final-form rulemaking this requirement is deleted in response to public comments requesting clarification on proper training for persons collecting PFAS samples. The Department did not intend to require extensive training or certification for sample collectors; the training conducted by accredited laboratory staff was intended to educate sample collectors on the preparation needed to minimize cross contamination of samples. The Department has determined that this information can be made available to sample collectors through guidance, so this requirement has been deleted and subsection (b)(6) is reserved.

§ 109.1403. Monitoring waiver fees

Subsection (a) is amended to add a PFAS use waiver fee of $100. No change is made to this section from proposed to final-form rulemaking.

F. *Summary of Comments and Responses on the Proposed Rulemaking*

The Board adopted the proposed rulemaking at its November 16, 2021 meeting. The proposed rulemaking was published at 52 Pa.B. 1245 (February 26, 2022). Five virtual public hearings were held the week of March 21—25, 2022. The 60-day public comment period on the proposed rulemaking closed April 27, 2022. The Board received more than 3,500 comments on the proposed rulemaking, including comments from members of the General Assembly, the House Environmental Resources and Energy Committee, the Independent Regulatory Review Commission (IRRC), public advocacy groups, and a variety of industries.

The comments received on the proposed rulemaking are summarized as follows and are addressed in more detail in a comment and response document that accompanies this final-form rulemaking.

Regulating PFAS as a class

IRRC and several commentators commented regarding the reasonableness of regulating PFOA and PFOS as individual compounds rather than as a class. Through a toxicology services contract with the Department, the DPAG determined that currently available scientific evidence does not appear to support a decision to use a cumulative or summative approach for regulating PFAS because using a combined approach for a drinking water standard for PFAS appears to be a "shortcut based on a presumption that the agents all have similar health effects and endpoints" (DPAG, 2021). The DPAG determined that it could not be assumed that all PFAS have shared hazard traits and target the same health endpoints, and that the best approach, which is most protective of public health, was to develop individual MCLGs for each PFAS requested by the Department, and the DPAG recommended that each PFAS compound be reviewed and MCLs determined individually. Additionally, the occurrence data used by the Department in development of this final-form rulemaking did not suggest a meaningful opportunity to regulate other PFAS compounds besides PFOA and PFOS. Based on the determination and recommendation from the DPAG, the Department moved forward with evaluating each PFAS individually to determine which ones to regulate and at what levels.

Forthcoming Federal regulations

IRRC, the House Environmental Resources and Energy Committee and several commentators expressed concerns regarding the promulgation of potentially overlapping and differing State and Federal regulations related to PFOA and PFOS in drinking water. The EPA has publicly stated its intent to publish a proposed PFAS National Primary Drinking Water Regulation in December 2022, and a final regulation in December 2023. While there are no guarantees that the Federal government will publish a proposed rule as stated in December 2022, when the EPA's proposed rule is published, the Department will review the proposal and provide comments during the public comment period. As a basis for providing comments on a proposed Federal rule, the Department will rely on the rigorous rulemaking process by which this final-form rulemaking was developed, a process which identified where PFAS was present and provides justification for the Board's MCLs. Sometime after the closing of the comment period on the EPA's proposed rulemaking, the EPA will publish a final rule.

Since a proposed Federal rule has not yet been published, it is impossible to predict whether the EPA will adhere to its intended schedule and publish a final rule in December 2023. However, when a final Federal rule is published, the regulations will go into effect three years after they are finalized. During this three-year period, the Department will review the Federal rule and evaluate the supporting documentation to determine how the federal rule compares to the Department's regulations. If the Federal rule is more stringent, the Department will follow the Commonwealth's rulemaking process to revise its regulation to address any discrepancies and to ensure the Department's regulations meet at least the minimum Federal requirements. If the final federal rule is less stringent than the Department's regulations, the Department will evaluate the Federal rule and its supporting documentation to determine if any revisions are needed to the Department's regulations.

Setting MCLs ahead of EPA is expected to provide more timely protection of public health while imposing minimal additional regulatory requirements on the regulated community. Under this final-form rulemaking, PWSs will be required to conduct monitoring for PFOA and PFOS earlier than may be required under federal regulations, and if levels are in violation of one or both MCLs, PWSs will be required to complete corrective actions sooner. If EPA ultimately sets MCLs that are less stringent, there may be some PWSs required to install treatment under this rule that would not have been required to under EPA's levels; however, through the rulemaking process, the Department has demonstrated that the MCLs in this final-form rulemaking are in the interest of improved public health protection and reasonably balance costs and benefits. If EPA's MCLs are more stringent, there will likely be additional PWSs that will need to install treatment beyond those that exceed the MCLs in this final-form rulemaking. For the PWSs that install treatment as a result of a violation of the MCLs in this final-form rulemaking, that treatment will put those PWSs in a better position to comply with EPA's MCLs regardless of whether they are more or less stringent. The approved treatment technologies in this final-form rulemaking are capable of treating PFOA, PFOS and other PFAS to non-detectable levels. If EPA's MCLs are more stringent, those PWSs that have installed treatment as required by this final-form rulemaking may need to make relatively minor operational adjustments, such as changing out the media more frequently, but large-scale design changes are not expected.

It is the Board's position that in the interest of improved public health protection, it is imperative to move forward with this final-form rulemaking at this time and not delay implementation. The Department has a responsibility to protect this Commonwealth's drinking water. Recent research suggests that the EPA's 2016 Combined Lifetime HAL for PFOA and PFOS of 70 ng/L is not sufficiently protective against adverse health effects. Although the EPA has started the process of setting more stringent standards for PFOA and PFOS in drinking water, that process is expected to take years to complete. Even if the EPA meets its stated goal of publishing a final rulemaking by the end of 2023, there will be delayed implementation of the Federal rule to allow states to incorporate the final regulation. Therefore, the Federal standards would not be in place until late 2026 at the earliest. For that reason, it is important that the Board act now to set more protective standards for this Commonwealth, to protect the health of residents in this Commonwealth.

Use of UCMR5 data for compliance

IRRC and several commentators recommended that the regulation allow UCMR5 monitoring data to be used for compliance with the initial monitoring period of the proposed rulemaking. The Board agrees and has amended this final-form rulemaking to include a clause in the initial monitoring requirements in § 109.301(16)(i) that allows for a modification of the timing of the initial monitoring period to coincide with UCMR5 monitoring. This may allow some systems to realize cost savings by preventing duplicate analyses if they meet all requirements. To modify the initial monitoring period, a PWS must request this change and the Department must approve it in writing. The Department will provide details on how to modify the initial monitoring schedule in guidance.

It is the responsibility of the PWS to ensure, if so desired by the PWS, that the schedules for initial compliance monitoring for this final-form rulemaking and for UCMR5 monitoring coincide, and to request a schedule change, if necessary, for either UCMR5 monitoring or for initial compliance monitoring for this final-form rulemaking. Details about how PWS can request schedule changes for UCMR5 monitoring are provided in the comment and response document that accompanies this final-form rulemaking.

For the same set of data to count toward both UCMR5 monitoring and initial compliance monitoring for this final-form rulemaking, the data must meet requirements of both rules. For initial compliance monitoring for this final-form rulemaking, monitoring must be conducted according to all requirements in this final-form rulemaking, such as analyses being conducted by a Commonwealth-accredited laboratory using an approved method, and data being reported appropriately and on time, and other requirements in this final-form rulemaking. For UCMR5 monitoring, analyses must be conducted by an EPA-approved laboratory for UCMR5 using the UCMR5-specified method and the monitoring must meet all requirements of the published UCMR5. Therefore, if a PWS wishes to have the same data reported for both UCMR5 monitoring and for initial compliance monitoring for this final-form rulemaking, it is the responsibility of the PWS to ensure that the monitoring schedules align, and that the lab conducting the analysis is both Commonwealth-accredited and UCMR5-approved, using an appropriate method, and is amenable to reporting the same data twice, including meeting Commonwealth and UCMR5 reporting requirements.

Laboratory capacity

IRRC and several commentators raised concerns regarding laboratory capacity, and requested the Board provide information on the number and capacity of laboratories certified to perform required testing for implementation of this final-form rulemaking. The Department conducted a survey of laboratories accredited by the Commonwealth for analysis of PFAS by one or more of the three approved methods in this final-form rulemaking. The purpose of the survey was to collect data on laboratory capacity, services provided, analytical costs and minimum reporting levels to assess the technical feasibility and analytical cost estimates of the proposed rulemaking. The results indicate more than sufficient capacity for compliance monitoring requirements of this final-form rulemaking. Details about the survey responses are provided in the comment and response document that accompanies this final-form rulemaking.

Cost estimates and sources of funding

IRRC and several commentators submitted comments regarding cost estimates and funding sources.

There are currently several funding sources available to PWSs for PFAS treatment costs. The Pennsylvania Infrastructure Investment Authority's Per- and Polyfluoroalkyl Substances Remediation Program is currently available to remediate PFAS contamination or presence in the water supply of public drinking water supply systems not related to the presence of a qualified former military installation. The Federal Infrastructure Investment and Jobs Act (IIJA) also provides relevant funding, including $4 billion nationally in Drinking Water State Revolving Fund (DWSRF) monies for projects to address emerging drinking water contaminants like PFAS and $5 billion nationally in grants to small and disadvantaged communities for projects addressing emerging drinking water contaminants like PFAS. Over 5 years, the Commonwealth's allocation of these IIJA funds is expected to be $116 million in DWSRF emerging contaminants funds and an additional $140.5 million in funding for projects addressing emerging drinking water contaminants in small and disadvantaged communities, for a total of $256.5 million.

Cost estimates are based on a survey of costs from vendors and systems that have installed PFAS treatment. The sizes of the treatment systems of respondents varied from 0.005 million gallons per day (MGD) to 2.88 MGD and costs for these systems ranged from approximately $47,000 to $3,250,000, respectively. The survey showed generally lower capital and operational costs for smaller systems and increased costs as the volume of water treated increases; however, capital costs can vary greatly based on site-specific needs. Some systems may need infrastructure upgrades above and beyond the cost of the PFAS treatment, such as new well pumps, booster pumps and buildings to house the treatment, whereas other systems may only need to purchase and install the PFAS treatment equipment and media.

The Board requested comments on the proposed rulemaking regarding anticipated costs to comply with the proposed MCLs, including costs to design, install and operate treatment and other remedies. Although some comments were submitted expressing concerns about potentially high costs of treatment for PFAS removal, no comments were submitted with specific details regarding anticipated costs to comply with the MCLs.

Byproducts of treatment technologies

IRRC and several commentators submitted comments suggesting the Board should address implementation concerns related to byproducts of treatment technologies for PFAS removal. The Department requires a person to obtain a permit prior to constructing or modifying a PWS. As per this permitting process, the water system must demonstrate it will properly dispose of any untreated PFAS contaminated waters and spent media. Industrial discharges, such as wastewater from drinking water treatment that contain PFAS wastes, would not be acceptable to discharge to an on-lot or municipal wastewater system. All spent media will need to be disposed to an appropriate landfill or an incinerator.

Regarding the costs associated with disposing of byproducts of treatment technologies (such as spent treatment media), the Department conducted a survey of PWSs currently treating for PFAS, other state agencies and water treatment manufacturers to evaluate treatment technologies and treatment costs. Information regarding disposal costs were included in this survey. For example, it is the Board's understanding that GAC manufacturers are accepting used media from PWSs to either regenerate the media or incinerate or dispose of the media properly.

Cost-benefit analysis

IRRC and several commentators submitted comments indicating that the Board should address concerns regarding the cost/benefit analysis, including comments that the benefits were not quantified or estimated, clarification on the basis for 90% improvement compared with the EPA's 2016 Combined Lifetime HAL for PFOA and PFOS as a goal for benefits, and how increasingly stringent drinking water values affect health outcomes. The Department conducted several surveys to gather information to estimate monitoring and treatment costs of the rule. The information from the surveys was used along with the occurrence data to conduct the cost and benefit analysis. The Department estimated treatment costs at the MCLGs, the 2016 EPA HAL of 70 ppt, and several values in between, including the MCLs. Actual costs are likely to vary greatly based on site-specific needs. The selection of a 90% reduction in adverse health effects as a goal for improved public health protection was selected to be consistent with other existing drinking water standards, including the requirement to achieve at least a 90% inactivation of *Giardia* cysts using disinfection processes within a filtration plant.

To provide additional information to support the cost to benefits analysis, the Department extended the contract with Drexel University and charged the DPAG with estimating monetized benefits expected to be realized from implementation of the MCLs. Details about the DPAG's analysis of benefits/cost savings can be found in section G of this preamble. In summary, the DPAG determined the PFOA MCL of 14 ng/L is estimated to result in health care cost savings of $583 million over an 11-year period, or $53 million per year. Additionally, using a value transfer methodology, the DPAG estimated an annual monetized impact of elevated mortality due to PFAS exposure of $2 to $3.3 billion for the 11.9 million residents of this Commonwealth served by public water. This suggests that PFAS contamination in drinking water may account for 2% to 3% of the annual health care costs in this Commonwealth, which are estimated by the Kaiser Family Foundation (KFF 2022) at $120 billion annually. The DPAG also used a blood serum PFAS calculator to: (1) confirm that the MCL of 14 ppt for PFOA would provide a 90% improvement in blood serum levels compared to the serum level predicted at the 2016 EPA HAL of 70 ppt; and (2) demonstrate that increasingly stringent drinking water values (that is, lower concentrations of PFAS in drinking water) are expected to result in improved health outcomes.

Additional information on costs and benefits are detailed in section G of this preamble, as well as the comment and response document that accompanies this final-form rulemaking.

Scientific foundation and implications of future advances in scientific understanding about PFAS

IRRC and several commentators urged the Board to address concerns related to acceptable data and explain how the data supporting this final-form rulemaking protects public health. These commentators also recommended the Board explain how the standards in this final-form rulemaking may be revised in the future based on improved scientific understanding about exposure, dose, and toxicology.

In determining recommended MCLGs, the DPAG used an evidence-based approach to independently review the available studies and to select critical health effects and critical studies for the PFAS evaluated. The scientific studies reviewed by the DPAG, including their strengths and weaknesses, are discussed fully and cited in the PFAS Workbook and MCLG Report. References reviewed by the Department, including the DPAG deliverables, are cited in this final-form rulemaking. The DPAG provided substantial justification in the MCLG Report for the selection of critical health effects and critical studies, based on the extensive expertise of the group. The Department used the MCLG recommendations from the DPAG's MCLG Report as the basis for development of MCLs.

In addition to the toxicology services contract, the Department's Safe Drinking Water Program developed and implemented the PFAS Sampling Plan to prioritize PWS sites for PFAS sampling and generate Statewide occurrence data. That occurrence data was extrapolated across all applicable PWSs and EPs and was ultimately used to inform the decision on which PFAS to regulate and to estimate the number of PWSs that may potentially have levels of PFAS exceeding various MCL levels.

As detailed in section G of this preamble, the Department also conducted several surveys to gather information to support development of this final-form rulemaking. The Department used the information gathered from these surveys to: consider available analytical methods, minimum reporting levels, laboratory capacity and analytical costs; evaluate treatment technologies and costs of installation and maintenance of treatment options; and, along with the occurrence data, to conduct the cost and benefit analysis.

This final-form rulemaking is designed to improve public health protections for residents of this Commonwealth based on scientific studies and data available at the time this final-form rulemaking was developed. Current research indicates that the EPA 2016 Combined Lifetime HAL of 70 ng/L for PFOA and PFOS is not sufficiently protective of public health. Implementing the MCLs in this final-form rulemaking will provide an increased measure of public health protection by resulting in lower levels of PFOA and PFOS in drinking water provided to PWS customers in this Commonwealth. Therefore, it is the Board's position that it is imperative to move forward at this time with this final-form rulemaking in the interest of improved public health protection. The

Department will continue to review and evaluate emerging science and recommendations from experts in the field of toxicology, including recommendations from the EPA's Science Advisory Board, and the Department will consider future revisions to this rule as deemed necessary. If the Department determines that revisions to this rule are needed in the future, the Department will initiate and follow the Commonwealth's rulemaking process.

Lower MCLs

IRRC and numerous commentators submitted comments indicating that the proposed MCLs should be lower and requesting that the Board explain how it determined that the MCLs for PFOA and PFOS in this final-form rulemaking protect the health, safety, and welfare of children, particularly young children. As detailed in section D of this preamble, the Department is required to follow a rigorous process when setting an MCL, a process which includes estimation of health risk reduction benefits.

As noted in section D of this preamble and in the MCLG Report, the DPAG was charged with developing recommended MCLGs at concentrations that were focused solely on protection of human health. The DPAG identified the target population for PFOA and PFOS as infant exposure via breastmilk for 1 year, from mother chronically exposed via water, followed by lifetime of exposure via drinking water. The DPAG noted in the MCLG Report that the recommended MCLGs for PFOA and PFOS are at levels intended to "protect breastfed infants and throughout life" (DPAG, 2021).

The MCLs of 14 ng/L for PFOA and 18 ng/L for PFOS are based on the health effects and MCLGs, occurrence data, technical feasibility, and costs and benefits.

As detailed in section G of this preamble, in evaluating the costs and benefits, the Board compared costs for several possible values for the proposed MCLs, including the 2016 EPA HAL of 70 ppt, the MCLG, and several levels in between. The Board's goal was to provide at least a 90% reduction in adverse health effects (a 90% improvement in health protection) when compared to the 2016 EPA HAL of 70 ng/L. This goal is consistent with several existing drinking water standards. The Board believes that the MCLs for PFOA and PFOS strike an appropriate balance between the benefits (90% and 93% improvement in public health, respectively) and costs (253% and 94% increase in costs, respectively) when compared to the benefits and costs associated with meeting the 2016 EPA HAL. Additionally, the total estimated treatment and monitoring costs are offset by the total estimated health care cost savings of at least $53 million annually.

Effective dates

IRRC and numerous commentators requested that the Board explain how it determined that the effective dates in this final-form rulemaking balance protection of the public, health, safety, and welfare with the economic impacts of implementation. According to this final-form rulemaking, initial compliance monitoring for systems serving a population of greater than 350 persons begins January 1, 2024 and initial monitoring for systems serving a population of less than or equal to 350 persons begins January 1, 2025. However, the MCLs will be effective upon publication of this final-form rulemaking, expected in early 2023. Water systems may begin to sample for PFAS voluntarily at any point. Additionally, water systems may be required to sample for contaminants identified in UCMR5 (including 29 PFAS compounds) as soon as January 2023.

The 2024 and 2025 initial compliance monitoring dates were selected to provide adequate time for water systems to plan for additional sampling that will be required at each EP and to incorporate the cost of additional sampling and analysis into their 2024 or 2025 budgets. Requiring all systems to begin monitoring immediately in 2023 would overwhelm sample capacity at accredited laboratories. The phased sampling approach focuses on analyzing the drinking water of as many consumers as possible earlier in implementation of this final-form rulemaking. In addition, a delay in initial monitoring until January 2024 will provide adequate time for water system personnel to learn the regulatory requirements and to train personnel. PFAS sample collection requires strict adherence to the method and trained samplers. The Department intends to conduct training in 2023 on implementation of this final-form rulemaking and on sample collection techniques.

Monitoring frequency

IRRC and several commentators submitted comments indicating that the Board should explain how the frequency of monitoring required in this final-form rulemaking is reasonable and protects public health, safety, and welfare and whether a shorter monitoring timeframe following a detection was considered. In the existing 40 CFR Part 141 National Primary Drinking Water Regulations and Chapter 109 Safe Drinking Water regulations, there is a cohesive strategy for setting monitoring frequencies. For a specific contaminant, the monitoring frequency is set according to whether the contaminant is expected to cause potential adverse health effects from short-term acute exposure or long-term chronic exposure at concentrations likely to be detected in drinking water. Contaminants in the chronic group, including VOCs and SOCs, are monitored for compliance according to a schedule based on the EPA's Standardized Monitoring Framework (SMF), with monitoring occurring quarterly or less frequently, based on previous results and whether treatment is installed for a particular contaminant. The PFAS monitoring framework in this final-form rulemaking originated in existing monitoring requirements for the organic contaminants that already have MCLs, namely, the VOCs and SOCs. PFAS are a class of SOCs, and this final-form rulemaking adds two PFAS, PFOA and PFOS, to the chronic contaminant group. To be consistent with the EPA's SMF, this final-form rulemaking does not require monthly compliance monitoring of PFOA and PFOS.

Initial monitoring for VOCs, SOCs and PFAS is based on the EPA's SMF and consists of four consecutive quarterly samples. This will produce results that are representative of each calendar quarter, thereby representing any seasonal variations that could potentially occur. If PFOA or PFOS or both are detected at a level greater than their respective MCL during initial monitoring, compliance monitoring is required quarterly. When sample results indicate a violation of one or both MCLs, follow-up actions are required, including one-hour notification to the Department, consultation with the Department on appropriate corrective actions, and Tier 2 public notification (PN). Once an MCL violation occurs and a PWS issues Tier 2 PN and begins taking corrective actions to comply with one or both MCLs, there is no significant health or information benefit obtained from conducting compliance monitoring for these chronic contaminants at the EP more frequently than quarterly.

Waivers

IRRC and numerous commentators requested the Board explain how it determined that the granting of waivers will not negate the protection of the public health, safety, and welfare afforded by consistent testing. The PFAS waiver framework follows the existing waiver framework for

VOCs, which is significantly more limited than the waiver framework for SOCs. Under this final-form rulemaking, a PWS can only apply for a waiver after the PWS completes 3 consecutive years of quarterly or annual samples with no detection of PFOA or PFOS. Waivers are only available at EPs supplied by groundwater or GUDI. Waivers are available after evaluating land use and the use of PFAS in wellhead protection area Zone II. The granting of waivers is at the Department's discretion.

The waiver process is a balance between requiring monitoring protective of public health and allowing a reduction in monitoring when a PFAS has an isolated appearance, has exited the system, decreases below the minimum reporting level, and there is no known use of it near the groundwater source. Therefore, monitoring is only reduced when there is no expectation a PFAS detection will recur. There are a number of conditions that must be met for a waiver to be granted, and the granting of waivers will not negate the protection of public health.

Achieving compliance

IRRC and several commentators requested the Board explain how it will ensure that compliance is achieved by water systems and that, following an MCL exceedance, a water system would not remain in the state of repeat monitoring and never reach compliance. Under existing authorities in § 109.701(a)(3)(i), PWSs are required to notify the Department within one hour if any single sample result exceeds an MCL value or if the system is determined to be in violation of an MCL, according to § 109.301(16)(ix) for PFOA and PFOS. An initial consultation with the Department typically occurs during this notification regarding any immediate actions. When a PWS is in violation of an MCL, the Department issues a Notice of Violation (NOV) which contains requested actions and associated timeframes, including a request for the PWS to consult with the Department to determine appropriate corrective actions. In addition to issuing PN, corrective actions may include additional monitoring, installation of treatment, using alternative sources, blending sources or taking a source offline. PWSs are responsible for taking any and all corrective actions necessary to protect public health.

When systems fail to take corrective action and continue to be in violation of an MCL, the Department identifies the ongoing MCL violation as a significant deficiency which is defined in § 109.1. The Department notifies the PWS of the ongoing MCL violation and the identification of the ongoing violation as a significant deficiency through an NOV. This NOV outlines the regulatory responsibilities of systems as stipulated in § 109.717 (relating to significant deficiencies) for responding to significant deficiencies.

The exact corrective actions in response to an MCL violation are not codified in regulation because they are case specific and may vary based on each individual situation and system specific considerations, including the level detected, any known or suspected source of contamination, other water sources available and treatment processes already in place. Sufficient quarterly monitoring data may be necessary to evaluate whether there are seasonal variations in contaminant levels to identify the most appropriate corrective actions.

Invalidation of sample results

IRRC and a commentator recommended that the Board clarify implementation related to the invalidation of PFAS samples as provided in § 109.301(16)(viii)(A) of the proposed rulemaking.

The language used in § 109.301(16)(viii) matches that already in use for the other groups of regulated organic chemicals, the VOCs and SOCs. As specified in § 109.304(f)(1), "Sampling and analysis shall be according to the following approved methods" which include EPA Method 533, EPA Method 537.1 or EPA Method 537 Version 1.1. Failure to follow the "Sample Collection, Preservation, and Storage" steps in the chosen method could result in sample invalidation. Decisions about sample invalidations will be based on available documentation. For example, if a sample is taken at a tap other than the EP, that error would have to be determinable from documentation. If PFOA or PFOS is detected in a field reagent blank sample, it could be considered an obvious sampling error, if there is evidence that indicates PFOA or PFOS was introduced by the sampler. Obvious sampling errors will be further addressed in guidance materials and in training, which will be provided by the Department after this final-form rulemaking is promulgated.

Compliance determinations

IRRC and some commentators advised the Board to clarify how compliance determination will be implemented for systems that choose to monitor more frequently than required. Compliance will be determined according to §§ 109.301(16)(ix)(A) and 109.301(16)(ix)(B). According to § 109.301(16)(ix)(A), "For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average of all samples taken at each entry point." The running annual average (RAA), as defined in § 109.1, is the "average, computed quarterly, of quarterly arithmetic averages of all analytical results for samples taken during the most recent 4 calendar quarters." Therefore, individual monthly results will not be used directly for compliance; instead, the monthly results will be averaged within each calendar quarter to calculate a quarterly average, and then compliance is determined using that quarterly average. According to § 109.301(16)(ix)(B), "If monitoring is conducted annually or less frequently, the system is out of compliance if the level of a contaminant at any entry point is greater than the MCL. If a confirmation sample is collected as specified in subparagraph (v), compliance is determined using the average of the two sample results."

Compliance is determined based on the monitoring frequency in use and not on the monitoring frequency required. For example, if a system required to monitor annually is monitoring quarterly, compliance will be determined according to § 109.301(16)(ix)(A). As another example, if a system required to monitor quarterly is monitoring monthly, a quarterly average will be calculated with the monthly results each quarter and those quarterly averages will be used to calculate compliance according to § 109.301(16)(ix)(A).

IRRC and some commentators also advised the Board to clarify whether a determination of "out of compliance" will begin with the first sampling following the effective date of the regulation, and whether a system will be out of compliance if the first sample exceeds the MCL. During the initial year of quarterly compliance monitoring, compliance with each MCL will be determined by an RAA of all sample results for each of the regulated PFAS. During the first year of monitoring, results will not exist for all four of the most recent calendar quarters until the result from the fourth quarter is available. Until that point, results that do not yet exist are assumed to be less than the MRL and, thus, are entered as zero in the RAA calculation. If a system fails to collect a sample in all quarters of the initial year of compliance monitoring, then, in accordance with § 109.301(16)(ix)(D), compliance with the MCL will be based on the total number of quarters in which results were reported. According to § 109.301(16)(ix)(C), "If any sample result will cause the running annual average to exceed the MCL at any entry point, the system is out of compliance with the MCL immediately." For example, if the first quarterly result of initial compliance monitoring is more than four times the MCL, the system is out of compliance based on the compliance calculation for the first quarter of initial quarterly monitoring. However, if the first quarterly result is at a level that is over the MCL but not over four times the MCL, the system would not be out of compliance.

Analytical requirements

IRRC and a commentator advised the Board to explain the need for and reasonableness of retaining analytical requirements in this final-form rulemaking instead of including those requirements in guidance or codifying those requirements in the Department's Environmental Laboratory Accreditation regulations in Chapter 252 (relating to environmental laboratory accreditation). The existing analytical requirements have been established through § 109.304(a), which states "Sampling and analysis shall be performed in accordance with analytical techniques adopted by the EPA under the Federal act or methods approved by the Department." The analytical techniques adopted by the EPA under the Federal act are specified explicitly in the National Primary Drinking Water Regulations in 40 CFR Part 141 Subpart C – Monitoring and Analytical Requirements. However, the EPA has not yet adopted analytical techniques for PFAS in 40 CFR Part 141 Subpart C. Therefore, in accordance with § 109.304(a), the Department is responsible for approving methods for PFAS analysis. Updating Chapter 252 would require a procedure equivalent to updating Chapter 109, so there would be no flexibility gained from listing the methods in Chapter 252 instead. By explicitly specifying these methods in § 109.304(f), the Department is following the EPA's convention.

Treatment technology piloting

IRRC and a commentator advised the Board to clarify whether piloting will be required for the approved treatment technologies listed in the proposed rulemaking, and, if so, to amend this final-form rulemaking and associated documents to take the additional costs and economic impacts into consideration. The Department currently is not requiring PWS to pilot all PFAS treatment projects. However, the Department retains the right to require piloting even if the technology is listed as approved in regulation, as the Department can for all types of treatment processes. The Department encourages piloting for the technology listed as approved for PFAS treatment to develop site-specific design requirements. For systems that have provided successful demonstration of a technology on similar water quality, the Department has not required a pilot study. The PWS is responsible for demonstrating similarity in water quality to the Department.

Other treatment technologies

Commenting on proposed § 109.602(j)(2), IRRC asked the Board to explain what standards would determine if an alternate treatment technology has demonstrated the capability to provide an adequate and reliable quantity and quality of water to the public, and clarify how this provision will be implemented. This provision will be implemented in the same manner in which it would be for any other contaminant or any innovative treatment technology; it is addressed in Section I.C. of the Department's *Public Water Supply Manual Part II, Community System Design Standards* (383-2125-108).

Regulatory initiatives for PFAS source control requirements

IRRC and a commentator advised the Board to address the impact of other regulatory initiatives related to PFAS source control requirements on the economic impacts of this final-form rulemaking. Although these issues are outside the scope of this final-form rulemaking, the Board notes that, as part of the multi-agency PFAS Action Team established by Governor Wolf, the Department is actively exercising its statutory authorities to implement regulatory and permitting initiatives to address PFAS contamination.

In November 2021, the Board promulgated regulatory provisions in Chapter 250 (relating to administration of the land recycling program) to address PFAS contamination in soil and groundwater. The regulatory provisions established soil and groundwater Medium Specific Concentrations (MSC) for PFOS, PFOA and PFBS under the Statewide Health Standard. Through this update, remediators must demonstrate attainment of a standard provided by the Land Recycling and Environmental Remediation Standards Act (35 P.S. §§ 6026.101—6026.908) (Act 2) and obtain Act 2 liability relief for PFOA, PFOS and PFBS. By law, the Department is required to review these standards every 36 months to ensure the MSCs reflect the most current science available to protect human health and the environment. When a state or Federal MCL is published, it will become the updated MSC as required by Act 2.

The Department also recently established a multi-pronged strategy to better characterize and control PFAS in permitted discharges to surface waters by implementing monitoring and other requirements in National Pollutant Discharge Elimination System (NPDES) permits. The Department's PFAS strategy for NPDES discharges includes: identifying industries likely to discharge PFAS; revising NPDES permit applications for these industries and for major sewage facilities receiving discharges from these industries to include PFOA and PFOS sampling requirements and, where relevant, source evaluations; and adding monitoring requirements for PFOA and PFOS to NPDES permits from facilities with identified elevated concentrations in their effluent and, where necessary, evaluating the need for effluent limits for those facilities.

Private water wells

Most commentators noted that many residents of this Commonwealth receive their water from private water sources, including private wells, and requested that the Board include private water sources in the requirements of the proposed rule.

However, the Board does not have the authority to regulate private water sources. The Pennsylvania Safe Drinking Water Act states that rules and regulations established by the Board "shall apply to each public water system in the Commonwealth ..." (35 P.S. § 721.4(b)). The act defines a public water system as "a system for the provision to the public of water for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year." (35 P.S. § 721.3).

The act grants authority for the Board to establish rules and regulations that govern only public water systems, not private water systems (which include privately owned water wells). The act additionally grants authority to the Department to enforce only Federal and State regulations regarding well design and construction standards and drinking water standards. As Federal standards and State standards established by the Board govern only public water systems, the Department cannot enforce standards for public water systems on privately owned wells, seeps, and springs that do not meet the definition of a public water system; therefore, this comment is outside the scope of this final-form rulemaking.

Although the Department may not enforce public water system regulations on privately owned water systems, the Department often receives questions regarding privately owned wells. Information regarding well construction, drinking water testing and treatment, and other information are available on the Department's website at https://www.dep.pa.gov/Citizens/My-Water/PrivateWells/pages/default.aspx.

Other comments beyond statutory and regulatory authority

Several comments submitted on the proposed rulemaking were outside the scope and authority of the act and Chapter 109 regulations and, therefore, cannot be addressed in this final-form rulemaking, including comments on requiring blood testing or health monitoring, reducing sources of PFAS and holding polluters responsible for cleaning up contamination.

G. *Benefits, Costs and Compliance*

Benefits

The PFOA and PFOS MCLs will apply to all 3,117 community, nontransient noncommunity and BVRB water systems in this Commonwealth. Of these, 1,905 are community water systems, serving a combined population of approximately 11.4 million residents of this Commonwealth; another 1,096 are nontransient noncommunity water systems serving approximately 507,000 persons.

The benefits associated with reductions of PFOA and PFOS in drinking water arise from a reduction in adverse human health effects. Exposure to PFOA is associated with adverse developmental effects (including neurobehavioral and skeletal effects) and exposure to PFOS is associated with adverse immune system impacts (including immune suppression). Benefits may also be derived through effects on customer actions to avoid exposure, such as a customer's purchase of bottled water or the installation and operation of home water treatment systems.

The benefits of MCLs can be presented as a percent improvement in public health protection as compared to the 2016 EPA HAL of 70 ng/L. Table 10 includes a summary of the percent improvement in public health protection for PFOA and PFOS at several levels.

Table 10. Percent Improvement in Health Protection as Compared to EPA's HAL

PFOA		**PFOS**	
Various Levels (ng/L)	**Percent Improvement in Health Protection as Compared to EPA HAL of 70 ng/L**	**Various Levels (ng/L)**	**Percent Improvement in Health Protection as Compared to EPA HAL of 70 ng/L**
35	56%	35	63%
20	80%	20	89%
14 (MCL)	**90%**	**18 (MCL)**	**93%**
12	93%	16	96%
10	96%	15	98%
8 (MCLG)	**100%**	**14 (MCLG)**	**100%**

The percentage improvement in health protection values for PFOA and PFOS are based on an assumption that there is a linear improvement in health protection between the 2016 EPA HAL and the DPAG MCLG. The amount of improvement is set such that it totals 100% between the 2016 EPA HAL and the DPAG MCLG. The equation for calculating percent improvement in health protection is established as follows:

$$\text{Percent Improvement} = ((\text{EPA HAL} - \text{MCLG})^{-1} \times 100) \times (\text{EPA HAL} - \text{Level "X"})$$

As per the DPAG MCLG Report, PFOA has the potential to disrupt human development. The most sensitive developmental effects observed include neurobehavioral and skeletal effects. It is anticipated that these developmental effects have a measurable effect on the health of infants. The MCL for PFOA of 14 ng/L would be expected to improve health protection and lower the incidence of developmental effects by 90% compared with the 2016 EPA HAL of 70 ng/L.

The DPAG MCLG Report also found that PFOS has the potential to disrupt the immune system. The effects of immune suppression are anticipated to reduce the ability to resist infections, potentially increasing the risk, duration and severity of diseases. These immune effects from PFOS have a substantial effect on the health and economy of this Commonwealth. The MCL for PFOS of 18 ng/L would be expected to improve health protection and lower the incidence of immune suppression effects by 93% compared with the 2016 EPA HAL of 70 ng/L.

In 2022, the DPAG provided additional information on the health benefits achieved by these MCLs. In a report titled "Review of Proposed Maximum Contaminant Levels for PFOA and PFOS in Drinking Water for the Commonwealth of Pennsylvania", the DPAG concluded that the proposed MCLs are predicted to have a significant economic benefit to this Commonwealth because the MCLs will reduce health care problems associated with PFAS (DPAG, 2022).

To predict the value of health care benefits, the DPAG used two approaches—the value transfer method and the counterfactual method. The value transfer method applies and scales quantitative estimates of health care impact costs from one study site to another. The counterfactual method assumes that reduction in exposure to PFOA and PFOS from drinking water will result in a health care cost benefit equal to estimated health care costs attributable to the base exposures to PFOA and PFOS. Although each of these methods has their limitations, it is possible to estimate projected savings from reducing exposure to PFOA and PFOS.

The DPAG's health care analysis was broken down into three steps: (1) testing whether the selected MCL will result in hypothetical serum levels known to be associated with disease specific critical effects identified by the DPAG working group; (2) applying the counterfactual method to data derived from a study of a subpopulation of residents of this Commonwealth near a PFAS-contaminated site to estimate health care benefits for that group; and (3) deriving a value transfer estimate from other health care impact studies.

The DPAG reviewed several studies that examined the exposure response relationship between PFOA levels and low birth weight. The authors of the Malits study selected a maternal serum level of 3.1 ng/mL as a reference level (Malits 2018); below this level, the adverse health effects on low-birthweight infants would be reduced. The 3.1 ng/mL level also represents the upper limit of the lowest tertile in the study by Maisonet and colleagues (Maisonet 2012) and represents the point above which statistically significant associations have been demonstrated when median serum or plasma levels during pregnancy were above approximately 3.1 ng/mL (Maisonet 2012; Fei 2011; Wu 2012).

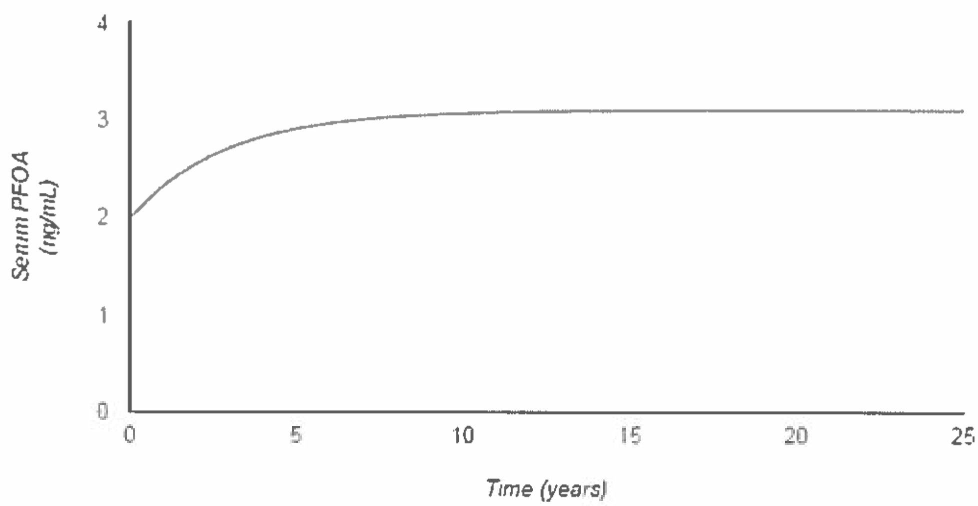
The DPAG utilized a serum PFAS calculator developed by Bartell to estimate blood serum concentrations of PFOA, based on an initial serum concentration and proposed levels of PFOA (Bartell 2017). The DPAG found that the model predicts that a woman of childbearing age would reach a steady-state PFOA serum level of 3.1 ng/mL if the consumed water was at the proposed MCL of 14 ng/L. See Figure 1. Furthermore, the Bartell calculator confirms that the proposed MCL of 14 ng/L for PFOA is protective and is consistent with the Department's analysis that the MCL represents a 90% improvement in blood serum levels compared to the serum level predicted at the EPA HAL of 70 ng/L (DPAG, 2022).

Figure 1: Steady-state PFOA level predicted in females childbearing age consuming water with PFOA of 14 ppt (from DPAG, 2022)

Serum PFAS Calculator for Adults:

Enter the following values, then click on the "submit" button:

1. Select the chemical you want to model: PFOA
2. Starting serum PFOA concentration (μg/L, ng/mL, or ppb)
3. Two (2) is a typical value for an adult with no PFOA in his or her water.
4. PFOA concentration in drinking water (ng/L, or ppt)
5. Enter zero (0) if drinking only bottled water, carbon-filtered water, or water treated by reverse osmosis. 14
6. Biological sex and menstrual status (optional): Female, premenopause or perimenopause (still having periods)



Starting serum PFOA concentration: 2 ng/mL
Water PFOA concentration: 14 ppt
Serum PFOA contribution from other ongoing exposures: 1.67 ng/mL
Water ingestion rate: 16.6 ml/kg/d
Volume of distribution: 0.17 L/kg
Half-life of PFOA in serum: 2 years
Steady-state ratio for serum:water concentrations: 102.91
Predicted steady-state serum PFOA concentration: 3.11 ng/mL

Calculator Version 1.2 by Sherman Lu and Scott Bartell.
Citation: Lu S, Bartell SM. Serum PFAS Calculator for Adults, Version 1.2, 2020, www.ics.uci.edu/~sbartell/pfascalc.html.

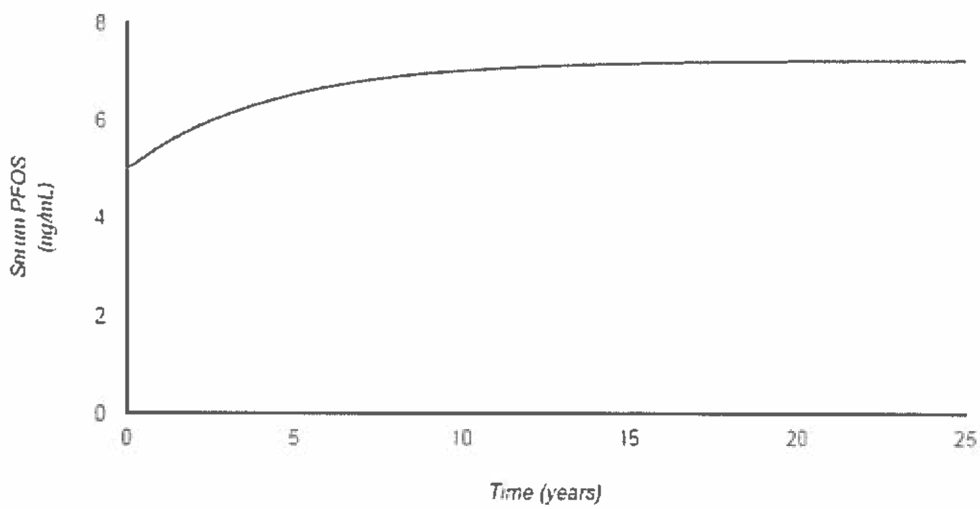
The DPAG conducted a similar analysis for PFOS using data from the Grandjean (2012) study. The method developed by Bartell predicts that in women of childbearing age, the PFOS MCL of 18 ng/L would result in a steady-state serum level of 7.2 ng/L, which is below the lower bound of interquartile range and the geometric mean in mothers in the Grandjean study. See Figure 2.

Figure 2: Steady-state PFOA level predicted in females childbearing age consuming water with PFOA of 14 ppt (from DPAG, 2022)

Serum PFAS Calculator for Adults:

Enter the following values, then click on the "submit" button:

1. Select the chemical you want to model: PFOS
2. Starting serum PFOS concentration (µg/L, ng/mL, or ppb)
3. Five (5) is a typical value for an adult with no PFOS in his or her water.
4. PFOS concentration in drinking water (ng/L, or ppt)
5. Enter zero (0) if drinking only bottled water, carbon-filtered water, or water treated by reverse osmosis.
6. Biological sex and menstrual status (optional): Female, premenopause or perimenopause (still having periods)



Starting serum PFOS concentration: 5 ng/mL
Water PFOS concentration: 18 ppt
Serum PFOS contribution from other ongoing exposures: 5.2 ng/mL
Water ingestion rate: 16.6 ml/kg/d
Volume of distribution: 0.23 L/kg
Half-life of PFOS in serum: 3 years
Steady-state ratio for serum:water concentrations: 114.09
Predicted steady-state serum PFOS concentration: 7.25 ng/mL

Calculator Version 1.2 by Sherman Lu and Scott Bartell.
Citation: Lu S, Bartell SM. Serum PFAS Calculator for Adults, Version 1.2, 2020, www.ics.uci.edu/~sbartell/pfascalc.html.

To summarize, the DPAG's review of PFAS blood serum levels at various PFAS concentrations in drinking water correlate well with the Department's assessment of at least 90% improvement of public health at the proposed MCLs.

In estimating the health care benefits for the MCLs, the DPAG noted that Malits (2018) estimated the total socioeconomic cost of PFOA-attributable low-birthweight births in the United States from 2003 through 2014 (over 11 years) was $13.7 billion. These costs included the direct hospital costs at the time of birth and lost economic productivity due to low-birthweight births being associated with longer-term outcomes such as lower lifetime earning potential. To determine what this would mean in this Commonwealth, the DPAG applied a value transfer method that assumes a scalable relationship between impacts of PFOA-attributable low-birthweight births quantified by Malits in the total United States population. Since 4.0% of the United States population lives in this Commonwealth, the total costs for the entire Statewide population due to low birthweight from PFOA exposure for the same period (2003 – 2014) are calculated to $548 million (approximately $637.58 million in 2022 dollars). To compare the costs and benefits to the Commonwealth's PWSs and the 11.9 million customers they serve, the DPAG estimated the total socioeconomic costs equate to $583 million in 2022 dollars. In other words, the PFOA MCL of 14 ng/L is estimated to result in health care cost savings of $583 million over a similar time period, or an average of $53 million annually.

The DPAG analyzed two additional studies to inform the estimated annual health care costs. In 2018, Nair studied communities near two former military bases in this Commonwealth that were exposed for several decades to PFAS through contaminated drinking water (Nair 2021). The population in that community was estimated to be 84,000. Serum PFAS levels were compared with the national averages for 2013-2014 and their relationships with demographic and exposure characteristics were analyzed. The average levels of PFOA and PFOS among the study participants were 3.13 and 10.24 ng/mL, respectively. Overall, 75% and 81% of the study participants had levels exceeding the national average for PFOA (1.94 μg/L or ng/mL) and PFOS (4.99 μg/L or ng/mL), respectively. This study places these 2018 Commonwealth communities in the same broad category as the 2003 National Health and Nutrition Examination Survey data for the United States population. A similar value transfer analysis suggests that the total health care costs associated with PFOA exposure in these Commonwealth communities alone over a similar time period (11 years) would be $4.3 million in 2022 dollars. Assuming that PFAS levels fell in these Commonwealth communities in the same manner that they fell nationally, the costs would average to $390,000 per year.

Finally, the DPAG reviewed a study by the Nordic Council of Ministers (2019) that estimated the annual monetized impact of elevated mortality due to PFAS exposure ranged from $3.5 to $5.7 billion for a total population of 20.7 million people. Adjusted for the 11.9 million residents of this Commonwealth served by public water, this produces a value transfer estimate of $2 to $3.3 billion. This suggests that PFAS contamination in drinking water may account for 2% to 3% of the total annual health care costs in this Commonwealth, which are estimated by the Kaiser Family Foundation at $120 billion annually (KFF 2022).

Compliance monitoring costs

Compliance monitoring cost estimates for this final-form rulemaking were determined based on a survey conducted of laboratories accredited in this Commonwealth for PFAS analysis by one or more of the analytical methods in this final-form rulemaking, as well as assumptions made based on an analysis of the occurrence data. According to lab survey results, the analytical cost for PFAS by either EPA Method 533, EPA Method 537 version 1.1 or EPA Method 537.1 varied greatly among the labs that responded, with a range of $325 to $750, and an average of $516, including the cost of analysis of the associated field reagent blank required by the methods for each sample site. This does not include an additional fee for sample collection, which also varied greatly among the labs offering that service; sample collection is approximately an additional $200 based on the survey.

Approximately half of the responding laboratories noted that they offer a cost reduction for reporting of fewer analytes than included in the method, which would provide a cost savings for systems since monitoring is required for only two analytes—PFOA and PFOS. Also, a few labs noted potential savings if there are no detections in the sample; the associated field blank would be extracted, but would not need to be analyzed, which would reduce the overall cost. A few labs also noted potential additional fees for PFAS-free blank water, overnight shipping costs for samples and Level 4 data reports if requested.

For compliance monitoring cost estimates, it was assumed that approximately half of all water systems will collect their own samples and half will utilize sample collection services provided by the laboratory. Therefore, an average cost of $616 per sample was used in the following compliance monitoring cost estimate calculations.

In this final-form rulemaking, initial quarterly monitoring for community and nontransient noncommunity systems serving a population of more than 350 persons begins January 1, 2024, and initial quarterly monitoring for community and nontransient noncommunity systems serving 350 or fewer persons begins January 1, 2025. This population breakdown was selected to evenly split initial monitoring across 2 years to ease laboratory capacity issues and allow small systems more time to prepare for compliance monitoring. Initial monitoring for BVRB systems begins January 1, 2024. Based on the number of PWSs and EPs in the Pennsylvania Drinking Water Information System (PADWIS) at the time of this final-form rulemaking, there are 1,885 EPs that will begin monitoring in year 1 (2024) and 1,900 that will conduct initial monitoring in year 2 (2025).

This final-form rulemaking requires repeat compliance monitoring on a quarterly basis for any EPs at which either PFOA or PFOS is detected at a level above its respective minimum reporting limit (MRL), including those EPs at which one or both MCLs are exceeded. If the quarterly repeat monitoring results are reliably and consistently below the MCLs, the frequency of repeat monitoring may be reduced from quarterly monitoring to annual monitoring. Based on the occurrence data, it is assumed that up to 34.9% of all EPs will have a detection of PFOA or PFOS, or both, at or above the relevant MRL; this equates to 658 EPs of the year 1 initial systems that will need to continue quarterly repeat monitoring in year 2, and 663 EPs of the year 2 initial systems that will need to continue quarterly repeat monitoring in year 3. The remaining systems (1,227 EPs in year 1 and 1,237 EPs in year 2) were assumed to conduct annual repeat monitoring in each year following the initial monitoring, but this overestimates the repeat monitoring requirements and costs after the initial monitoring because, for EPs where initial monitoring results do not detect PFOA or PFOS, the frequency of repeat monitoring is reduced from annual to once every 3 years.

In addition to and separate from the performance monitoring required by permit special condition, systems with EPs that exceed one or both MCLs may require treatment, which would require the system to conduct ongoing repeat compliance monitoring at least annually. Using the noncompliance rate of 7.4% from the occurrence data (as described in section D of this preamble), a total of 280 EPs are estimated to require ongoing repeat compliance monitoring: 139 EPs from initial year 1 and 141 EPs from initial year 2. However, this is likely an overestimate because: (1) systems may have options other than installing treatment to address concentrations of PFOA or PFOS, or both, above the relevant MCL; and (2) the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination, so the exceedance rate in the occurrence data may overestimate the exceedance rate for other PWSs in this Commonwealth that were not included in the occurrence data. For total compliance monitoring cost estimates, the ongoing annual compliance monitoring for EPs where treatment is installed was assumed to begin in the third year of monitoring (year 3 or year 4 overall).

Using these assumptions (which likely overestimate the compliance monitoring requirements and costs for the reasons described previously) and an estimated average cost of $616 per sample, Table 11 summarizes the overall cost estimates for compliance monitoring costs in each of the first four years of rule implementation. Note that this estimate does not include performance monitoring costs.

Table 11. Compliance Monitoring Costs

	Total # EPs	Quarterly Initial EPs	Annual Repeat EPs	Quarterly repeat EPs	Quarterly compliance monitoring cost	Annual compliance monitoring cost	Total yearly compliance monitoring cost
Year 1	1885	1885	0	0	$4,644,640	$0	$4,644,640
Year 2	1900	1900	1227	658	$6,302,579	$755,915	$7,058,495
Year 3		0	3122	663	$1,633,878	$1,923,090	$3,556,969
Year 4		0	3785	0	$0	$2,331,560	$2,331,560

Based on these estimates, the average annual monitoring costs over the first 4 years are $4,397,916. Note that this average annual compliance monitoring cost estimate of approximately $4.4 million is less than the sum of the average annual compliance monitoring cost estimates presented in section D of this preamble for PFOA ($2.9 million) and PFOS ($2.7 million). The reason for this difference in the average annual compliance monitoring cost estimates when considered for each individual contaminant (that is, PFOA and PFOS separately) compared with both contaminants together is that exceedances of the PFOA and PFOS MCLs are expected to co-occur at some sites. For instance, the occurrence data showed exceedance rates of the individual MCLs for PFOA and PFOS of 5.7% and 5.1%, respectively; however, the exceedance rate for the MCLs accounting for co-occurring exceedances was only 7.4% (not 10.8%, the sum of the exceedance rates for the MCLs considered individually). Since the laboratory analytical methods include both PFOA and PFOS, systems with exceedances of both MCLs will not have to collect separate samples for PFOA and PFOS, which results in some reduction in compliance monitoring costs for these systems compared with if each contaminant is considered separately. However, because PFOA and PFOS are each associated with different health effects and have different recommended MCLGs, the compliance monitoring cost estimates are presented separately for each contaminant in section D of this preamble to inform the cost-benefit analysis for each MCL.

Treatment costs

Treatment cost estimates were determined based on a survey conducted of systems in this Commonwealth with existing PFAS treatment and of PFAS treatment manufacturers, a PFAS Case Study published by the American Water Works Association (AWWA, 2020) and from information provided by members of the Association of State Drinking Water Administrators. Costs were provided for GAC, anion exchange (IX) and reverse osmosis (RO). The RO costs were not included in the final cost estimates because, due to wastewater disposal requirements, the technology is currently impractical. Additionally, the costs for GAC, IX and RO provided from the vendors were excluded from the final cost estimates because they were limited to media costs and did not include the infrastructure requirements.

GAC and IX construction costs were based on a lead lag configuration where the first vessel (lead vessel) is capable of treating the entire flow and second vessel (lag vessel) is provided for polishing. Treatment costs were normalized to construction costs for treating 1 MGD.

As shown in Table 12, the average capital cost for the GAC treatment was $3,457,110 per MGD per EP with an average annual O&M cost of $171,970 per MGD per EP.

Table 12. GAC Treatment Costs

Treatment	System	Capital Cost per MGD per EP	Annual O&M Cost per MGD per EP
GAC	Vendor A	$343,000 *	$32,018
GAC	Vendor B	$535,000 *	$356,000
GAC	System A (2 GAC and 1 IX)	$3,125,000	$107,007
GAC	System B, Site 1	$1,675,347	$121,528
GAC	System B, Site 2	$2,454,259	$220,820
GAC	System B, Site 3	$2,433,333	$194,444
GAC	System C	$9,250,000	unknown
GAC	System D	$3,139,000	unknown
GAC	System E	$1,135,497	unknown
GAC	System F	$4,444,444	unknown
Average cost of GAC per MGD per EP		$3,457,110	$171,970

* Not included in calculations

As shown in Table 13, the average capital cost for the IX treatment was $3,284,360 per MGD per EP with an average annual O&M cost of $155,666 per MGD per EP.

Table 13. IX Treatment Costs

Treatment	System	Capital Cost per MGD per EP	Annual O&M Cost per MGD per EP
IX	Vendor A	$357,000 *	$59,361 *
IX	Vendor B	$500,000 *	$175,000
IX	Vendor D	No information	$159,722
IX	System G	$10,400,000	unknown
IX	System H	$3,333,000	unknown
IX	System I	$634,900	unknown
IX	System J	$1,128,000	unknown
IX	System K	$925,900	$132,275
Average cost of IX per MGD per EP		$3,284,360	$155,666

* Not included in calculations

The average capital costs of the GAC and IX treatment is $3,370,735 per MGD per EP with an average annual O&M costs $163,818 per MGD per EP.

To estimate annual treatment costs, the average capital cost of treatment installation of $3,370,735 per MGD per EP was annualized over 20 years at a 4% interest rate. This yields an estimated annualized capital cost of $248,025 per MGD per EP.

In addition, water systems that install treatment will need to conduct performance monitoring, to verify treatment efficacy. Using the average cost per sample of $616 and assuming a total of 36 performance monitoring samples per year—monthly samples at each of three locations (raw water, mid-point of treatment and finished water)—that is an additional annual cost of $22,176 per EP.

In the occurrence data, the percentage of EPs exceeding the MCLs for PFOA and PFOS was 5.7% and 5.1%, respectively; however, due to co-occurrence of PFOA and PFOS, some EPs that exceeded the MCL for PFOA also exceeded the MCL for PFOS. In the occurrence data, the percentage of EPs exceeding the MCL for PFOA or the MCL for PFOS, or both, was 7.4%. However, this exceedance rate may overestimate the exceedance rate for the other PWSs in this Commonwealth that were not sampled, because the occurrence data sampling predominately targeted sites near potential sources of PFAS contamination. Also, as treatment for PFOA and PFOS is the same, EPs exceeding both MCLs would not be required to install two different treatment systems; therefore, the estimated percentage of EPs requiring treatment is less than the combined percentage of systems exceeding either MCL in the occurrence data. Additionally, systems with MCL exceedances may have several options to address the contamination aside from installing treatment, including taking contaminated sources offline, making operational changes such as blending sources, or using alternate sources of supply (developing new sources or using purchased sources from a new interconnect). Recognizing that the MCL exceedance rates from the occurrence data may overestimate the proportion of systems that will need to install treatment to address MCL exceedances for the aforementioned reasons, the occurrence data provides the most relevant information currently available on the prevalence and levels of PFAS in PWSs in this Commonwealth. Using the 7.4% exceedance rate from the occurrence data to estimate how many of the larger universe of 3,785 EPs may require treatment to meet one or both MCLs produces an estimate of 280 EPs. At an average annualized treatment capital cost of $248,025 per MGD per EP, and assuming 280 EPs require treatment installed, the total estimated annual treatment costs are shown in Table 14.

Table 14. Total Estimated Annual Treatment Costs

Estimated average annualized treatment *capital* costs (per MGD per EP)	$248,025
Estimated average annual treatment *O&M* costs (per MGD per EP)	$163,818
Estimated average annual treatment *capital + O&M* costs (per MGD per EP)	$411,843
Estimated annual *performance monitoring* costs (per EP)	$22,167
Estimated # of EPs (of 3,785) that require treatment for one or both MCLs	280
Total estimated average annual treatment *capital + O&M* costs (per MGD)	$115,316,040
Total estimated annual *performance monitoring* costs	$6,206,760

Cost-benefit analysis

Following is a summary of the estimated costs and benefits associated with the MCL for PFOA of 14 ng/L. Treatment cost estimates are based on the costs to install and maintain treatment for a 1-MGD treatment plant. Cost estimates are based the Department's survey of costs from vendors and systems that have installed PFAS treatment. This survey provided information that showed generally lower capital and operational costs for smaller systems and increased costs as the volume of water treated increases; however, capital costs can vary greatly based on site-specific needs. Because of this variability and the limited cost information from available systems, a linear model for cost determination may not be accurate. Smaller systems may be more expensive to treat on a per gallon basis. Some systems may need infrastructure upgrades above and beyond the cost of the PFAS treatment, such as new well pumps, booster pumps, and buildings to house the treatment, whereas other systems may only need to purchase and install the PFAS treatment equipment and media.

- Estimated costs:
  - Estimated average annual compliance monitoring costs (@ $616/EP/Quarter) = $2.9 million
  - Estimated average annual treatment costs (average of GAC and IX) = $89.8 million per MGD + estimated annual performance monitoring costs = $4.8 million
    - Estimated annual treatment capital costs, annualized over 20 years at 4% interest = $248,025 per MGD per EP × 218 EPs = $54.1 million per MGD
    - Estimated annual treatment O&M costs = $35.7 million per MGD + estimated annual performance monitoring costs = $4.8 million
    - Estimated annual treatment O&M costs = $163,818 per MGD per EP × 218 EPs = $35.7 million per MGD
    - Estimated annual performance monitoring costs = $616 per sample per EP × 36 samples = $22,176 per EP × 218 EPs = $4.8 million

- Estimated total annual costs = $89.8 million per MGD in treatment costs + $7.7 million in compliance monitoring and performance monitoring costs

- Estimated benefits:
    - 90% improvement in health protection as compared to 2016 EPA HAL of 70 ppt
    - Estimated health care cost savings of $53 million annually, including direct hospital costs at the time of birth and lost economic productivity due to low-birthweight births being associated with longer-term outcomes such as lower lifetime earning potential

Table 15 provides a comparison of costs and benefits for the MCL for PFOA of 14 ng/L, EPA's 2016 HAL of 70 ng/L and other values considered for the MCL.

Table 15. PFOA Comparison of Costs and Benefits

PFOA Annual Costs and Benefits Analysis								
			Treatment O&M Costs					
Value (ng/L)	*Estimated # of EPs (of 3,785) > Value*	*Compliance Monitoring Costs (Millions)*	*Treatment O&M Costs (Millions) per MGD**	*Performance Monitoring Costs (Millions)*	*Treatment Capital Costs (Millions) per MGD* annualized over 20 years*	*Total Costs (Millions)*	*% Increase in Cost Compared to HAL*	*% Improvement in Health Protection Compared to HAL*
HAL = 70	58	$2.46	$9.50	$1.29	$14.39	$27.63	0%	0%
35	78	$2.56	$12.78	$1.73	$19.35	$36.41	32%	56%
20	200	$2.73	$32.76	$4.44	$49.60	$89.53	224%	80%
MCL = 14	**218**	**$2.89**	**$35.71**	**$4.83**	**$54.07**	**$97.51**	**253%**	**90%**
12	270	$2.97	$44.23	$5.99	$66.97	$120.15	335%	93%
10	313	$3.07	$51.28	$6.94	$77.63	$138.92	403%	96%
MCLG = 8	400	$3.39	$65.53	$8.87	$99.21	$177.00	541%	100%

* For purposes of totaling annual costs, the costs that vary with design capacity (treatment O&M and treatment capital costs) were multiplied by a benchmark design capacity of 1 MGD.

In evaluating the costs and benefits, the Department's goal was to provide at least a 90% reduction in adverse health effects (a 90% improvement in health protection) when compared to the 2016 EPA HAL of 70 ng/L. This goal is consistent with several existing drinking water standards including the following standards:

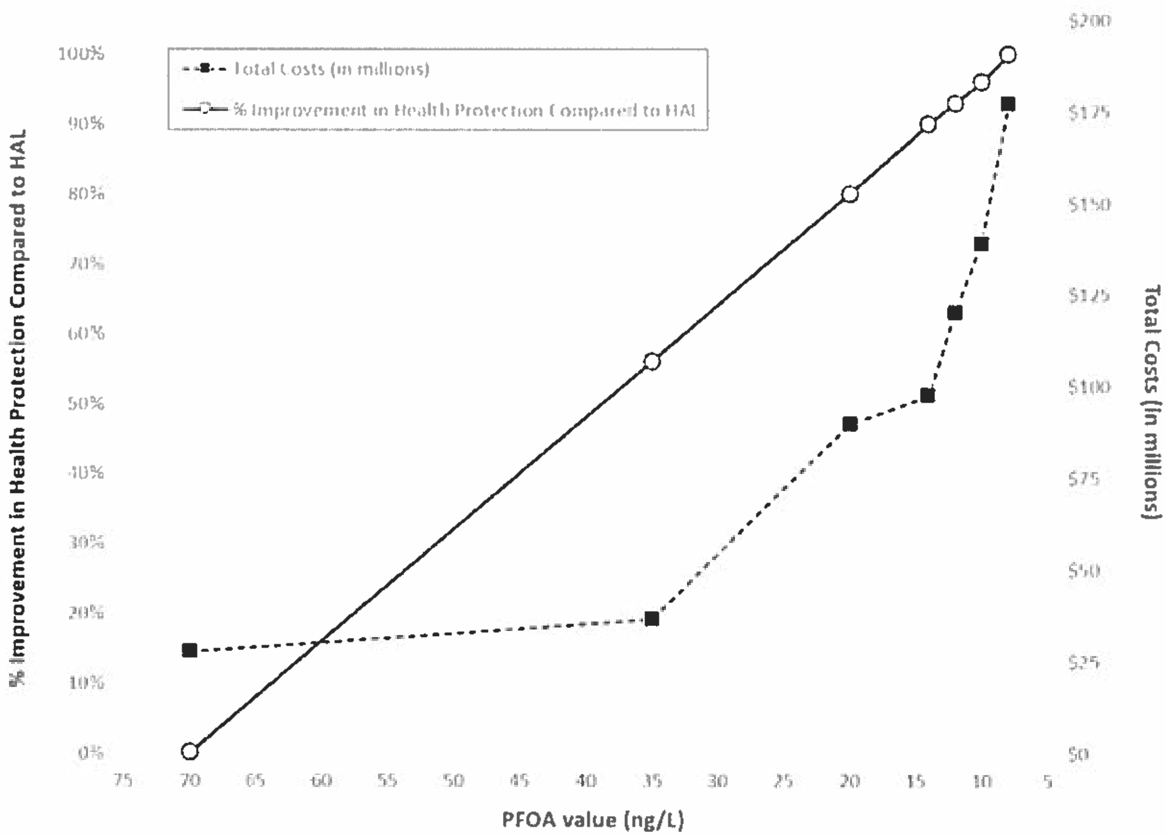
- the requirement to achieve at least a 90% inactivation of *Giardia* cysts using disinfection processes within a filtration plant (§ 109.202(c)(1)(ii) (relating to State MCLs, MRDLs and treatment technique requirements) regarding treatment technique requirements for pathogenic bacteria, viruses and protozoan cysts);
- the use of the 90th percentile lead and copper levels when determining compliance with the lead and copper action levels of 0.015 mg/L and 1.3 mg/L, respectively (§ 109.1102(a)

(relating to action levels and treatment technique requirements) regarding action levels for lead and copper), and

- the requirement to meet the filtered water turbidity standards in 95% of measurements taken each month (§ 109.202(c)(1)(i)).

As shown in Table 15 and Figure 3, additional improvement in public health benefits at PFOA values lower than the MCL of 14 ng/L would require increasingly steep costs. For example, compared with the MCL of 14 ng/L, an MCL value of 10 ng/L is estimated to achieve an additional 6% increase at an additional annual cost of approximately $41.4 million (Table 15, Figure 3), which is a rate of approximately $7 million in additional annual costs for every additional 1% of benefits. Compared with the 2016 EPA HAL, the MCL of 14 ng/L is estimated to achieve a 90% improvement in public health benefits at an additional annual cost of roughly $70 million, which is a rate of approximately $0.8 million in additional annual costs for every additional 1% of benefits.

Figure 3. Annual Total Costs and Benefits (% Health Protection Improvement) at Various PFOA levels



For the aforementioned reasons, the Board is setting an MCL for PFOA of 14 ng/L, which strikes an appropriate balance between the benefits (90% improvement in public health) and costs (253% increase in costs) when compared to the benefits and costs associated with meeting the 2016 EPA HAL of 70 ng/L. Additionally, the total estimated treatment and monitoring costs are offset by the total estimated health care cost savings of at least $53 million annually.

Following is a summary of the estimated costs and benefits associated with the MCL for PFOS of 18 ng/L. Treatment cost estimates are based on the costs to install and maintain treatment for a 1-MGD treatment plant. The actual costs would be expected to be less for a treatment plant with a smaller design capacity. Cost estimates are based the Department's survey of costs from vendors and systems that have installed PFAS treatment. This survey provided information that showed generally lower capital and operational costs for smaller systems and increased costs as the volume of water treated increases; however, capital costs can vary greatly based on site-specific needs. Because of this variability and the limited cost information from available systems, a linear model for cost determination may not be accurate. Smaller systems may be more expensive to treat on a per gallon basis. Some systems may need infrastructure upgrades above and beyond the cost of the PFAS treatment, such as new well pumps, booster pumps, and buildings to house the treatment, whereas other systems may only need to purchase and install the PFAS treatment equipment and media.

- Estimated costs:
  - Estimated average annual compliance monitoring costs (@ $616/EP/Quarter) = $2.7 million
  - Estimated average annual treatment costs (average of GAC and IX) = $78.7 million per MGD + estimated annual performance monitoring costs = $4.2 million
    - Estimated annual treatment capital costs, annualized over 20 years at 4% interest = $$248,025 per MGD per EP × 191 EPs = $47.4 million per MGD
    - Estimated annual treatment O&M costs = $31.3 million per MGD + estimated annual performance monitoring costs = $4.2 million
    - Estimated annual treatment O&M costs = $163,818 per MGD per EP × 191 EPs = $31.3 million per MGD
    - Estimated annual performance monitoring costs = $616 per sample per EP × 36 samples = $22,176 per EP × 191 EPs = $4.2 million
  - Estimated total annual costs = $78.7 million per MGD in treatment costs + $6.9 million in compliance monitoring and performance monitoring costs
- Estimated benefits:
  - 93% improvement in health protection as compared to 2016 EPA HAL of 70 ppt

Table 16 provides a comparison of costs and benefits for the MCL for PFOS of 18 ng/L, EPA's 2016 HAL of 70 ng/L and other values considered for the MCL.

Table 16. PFOS Comparison of Costs and Benefits

PFOS Annual Costs and Benefits Analysis								
			Treatment O&M Costs					
Value (ng/L)	*Estimated # of EPs (of 3785) > Value*	*Compliance Monitoring Costs (Millions)*	*Treatment O&M Costs (Millions) per MGD**	*Performance Monitoring Costs (Millions)*	*Treatment Capital Costs (Millions) per MGD* annualized over 20 years*	*Total Costs (Millions)*	*% Increase in Cost Compared to HAL*	*% Improvement in Health Protection Compared to HAL*
HAL = 70	96	$2.57	$15.73	$2.13	$23.81	$44.24	-----	-----
35	148	$2.64	$24.25	$3.28	$36.71	$66.87	51%	63%
20	183	$2.70	$29.98	$4.06	$45.39	$82.13	86%	89%
MCL = 18	**191**	**$2.70**	**$31.29**	**$4.24**	**$47.37**	**$85.60**	**94%**	**93%**
16	200	$2.73	$32.76	$4.44	$49.60	$89.53	102%	96%
15	200	$2.81	$32.76	$4.44	$49.60	$89.61	103%	98%
MCLG = 14	200	$2.88	$32.76	$4.44	$49.60	$89.68	103%	100%

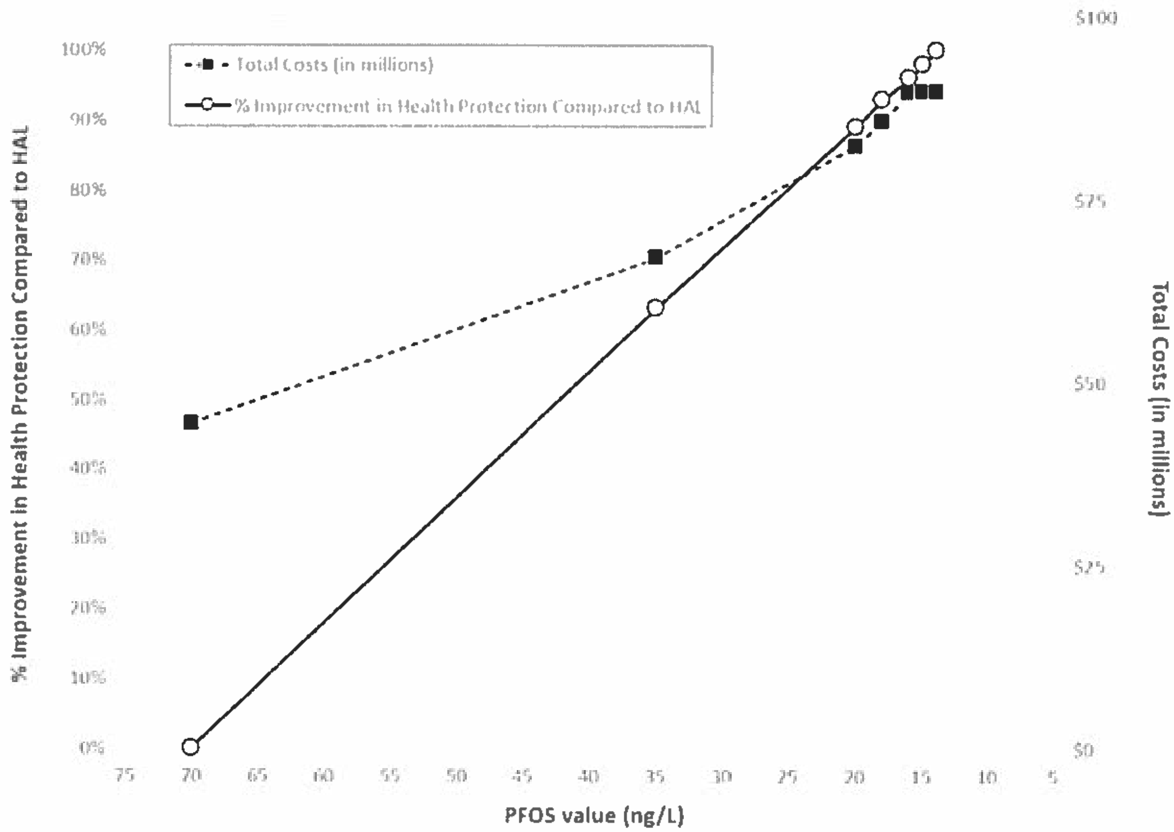
* For purposes of totaling annual costs, the costs that vary with design capacity (treatment O&M and treatment capital costs) were multiplied by a benchmark design capacity of 1 MGD.

In evaluating the costs and benefits, the Department's goal was to provide at least a 90% reduction in adverse health effects (a 90% improvement in health protection) when compared to the 2016 EPA HAL of 70 ng/L. This goal is consistent with several existing drinking water standards including the following standards:

- the requirement to achieve at least a 90% inactivation of *Giardia* cysts using disinfection processes within a filtration plant (§ 109.202(c)(1)(ii) (relating to State MCLs, MRDLs and treatment technique requirements) regarding treatment technique requirements for pathogenic bacteria, viruses and protozoan cysts);
- the use of the 90th percentile lead and copper levels when determining compliance with the lead and copper action levels of 0.015 mg/L and 1.3 mg/L, respectively (§ 109.1102(a) (relating to action levels and treatment technique requirements) regarding action levels for lead and copper), and
- the requirement to meet the filtered water turbidity standards in 95% of measurements taken each month (§ 109.202(c)(1)(i)).

As shown in Table 16 and Figure 4, additional improvement in public health benefits at PFOS values lower than the MCL of 18 ng/L would require increasingly steep costs. For example, compared with the MCL of 18 ng/L, an MCL value of 16 ng/L is estimated to achieve an additional 3% increase at an additional annual cost of approximately $3.9 million (Table 16, Figure 4), which is a rate of approximately $1.3 million in additional annual costs for every additional 1% of benefits. Compared with the 2016 EPA HAL, the MCL of 18 ng/L is estimated to achieve a 93% improvement in public health benefits at an additional annual cost of roughly $41.4 million, which is a rate of approximately $0.4 million in additional annual costs for every additional 1% of benefits.

Figure 4. Annual Total Costs and Benefits (% Health Protection Improvement) at Various PFOS levels



For the aforementioned reasons, the Board is setting an MCL for PFOS of 18 ng/L, which strikes a balance between the benefits (93% improvement in public health) and costs (94% increase in costs) when compared to the benefits and costs associated with meeting the 2016 EPA HAL of 70 ng/L. Additionally, the total estimated treatment and monitoring costs are offset by the total estimated health care cost savings of at least $53 million annually.

Compliance assistance plan

The Department's Safe Drinking Water Program utilizes Pennsylvania Infrastructure Investment Authority (PENNVEST) programs to offer financial assistance to eligible PWSs. This assistance is in the form of a low-interest loan, with some augmenting grant funds for hardship cases. Eligibility is based upon factors such as public health impact, compliance necessity and project/operational affordability.

In addition to the standard funding mentioned previously, PENNVEST approved an additional funding program in 2021 under authority of the act of November 27, 2019 (P.L. 695, No. 101). The PENNVEST PFAS Remediation Program is designed as an annual funding opportunity to aid in the remediation and elimination of PFAS in PWSs. In 2021, approximately $25 million was made available for this grant program.

On November 15, 2021, the Infrastructure Investment and Jobs Act (IIJA) was signed into Federal law. One component of the legislation is $4 billion nationally in DWSRF monies for projects to address emerging drinking water contaminants like PFAS and S5 billion nationally in grants to small and disadvantaged communities for projects addressing emerging drinking water contaminants like PFAS. Over 5 years, the Commonwealth's allocation of these IIJA funds is expected to be $116 million in DWSRF emerging contaminants funds and an additional $140.5 million in funding for projects addressing emerging drinking water contaminants in small and disadvantaged communities, for a total of $256.5 million.

The Department's Safe Drinking Water Program has established a network of regional and Central Office training staff that is responsive to identifiable training needs. The target audience in need of training may be either program staff or the regulated community.

In addition to this network of training staff, the Department's Bureau of Safe Drinking Water has staff dedicated to providing both training and technical outreach support services to PWS owners and operators. The Department's web site also provides timely and useful information for treatment plant operators.

Paperwork requirements

No new forms are required for implementation of these amendments.

H. *Sunset Review*

This final-form rulemaking will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulations effectively fulfill the goals for which they were intended.

I. *Regulatory Review*

Under section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on February 15, 2022, the Department submitted a copy of the notice of proposed rulemaking, published at 52 Pa.B. 1245 (February 26, 2022), and a copy of a Regulatory Analysis Form to the Independent Regulatory Review Commission (IRRC) and to the Chairpersons of the House and Senate Environmental Resources and Energy Committees for review and comment.

Under section 5(c) of the Regulatory Review Act (71 P.S. § 745.5(c)), IRRC and the Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing this final-form rulemaking, the Department has considered all comments from IRRC, the House and Senate Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P.S. § 745.5a(j.2)), on DATE this final-form rulemaking was deemed approved by the House and Senate Committees. Under section 5.1(e) of the Regulatory Review Act, IRRC met on DATE, and approved this final-form rulemaking.

J. *Findings of the Board*

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P.L. 769, No. 240) (45 P.S. §§ 1201 and 1202), known as the Commonwealth Documents Law, and regulations promulgated thereunder at 1 Pa. Code §§ 7.1 and 7.2 (relating to notice of proposed rulemaking required; and adoption of regulations).

(2) A public comment period was provided as required by law, and all comments were considered.

(3) This final-form rulemaking does not enlarge the purpose of the proposed rulemaking published at 52 Pa.B. 1245 (February 26, 2022).

(4) These regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in section C of this order.

K. *Order of the Board*

The Board, acting under the authorizing statutes, orders that:

(a) The regulations of the Department, 25 Pa. Code Chapter 109, are amended to read as set forth in Annex A.

(b) The Chairperson of the Board shall submit this final-form regulation to the Office of General Counsel and the Office of Attorney General for review and approval as to legality and form, as required by law.

(c) The Chairperson of the Board shall submit this final-form regulation to the IRRC and the Senate and House Environmental Resources and Energy Committees as required by the Regulatory Review Act (71 P.S. §§ 745.1—745.14).

(d) The Chairperson of the Board shall certify this final-form regulation and deposit it with the Legislative Reference Bureau, as required by law.

(e) This final-form regulation shall take effect immediately upon publication in the *Pennsylvania Bulletin*.

RAMEZ ZIADEH, P.E.,
Acting Chairperson

Annex A

TITLE 25. ENVIRONMENTAL PROTECTION

PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION

Subpart C. PROTECTION OF NATURAL RESOURCES

ARTICLE II. WATER RESOURCES

CHAPTER 109. SAFE DRINKING WATER

Subchapter A. GENERAL PROVISIONS

§ 109.1. Definitions.

The following words and terms, when used in this chapter, have the following meanings, unless the context clearly indicates otherwise:

*   *   *   *   *

Bulk water hauling system—A public water system which provides water piped into a carrier vehicle and withdrawn by a similar means into the user's storage facility or vessel. The term includes, but it not limited to, the sources of water, treatment, storage or distribution facilities. The term does not include a public water system which provides only a source of water supply for a bulk water hauling system.

<u>CASRN</u>**<u>—Chemical Abstracts Service Registry Number.</u>**

CCR—Consumer Confidence Report—An annual water quality report that community water systems deliver to their customers, as described in § 109.416 (relating to CCR requirements).

*   *   *   *   *

Flowing stream—A course of running water flowing in a definite channel.

<u>GAC—Granular Activated Carbon</u>**<u>—A highly porous adsorbent carbon material produced by heating organic matter that can absorb various dissolved chemicals in the water.</u>**

GAC10—A granular activated carbon filter bed with an empty bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a BAT shall be 120 days.

*   *   *   *   *

MCL—Maximum Contaminant Level—The maximum permissible level of a contaminant in water which is delivered to a user of a public water system, and includes the primary and secondary MCLs established under the Federal act, and MCLs adopted under the act.

MCLG—Maximum Contaminant Level Goal—

(i) The maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety.

(ii) The term includes the MCLGs established under the Federal act and MCLGs adopted under the act.

(iii) Maximum contaminant level goals are nonenforceable health goals.

***MDL—Method detection limit*—The minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results.**

MRDL—Maximum Residual Disinfectant Level—The maximum permissible level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. The consumer's tap means the entry point for bottled water and vended water systems, retail water facilities and bulk water hauling systems.

***MRL—Minimum reporting level*—The minimum quantitation limit that can practically and consistently be achieved, with 95% confidence, by capable analysts at 75% or more of laboratories using a specified analytical method.**

Membrane filtration—

(i) A pressure or vacuum driven separation process in which particulate matter larger than 1 micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test.

(ii) The term includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration and reverse osmosis.

[*Method detection limit*—The amount of a substance which the EPA has determined to be the minimum concentration which can be measured and be reported with 99% confidence that the true value is greater than zero.]

Microorganism—Any of a number of unicellular, multicellular or colonial bacteria, fungi, protozoa, archaea or viruses whose individuals are too small to be seen by the human eye without magnification.

* * * * *

PDWEP—Guidelines for Public Drinking Water Equipment Performance issued by NSF.

***PFAS*—Perfluoroalkyl and Polyfluoroalkyl Substances.**

***PFOA*—Perfluorooctanoic acid—CASRN 335-67-1.**

***PFOS*—Perfluorooctanesulfonic acid—CASRN 1763-23-1.**

***Performance Evaluation Sample*—A reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within the limits of performance specified by the Department. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.**

Person—An individual, partnership, association, company, corporation, municipality, municipal authority, political subdivision, or an agency of Federal or State government. The term includes the officers, employees and agents of a partnership, association, company, corporation, municipality, municipal authority, political subdivision, or an agency of Federal or State government.

*   *   *   *   *

Recycle flows—Any water, solid or semi-solid generated by a conventional or direct filtration plant's treatment process and residual treatment processes that is returned to the plant's treatment process.

Reliably and consistently below the MCL—

(i) For **[VOCs, SOCs, and IOCs (with the exception of nitrate and nitrite),] VOCs, SOCs, IOCs (with the exception of nitrate and nitrite), and PFAS,** this means that each sample result is less than 80% of the MCL.

(ii) For nitrate and nitrite, this means that each sample result is less than 50% of the MCL.

*   *   *   *   *

Subchapter B. MCLs, MRDLs OR TREATMENT TECHNIQUE REQUIREMENTS

§ 109.202. State MCLs, MRDLs and treatment technique requirements.

(a) *Primary MCLs, MRDLs and treatment technique requirements.*

*   *   *   *   *

(3) A public water system that is installing granular activated carbon or membrane technology to comply with the MCL for TTHMs, HAA5, chlorite (where applicable) or bromate (where applicable) may apply to the Department for an extension of up to 24 months past the applicable compliance date specified in the Federal regulations, but not beyond December 31, 2003. In granting the extension, the Department will set a schedule for compliance and may specify any

interim measures that the Department deems necessary. Failure to meet the schedule or interim treatment requirements constitutes a violation of National Primary Drinking Water Regulations.

(4) Other MCLs.

(i) *Effective dates.* The MCLGs and MCLs in subparagraph (ii)(A)—(B) are effective on ______. (*Editor's Note*: The blank refers to the effective date of adoption of this proposed rulemaking when published as a final-form rulemaking.)

(ii) The MCLGs and MCLs for PFAS are:

	CASRN	Contaminant	MCLG (mg/L)	MCL (mg/L)	MCLG (ng/L)	MCL (ng/L)
(A)	335-67-1	PFOA	0.000008	0.000014	8	14
(B)	1763-23-1	PFOS	0.000014	0.000018	14	18

(b) *Secondary MCLs.*

* * * * *

Subchapter C. MONITORING REQUIREMENTS

§ 109.301. General monitoring requirements.

Public water suppliers shall monitor for compliance with MCLs, MRDLs and treatment technique requirements in accordance with the requirements established by the EPA under the National Primary Drinking Water Regulations, 40 CFR Part 141 (relating to National Primary Drinking Water Regulations), except as otherwise established by this chapter unless increased monitoring is required by the Department under § 109.302 (relating to special monitoring requirements). Alternative monitoring requirements may be established by the Department and may be implemented in lieu of monitoring requirements for a particular National Primary Drinking Water Regulation if the alternative monitoring requirements are in conformance with the Federal act and regulations. The monitoring requirements shall be applied as follows:

* * * * *

(2) *Performance monitoring for unfiltered surface water and GUDI.* A public water supplier using unfiltered surface water or GUDI sources shall conduct the following source water and performance monitoring requirements on an interim basis until filtration is provided, unless increased monitoring is required by the Department under § 109.302:

(i) Except as provided under subparagraphs (ii) and (iii), a public water supplier:

(A) Shall perform *E. coli* or total coliform density determinations on samples of the source water immediately prior to disinfection. Regardless of source water turbidity, the minimum frequency of sampling for total coliform or *E. coli* determinations may be no less than the following:

System Size (People)	Samples/Week
<500	1
500—3,299	2
3,300—10,000	3
10,001—25,000	4
25,001 or more	5

(B) Shall measure the turbidity of a representative grab sample of the source water immediately prior to disinfection as follows until August 19, 2019:

(I) For systems that operate continuously, at least once every 4 hours that the system is in operation, except as provided in clause (C).

(II) For systems that do not operate continuously, at start-up, at least once every 4 hours that the system is in operation, and also prior to shutting down the plant, except as provided in clause (C).

(C) May substitute continuous turbidity monitoring for grab sample monitoring until August 19, 2019, if it validates the continuous measurement for accuracy on a regular basis using a procedure specified by the manufacturer. At a minimum, calibration with an EPA-approved primary standard shall be conducted at least quarterly.

(D) Shall continuously monitor and record the turbidity of the source water immediately prior to disinfection beginning August 20, 2019, using an analytical method specified in 40 CFR 141.74(a) and record the results at least every 15 minutes while the source is operating. If there is a failure in the continuous turbidity monitoring or recording equipment, or both, the supplier shall conduct grab sampling or manual recording, or both, every 4 hours in lieu of continuous monitoring or recording. The public water supplier shall notify the Department within 24 hours of the equipment failure. Grab sampling or manual recording may not be substituted for continuous monitoring for longer than 5 working days after the equipment fails. The Department will consider case-by-case extensions of the time frame to comply if the water supplier provides written documentation that it was unable to repair or replace the malfunctioning equipment within 5 working days due to circumstances beyond its control.

(E) Shall continuously monitor and record the residual disinfectant concentration required under § 109.202(c)(1)(iii)of the water being supplied to the distribution system and record the lowest value for each day. If a public water system's continuous monitoring or recording equipment fails, the public water supplier may, upon notification of the Department under § 109.701(a)(3), substitute grab sampling or manual recording, or both, every 4 hours in lieu of continuous monitoring. Grab sampling or manual recording may not be substituted for continuous monitoring for longer than 5 days after the equipment fails.

(F) Until April 28, 2019, shall measure the residual disinfectant concentration at representative points in the distribution system no less frequently than the frequency required for total coliform sampling for compliance with the MCL for microbiological contaminants.

(G) Beginning April 29, 2019, shall measure and record the residual disinfectant concentration at representative points in the distribution system in accordance with a sample siting plan as specified in § 109.701(a)(8) and as follows:

(I) A public water supplier shall monitor the residual disinfectant concentration at the same time and from the same location that a total coliform sample is collected as specified in paragraph (3)(i) and (ii). Measurements taken under this subclause may be used to meet the requirements under subclause (II).

(II) A public water supplier shall monitor the residual disinfectant concentration at representative locations in the distribution system at least once per week.

(III) A public water supplier that does not maintain the minimum residual disinfectant concentration specified in § 109.710 at one or more sample sites shall include those sample sites in the monitoring conducted the following month.

(IV) Compliance with the minimum residual disinfectant concentration shall be determined in accordance with § 109.710.

(V) A public water system may substitute online residual disinfectant concentration monitoring and recording for grab sample monitoring and manual recording if it validates the online measurement for accuracy in accordance with § 109.304.

(ii) Until August 19, 2019, for a public water supplier serving 3,300 or fewer people, the Department may reduce the residual disinfectant concentration monitoring for the water being supplied to the distribution system to a minimum of 2 hours between samples at the grab sampling frequencies prescribed as follows if the historical performance and operation of the system indicate the system can meet the residual disinfectant concentration at all times:

System Size (People)	Samples/Week
<500	1
500—1,000	2
1,001—2,500	3
2,501—3,300	4

If the Department reduces the monitoring, the supplier shall nevertheless collect and analyze another residual disinfectant measurement as soon as possible, but no longer than 4 hours from any measurement which is less than the residual disinfectant concentration approved under § 109.202(c)(1)(iii).

(iii) Until August 19, 2019, for a public water supplier serving fewer than 500 people, the Department may reduce the source water turbidity monitoring to one grab sample per day, if the historical performance and operation of the system indicate effective disinfection is maintained under the range of conditions expected to occur in the system's source water.

(*Editor's Note*: The bracketed text as follows to be deleted is duplicated due to a previous printing error. The text of these serial pages can be found at (393259) and (391315) to (391317).)

[(iv) A public water supplier providing conventional filtration treatment or direct filtration and serving 10,000 or more people and using surface water or GUDI sources shall, beginning January 1, 2002, conduct continuous monitoring of turbidity for each individual filter using an approved method under the EPA regulation in 40 CFR 141.74(a) (relating to analytical and monitoring requirements) and record the results at least every 15 minutes. Beginning January 1, 2005, public water suppliers providing conventional or direct filtration and serving fewer than 10,000 people and using surface water or GUDI sources shall conduct continuous monitoring of turbidity for each individual filter using an approved method under the EPA regulation in 40 CFR 141.74(a) and record the results at least every 15 minutes.

(A) The water supplier shall calibrate turbidimeters using the procedure specified by the manufacturer. At a minimum, calibration with an EPA-approved primary standard shall be conducted at least quarterly.

(B) If there is failure in the continuous turbidity monitoring or recording equipment, or both, the system shall conduct grab sampling or manual recording, or both, every 4 hours in lieu of continuous monitoring or recording.

(C) A public water supplier serving 10,000 or more persons has a maximum of 5 working days following the failure of the equipment to repair or replace the equipment before a violation is incurred.

(D) A public water supplier serving fewer than 10,000 persons has a maximum of 14 days following the failure of the equipment to repair or replace the equipment before a violation is incurred.

(v) A public water supplier shall calculate the log inactivation of Giardia, using measurement methods established by the EPA, at least once per day during expected peak hourly flow. The log inactivation for Giardia must also be calculated whenever the residual disinfectant concentration at the entry point falls below the minimum value specified in § 109.202(c) (relating to State MCLs, MRDLs and treatment technique requirements) and continue to be calculated every 4 hours until the residual disinfectant concentration at the entry point is at or above the minimum value specified in § 109.202(c). Records of log

inactivation calculations must be reported to the Department in accordance with § 109.701(a)(2).

(vi) In addition to the requirements specified in subparagraph (v), a public water supplier that uses a disinfectant other than chlorine to achieve log inactivation shall calculate the log inactivation of viruses at least once per day during expected peak hourly flow. The log inactivation for viruses shall also be calculated whenever the residual disinfectant concentration at the entry point falls below the minimum value specified in § 109.202(c) and continue to be calculated every 4 hours until the residual disinfectant concentration at the entry point is at or above the minimum value specified in § 109.202(c). Records of log inactivation calculations shall be reported to the Department in accordance with § 109.701(a).

(2) *Performance monitoring for unfiltered surface water and GUDI.* A public water supplier using unfiltered surface water or GUDI sources shall conduct the following source water and performance monitoring requirements on an interim basis until filtration is provided, unless increased monitoring is required by the Department under § 109.302:

(i) Except as provided under subparagraphs (ii) and (iii), a public water supplier:

(A) Shall perform *E. coli* or total coliform density determinations on samples of the source water immediately prior to disinfection. Regardless of source water turbidity, the minimum frequency of sampling for total coliform or *E. coli* determinations may be no less than the following:

System Size (People)	**Samples/Week**
<500	**1**
500—3,299	**2**
3,300—10,000	**3**
10,001—25,000	**4**
25,001 or more	**5**

(B) Shall measure the turbidity of a representative grab sample of the source water immediately prior to disinfection as follows until August 19, 2019:

(I) For systems that operate continuously, at least once every 4 hours that the system is in operation, except as provided in clause (C).

(II) For systems that do not operate continuously, at start-up, at least once every 4 hours that the system is in operation, and also prior to shutting down the plant, except as provided in clause (C).

(C) May substitute continuous turbidity monitoring for grab sample monitoring until August 19, 2019, if it validates the continuous measurement for accuracy on a regular basis

using a procedure specified by the manufacturer. At a minimum, calibration with an EPA-approved primary standard shall be conducted at least quarterly.

(D) Shall continuously monitor and record the turbidity of the source water immediately prior to disinfection beginning August 20, 2019, using an analytical method specified in 40 CFR 141.74(a) and record the results at least every 15 minutes while the source is operating. If there is a failure in the continuous turbidity monitoring or recording equipment, or both, the supplier shall conduct grab sampling or manual recording, or both, every 4 hours in lieu of continuous monitoring or recording. The public water supplier shall notify the Department within 24 hours of the equipment failure. Grab sampling or manual recording may not be substituted for continuous monitoring for longer than 5 working days after the equipment fails. The Department will consider case-by-case extensions of the time frame to comply if the water supplier provides written documentation that it was unable to repair or replace the malfunctioning equipment within 5 working days due to circumstances beyond its control.

(E) Shall continuously monitor and record the residual disinfectant concentration required under § 109.202(c)(1)(iii) of the water being supplied to the distribution system and record the lowest value for each day. If a public water system's continuous monitoring or recording equipment fails, the public water supplier may, upon notification of the Department under § 109.701(a)(3), substitute grab sampling or manual recording, or both, every 4 hours in lieu of continuous monitoring. Grab sampling or manual recording may not be substituted for continuous monitoring for longer than 5 days after the equipment fails.

(F) Until April 28, 2019, shall measure the residual disinfectant concentration at representative points in the distribution system no less frequently than the frequency required for total coliform sampling for compliance with the MCL for microbiological contaminants.

(G) Beginning April 29, 2019, shall measure and record the residual disinfectant concentration at representative points in the distribution system in accordance with a sample siting plan as specified in § 109.701(a)(8) and as follows:

(I) A public water supplier shall monitor the residual disinfectant concentration at the same time and from the same location that a total coliform sample is collected as specified in paragraph (3)(i) and (ii). Measurements taken under this subclause may be used to meet the requirements under subclause (II).

(II) A public water supplier shall monitor the residual disinfectant concentration at representative locations in the distribution system at least once per week.

(III) A public water supplier that does not maintain the minimum residual disinfectant concentration specified in § 109.710 at one or more sample sites shall include those sample sites in the monitoring conducted the following month.

(IV) Compliance with the minimum residual disinfectant concentration shall be determined in accordance with § 109.710.

(V) A public water system may substitute online residual disinfectant concentration monitoring and recording for grab sample monitoring and manual recording if it validates the online measurement for accuracy in accordance with § 109.304.

(ii) Until August 19, 2019, for a public water supplier serving 3,300 or fewer people, the Department may reduce the residual disinfectant concentration monitoring for the water being supplied to the distribution system to a minimum of 2 hours between samples at the grab sampling frequencies prescribed as follows if the historical performance and operation of the system indicate the system can meet the residual disinfectant concentration at all times:

System Size (People)	Samples/Week
<500	**1**
500—1,000	**2**
1,001—2,500	**3**
2,501—3,300	**4**

If the Department reduces the monitoring, the supplier shall nevertheless collect and analyze another residual disinfectant measurement as soon as possible, but no longer than 4 hours from any measurement which is less than the residual disinfectant concentration approved under § 109.202(c)(1)(iii).

(iii) Until August 19, 2019, for a public water supplier serving fewer than 500 people, the Department may reduce the source water turbidity monitoring to one grab sample per day, if the historical performance and operation of the system indicate effective disinfection is maintained under the range of conditions expected to occur in the system's source water.]

(3) *Monitoring requirements for coliforms.* Public water systems shall determine the presence or absence of total coliforms for each routine or check sample; and, the presence or absence of *E. coli* for a total coliform positive sample in accordance with analytical techniques approved by the Department under § 109.304 (relating to analytical requirements). A system may forego *E. coli* testing on a total coliform-positive sample if the system assumes that any total coliform-positive sample is also *E. coli*-positive. A system which chooses to forego *E. coli* testing shall, under § 109.701(a)(3), notify the Department within 1 hour after the water system learns of the violation or the situation, and shall provide public notice in accordance with § 109.408 (relating to Tier 1 public notice—categories, timing and delivery of notice) if there is a violation of the *E. coli* MCL as set forth in subparagraph (iv).

* * * * *

(6) *Monitoring requirements for SOCs (pesticides and PCBs).* Community water systems and nontransient noncommunity water systems shall monitor for compliance with the MCLs for

SOCs established by the EPA under 40 CFR 141.61(c). The monitoring shall be conducted according to the requirements established by the EPA under 40 CFR 141.24(h), incorporated herein by reference except as modified by this chapter.

*   *   *   *   *

(vii) *Waivers.* A waiver will be granted to a public water supplier from conducting the initial compliance monitoring or repeat monitoring, or both, for an SOC based on documentation provided by the public water supplier and a determination by the Department that the criteria in clause (B), (C) or (D) has been met. A waiver is effective for one compliance period and may be renewed in each subsequent compliance period. If the Department has not granted a use waiver in accordance with clause (B), the public water supplier is responsible for submitting a waiver application and renewal application to the Department for review in accordance with clause (B), (C) or (D) for specific entry points. Waiver applications will be evaluated relative to the vulnerability assessment area described in clause (A) and the criteria in clause (B), (C) or (D). Entry points at which treatment has been installed to remove an SOC are not eligible for a monitoring waiver for the SOCs for which treatment has been installed.

(A) *Vulnerability assessment area for SOCs including dioxin and PCBs.*

(I) For groundwater or GUDI entry points, the vulnerability assessment area shall consist of wellhead protection area Zones I and II <u>**as defined under § 109.1 (relating to definitions)**</u>.

(II) For surface water entry points, the vulnerability assessment area shall consist of **[the area that supplies water to the entry point and is separated from other watersheds by the highest topographic contour]** <u>**surface water intake protection area Zones A and B as defined under § 109.1**</u>.

(B) *Use waivers.* A use waiver will be granted by the Department for contaminants which the Department has determined have not been used, stored, manufactured, transported or disposed of in this Commonwealth, or portions of this Commonwealth. A use waiver specific to a particular entry point requires that an SOC was not used, stored, manufactured, transported or disposed of in the vulnerability assessment area. If use waiver criteria cannot be met, a public water supplier may apply for a susceptibility waiver.

*   *   *   *   *

(8) *Monitoring requirements for public water systems that obtain finished water from another public water system.*

*   *   *   *   *

(iii) Consecutive water suppliers may be exempt from conducting monitoring for the MCLs for **[VOCs, SOCs and IOCs and radionuclides]** <u>**VOCs, SOCs, IOCs, radionuclides and PFAS**</u> if the public water system from which the finished water is obtained complies with paragraphs **[(5)—(7) and (14)]** **(5)—(7), (14) and (16)** and is in compliance with the MCLs, except that asbestos monitoring is required in accordance with subparagraph (ii).

* * * * *

(9) *Monitoring requirements for POE devices.* A public water supplier using a POE device shall, in addition to the monitoring requirements specified in paragraphs (1)—(8)**, (10)—(16) and Subchapter K (relating to lead and copper)**, conduct monitoring on the devices installed. As a minimum, the monitoring shall include the MCLs for which the POE device is intended to treat and monthly microbiological monitoring. The Department may allow the water supplier to reduce the frequency of microbiological monitoring based upon historical performance. Except for microbiological contaminants, monitoring shall be performed quarterly on 25% of the installed POE devices with the locations rotated so that each device is monitored at least once annually, unless increased monitoring is required by the Department under § 109.302.

* * * * *

(11) *Monitoring requirements for entry points that do not provide water continuously.* Entry points from which water is not provided during every quarter of the year shall monitor in accordance with paragraphs **[(5)—(7) and (14)]** **(5)—(7), (14) and (16)**, except that monitoring is not required during a quarter when water is not provided to the public, unless special monitoring is required by the Department under § 109.302.

* * * * *

(15) *Monitoring requirements for reserve entry points and entry points supplied by one or more reserve sources.* Beginning August 20, 2019, a water supplier using reserve sources or reserve entry points as defined and identified in the comprehensive monitoring plan in § 109.718(a) (relating to comprehensive monitoring plan) shall:

(i) Monitor reserve entry points at the initial frequencies specified in paragraphs **[(5)—(7) and (14)]** **(5)—(7), (14) and (16)**.

(ii) Monitor permanent entry points at the initial frequencies specified in paragraphs **[(5)—(7) and (14)]** **(5)—(7), (14) and (16)** while the entry point is receiving water from a reserve source.

(iii) Conduct special monitoring as required by the Department under § 109.302.

(16) *Monitoring requirements for PFAS.* Community water systems and nontransient noncommunity water systems shall monitor for compliance with the MCLs for PFAS established under § 109.202(a).

(i) *Initial monitoring.* Initial monitoring shall consist of 4 consecutive quarterly samples at each entry point in accordance with the following monitoring schedule:

(A) Systems serving more than 350 persons shall begin monitoring ~~for the PFAS listed in § 109.202(a)(4)(ii)(A) and (B)~~ during the quarter beginning January 1, 2024.

(B) Systems serving 350 or fewer persons shall begin monitoring ~~for the PFAS listed in § 109.202(a)(4)(ii)(A) and (B)~~ during the quarter beginning January 1, 2025.

(C) UPON REQUEST, A SYSTEM REQUIRED TO CONDUCT MONITORING UNDER THE FIFTH UNREGULATED CONTAMINANT MONITORING RULE (UCMR 5), SPECIFIED IN 40 CFR PART 141, MAY UPON WRITTEN APPROVAL FROM THE DEPARTMENT MODIFY THE INITIAL MONITORING PERIOD REQUIRED UNDER CLAUSE (A) OR (B) TO COINCIDE WITH UCMR 5.

(D) Systems that add new sources to new or existing entry points on or after the applicable dates in clauses (A) and (B), shall conduct initial monitoring according to this clause. An entry point with one or more new sources shall be monitored for 4 consecutive quarters, beginning the first full quarter the entry point begins serving the public.

(ii) *Repeat monitoring for ~~entry points at which at least one of the PFAS with an MCL is~~ PFAS THAT ARE detected.* For entry points at which ~~at least one of the PFAS with an MCL established under § 109.202(a)~~ A PFAS is detected at a level equal to or greater than its corresponding MRL as defined in § 109.304(f), then:

(A) Monitoring for ~~compliance with the MCLs for PFAS established under § 109.202(a) shall be repeated~~ THE DETECTED PFAS SHALL BE CONDUCTED quarterly, beginning the quarter following the detection, until reduced monitoring is granted in accordance with this subparagraph.

(B) The Department may decrease the quarterly monitoring requirement specified in clause (A) if it has determined that monitoring results are reliably and consistently below ~~all MCLs for PFAS established under § 109.202(a)~~ THE MCL. The Department will not make this determination until the water system obtains results from a minimum of four consecutive quarterly samples that are reliably and consistently below ~~all PFAS MCLs~~ THE MCL.

(C) If the Department determines that THE monitoring results are reliably and consistently below ~~all PFAS MCLs~~ THE MCL, the Department may allow the system to monitor annually. Systems which monitor annually shall monitor ~~for compliance with the MCLs for PFAS established under § 109.202(a)~~ during the quarter that previously yielded the highest analytical result, or as specified by the Department.

(iii) *Repeat monitoring ~~at entry points at which none of the PFAS are~~ FOR PFAS THAT ARE NOT detected.* For entry points at which ~~none of the PFAS with an MCL established under § 109.202(a) are~~ A PFAS IS NOT detected during initial monitoring in accordance with subparagraph (i), required monitoring FOR THE PFAS NOT DETECTED is reduced to one sample per entry point during each subsequent compliance period. This reduced monitoring shall be conducted in the same year as reduced monitoring granted for VOCs under paragraph (5)(iv)(B) and SOCs under paragraph (6)(iii) as specified by the Department.

(iv) *Repeat monitoring for ~~entry points at which at least one of the PFAS exceeds an~~ PFAS WITH MCL EXCEEDANCES.* For entry points at which a ~~result for at least one of the~~ PFAS ~~exceeds an~~ MCL IS EXCEEDED ~~established under § 109.202(a)~~, monitoring for ~~compliance with the MCLs for PFAS established under § 109.202(a)~~ THE EXCEEDING PFAS shall be conducted quarterly, beginning the quarter following the exceedance. Quarterly monitoring shall continue until a minimum of four consecutive quarterly samples shows the system is in compliance as specified in subparagraph (ix) and the Department determines the system is reliably and consistently below ~~all PFAS MCLs~~ THE MCL. If the Department determines that the system is in compliance and is reliably and consistently below ~~all PFAS MCLs~~ THE MCL, the Department may allow the system to monitor in accordance with subparagraph (ii)(C).

(v) *Confirmation samples.* A confirmation sample shall be collected and analyzed for each of the PFAS detected in exceedance of its MCL during annual or less frequent compliance monitoring. The confirmation sample shall be collected within 2 weeks of notification from the accredited laboratory performing the analysis that an MCL has been exceeded.

(vi) *~~Repeat and performance monitoring~~ MONITORING for entry points with PFAS removal treatment.* The reduced monitoring option in subparagraph (iii) does not apply to entry points at which treatment has been installed for PFAS removal ~~of at least one of the PFAS with an MCL established under § 109.202(a)~~. Compliance monitoring FOR THE SPECIFIC PFAS FOR WHICH TREATMENT HAS BEEN INSTALLED shall be conducted at least annually ~~at entry points with PFAS treatment~~. Performance monitoring shall be conducted AT LEAST quarterly for the specific PFAS for which treatment ~~is provided~~ HAS BEEN INSTALLED.

(vii) *Waivers.* Systems conducting monitoring under subparagraph (ii) at groundwater or GUDI entry points may apply for a use waiver for those entry points which have 3 consecutive years of quarterly or annual samples with no detection of ~~any of~~ the PFAS ~~with an MCL established under § 109.202(a)~~ MONITORED UNDER SUBPARAGRAPH (ii). A use waiver from conducting monitoring under subparagraph (ii)(C) may be granted to a public water supplier with groundwater or GUDI entry points based on documentation provided by the public water supplier and a determination by the Department that the requirements in clauses (A) and (B) have been met. Entry points at which treatment has been installed to remove one or more of the PFAS ~~with MCLs established under § 109.202(a)~~ are not eligible for a waiver.

(A) A use waiver may be granted for a specific entry point after evaluating knowledge of previous use, including storage, manufacturing, transport or disposal of one or more PFAS within the wellhead protection area Zones I and II as defined under § 109.1. If a determination by the Department reveals no previous use, a waiver may be granted for the entry point.

(B) Waiver requests and renewals shall be submitted to the Department, on forms provided by the Department, for review and approval prior to the end of the applicable monitoring period. Until the waiver request or renewal is approved, the public water system is responsible for conducting all required monitoring.

(C) If a use waiver is granted by the Department, required monitoring at that entry point is reduced to one sample during the subsequent compliance period. This monitoring shall be conducted during the quarter that previously yielded the highest analytical result, or as specified by the Department, and in the same years as any reduced monitoring granted for VOCs under paragraph (5)(iv)(B) and SOCs under paragraph (6)(iii) as specified by the Department.

(D) A waiver is effective for one compliance period and may be renewed in each subsequent compliance period.

(viii) *Invalidation of PFAS samples.*

(A) The Department may invalidate results of obvious sampling errors.

(B) A sample invalidated under this subparagraph does not count towards meeting the minimum monitoring requirements of this paragraph.

(ix) *Compliance determinations.* Compliance with the PFAS MCLs shall be determined based on the analytical results obtained at each entry point. If one entry point is in violation of an MCL, the system is in violation of the MCL.

(A) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average of all samples taken at each entry point.

(B) If monitoring is conducted annually or less frequently, the system is out of compliance if the level of a contaminant at any entry point is greater than the MCL. If a confirmation sample is collected as specified in subparagraph (v), compliance is determined using the average of the two sample results.

(C) If any sample result will cause the running annual average to exceed the MCL at any entry point, the system is out of compliance with the MCL immediately.

(D) If a system fails to collect the required number of samples, compliance with the MCL will be based on the total number of samples collected.

(E) If a sample result is less than the MRL, zero will be used to calculate compliance.

§ 109.303. Sampling requirements.

(a) The samples taken to determine a public water system's compliance with MCLs, MRDLs or treatment technique requirements or to determine compliance with monitoring requirements shall be taken at the locations identified in §§ 109.301, 109.302, 109.1003, 109.1103, 109.1202 and 109.1303 and as follows:

* * * * *

(4) Samples for determining compliance with MCLs for organic contaminants listed by the EPA under 40 CFR 141.61 (relating to maximum contaminant levels for organic contaminants), inorganic contaminants listed by the EPA under 40 CFR 141.62 (relating to maximum contaminant levels (MCLs) for inorganic contaminants), radionuclide contaminants listed by the EPA under 40 CFR 141.66 (relating to maximum contaminant levels for radionuclides) **[and with the special monitoring requirements for unregulated contaminants under § 109.302(f) (relating to special monitoring requirements)]** shall be taken at each entry point to the distribution system which is representative of each source after an application of treatment during periods of normal operating conditions. If a system draws water from more than one source and the sources are combined prior to distribution, the system shall sample at the entry point during periods of normal operating conditions when water is representative of all sources being used.

(5) Asbestos sampling points shall be at the distribution tap where asbestos contamination is expected to be the greatest based on the presence of asbestos cement pipe and lack of optimum corrosion control treatment, and at the entry point for each source which the Department has reason to believe may contain asbestos, except that a collected distribution sample which is representative of a source may be substituted for a required entry point sample.

(6) Samples for determining compliance with MCLs for PFAS contaminants listed in § 109.202(a)(4) shall be ~~taken as follows:~~ COLLECTED AT EACH ENTRY POINT TO THE DISTRIBUTION SYSTEM WHICH IS REPRESENTATIVE OF EACH SOURCE AFTER AN APPLICATION OF TREATMENT DURING PERIODS OF NORMAL OPERATING CONDITIONS. IF A SYSTEM DRAWS WATER FROM MORE THAN ONE SOURCE AND THE SOURCES ARE COMBINED PRIOR TO DISTRIBUTION, THE SYSTEM SHALL SAMPLE AT THE ENTRY POINT DURING PERIODS OF NORMAL OPERATING CONDITIONS WHEN WATER IS REPRESENTATIVE OF ALL SOURCES BEING USED.

~~(i) Samples shall be collected at each entry point to the distribution system which is representative of each source after an application of treatment during periods of normal operating conditions. If a system draws water from more than one source and the sources are combined prior to distribution, the system shall sample at the entry point during periods of normal operating conditions when water is representative of all sources being used.~~

~~(ii) Samples shall be collected by a person properly trained by a laboratory accredited by the Department to conduct PFAS analysis.~~

(b) The samples taken to determine a public water system's compliance with treatment technique and performance monitoring requirements shall be taken at a point that is as close as practicable to each treatment technique process and that is not influenced by subsequent treatment processes or appurtenances.

* * * * *

§ 109.304. Analytical requirements.

(a) Sampling and analysis shall be performed in accordance with analytical techniques adopted by the EPA under the Federal act or methods approved by the Department.

* * * * *

(e) A water supplier shall calibrate all turbidimeters used for compliance monitoring using the procedure specified by the manufacturer. At a minimum, calibration with an EPA-approved primary standard shall be conducted at least every 90 days. The Department may extend this 90-day calibration frequency if the calibration due date coincides with a holiday or weekend, or during a water system emergency which prevents timely calibration.

(f) For the purpose of determining compliance with the PFAS MCLs established in § 109.202(a)(4) (relating to State MCLs, MRDLs and treatment technique requirements), sampling and analysis for PFAS shall be conducted as follows:

(1) Sampling and analysis shall be according to the following approved methods and MRLs:

Contaminant	**Methods**	**MRL (ng/L)**
(i) PFOA	**EPA 533, EPA 537.1, EPA 537 Version 1.1**	**5**
(ii) PFOS	**EPA 533, EPA 537.1, EPA 537 Version 1.1**	**5**

(2) Analysis shall be conducted by a laboratory accredited by the Department.

(3) Accredited laboratories must determine the MDL for each analyte, according to the procedure in Appendix B, Revision 2 to 40 CFR Part 136 (relating to definition and procedure for the determination of the method detection limit) or as specified in the method.

(4) Accredited laboratories must analyze Performance Evaluation Samples provided by a third party at least once per year by each method for which the laboratory maintains certification. Results of Performance Evaluation Samples must be within ±30% of the true value.

(5) The MRL must be contained within the range of calibration.

Subchapter D. PUBLIC NOTIFICATION

§ 109.411. Content of a public notice.

(a) *Elements of a public notice.* When a public water system is required to give public notice under this subchapter, each public notice must include the following elements:

*   *   *   *   *

(e) *Standard language for a public notice.* Public water systems shall include the following standard language in their public notice:

(1) *Standard health effects language for primary MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption.* Public water systems shall include in each public notice appropriate health effects language. This subchapter incorporates by reference the health effects language specified in 40 CFR Part 141, Subpart Q, Appendix B (relating to standard health effects language for public notification), corresponding to each primary MCL, MRDL and treatment technique violation listed in 40 CFR Part 141, Subpart Q, Appendix A (relating to NPDWR violations and other situations requiring public notice), and for each violation of a condition of a variance or exemption, unless other health effects language is established by regulations or order of the Department. **[The health effects language for fluoride is not incorporated by reference. Public water systems shall include the following health effects language in each Tier 2 public notice for violation of the primary MCL of 2 mg/L for fluoride:]**

<u>**(i) The health effects language for fluoride is not incorporated by reference. Public water systems shall include the following health effects language in each Tier 2 public notice for violation of the primary MCL of 2 mg/L for fluoride:**</u>

"This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). Dental fluorosis, in its moderate or severe forms, may result in a brown staining and or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease."

<u>**(ii) Public water systems shall include the following health effects language in each Tier 2 public notice for violation of the primary MCL for PFOA:**</u>

<u>**"Drinking water containing PFOA in excess of the MCL of 14 ng/L may cause adverse health effects, including developmental effects (neurobehavioral and skeletal effects)."**</u>

<u>**(iii) Public water systems shall include the following health effects language in each Tier 2 public notice for violation of the primary MCL for PFOS:**</u>

<u>**"Drinking water containing PFOS in excess of the MCL of 18 ng/L may cause adverse health effects, including decreased immune response."**</u>

(2) *Standard language for violations of monitoring requirements.* Public water systems shall include the following language in their notice, including the language necessary to fill in the blanks, for all violations of monitoring requirements listed in 40 CFR Part 141, Subpart Q, Appendix A:

* * * * *

§ 109.416. CCR requirements.

This section applies only to community water systems and establishes the minimum requirements for the content of the annual CCR that each system shall deliver to its customers. This report must contain information on the quality of the water delivered by the system and characterize the risks, if any, from exposure to contaminants detected in the drinking water in an accurate and understandable manner.

* * * * *

(3) Except as noted in subparagraphs (i)—(v), the annual report that a community water system provides to its customers shall contain all of the information, mandatory language and optional text specified by the EPA under 40 CFR 141.153 and 141.154 (relating to content of the reports; and required additional health information), which are incorporated by reference, and under 40 CFR 141, Subpart O, Appendix A (relating to regulated contaminants), which is incorporated by reference, unless other information, mandatory language or optional text is established by regulations or order of the Department. The health effects language for fluoride is not incorporated by reference. Public water systems shall include the health effects language specified in § **[109.411(d)(1)]** **109.411(e)(1)(i)** (relating to content of a public notice) for violation of the primary MCL of 2 mg/L fluoride.

(i) If a water system wants to use wording of its own choice in place of optional text, the water supplier shall submit the proposed wording to the Department for review and written approval prior to including it in its annual CCR. Once approved, the water supplier's wording may be used in future CCRs without further approval from the Department as long as it is not changed and is still applicable.

(ii) The CCR shall contain information in Spanish regarding the importance of the report or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the report or to request assistance.

(iii) For each non-English-speaking group other than Spanish-speaking that exceeds 10% of the residents for systems serving at least 1,000 people or 100 residents for systems serving less than 1,000 people, and speaks the same language other than English, the report shall contain information in the appropriate languages regarding the importance of the report or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the report or to request assistance in the appropriate language. The Department will make the final determination of which systems need to include this information.

(iv) For the purpose of defining how certain portions of a CCR shall appear, the term "prominently display" as used in 40 CFR 141.154(a) means that the information shall be printed either in a larger size typeface or bolded or enclosed within a border or all these so as to make the information conspicuous in comparison to the rest of the text appearing before and after the prominently displayed text. Prominently displayed text placed away from other text (such as, in a highlighted or boxed area) shall be printed no smaller than the text used elsewhere in the body of the report, excluding main or section titles.

(v) Information contained in a CCR shall appear in an easy-to-read format. Font sizes below 10 points or color combinations, or both, that make it difficult for persons to read and understand the information contained in the CCR may not be used.

(3.1) Public water suppliers required to conduct monitoring for PFAS under § 109.301(16) (relating to monitoring requirements) shall also include at a minimum the following information:

(i) Information on results detected.

(A) MCL in ng/L.

(B) MCLG in ng/L.

(C) Highest level detected in ng/L.

(D) Range of detections in ng/L.

(E) Sample dates.

(F) Whether a violation occurred.

(G) *Sources of contamination.* The likely sources of detected contaminants to the best of the public water supplier's knowledge. Specific information regarding contaminants may be available in sanitary surveys or source water assessments and should be used when available. If the public water supplier lacks specific information on the likely source or sources of the contaminant or contaminants, the following statement shall be used:

"Discharge from manufacturing facilities and runoff from land use activities."

(ii) *Health effects language.* Public water systems shall include the health effects language specified in § 109.411(e)(1)(ii) and (iii) for violation of a primary MCL for PFAS specified in § 109.202(a) (relating to State MCLs, MRDLs and treatment technique requirements).

(4) Each community water system shall do the following:

(i) Mail or otherwise directly deliver to each customer one copy of the annual CCR no later than the date specified in paragraph (2).

(ii) Mail a paper copy of the annual CCR to the Department no later than the date the water system is required to distribute the CCR to its customers.

* * * * *

Subchapter E. PERMIT REQUIREMENTS

§ 109.503. Public water system construction permits.

(a) *Permit application requirements.* An application for a public water system construction permit shall be submitted in writing on forms provided by the Department and shall be accompanied by plans, specifications, engineer's report, water quality analyses and other data, information or documentation reasonably necessary to enable the Department to determine compliance with the act and this chapter. The Department will make available to the applicant the Public Water Supply Manual, available from the Bureau of Safe Drinking Water, Post Office Box 8467, Harrisburg, Pennsylvania 17105 which contains acceptable design standards and technical guidance. Water quality analyses shall be conducted by a laboratory accredited under this chapter.

(1) *General requirements.* An application must include:

* * * * *

(iii) *Information describing new sources.* Information describing new sources must include the items specified in clauses (A)—(F). The information specified in clauses (C) and (D) may not be more than 2 years old from the date the permit application is submitted unless the Department approves the use of data more than 2 years old. The Department may accept approval of an out-of-State source by the agency having jurisdiction over drinking water in that state if the supplier submits adequate proof of the approval and the agency's standards are at least as stringent as this chapter:

* * * * *

(D) An evaluation of the quality of the raw water from each new source. For groundwater sources, the evaluation shall be conducted at the conclusion of the constant rate aquifer test. This clause does not apply when the new source is finished water obtained from an existing permitted community water system unless the Department provides written notice that an evaluation is required. The evaluation must include analysis of all of the following:

* * * * *

(XIV) For groundwater sources, the monitoring specified in § 109.302(f) (relating to special monitoring requirements) if the Department determines that the source is susceptible to surface water influence.

(XIV.1) PFAS for which MCLs have been established under § 109.202(a) (relating to State MCLs, MRDLs and treatment technique requirements).

(XV) Other contaminants that the Department determines necessary to evaluate the potability of the source.

* * * * *

Subchapter F. DESIGN AND CONSTRUCTION STANDARDS

§ 109.602. Acceptable design.

(a) A public water system shall be designed to provide an adequate and reliable quantity and quality of water to the public. The design must ensure that the system will, upon completion, be capable of providing water that complies with the primary and secondary MCLs, MRDLs and treatment techniques established in Subchapters B, K, L and M except as further provided in this section.

* * * * *

(i) Alarm and shutdown capabilities must conform to all of the following:

* * * * *

(3) Be capable of notifying the available operator on duty of events triggering an alarm or plant shutdown.

(j) PFAS.

(1) The Department identifies the following treatment technologies as acceptable for achieving compliance with the MCLs for PFAS, established under § 109.202(a) (relating to State MCLs, MRDLs and treatment technique requirements):

(i) GAC.

(ii) Ion exchange.

(iii) Reverse Osmosis.

(2) Other treatment technologies may be approved by the Department if the applicant demonstrates the alternate technology is capable of providing an adequate and reliable quantity and quality of water to the public.

Subchapter G. SYSTEM MANAGEMENT RESPONSIBILITIES

§ 109.701. Reporting and recordkeeping.

(a) *Reporting requirements for public water systems.* Public water systems shall comply with the following requirements:

*   *   *   *   *

(3) *One-hour reporting requirements.* A public water supplier shall report the circumstances to the Department within 1 hour of discovery for the following violations or situations:

(i) A primary MCL or an MRDL has been exceeded or a treatment technique requirement has been violated under Subchapter B, K, L or M.

(ii) A sample result requires the collection of check **<u>or confirmation</u>** samples under § 109.301.

(iii) Circumstances exist which may adversely affect the quality or quantity of drinking water including, but not limited to:

*   *   *   *   *

Subchapter J. BOTTLED WATER AND VENDED WATER SYSTEMS, RETAIL WATER FACILITIES AND BULK WATER HAULING SYSTEMS

§ 109.1003. Monitoring requirements.

(a) *General monitoring requirements.* Bottled water and vended water systems, retail water facilities and bulk water hauling systems shall monitor for compliance with the MCLs, MRDLs and treatment techniques as follows, except that systems which have installed treatment to comply with a primary MCL shall conduct quarterly operational monitoring for the contaminant which the treatment is designed to remove:

(1) Bottled water systems, retail water facilities and bulk water hauling systems, for each entry point shall:

*   *   *   *   *

(xiv) Beginning April 28, 2018, a system that uses or obtains finished water from another permitted public water system using surface water or GUDI sources shall comply with the following requirements:

*   *   *   *   *

(C) When the requirements of clause (A) or (B) cannot be achieved, the supplier shall initiate an investigation under the Department's direction to determine the cause, potential health risks and appropriate remedial measures.

<u>(xv) Beginning January 1, 2024, monitor for compliance with the MCLs for PFAS established under § 109.202(a).</u>

(A) *Monitoring exemption.* Systems that obtain finished water from another permitted public water system are exempt from conducting monitoring for PFAS if the public water system supplying the finished water performs the required monitoring at least annually and a copy of the analytical reports are received by the Department.

(B) *Initial monitoring.* Initial monitoring shall consist of 4 consecutive quarterly samples at each entry point. Systems that add new sources to new or existing entry points on or after January 1, 2024 shall conduct initial monitoring according to this clause. An entry point with one or more new sources shall be monitored for 4 consecutive quarters, beginning the first full quarter the entry point begins serving the public.

(C) *Repeat monitoring.* Repeat monitoring for entry points shall be conducted as follows:

(I) For an entry point at which ~~at least one of the PFAS with an MCL established under § 109.202(a)~~ A PFAS is detected during initial monitoring or where ~~one or more~~ A PFAS is detected anytime at a level in excess of its MCL, compliance monitoring ~~shall be repeated quarterly for the PFAS for which an MCL has been established under § 109.202(a)~~ FOR THE DETECTED PFAS SHALL BE CONDUCTED QUARTERLY. After analyses of four consecutive quarterly samples at an entry point, including initial quarterly monitoring samples, demonstrate that the PFAS ~~levels~~ LEVEL in each quarterly sample ~~are less than the MCLs~~ IS RELIABLY AND CONSISTENTLY BELOW THE MCL, the required compliance monitoring is reduced to one sample per year at that entry point for ~~all PFAS for which an MCL has been established under § 109.202(a)~~ THE DETECTED PFAS.

(II) For ~~a groundwater or surface water~~ AN entry point at which ~~no PFAS for which an MCL has been established under § 109.202(a) are~~ A PFAS IS NOT detected during the initial and subsequent repeat monitoring, repeat monitoring shall be one sample per year from that entry point.

(D) *Confirmation samples.* A confirmation sample shall be collected and analyzed for each of the PFAS detected in exceedance of its MCL during annual monitoring. The confirmation sample shall be collected within 2 weeks of notification from the accredited laboratory performing the analysis of the MCL exceedance.

(E) *Repeat and performance monitoring for entry points with PFAS removal treatment.* Compliance monitoring shall be conducted annually at entry points with PFAS treatment. Performance monitoring shall be conducted AT LEAST quarterly for the specific PFAS for which treatment is provided.

(F) *Invalidation of PFAS samples.*

(I) The Department may invalidate results of obvious sampling errors.

(II) A sample invalidated under this clause does not count towards meeting the minimum monitoring requirements of this subparagraph.

(G) *Compliance determinations.* Compliance with the PFAS MCLs shall be determined based on the analytical results obtained at each entry point. If one entry point is in violation of an MCL, the system is in violation of the MCL.

(I) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average of all samples taken at each entry point.

(II) If monitoring is conducted annually, the system is out of compliance if the level of a contaminant at any entry point is greater than the MCL. If a confirmation sample is collected as specified in clause (D), compliance is determined using the average of the two sample results.

(III) If any sample result will cause the running annual average to exceed the MCL at any entry point, the system is out of compliance with the MCL immediately.

(IV) If a system fails to collect the required number of samples, compliance with the MCL will be based on the total number of samples collected.

(V) If a sample result is less than the MRL, zero will be used to calculate compliance.

(2) Vended water systems shall monitor in accordance with paragraph (1) except that vended water systems qualifying for permit by rule under § 109.1005(b), for each entry point shall:

* * * * *

(b) *Sampling requirements.*

* * * * *

(3) Sampling and analysis shall be performed in accordance with analytical techniques adopted by the EPA under the Federal act or methods approved by the Department **in accordance with § 109.304.**

(4) Compliance monitoring samples for VOCs, as required under subsection (a)(1)(iii), shall be collected by a person properly trained by a laboratory certified by the Department to conduct VOC or vinyl chloride analysis.

* * * * *

(6) **[Sampling and analysis shall be performed in accordance with analytical techniques adopted by the EPA under the Federal act or methods approved by the Department.]** ~~**Compliance monitoring samples for PFAS, as required under subsection (a)(1)(xv), shall be collected by a person properly trained by a laboratory accredited by the Department to conduct PFAS analysis.**~~ **(RESERVED).**

(c) *Repeat monitoring for microbiological contaminants.*

*　　*　　*　　*　　*

Subchapter N. DRINKING WATER FEES

§ 109.1403. Monitoring waiver fees.

(a) *New waivers.* An application for a new waiver from the monitoring requirements in §§ 109.301 and 109.302 (relating to general monitoring requirements; and special monitoring requirements) for a single source must be accompanied by a fee as follows:

Waiver Type	**New Waiver Fee**
VOC use waiver	$100
SOC use waiver	$100
SOC susceptibility waiver	$300
IOC waiver	$100
<u>PFAS use waiver</u>	**<u>$100</u>**

(b) *Waiver renewals.* An application for a waiver renewal from the monitoring requirements in §§ 109.301 and 109.302 for a single source must be accompanied by the appropriate fee as follows:

*　　*　　*　　*　　*

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

October 13, 2022

David Sumner
Executive Director
Independent Regulatory Review Commission
333 Market Street, 14th Floor
Harrisburg, PA 17120

Re: Final Rulemaking: Safe Drinking Water PFAS MCL Rule (#7-569 / IRRC # 3334)

Dear Mr. Sumner:

Pursuant to Section 5.1(a) of the Regulatory Review Act (RRA), please find enclosed the Safe Drinking Water PFAS MCL Rule (#7-569) final-form rulemaking for review by Independent Regulatory Review Commission (IRRC). The Environmental Quality Board (Board) adopted this rulemaking on October 12, 2022.

The Board adopted the proposed rulemaking at its meeting on November 16, 2021. On February 26, 2022, the proposed rulemaking was published in the *Pennsylvania Bulletin* at 52 Pa.B. 1245 for a 60-day public comment period. Five public hearings were held on March 21, 22, 23, 24 and 25, 2022. The public comment period closed on April 27, 2022. The Department received comments from 3,560 commentators including the House of Representatives Environmental Resources and Energy Committee, members of the Pennsylvania House of Representatives and the Senate of Pennsylvania, and the United States Environmental Protection Agency. The Board provided the Environmental Resources and Energy Committees and IRRC with copies of all comments received in compliance with Section 5(c) of the RRA.

The Department will provide assistance as necessary to facilitate IRRC's review of the enclosed rulemaking under Section 5.1(e) of the Regulatory Review Act.

Please contact me by e-mail at laurgriffi@pa.gov or by telephone at 717.772.3277 if you have any questions or need additional information.

Sincerely,

Laura E. G.

Laura Griffin
Regulatory Coordinator

Enclosures

TRANSMITTAL SHEET FOR REGULATIONS SUBJECT TO THE REGULATORY REVIEW ACT

I.D. NUMBER: 7-569

SUBJECT: Safe Drinking Water PFAS MCL Rule

AGENCY: DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

TYPE OF REGULATION

RECEIVED
OCT 13 2022
Independent Regulatory Review Commission

Proposed Regulation

X Final Regulation

Final Regulation with Notice of Proposed Rulemaking Omitted

120-day Emergency Certification of the Attorney General

120-day Emergency Certification of the Governor

Delivery of Tolled Regulation
a. With Revisions b. Without Revisions

FILING OF REGULATION

DATE	SIGNATURE	DESIGNATION
		HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
10/13/22	Pam Newgard	MAJORITY CHAIR Representative Daryl Metcalfe
10/13/22	[signature]	MINORITY CHAIR Representative Greg Vitali
		SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
10/13/22	electronic delivery	MAJORITY CHAIR Senator Gene Yaw
10/13/22	electronic delivery	MINORITY CHAIR Senator Carolyn Comitta
		INDEPENDENT REGULATORY REVIEW COMMISSION
		ATTORNEY GENERAL (for Final Omitted only)
		LEGISLATIVE REFERENCE BUREAU (for Proposed only)

October 13, 2022

Madison Brame

From: Eyster, Emily
Sent: Thursday, October 13, 2022 10:05 AM
To: Griffin, Laura; Troutman, Nick
Cc: Chalfant, Brian; Reiley, Robert A.; Nezat, Taylor; Rodriguez, Amanda
Subject: Re: Delivery of Final Rulemaking - Safe Drinking Water PFAS MCL (7-569)

Received. Thank you Laura!

Emily Eyster
Legislative Director, Office of Senator Carolyn T. Comitta
Executive Director, Senate Environmental Resources and Energy Committee
Cell: (717) 756-4702
Phone: (717) 787-5709
www.pasenatorcomitta.com

RECEIVED
OCT 13 2022
Independent Regulatory Review Commission

From: Griffin, Laura <laurgriffi@pa.gov>
Sent: Thursday, October 13, 2022 9:56:07 AM
To: ntroutman@pasen.gov <ntroutman@pasen.gov>; Eyster, Emily <Emily.Eyster@pasenate.com>
Cc: Chalfant, Brian <bchalfant@pa.gov>; Reiley, Robert A. <rreiley@pa.gov>; Nezat, Taylor <tnezat@pa.gov>; Rodriguez, Amanda <amarodrigu@pa.gov>
Subject: Delivery of Final Rulemaking - Safe Drinking Water PFAS MCL (7-569)

■ EXTERNAL EMAIL ■

Good morning,

Pursuant to Section 5.1(a) of the Regulatory Review Act, please find attached the Safe Drinking Water PFAS MCL Rule final rulemaking (#7-569) for review by the Senate Environmental Resources and Energy Committee. Due to the file size of the documents, the rulemaking documents are attached in a compressed folder and the cover letters for Senators Yaw and Comitta are attached separately.

Also attached is the transmittal sheet showing delivery to the House Environmental Resources and Energy Committee this morning.

Please confirm receipt of this rulemaking by replying to all recipients.

Thank you,
Laura

Laura Griffin | Regulatory Coordinator
she/her/hers

Madison Brame

From:	Troutman, Nick
Sent:	Thursday, October 13, 2022 1:20 PM
To:	Griffin, Laura; Eyster, Emily
Cc:	Chalfant, Brian; Reiley, Robert A.; Nezat, Taylor; Rodriguez, Amanda
Subject:	Re: Delivery of Final Rulemaking - Safe Drinking Water PFAS MCL (7-569)

Got it thanks again Laura

Get Outlook for iOS

From: Griffin, Laura <laurgriffi@pa.gov>
Sent: Thursday, October 13, 2022 9:56:07 AM
To: Troutman, Nick <ntroutman@pasen.gov>; Emily.Eyster@pasenate.com <Emily.Eyster@pasenate.com>
Cc: Chalfant, Brian <bchalfant@pa.gov>; Reiley, Robert A. <rreiley@pa.gov>; Nezat, Taylor <tnezat@pa.gov>; Rodriguez, Amanda <amarodrigu@pa.gov>
Subject: Delivery of Final Rulemaking - Safe Drinking Water PFAS MCL (7-569)

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Also attached is the transmittal sheet showing delivery to the House Environmental Resources and Energy Committee this morning.

Please confirm receipt of this rulemaking by replying to all recipients.

Thank you,
Laura

Laura Griffin | Regulatory Coordinator
she/her/hers
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Rachel Carson State Office Building
400 Market Street | Harrisburg, PA
Phone: 717.772.3277| Fax: 717.783.8926
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