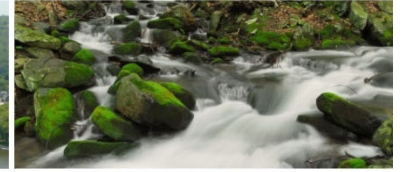




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DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Safe Drinking Water

# **Proposed Per- and Polyfluoroalkyl Substance (PFAS) Maximum Contaminant Level (MCL) Rulemaking**

Environmental Quality Board Meeting  
November 16, 2021

Tom Wolf, Governor

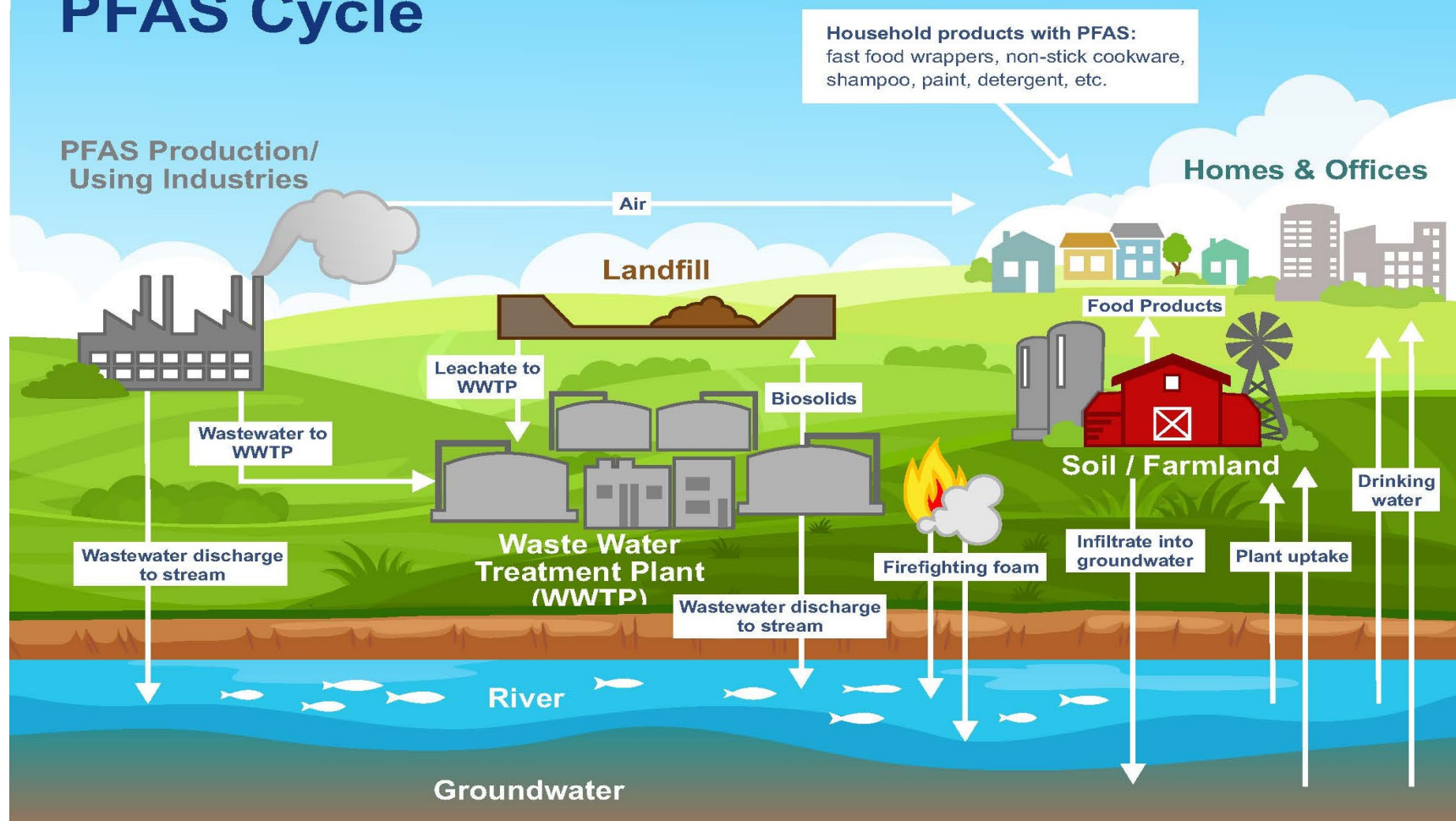
Patrick McDonnell, Secretary

# PFAS Background

- Per- and polyfluoroalkyl substances (PFAS) are a class of synthetic chemicals that have been manufactured and in use since the 1940s.
- PFAS are used to make products resistant to water, heat and stains and are found in industrial and consumer products such as clothing, carpeting, food packaging, non-stick cookware, firefighting foam, personal care products, adhesives, metal plating, wire manufacturing and many other uses.
- PFAS have unique chemical properties because they readily dissolve in water and are mobile, are highly persistent in the environment, and bioaccumulate.

# PFAS Background

## PFAS Cycle



# Rulemaking Background

- **Pennsylvania's PFAS Action Team** – formed in 2018 and consisting of leaders of ten state agencies – has worked to: develop a comprehensive response to identify and eliminate sources of PFAS contamination; ensure drinking water is safe; manage environmental contamination; review gaps in data and oversight authority; and recommend actions to address those gaps.
- **Public Comment Period** to collect scientific information, data, and feedback regarding PFAS compounds; **860 comments** from Pennsylvania residents, legislators, academics, doctors, local government officials, businesses, redevelopment authorities, and environmental organizations.
- **Action Team Initial Report** released in December 2019, including information about PFAS, challenges associated with managing contamination, actions taken to date and recommendations for future actions.
- **One of the Action Team's recommendations is for DEP to establish drinking water standards – such as a maximum contaminant limit (MCL) – for PFAS** so public water suppliers can determine appropriate treatment options.

# Rulemaking Background

- Two of the PFAS targeted by this proposed rulemaking are linked to adverse health effects
  - Perfluorooctanoic acid (PFOA) linked to adverse developmental effects (neurobehavioral effects and skeletal effects)
  - Perfluorooctanesulfonic acid (PFOS) linked to adverse immune system effects (including immune suppression)

# Rulemaking Background

- USEPA has established a combined lifetime health advisory limit (HAL) for PFOA and PFOS of 70 parts per trillion (ppt) in finished drinking water.
- HALs are not enforceable regulatory standards, but DEP has regulatory authority to require corrective actions if HALs are exceeded.
- Current research suggests that the HAL for PFOA and PFOS is not sufficiently protective of public health.
- USEPA has started the process of setting more stringent national 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 Pennsylvanians.

# Purpose of Proposed Rulemaking

- Improve public health protection by setting maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for PFOA and PFOS
- Set more protective State MCLs for contaminants in drinking water that are unregulated at the Federal level

Applicability: All 3,117 community, nontransient noncommunity, bottled, vended, retail and bulk water systems in Pennsylvania

# MCL Rulemaking Process

An MCL rulemaking should be based on available data, studies, and science, and must consider all factors as required by the Federal Safe Drinking Water Act (SDWA) and Pennsylvania's Regulatory Review Act (RRA), including:

- Health effects
- Occurrence data
- Technical limitations such as available analytical methods and detection and reporting limits
- Treatability of the contaminant and available treatment technologies
- Costs and benefits



# Toxicology Report

Drexel University contract to:

- Review other states' and federal agencies' work on MCLs
- Independently review the data, science and studies
- 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.

# Toxicology Report

## Deliverables:

- “Drexel PFAS Workbook” – summary of the toxicological work and health recommendations in each state or agency
- “MCLG Drinking Water Recommendations for PFAS in the Commonwealth of PA” – comprehensive report of the work completed by Drexel to recommend MCLGs, including their approach, review of critical studies, and the development of the MCLGs for each of the PFAS considered

# PFOA - Recommended MCLG

## PFOA – Development of Recommended MCLG:

- Drexel PFAS Advisory Group (DPAG) selected Koskela (2016) and Onishchenko (2011) as the critical studies – identified developmental effects (neurobehavioral and skeletal)
- Point of departure (POD) = 8.29 mg/L
- Uncertainty Factor Total = 300
- Reference dose = 3.9 ng/kg/day
- Receptor – Infant exposure via breastmilk for 1 yr., from mother chronically exposed via water, followed by lifetime of exposure via drinking water (also protective of formula fed infant); Goeden Model; human serum half-life = 840 days; Relative source contribution (RSC) = 50%
- Chronic non-cancer MCLG = 8 ng/L or ppt; protects health during the growth and development of a breast fed infant

# PFOS - Recommended MCLG

## PFOS – Development of Recommended MCLG:

- DPAG selected Dong I (2011) as the critical study – identified immunological effects (immune suppression)
- POD = 2.36 mg/L
- Uncertainty Factor Total = 100
- Reference dose = 3.1 ng/kg/day
- Receptor – Infant exposure via breastmilk for 1 yr., from mother chronically exposed via water, followed by lifetime of exposure via drinking water (also protective of formula fed infant); Goeden Model; human serum half-life = 1241 days; RSC = 50%
- Chronic non-cancer MCLG = 14 ng/L or ppt; protects health during the growth and development of a breast fed infant

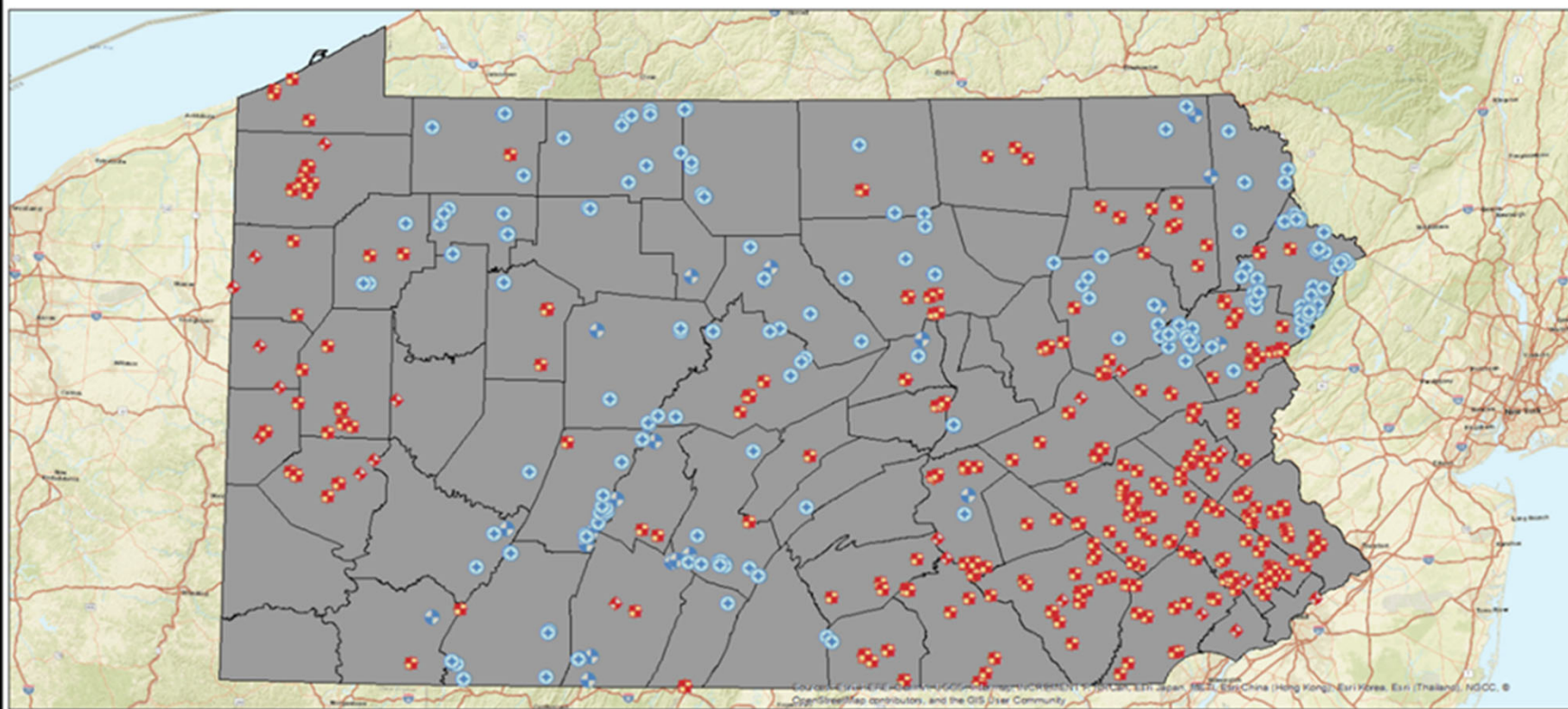
# PFAS Sampling Plan

Intended to prioritize sites for PFAS sampling and generate statewide occurrence data:

- Developed a GIS data layer of potential sources of PFAS contamination (PSOC) including military bases, fire training schools/sites, airports, landfills, manufacturing facilities, and state/federal cleanup sites
- Identified public water supply (PWS) sources located within  $\frac{1}{2}$  to  $\frac{3}{4}$  of mile of PSOCs
- Identified PWS sources located within forested watersheds and  $> 5$  miles from PSOCs to serve as baseline/control sites

# PFAS Sampling Plan

## Identified Water Sources for Potential Sampling



### LEGEND

- ⊕ Potential Baseline Wells 04102019
- ⊕ Potential Target Wells 04102019
- ⊕ Potential Baseline Intakes 04102019
- ⊕ Potential Target Intakes 04102019



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Revised: 10 April 2019

# ▶ Sampling Plan – Summary of Results

	PFOA	PFOS	PFNA	PFHxS	PFHpA	PFBS	Units
<b>Total # Samples</b>	412	412	412	412	412	412	--
<b>Average</b>	2.0	2.5	0.4	1.4	0.7	1.1	ng/l
<b>Median</b>	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	ng/l
<b>Minimum</b>	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	0 (ND)	ng/l
<b>Maximum</b>	59.6	187.1	18.1	140.0	32.6	64.0	ng/l
<b># and % of Detects</b>	112 (27%)	103 (25%)	23 (6%)	52 (13%)	49 (12%)	66 (16%)	--
<b>Avg Detect Value</b>	7.5	9.9	7.2	10.9	6.1	7.0	ng/l
<b>Med Detect Value</b>	5.3	6.5	5.6	4.5	4.5	4.2	ng/l
<b>Min Detect Value</b>	1.7	1.8	1.8	1.9	1.8	1.7	ng/l
<b>Max Detect Value</b>	59.6	187.1	18.1	140.0	32.6	64.0	ng/l

Full results available at [www.dep.pa.gov/pfas](http://www.dep.pa.gov/pfas)

# UCMR3 Monitoring Results

- PFAS detections from the Third Unregulated Contaminant Monitoring Rule (UCMR3) were also considered
  - UCMR3 monitoring included the same 6 PFAS listed on the previous slide
  - PFAS detections at 23 sites added to 412 sampling plan sites for a total of 435 sites considered



# Proposed MCLs

- DEP is proposing to move forward with MCLs for PFOA and PFOS
- DEP is proposing to NOT move forward with MCLs for other PFAS at this time for the following reasons:

	PFNA	PFHxS	PFHpA	PFBS
Lack of occurrence data greater than recommended MCLG	X	X		X
Incomplete cost/benefit data and analysis	X	X	X	X
Reference dose was not derived due to lack of evidence on its toxicity			X	

# Proposed PFOA MCLG & MCL

## Proposed PFOA MCL of 14 ppt:

- # of sites (of 435) > 14 ppt = 25 (or 5.7%)
- Estimated # of Entry Points (of 3785) > 14 ppt = **218**
- Estimated costs:
  - Estimated average annual compliance monitoring costs (@ \$616/EP/Q) = **\$2.9 M**
  - Estimated average annual treatment costs = **\$89.8 M**  
(Includes annual treatment capital costs, per EP per MGD, annualized over 20 years at 4% interest, and annual treatment O&M costs)
  - Estimated annual performance monitoring costs = **\$4.8 M**
  - Estimated total annual costs = **\$89.8 M in treatment costs + \$7.7 M in compliance monitoring and performance monitoring costs**
- Estimated benefits:
  - **90%** improvement in health protection as compared to current EPA Health Advisory Level (HAL) of 70 ppt

	PFOA (ng/L or ppt)
Proposed MCLG	8
Proposed MCL	14

# PFOA Comparison of Annual Costs & Benefits

Value (ng/L)	Estimated # of EPs (of 3,785) > Value	Total Costs (Millions)	% Increase in Cost Compared to HAL	% Improvement in Health Protection Compared to HAL
HAL = 70	58	\$27.63	0%	0%
35	78	\$36.41	32%	56%
20	200	\$89.53	224%	80%
<b>MCL = 14</b>	<b>218</b>	<b>\$97.51</b>	<b>253%</b>	<b>90%</b>
12	270	\$120.15	335%	93%
10	313	\$138.92	403%	96%
MCLG = 8	400	\$177.00	541%	100%

EP – Entry Point (1st tap in the distribution system after all treatment)

HAL – Health Advisory Level

# Proposed PFOS MCLG & MCL

## Proposed PFOS MCL of 18 ppt:

- # of sites (of 435) > 18 ppt = 22 (or 5.1%)
- Estimated # of EPs (of 3785) > 18 ppt = **191**
- Estimated costs:
  - Estimated average annual compliance monitoring costs (@ \$616/EP/Q) = **\$2.7 M**
  - Estimated average annual treatment costs = **\$78.7 M**  
(Includes annual treatment capital costs, per EP per MGD, annualized over 20 years at 4% interest, and annual treatment O&M costs)
  - Estimated annual performance monitoring costs = **\$4.2 M**
  - Estimated total annual costs = **\$78.7 M in treatment costs + \$6.9 M in compliance monitoring and performance monitoring costs**
- Estimated benefits:
  - **93% improvement** in health protection as compared to current EPA HAL of 70 ppt

	PFOS (ng/L or ppt)
Proposed MCLG	14
Proposed MCL	18

# PFOS Comparison of Annual Costs & Benefits

Value (ng/L)	Estimated # of EPs (of 3,785) > Value	Total Costs (Millions)	% Increase in Cost Compared to HAL	% Improvement in Health Protection Compared to HAL
HAL = 70	96	\$44.24	0%	0%
35	148	\$66.87	51%	63%
20	183	\$82.13	86%	89%
<b>MCL = 18</b>	<b>191</b>	<b>\$85.60</b>	<b>94%</b>	<b>93%</b>
16	200	\$89.53	102%	96%
15	200	\$89.61	103%	98%
MCLG = 14	200	\$89.68	103%	100%

EP – Entry Point (1st tap in the distribution system after all treatment)

HAL – Health Advisory Level

# Total Estimated Annual Treatment Costs

## Co-occurrence of PFOA and PFOS:

- % of sites (of 435) exceeding one or both proposed MCLs = 7.4%
- Estimated # of EPs (of 3,785) exceeding one or both proposed MCLs = **280**

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
<b>Total estimated average annual treatment capital + O&amp;M costs (per MGD)</b>	<b>\$115,316,040</b>
<b>Total estimated annual performance monitoring costs</b>	<b>\$6,206,760</b>

# PFOA MCL Petition Response

On June 15, 2021, responding to a rulemaking petition, EQB voted to accept the Department's recommendation to move forward with a proposed rulemaking to establish an MCL for PFOA.

# Advisory Committee Review

DEP's drinking water advisory body – the Public Water System Technical Assistance Center (TAC) Board – reviewed the pre-draft proposed rulemaking on July 29, 2021.

The Public Water System TAC Board unanimously recommended that DEP move forward with the rulemaking to present to EQB as a proposed rulemaking.



# Recommendation

DEP recommends the adoption of this proposed rulemaking.

A 60-day public comment period with at least five public hearings is recommended.



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