Stakeholder Meeting

Anticipated Updates
Surface Water Quality Standards (N.J.A.C. 7:9B)
Toxics Human Health Criteria – June 2022

NEW JERSEY DEP
Division of Water Monitoring, Standards and Pesticide Control

Department of Environmental Protection

Division of Water Monitoring, Standards and Pesticide Control

Bureau of Environmental Analysis, Restoration and Standards

Anticipated Amendments to Surface Water Quality Standards

- New policies
- Updates to human health-based surface water quality criteria:

Revising and adding fresh and saline water numeric criteria for 94 toxic substances*

(based on NJDEP's review of USEPA's 2015 Revisions to Human Health Ambient Water Quality Criteria for Toxics)

Adding new fresh water numeric criteria for additional toxic substances: PFNA, PFOA, PFOS, and 1,4-dioxane based on drinking water exposure.

*"toxic substances" refers to any chemical pollutants (also referred to as "constituents" or "parameters") with water quality criteria that protect human health, all of which have been reported to cause adverse health effects after exposure.

New Significant Figures and Rounding Policy

Reason for change:

- Reduce inconsistencies between:
  - Safe Drinking Water Act (SDWA) Rules,
  - Ground Water Quality Standards (GWQS),
  - Surface Water Quality Standards (SWQS),
  - and Site Remediation Program (SRP) Rules

Solution:

- Establish a consistent significant figures/rounding policy in each of the upcoming rulemakings for the SDWA, GWQS, SWQS, and SRP rules.

Significant Figures Policy

Every new/revised numeric criterion will be expressed in **<u>two</u> significant figures**, EXCEPT...

When factors (including toxicity factors and exposure factors, but not uncertainty factors, conversion factors, and cancer risk levels) used for numeric criterion are not available in two or more significant figures, the final criterion will be rounded to **<u>one</u> significant figure.**

Two significant figures examples:
3.1 µg/L, 68 µg/L, 220 µg/L, 0.00014 µg/L, 60. µg/L*

One significant figure examples:
0.06 µg/L, 400 µg/L

* Final zeros considered to be significant are followed by a decimal point.

Rounding Policy

Most science and technology-based standards [EPA 304(a) criteria and American Society for Testing and Materials (ASTM)] use a similar rounding policy called the **"five even" rule.**

Rule: If the digit 5 is dropped, then the preceding digit is increased if it is odd, and kept the same if it is even.

Examples:

- 2.**3**5 -> 2.4 (rounding up)
- 2.**2**5 -> 2.2 (preceding digit stays the same)

Numeric Translator for Narrative Criteria Policy

Why is an Additional Policy Needed?

- To further protect public health and aquatic life from **contaminants of emerging concern (CECs).**

Concept - The Ground Water Quality Standards (GWQS) use interim specific ground water quality criteria (ISGWQC) to promptly address CECs:

- established by New Jersey Register notice and Technical Support Document (shorter timeline than rule proposal/adoption process)

Authority - Toxic Substances Narrative Criteria at N.J.A.C. 7:9B 1.14(d)12 to establish Numeric Translator Values for toxic substances.

Process

- Numeric thresholds will be derived using USEPA guidance for human health and aquatic life criteria development
- Notice will be provided in the New Jersey Register along with a Technical Support Document, and posted online
- *May be statewide or site-specific*
- *Numeric Translator values will not be SWQS until adopted through rule making*
- *Rulemaking to follow as soon as reasonably possible if there is a need for a SWQS*
- *New definitions may be added to the SWQS*

Updated/New Criteria for 94 Toxic Substances

What are Federal and State Goals for Toxic Substances?

Goals of the Clean Water Act §1251(a):

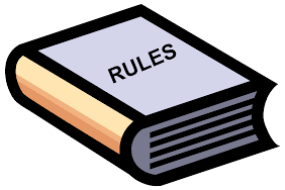
- "It is the national goal that the discharge of pollutants into the navigable waters be **eliminated** by 1985..."
- "It is the national policy that the discharge of toxic pollutants in toxic amounts be **prohibited**..."

Policy of the NJ Surface Water Quality Standards (N.J.A.C. 7:9B-1.5):

"Toxic substances in waters of the State shall **not** be at levels that are toxic to humans or the aquatic biota, or that bioaccumulate in the aquatic biota so as to render them unfit for human consumption."

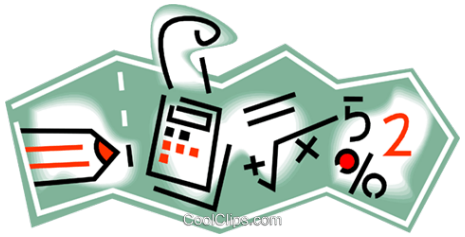
What are Human Health-based Criteria for Toxic Substances?

- Substances that are carcinogenic, mutagenic, cause developmental malformations, or other adverse health effects are assigned water quality criteria based on health effects studies relevant to human exposure.
- Human health criteria are established for fresh waters and saline (estuarine and coastal) waters.



Surface Water Quality Standards (SWQS)

- Wastewater treatment plants (NJPDES* Permittees)
- Remediation sites discharging to surface waters
- Remediation sites with ground water/surface water interactions



- NJPDES Permits - Effluent Limitations for Surface Waters
- May be based on Surface Water Quality Standards in certain conditions.

*NJPDES – New Jersey Pollutant Discharge Elimination System

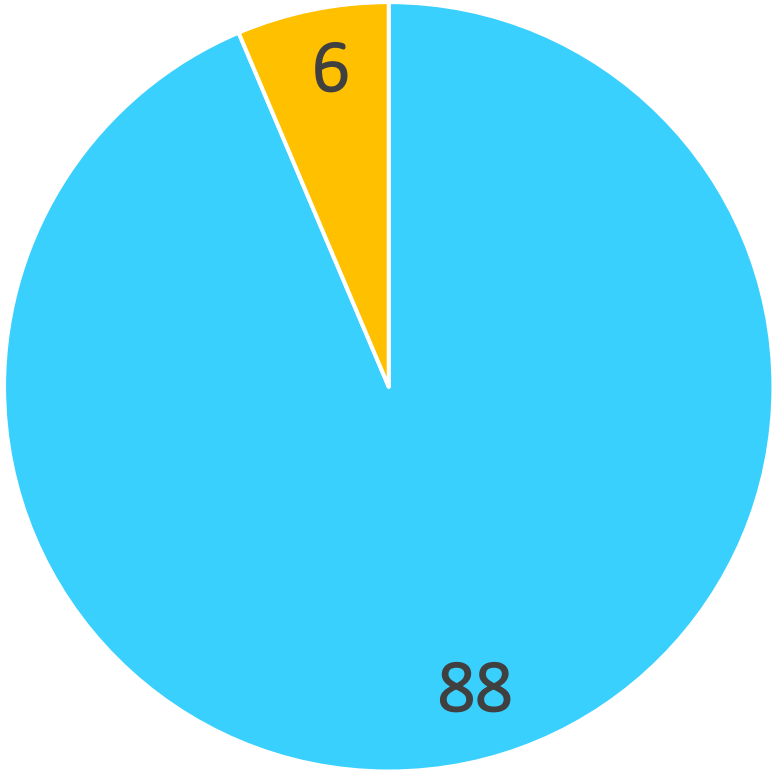
Potential Benefits from Revised Human Health Criteria

Criteria for ambient waters based on the best available science leads to...

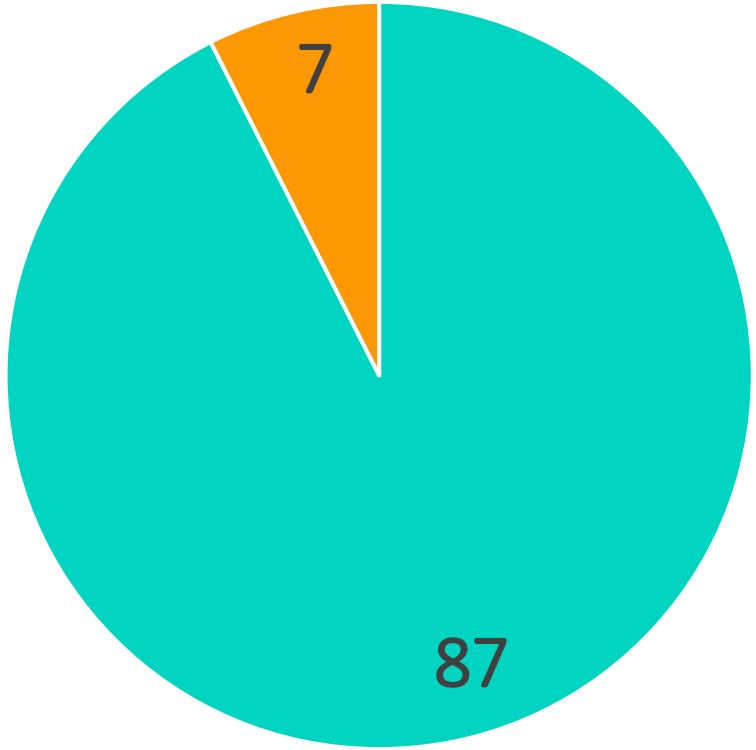
- Reduced burden on drinking water treatment plants
- Avoided illnesses and other health effects from exposure to toxics
- Greater confidence in consumption of fish from NJ waters

Summary of revisions to SWQS for 94 Toxic Substances

Fresh Water



Saline Water



- Number of substances with revised fresh water criteria
- Number of substances with new fresh water criteria
- Number of substances with revised saline criteria
- Number of substances with new saline criteria

New Substances/Criteria Added to the SWQS (Anticipated)

New Fresh Water Criteria (6)

Chemical Name	EPA 2015 Recommended Fresh Water Criteria (µg/L)	Proposed Fresh Water Criteria (µg/L)
Bis(Chloromethyl) Ether	0.00015	0.00015
Chlorophenoxy Herbicide (2,4-D)	1300	60.
Chlorophenoxy Herbicide (2,4,5-TP)	100	130
Dimethyl Phthalate	2000	500
Hexachlorocyclohexane - Technical	0.0066	0.0066
3-Methyl-4-Chlorophenol	500	500

New Saline Water Criteria (7)

Chemical Name	EPA 2015 Recommended Saline Criteria (µg/L)	Proposed Saline Criteria (µg/L)
Bis(Chloromethyl) Ether	0.017	0.017
Chlorophenoxy Herbicide (2,4-D)	12000	560
Chlorophenoxy Herbicide (2,4,5-TP)	400	380
Dimethyl Phthalate	2000	500
Hexachlorocyclohexane - Technical	0.010	0.010
Methoxychlor	0.02	0.02
3-Methyl-4-Chlorophenol	2000	2000

Using EPA's Recommendations and Significant Figures

If DEP's significant figures and rounding policy results in a criterion calculated to be **higher** or **"less stringent"** than EPA's 304(a) recommended criteria, then...

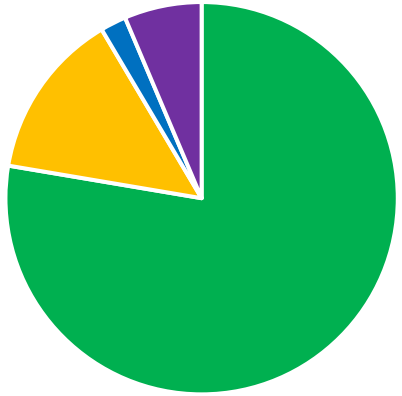
DEP will use EPA's recommended criterion.

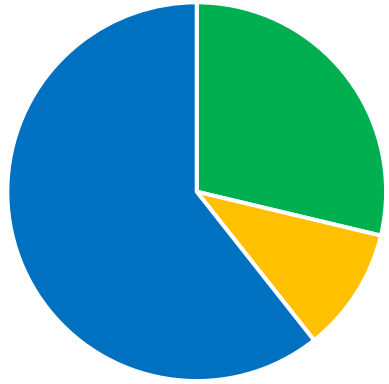
Note: This will be DEP's policy for SWQS rulemakings in the future.

Comparisons

Fresh Water Criteria

Comparing NJ Recommended Criteria With Existing NJ SWQS Criteria	
Number of constituents more stringent	73
Number of constituents less stringent	13
No difference	2
Number of new constituents	6
Comparing NJ Recommended Criteria With EPA Recommended Criteria	
Number of constituents more stringent	27
Number of constituents less stringent	10
No difference	57

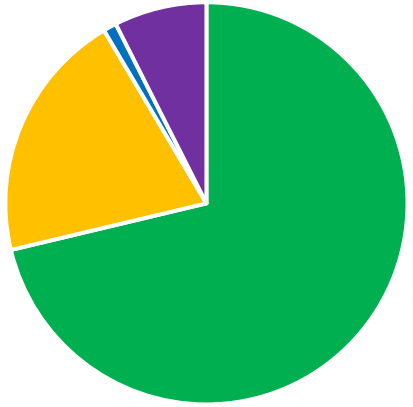




Comparisons (continued)

Saline Water Criteria

Comparing NJ Recommended Criteria With Existing NJ SWQS Criteria	
Number of constituents more stringent	67
Number of constituents less stringent	19
No difference	1
Number of new constituents	7
Comparing NJ Recommended Criteria With EPA Recommendations	
Number of constituents more stringent	29
Number of constituents less stringent	8
No difference	57



Background on Revisions to SWQC for 94 Toxic Substances

Information needed to derive SWQC (Surface Water Quality Criteria):

Toxicity factor

- Reference Dose for non-carcinogens
- Cancer Slope Factor for carcinogens

Exposure factors

- Body weight for adults
- Daily drinking water intake for adults
- Fish consumption rate for adults
- Bioaccumulation factor (*preferred*; uptake from food, water, environment) or bioconcentration factor (uptake from water only) for fish

Additional factors

- Relative source contribution for non-carcinogens – accounts for exposure sources not considered in criterion
- *Cancer risk level for carcinogens*
- Age-dependent adjustment factors for mutagenic carcinogens
- Uncertainty factor for potential carcinogenicity of carcinogens for which a slope factor is not available

Saline water exposure pathway

Fish Consumption Only

Non-carcinogen

$$\text{Criterion } (\mu g/L) = \frac{\text{RfD (mg/kg/day) x RSC x Adult body weight (kg) x 1000 } \mu g/mg}{\text{Fish consumption (kg/day) * BAF or BCF (L/kg)}}$$

Carcinogen

$$\text{Criterion } (\mu g/L) = \frac{10^{-6} \text{ risk level / Cancer Slope Factor } (mg/kg/day)^{-1} \text{ x Adult body weight (kg) x 1000 } \mu g/mg}{\text{Fish consumption (kg/day) * BAF or BCF (L/kg)}}$$

Fresh water exposure pathways

Drinking Water and Fish Consumption

Non-carcinogen

$$\text{Criterion } (\mu g/L) = \frac{\text{RfD (mg/kg/day) x RSC x Adult body weight (kg) x 1000 } \mu g/mg}{\text{Water consumption (L/day) + (Fish consumption (kg/day) * BAF or BCF (L/kg))}}$$

Carcinogen

$$\text{Criterion } (\mu g/L) = \frac{10^{-6} \text{ risk level/ Cancer Slope Factor } (mg/kg/day)^{-1} \text{ x Adult body weight (kg) x 1000 } \mu g/mg}{\text{Water consumption (L/day) + (Fish consumption (kg/day) * BAF or BCF (L/kg))}}$$

Note: for presentation purposes the denominators are simplified to be representative for a single trophic level of fish. In deriving criteria for chemicals with information for multiple trophic levels (i.e., for trophic levels 2 through 4), each trophic level-specific bioaccumulation factor and fish consumption rate are multiplied together, and that product is then summed with the products (i.e., bioaccumulation factor x fish consumption rate) for the other trophic levels.

Background on Revisions to SWQC for 94 Toxic Substances

Approach used by DEP scientists

- Informed by USEPA risk assessment guidance documents and practices
- Similar to approach used by the USEPA in 2015 for updating Human Health Ambient Water Quality Criteria for 94 toxics
- NJDEP reviewed basis of USEPA's recommended criteria
  - NJDEP has the authority to adopt criteria that differ from USEPA 304(a) recommendations, provided there is a scientific justification

- Resulted in proposed criteria for 94 chemicals for:

saline water	fresh water	
fish consumption	drinking water	fish consumption

- Differences in the selection of toxicity factors and application of additional factors and approach to significant figures resulted in numerical differences between USEPA 2015 recommended criteria and DEP proposed SWQC for some chemicals

Background on Revisions to SWQC for 94 Toxic Substances

Toxicity Factors

	USEPA (2015) HHAWQC	Considered for Proposal (DEP)
Toxicity factors		
Value Reference Dose (mg/kg/day) or Cancer Slope Factor $(mg/kg/day)^{-1}$	Chemical-specific	Chemical-specific (differs from USEPA in some cases; e.g., application of different uncertainty factors)
Sources	Based on information available as of 2015 from either: • USEPA IRIS database • Other USEPA programs (NCEA, OPPT, OSWER, OW) • US DHHS/ATSDR • Health Canada • CalEPA	Based on information available as of 2017 from either: • USEPA IRIS database • NJDWQI • USEPA 2015 updates to HHAWQC • Other USEPA programs (NCEA, OPPT, OSWER, OW) • US DHHS/ATSDR • CalEPA
How value selected	Most recently available toxicity factor	Best available toxicity factor based on scientific judgement

Abbreviations: ATSDR, Agency for Toxic Substances and Disease Registry; CalEPA, California Environmental Protection Agency; HHAWQC, human health ambient water quality criteria; IRIS, Integrated Risk Information System; NCEA, National Center for Environmental Assessment; NJDWQI, New Jersey Drinking Water Quality Institute; OPPT, Office of Pollution Prevention and Toxics; OSWER, Office of Solid Waste and Emergency Response; OW, Office of Water; USDHSS, United States Department of Health and Human Services

Background on Revisions to SWQC for 94 Toxic Substances
Exposure Factors

	USEPA (2015) HHAWQC	Considered for Proposal (DEP)	Current (DEP)
Exposure factors			
Body weight for adults	80.0 kg		70 kg
Daily drinking water intake for adults	2.4 L/day		2 L/day
Fish consumption rate for adults	22.0 g/day*		17.5 g/day
Bioaccumulation factor or bioconcentration factor	Chemical-specific (trophic level-specific for many chemicals)		Chemical specific

*To better reflect human consumption of fish and shellfish, trophic level-specific fish consumptions rates were used for many chemicals. Specifically, the trophic level-specific fish consumption rates were: trophic level 2 (benthic feeders) = 7.6 g/day; trophic level 3 (forage fish) = 8.6 g/day; trophic level 4 (predatory fish) = 5.1 g/day.

Background on Revisions to SWQC for 94 Toxic Substances
Other Considerations

	USEPA (2015) HHAWQC	Considered for Proposal (DEP)
	Additional factors	
Relative source contribution	Chemical-specific Range from 20% (default) to 80%	Same as USEPA
Age-dependent adjustment factors for mutagenic carcinogens	Not applied	Applied where appropriate
Uncertainty factor for potential carcinogenicity for some chemicals	Not applied	Applied where appropriate
	Other considerations	
Significant figures	Significant figures of criteria based on factors used for derivation • If factors were available as 1 significant figure, then criteria reported as 1 significant figure • If factors available as at least 2 significant figures, then criteria reported as 2 significant figures	Same as USEPA • However, DEP evaluated whether toxicity factors available as 1 significant figure could be recalculated as 2 significant figures

Revisions to SWQC for 94 Toxic Substances

	Chemical	CAS Number	EPA 2015 Recommended Criteria		Current NJ Criteria		NJ Criteria to be Proposed		Rationale for difference between NJDEP and EPA
			Water + Organism (Fresh Water) (µg/L)	Organism Only (Saline) (µg/L)	Water + Organism (Fresh Water) (µg/L)	Organism Only (Saline) (µg/L)	Water + Organism (Fresh Water) (µg/L)	Organism Only (Saline) (µg/L)	
1	Acenaphthene	83-32-9	70	90	670	990	68	83	Numerical difference due to NJDEP using same toxicity factor but with 2 or more significant figures
2	Acrolein	107-02-8	3	400	6.1	9.3	3	400	No difference
3	Acrylonitrile	107-13-1	0.061	7.0	0.051	0.25	0.061	7.0	No difference
4	Aldrin	309-00-2	0.00000077	0.00000077	0.000049	0.00005	0.00000077	0.00000077	No difference
5	alpha-BHC (alpha-HCH)	319-84-6	0.00036	0.00039	0.0026	0.0049	0.00036	0.00039	No difference
6	alpha-Endosulfan	959-98-8 (mixture: 115-29-7)	20	30	62	89	20	30	No difference
7	Anthracene	120-12-7	300	400	8300	40000	300	400	No difference
8	Benzene	71-43-2	0.58 - 2.1	16 - 58	0.15	3.3	0.11	3.1	NJDEP used a singular cancer slope factor as opposed to a range of cancer slope factors
9	Benzidine	92-87-5	0.00014	0.011	0.000086	0.0002	0.00014	0.011	No difference
10	Benzo(a) Anthracene	56-55-3	0.0012	0.0013	0.038	0.18	0.006	0.006	NJDEP used more recent cancer slope factor (for BaP) and applied ADAFs
11	Benzo(a) Pyrene	50-32-8	0.00012	0.00013	0.0038	0.018	0.0006	0.0006	NJDEP used more recent cancer slope factor (for BaP) and applied ADAFs
12	Benzo(b) Fluoranthene	205-99-2	0.0012	0.0013	0.038	0.18	0.006	0.006	NJDEP used more recent cancer slope factor (for BaP) and applied ADAFs
13	Benzo(k) Fluoranthene	207-08-9	0.012	0.013	0.38	1.8	0.06	0.06	NJDEP used more recent cancer slope factor (for BaP) and applied ADAFs
14	beta-BHC (beta-HCH)	319-85-7	0.0080	0.014	0.0091	0.017	0.0080	0.014	No difference
15	beta-Endosulfan	33213-65-9	20	40	62	89	20	40	No difference
16	Bis(Chloromethyl) Ether	542-88-1	0.00015	0.017	ND	ND	0.00015	0.017	No difference
17	Bis(2-Chloroethyl) Ether	111-44-4	0.030	2.2	0.03	0.53	0.030	2.2	No difference
18	Bis(2-Chloro-1-Methylethyl) Ether (previously Bis(2-Chloroisopropyl) Ether)	108-60-1	200	4000	1400	65000	200*	3200	Numerical difference due to NJDEP using same toxicity factor but with 2 or more significant figures. NJDEP calculated a fresh water criterion of 220 µg/L, but will use EPA's recommended fresh water criterion of 200 µg/L because it is more protective.
19	Bis(2-Ethylhexyl) Phthalate	117-81-7	0.32	0.37	1.2	2.2	0.32	0.37	No difference
20	Bromoform	75-25-2	7.0	120	4.3	140	7.0	120	No difference
21	Butylbenzyl Phthalate	85-68-7	0.10	0.10	150	190	0.10	0.10	No difference
22	Carbon Tetrachloride	56-23-5	0.4	5	0.33	2.3	0.33	3.6	NJDEP used a different cancer slope factor
23	Chlordane	57-74-9	0.00031	0.00032	0.0001	0.00011	0.000041	0.000041	NJDEP used a different cancer slope factor
24	Chlorobenzene	108-90-7	100	800	210	2500	37	270	NJDEP used a different reference dose
25	Chlorodibromomethane	124-48-1	0.80	21	0.4	13	0.75	19	No difference, but note: NJDEP used the same cancer slope factor but with 2 significant figures (EPA may have typo with CSF = 0.040, as opposed to CSF

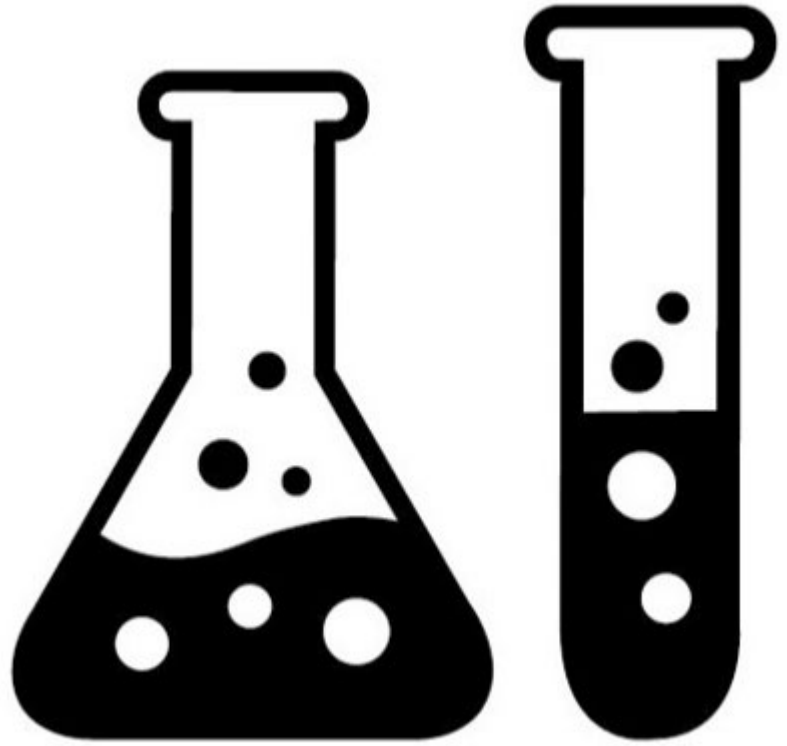
Please refer to handout containing information on all revised and new criteria.

For example:

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Includes benzo[a]pyrene and six other PAHs.
- The proposed criteria for PAHs differ (less stringent) from EPA recommendations as DEP used a more scientifically appropriate cancer slope factor that was not available to USEPA in 2015.

Anticipated Impacts to Laboratories

- Many parameters are already present in the GWQS, and permittees are already monitoring for said parameters.
- Analytical methods and PQLs for surface waters will be similar to what is currently in use for ground water monitoring.
  - *Always refer to the applicable 40 C.F.R. Part 136 for the list of approved methods for a parameter.*
- May require a grace period for laboratories to obtain certification, in the event that the number of certified labs for an allowable method is limited.



Anticipated Impacts to Remediation Sites

- Pursuant to the Remediation Standards, specifically N.J.A.C. 7:26D 3.2, the Surface Water Quality Standards are the basis for the Remediation Standards for Surface Water.
  - *Therefore, the updated and new Surface Water Quality Standards will be applied at all active remediation sites involving a ground water to surface water pathway.*
  - *Site Remediation projects would have six months to comply with new standards from the effective date of adoption.*

  Site Remediation has three years to review a submittal by the Licensed Site Remediation Professional (LSRP) and to invalidate the submittal if it does not meet DEP regulations or standards.
- May result in additional evaluation of potential surface water impacts. May include additional monitoring wells, additional sampling, and additional treatment of groundwater discharging to surface water bodies.
- For closed sites, sites with Final Remediation Documents (No Further Action or Response Action Outcome), or sites with Remedial Action Workplan approvals:

  May trigger additional remediation of contaminated sites f**or constituents becoming more stringent by an order of magnitude.**

  Closed sites with Classification Exception Areas (CEAs) will need to be reevaluated at the time of biennial certification.

  Closed sites without CEAs may be reevaluated if the site should be remediated again.

NJPDES Permits routinely require Waste Characterization Report requirements

Typically, the 88/87 parameters with updated Standards are not present in wastewater effluent.

Monitoring for most of the 94 Toxics is already required

88/87 are updated standards – current requirement

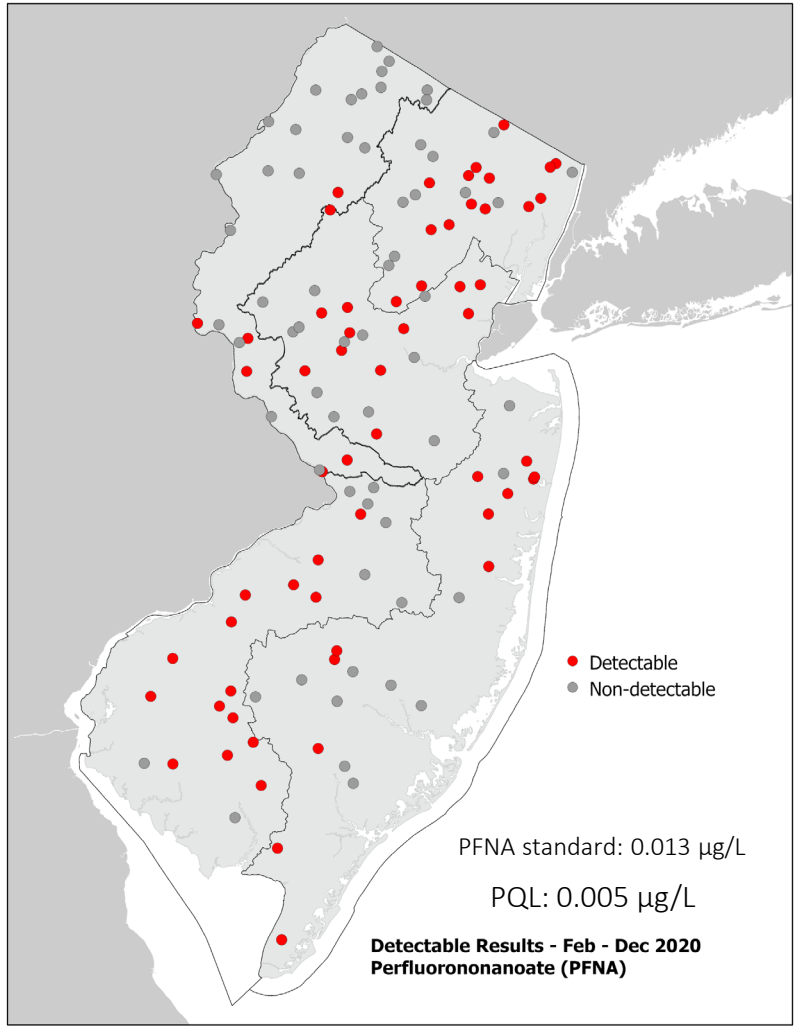
7 are new standards – new requirement

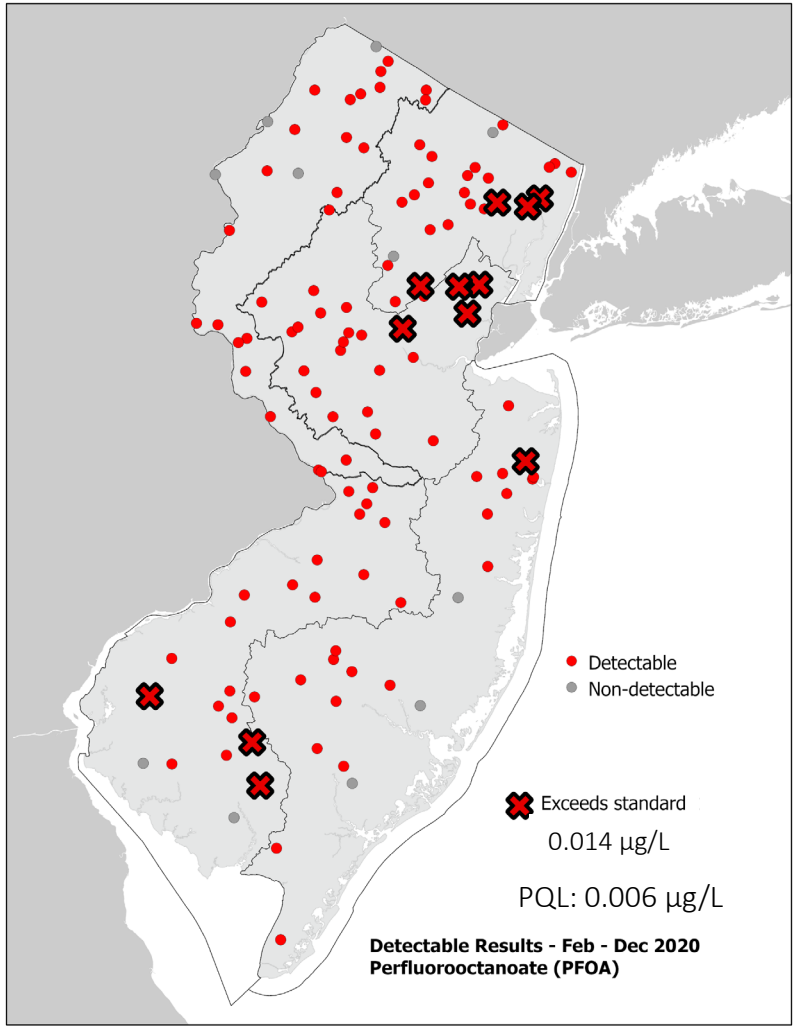
Anticipated Impacts of Surface Water Quality Standards Rule on NJPDES

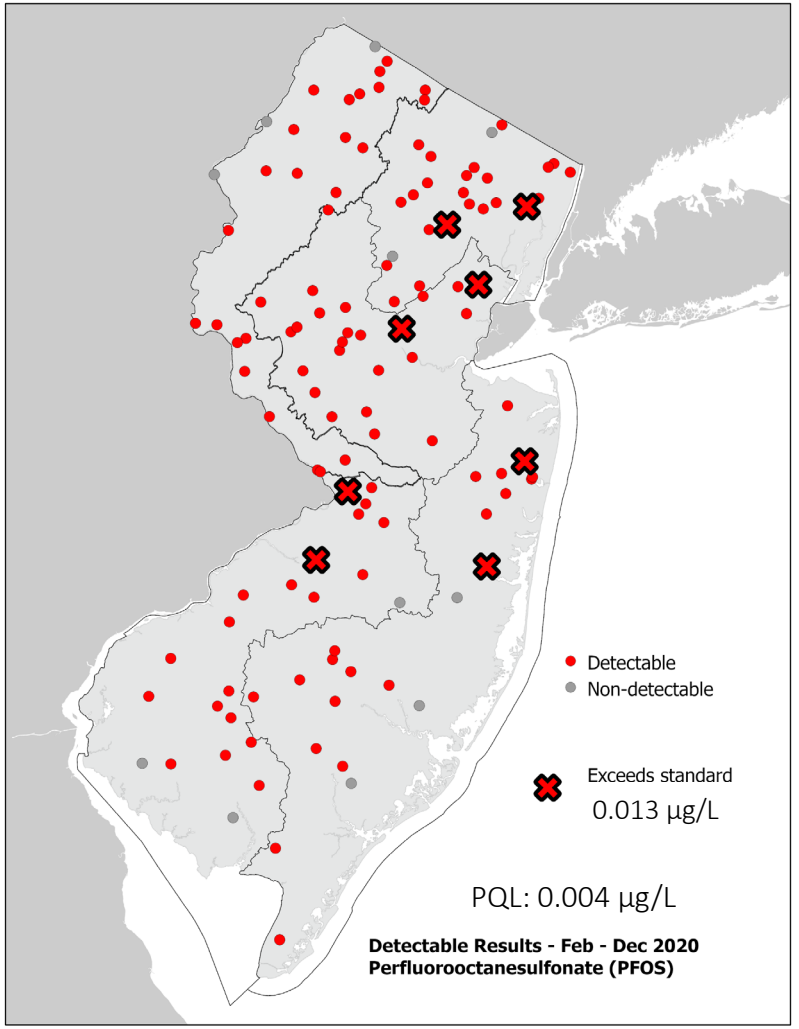
Discussion Break

Anticipated new criteria for perfluorononanoic acid (PFNA), perfluorooctanoic acid (PFOA), and perfluorooctane sulfonate (PFOS) at N.J.A.C. 7:9B

PFAS Have Been Found Throughout NJ







Note: All data used in this map will be available at: https://www.waterqualitydata.us/ once quality assurance checks are completed and data is uploaded.

Source:
NJDEP Bureau of Freshwater and Biological Monitoring, 2020

Timeline of New Jersey rulemakings for PFAS

2015-2018

Drinking Water Quality Institute Recommends Maximum Contaminant Levels (MCLs)

- MCL of 0.013 µg/L for PFNA
- MCL of 0.014 µg/L for PFOA
- MCL of 0.013 µg/L for PFOS

- These MCLs are set at Health-based

January 16, 2018

- GWQS of 0.01 µg/L for PFNA
- PFNA added to list of Hazardous Substances (N.J.A.C. 7:1E)

September 4, 2018

- Drinking Water MCL of 0.013 µg/L for PFNA
- GWQS of 0.013 µg/L for PFNA

June 1, 2020

- GWQS of 0.014 µg/L for PFOA
- Drinking Water MCL of 0.014 µg/L for PFOA
- GWQS of 0.013 µg/L for PFOS
- Drinking Water MCL of 0.013 µg/L for PFOS
- PFOA and PFOS added to List of Hazardous Substances (N.J.A.C. 7:1E)

Why are PFAS in surface water of particular concern?

- PFAS are unique as persistent, bioaccumulative, and toxic (PBT) drinking water contaminants.
  - Do not break down in the environment and are water soluble.
- Multiple toxic effects in laboratory animals, some at very low doses.
- Evidence for multiple human health effects from low exposures, including in general population without additional exposure from contaminated drinking water or other local contamination sources.
- **PFOA, PFOS, and PFNA** have human half-lives (time for half of the amount in body to be excreted) of several years.
  - Build up in the body over time, and remain in the body for many years after exposure ends.
- Drinking water -> major exposure source, even at low concentrations (i.e., at the human health criteria/MCL levels)
- Higher exposures in infants than older individuals when drinking water is contaminated.
  - From breast milk via mother's exposure, or formula prepared with contaminated water.
  - Sensitive subgroup for PFAS health effects.

**** Overall – indicates the need for caution regarding exposure to PFAS through drinking water.****

Basis for New SWQC for PFNA, PFOA, and PFOS

- Fresh water human health criteria for these PFAS are NJ Health-based Maximum Contaminant Levels (MCLs).
  - MCLs for these PFAS are set at Health-based MCLs.
  - Criteria only consider exposure through drinking water, and not through fish consumption.
- Saline water human health criteria not yet developed due to need for bioaccumulation factors.
- Animal toxicology data are primary basis.
- Multiple health effects in humans at exposures below doses causing toxicity in laboratory animals.
  - Support use of health-protective approaches in developing criteria.
- Animal-to-human comparisons account for much higher blood PFAS levels in humans than animals from the same dose of PFAS.
- Primary basis is non-cancer effects (Reference Dose):
  - Most sensitive effects that are well established, adverse/precursor to adverse, and relevant to humans.
- Carcinogenic effects also considered (next slide).
- Stated to be “based on an approach intended to be protective for lifetime (chronic) exposure.”
  - However, Reference Doses for these PFAS are also applicable to less-than-lifetime exposures.
- “Chemical-by-chemical” approach – did not consider potential additive toxicity of co-occurring PFAS.
  - Consistent with DWQI approach for previous MCL recommendations for other contaminants.

Basis for New SWQC for PFNA, PFOA, and PFOS

- PFOA – 14 ng/L (0.014 µg/L):
  - Liver toxicity in mice (primary basis).
  - Delayed mammary gland development in mice at very low doses.
    - Accounted for by uncertainty factor for potentially more sensitive effects.
    - If had been used as primary basis, Health-based MCL and SWQC would be less than 1 ng/L.
- PFOS – 13 ng/L (0.013 µg/L):
  - Decreased immune system response in mice (analogous to decreased vaccine response in humans).
- PFNA – 13 ng/L (0.013 µg/L):
  - Liver toxicity in mice.
- Cancer risk from lifetime exposure was also evaluated:
  - PFOA and PFOS: "Suggestive evidence of carcinogenicity."
    - MCLs based on non-cancer effects are also protective for cancer effects at 1-in-1 million lifetime cancer risk level used by New Jersey, based on cancer slope factors for animal tumor data.
  - PFNA: Cancer effects have not been studied.
- Used older USEPA default adult body weight (70 kg) and drinking water ingestion (2 L/day) assumptions.
- Default relative source contribution factor of 20% (most stringent choice).
  - Partially accounts for higher exposures in infants.

Development of NJ-Specific PFOA, PFOS, and PFNA Bioaccumulation Factors (BAFs)

- NJDEP is collecting data to develop field BAFs for PFOA, PFOS, and PFNA in New Jersey saline and freshwater fish. Data to be collected include:
  - *Fish tissue PFAS concentrations*
  - *Isotope analysis to confirm fish trophic levels*
  - *Water column PFAS concentrations*
  - *Water quality characteristics that may impact PFAS partitioning*
- BAFs derived from field data are generally preferred to account for all interactions between fish and their environment (sediment types, food/prey availability, etc.)
- BAFs estimated from octanol:water partition coefficients (K_{ow}) are not applicable to PFAS because PFAS do not bioaccumulate in lipids.
- Generally, the impacts of PFAS partitioning in the environment are not as well understood as for other traditional and legacy contaminants. This comprehensive field sampling will provide the data for NJ-specific BAF development.

Summer 2022
- Sampling of saline fish and water

Summer 2023
- Sampling of freshwater fish and water

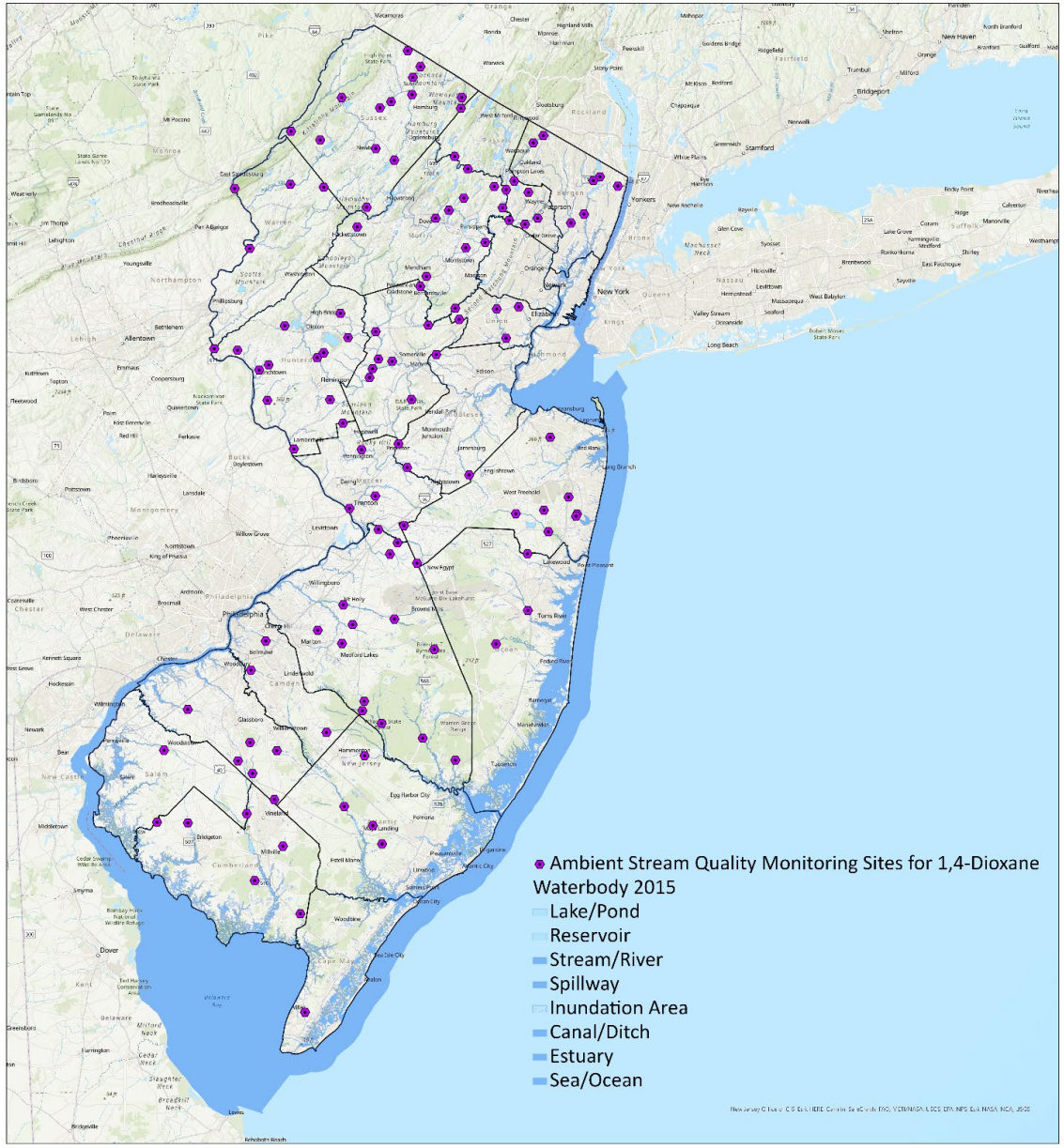
Summer 2024
- Final report anticipated to be available

Current USEPA Activities Relevant to PFAS SWQS

- Draft USEPA acute & chronic fresh water **aquatic life criteria** and chronic tissue-concentration criteria for PFOA and PFOS.
  - Much higher than values based on human health effects (e.g., NJ MCLs).
  - Public comment period ends July 2.
- Draft USEPA **health effects reevaluation** to support Maximum Contaminant Level Goals (MCLGs) for PFOA and PFOS:
  - USEPA plans proposal of PFOA and PFOS MCLs in 2022 and adoption in 2023.
  - Draft documents are under review by USEPA Science Advisory Board.
  - Draft USEPA Reference Doses are based on human data and are several orders of magnitude below current USEPA and New Jersey Reference Doses based on animal data.
  - Draft classification of PFOA as likely human carcinogen and updated PFOA cancer slope factor based on human data.
    - PFOA and PFOS currently classified by USEPA and New Jersey as suggestive human carcinogens, with much less stringent PFOA slope factor based on animal data.
    - PFOS remains suggestive carcinogen; no cancer slope factor developed by USEPA.
  - Also, draft USEPA document on assessing non-cancer risks of PFAS mixtures.
- USEPA Interim Drinking Water Health Advisories - issued June 15.
  - PFOA – 0.004 ng/L; PFOS – 0.02 ng/L.
  - Based on draft USEPA PFOA and PFOS Reference Doses.
  - Far below detection levels and USEPA Reporting Level for PFOA and PFOS of 4 ng/L.
  - Health-based drinking water levels may change when finalized, but USEPA anticipates that they will remain below detection levels.
  - Currently being reviewed by NJDEP.

Anticipated new criterion for 1,4-Dioxane

1,4-Dioxane Ambient Surface Water Monitoring Sites in NJ



N
W E
S

0 5 10 20 30 40 Miles

Data Sources:
NJDEP Bureau of GIS
NJDEP Bureau of Freshwater and Biological Monitoring

Monitoring Ambient Waters for 1,4-Dioxane

Note: All data used in this map will be available at: https://www.waterqualitydata.us/ once quality assurance checks are completed and data is uploaded.

Timeline of New Jersey rulemakings for 1,4-dioxane

January 16, 2018

GWQS of 0.4 ug/L for 1,4-dioxane

September 2021

Drinking Water Quality Institute Recommends MCL of 0.33 µg/L for 1,4-dioxane

Why is a SWQC for 1,4-Dioxane Necessary?

- 1,4-dioxane is water soluble and stable in water.
- Drinking water is the primary exposure pathway.
- Human epidemiology data are limited and not informative for risk assessment.
- Non-carcinogenic effects in laboratory animals include toxicity to liver and kidney.
  - Less sensitive than carcinogenic effects; not driver for risk assessment.
- Caused tumors in multiple organs in studies in rats, mice and guinea pigs.
  - Carcinogenicity is basis of risk assessment.

Basis for New SWQC for 1,4-Dioxane

Fresh water human health criterion is Health-based MCL of 0.33 µg/L developed by NJ DWQI in 2021.

- MCL recommended by DWQI is set at Health-based MCL.
- MCL recommendation accepted by NJDEP Commissioner, but MCL not yet proposed.

Not bioaccumulative; therefore, appropriate to base fresh water criterion on drinking water exposure only.

Classified as likely human carcinogen by:

- USEPA Integrated Risk Information System (IRIS) - 2010 and 2013.
- NJDEP Ground Water Quality Criterion (GWQC) – 2018.
- USEPA Office of Chemical Safety and Pollution Prevention (OCSPP; part of TSCA) – 2020.
- NJ DWQI - 2021.

Based on USEPA IRIS (2010, 2013) cancer slope factor of 0.10 $(mg/kg/day)^{-1}$.

- Based on liver tumors in female mice.
- Most sensitive of numerous available cancer slope factors for other tumor types and other studies.
- Also used as basis of NJDEP GWQC.

More recent USEPA OCSPP (2020) slope factor of 0.12 $(mg/kg/day)^{-1}$ confirms earlier IRIS conclusions.

- Reviewed more recent scientific literature.
- Slope factor is almost identical numerically to earlier IRIS value.
- Based on same female mouse liver tumor data and slightly different modeling approach.

Basis for New SWQC for 1,4-Dioxane

Fresh water human health criterion of 0.33 µg/L based on:

- Cancer slope factor of 0.10 $(mg/kg/day)^{-1}$.
- One in one million (1×10^{-6}) cancer risk level.
- Updated USEPA exposure assumptions (body weight – 80.0 kg; drinking water ingestion rate – 2.4 L/day).

NJ Ground Water Quality Criterion (GWQC) of 0.4 µg/L (rounded from 0.35 µg/L) is based on:

- Same cancer slope factor and risk level.
- Older USEPA exposure assumptions (body weight – 70 kg; drinking water ingestion rate – 2 L/day).

Anticipated **Impacts** to Remediation Sites

- As these are new standards, sites where these constituents are contaminants of concern at the site must be evaluated as discussed previously:
  - The new Surface Water Quality Standards will be applied at all active site remediation sites involving a ground water to surface water pathway.
  - Site Remediation projects would have six months to comply with new standards from the effective date of adoption.

    Site Remediation has three years to review a submittal by the Licensed Site Remediation Professional (LSRP) and to invalidate the submittal if it does not meet DEP regulations or standards.
- May result in additional evaluation of potential surface water impacts. May include additional monitoring wells, additional sampling, and additional treatment of groundwater discharging to surface water bodies.
- For closed sites or sites with remedial action workplan approvals:
  - Closed sites with Classification Exception Areas (CEAs) will need to be reevaluated at the time of biennial certification.
  - Closed sites without CEAs may be reevaluated if the site should be remediated again.

Anticipated Impacts to Laboratories

PFAS:

- Currently there are no laboratories certified for Draft Method 1633, but that is the preferred analytical method.
- All PFAS would need to be analyzed using:
  - *EPA Draft 1633, or*
  - *A user-defined, laboratory-specific Standard Operating Procedure (SOP) method reference, if not certified for EPA Draft 1633.*
- Recommend laboratories to obtain for certification to ensure consistency.

1,4-Dioxane:

- No analytical method for non-potable water listed in 40 C.F.R. Part 136
- Possible methods to use:
  - *SW-846 8260D, or SW-846 8270E with SIM, or*
  - *A user-defined, modified option for EPA Method 522*

Anticipated Amendments to the NJPDES Rules, N.J.A.C. 7:14A

June 2022

NJPDES Permits routinely require Waste Characterization Report requirements

Typically, **the 88/87 parameters with updated Standards are not present** in wastewater effluent.

11 parameters are new and may result in additional analytical costs

- 7 toxics
- 3 PFAS
- 1,4 Dioxane

Monitoring for most of the 94 Toxics is already required

88/87 are updated standards – current requirement

7 are new standards – new requirement

Anticipated Impacts of potential updates to the SWQS on NJPDES

Anticipated Amendments to N.J.A.C. 7:14A

- Addition of eleven (11) new parameters in Appendix A of Subchapter 4 to mirror the SWQS changes
- Table VI in Subchapter 4 to apply to both Surface Water and Ground Water Application Requirements
- Narrative language that clarifies the Department's ability to require monitoring in the application for parameters that have no numeric SWQS

11 Anticipated New Surface Water Quality Standards for Toxics

Perfluorononanoic acid (PFNA)
Perfluorooctanoic acid (PFOA)
Perfluorooctanesulfonic acid (PFOS)

→ PFAS

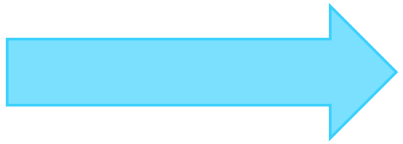
1,4 Dioxane → 1,4 Dioxane

Bis(Chloromethyl) Ether
Chlorophenoxy Herbicide (2,4-D)
Chlorophenoxy Herbicide (2,4,5-TP)
Dimethyl Phthalate
Hexachlorocyclohexane – Technical
3-Methyl-4-Chlorophenol
Methoxychlor

→ Other Toxics

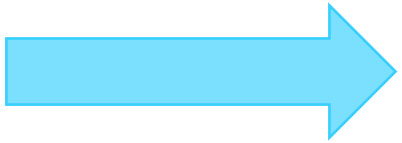
Estimated Cost of Analysis for 11 New Parameters

PFAS Analysis
- Perfluorononanoic acid (PFNA)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)



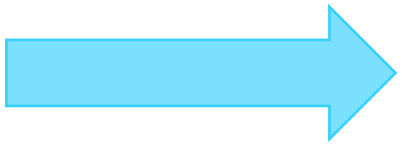
Cost of Analysis: $175 to $250*

Volatile Organics/Pesticide Analysis
- Bis(Chloromethyl) Ether
- Chlorophenoxy Herbicide (2,4-D)
- Chlorophenoxy Herbicide (2,4,5-TP)
- Dimethyl Phthalate
- Hexachlorocyclohexane – Technical
- 3-Methyl-4-Chlorophenol
- Methoxychlor



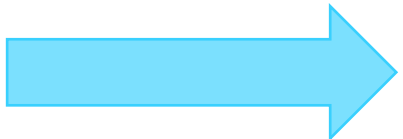
Cost of Analysis: $0*
(already covered under existing volatile organics and pesticide scans)

Volatile Organics Analysis (Targeted TIC)
- Bis(Chloromethyl) Ether



Cost of Analysis: $15*

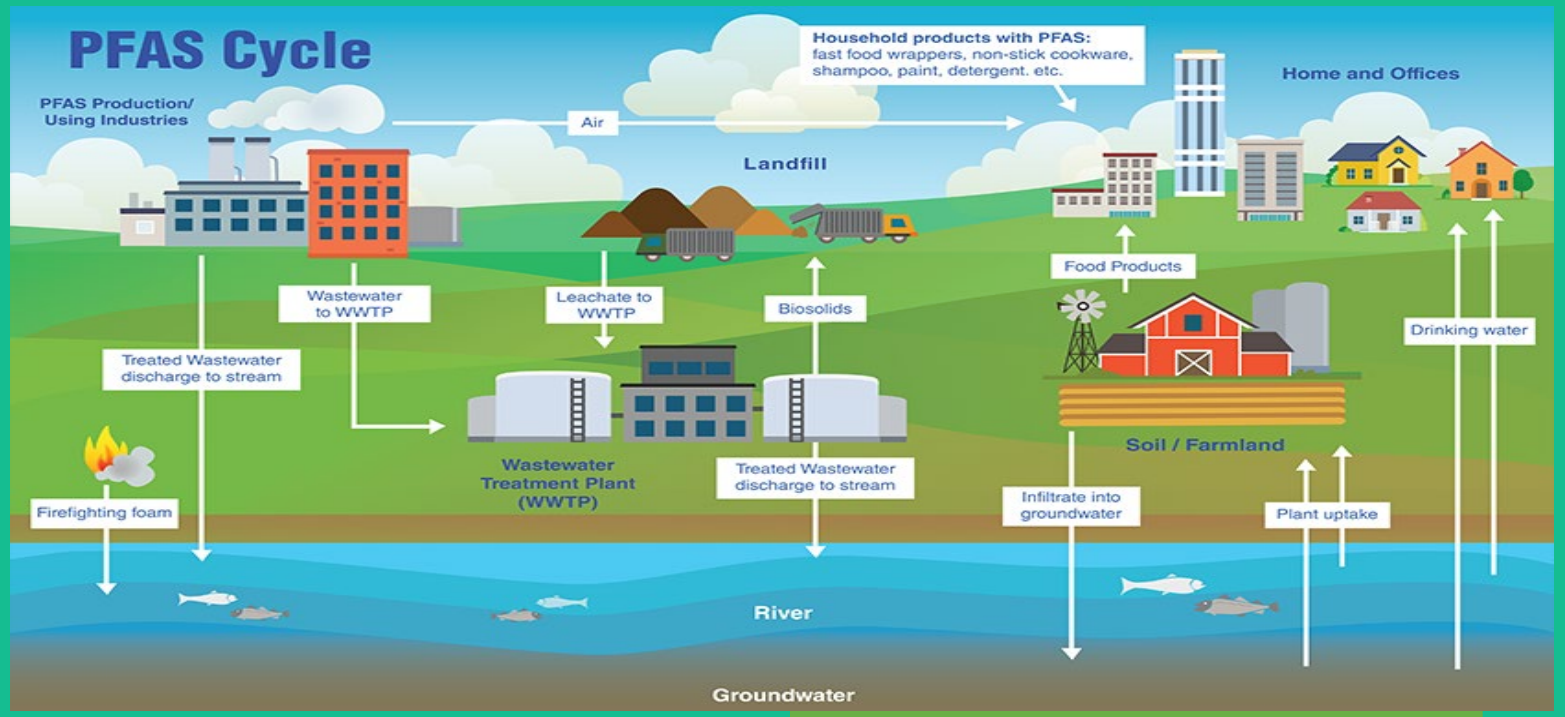
Volatile Organics Analysis (SIM)
- 1,4 Dioxane

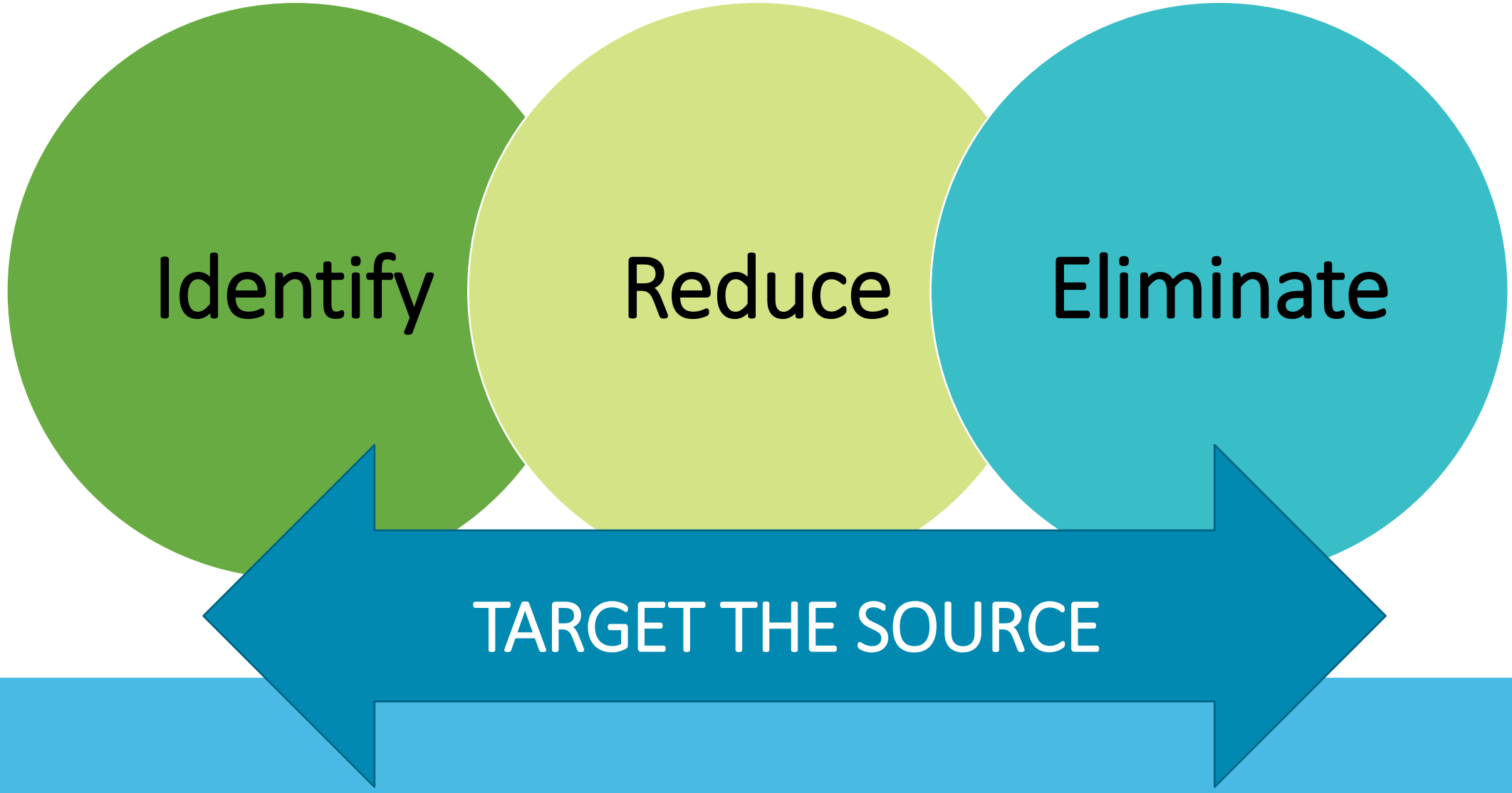


Cost of Analysis: $140*

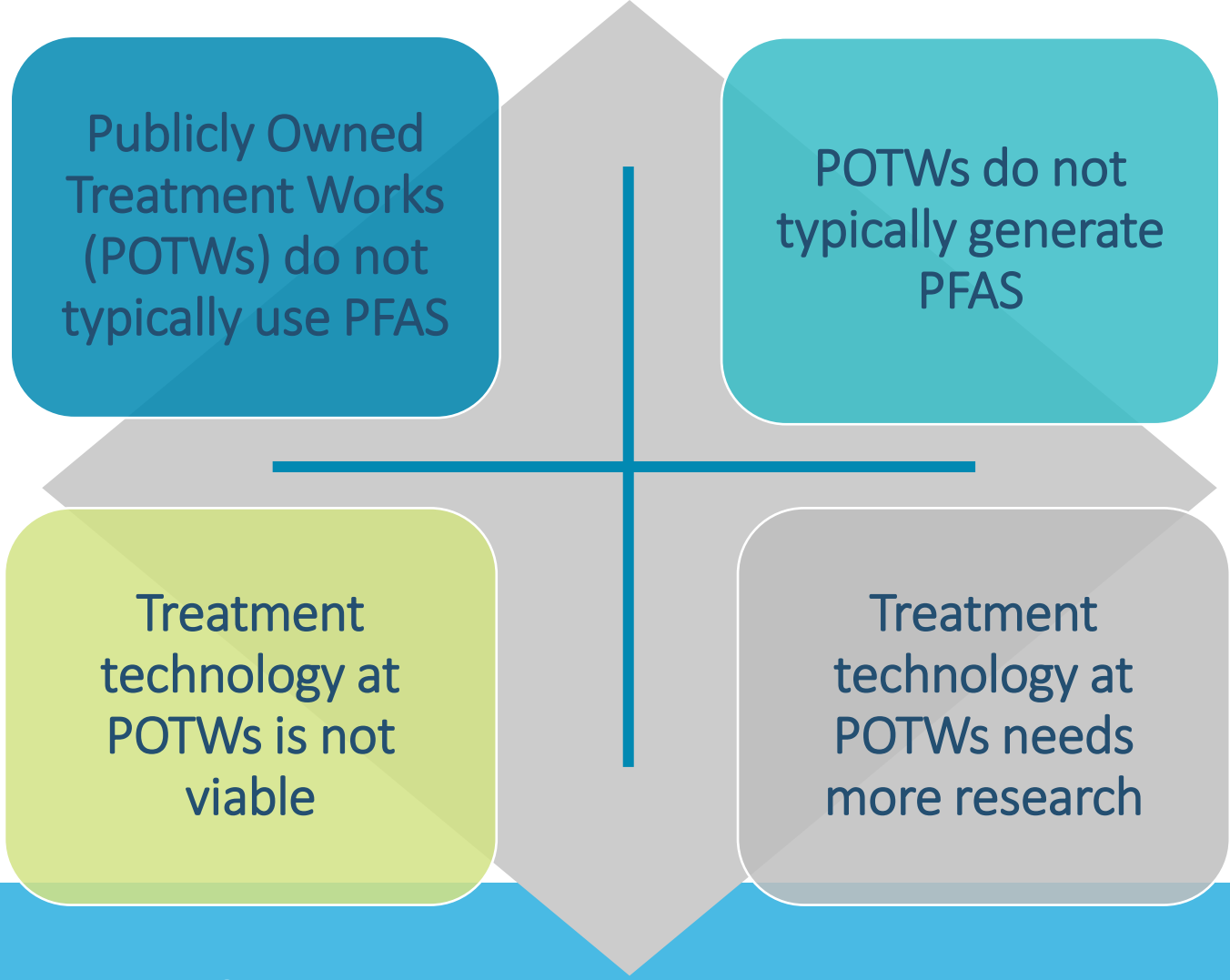
*Plus additional costs for any required blanks.

Addressing PFAS in NJPDES Surface Water & Pretreatment Permits



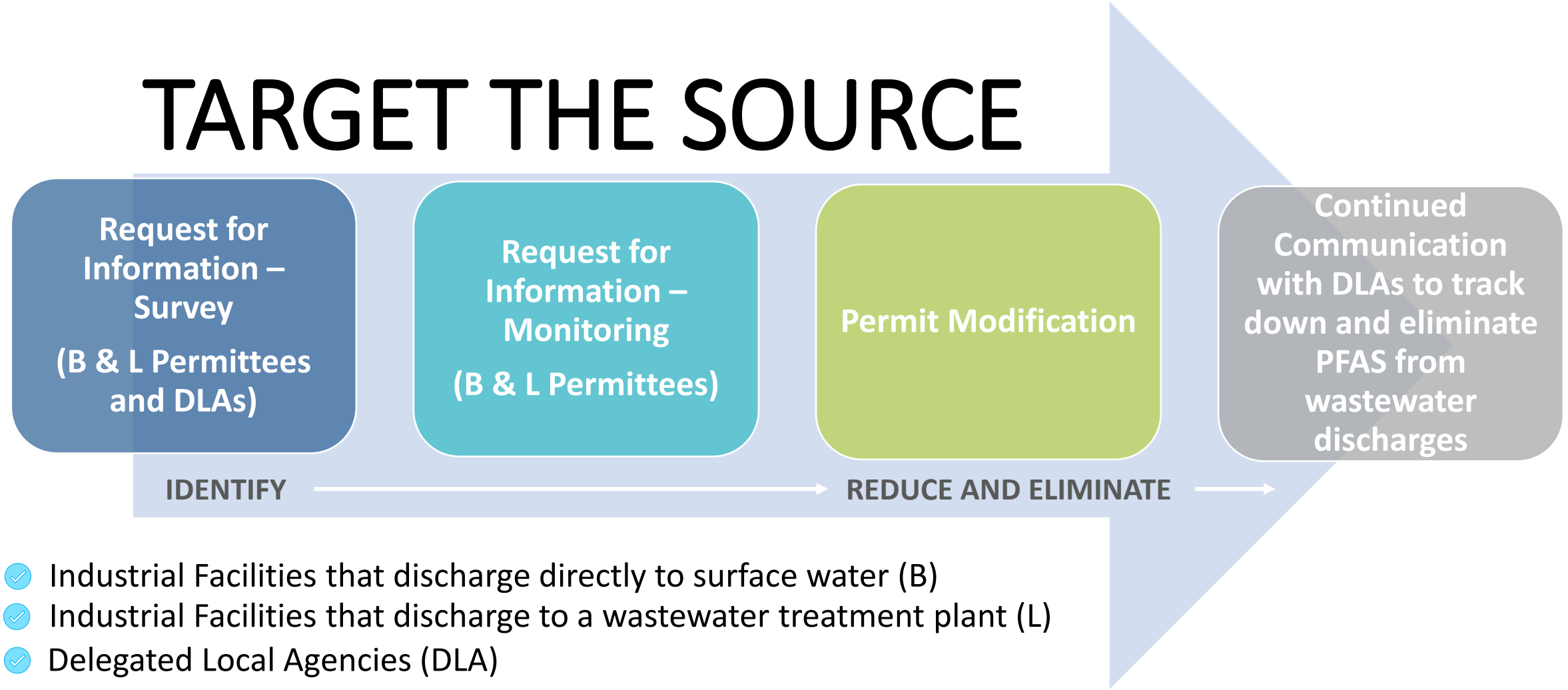


GOAL OF THE PFAS STRATEGY



Why Target the Source?

TARGET THE SOURCE



- Industrial Facilities that discharge directly to surface water (B)
- Industrial Facilities that discharge to a wastewater treatment plant (L)
- Delegated Local Agencies (DLA)

  DLAs are local agencies with an industrial pretreatment program approved by the Department. The 17 DLAs in NJ regulate over 650 industrial users throughout the state.

Focus on Identifying, Reducing and Eliminating PFAS

Monitoring will inform where PFAS is and at what levels

Goal is removal of PFAS at the source

Discussion Break

Wrap up / Next Steps

Goals:

- Finalize rule proposal by end of 2022.
- Anticipate publication of rule proposal by end of 2022 or 2023.

Contact Us

Bruce Friedman, Director	Division of Water Monitoring, Standards and Pesticide Control
Kimberly Cenno, Bureau Chief	Bureau of Environmental Analysis, Restoration & Standards
Tracy Fay, Standards Coordinator	Director's Office
Biswarup "Roop" Guha, SWQS/GWQS Rule Manager	SWQS@dep.nj.gov
Kelly Mascarenhas, SWQS/GWQS Rule Team	SWQS@dep.nj.gov
MaryAnne Kuserk, Manager	Bureau of Ground Water Pollution Abatement
Susan Rosenwinkel, Bureau Chief	Bureau of Surface Water and Pretreatment Permitting
Kerri Standowski, Environmental Specialist 2	Division of Water Quality

Nick Procopio, Acting Director	Division of Science and Research
Brian Pachkowski, Research Scientist Gloria Post, Research Scientist Dan Millemann, Research Scientist Michele Potter, Manager	