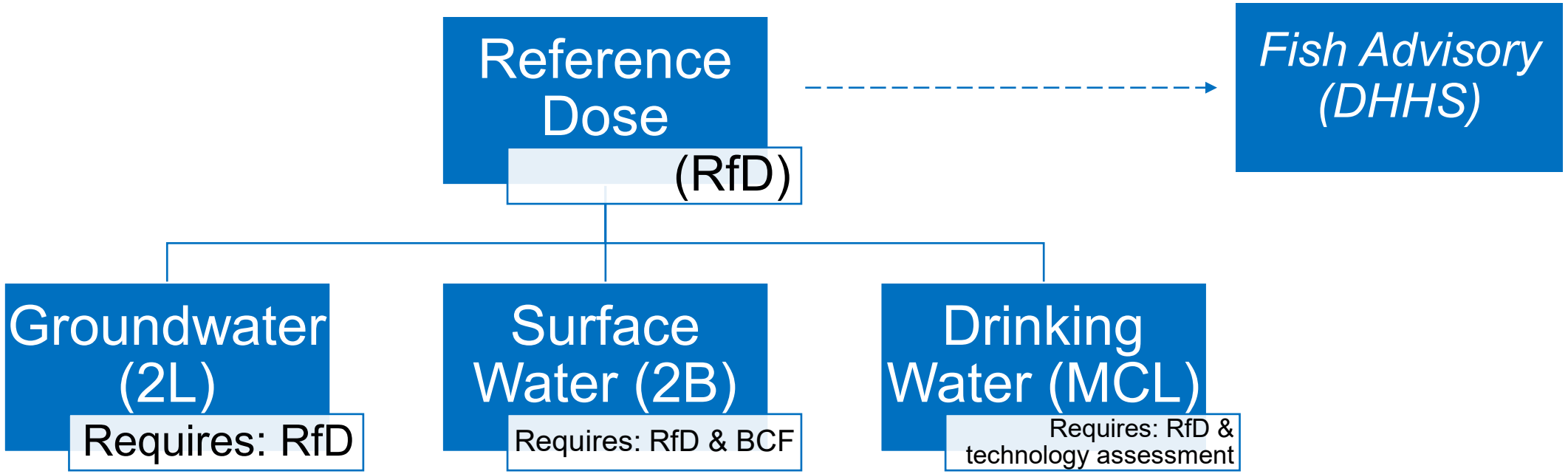
Feb 8, 2023

PFMOAA Summary

Frannie Nilsen, PhD
DEQ Environmental Toxicologist

The Important of Reference Doses in NC Standard Development



PFAS in North Carolina

EPA PFAS RoadMap Compounds

PFBS	PFHxS	PFOS
PFOA	PFBA	PFHxA
PFNA	GenX	PFDA

Non-EPA PFAS RoadMap Compounds

PFHpA	PFMOAA	PMPA
PFO2HxA	PEPA	PFO3OA
PFO4DA	PFO5DA	HydroEVE
PFPeA	Nafion BPs	

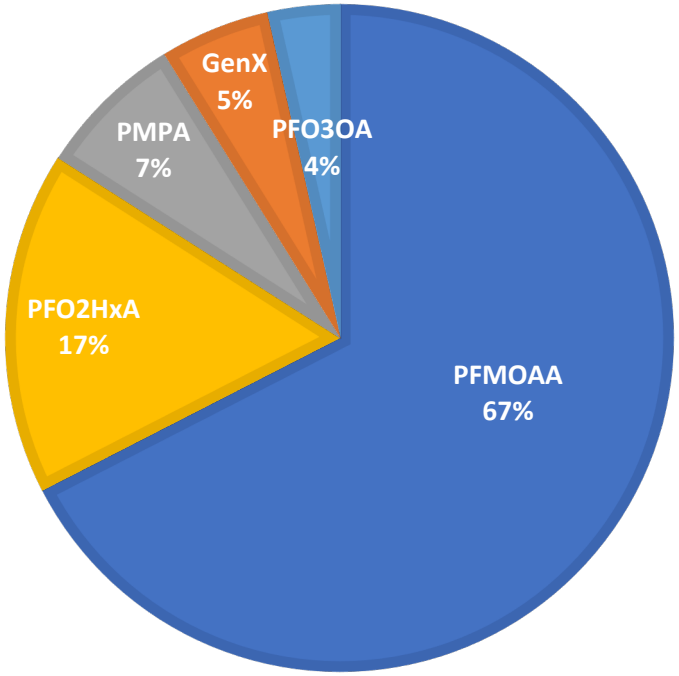
Department of Environmental Quality

DEQ's Regulatory Priorities – Chemours PFAS

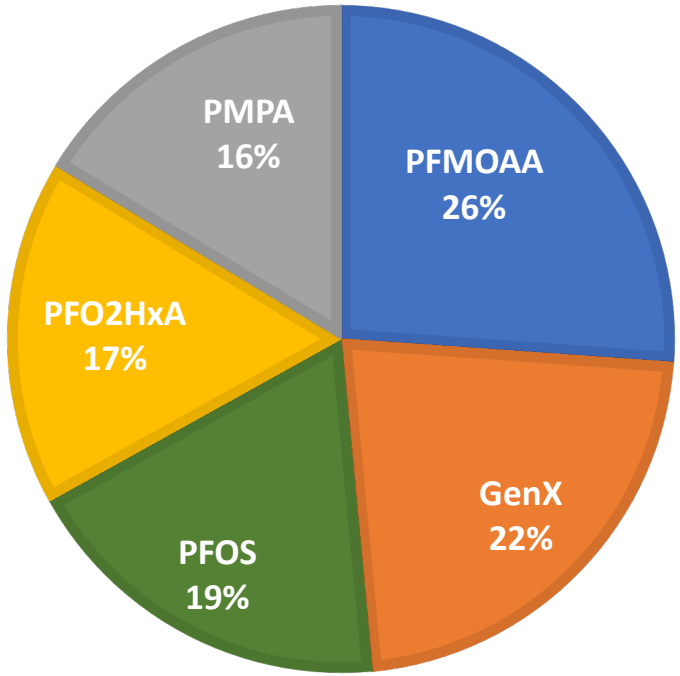
The Consent Order PFAS Compounds are unique to NC & EPA is not evaluating them.

Top 5 PFAS in Surface water bodies

HUSKE DAM BOAT RAMP

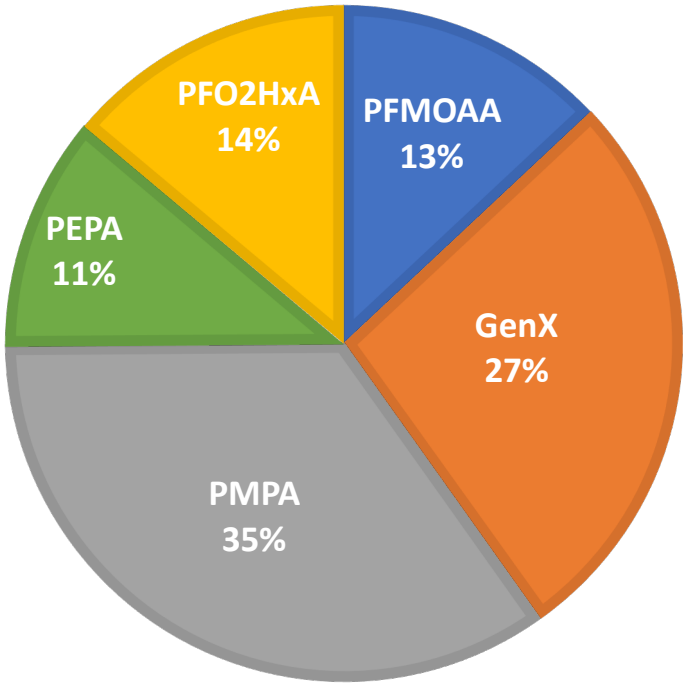


DOWNSTREAM CFR

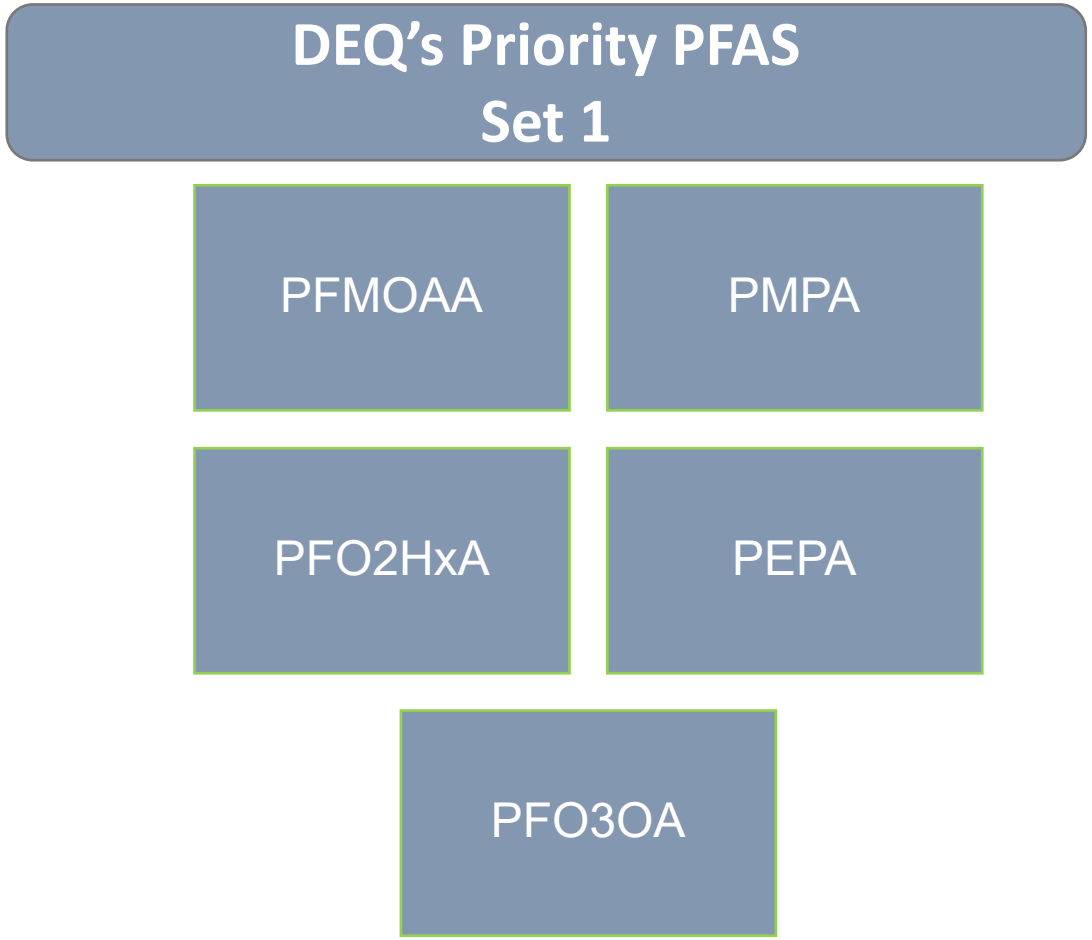


Top 5 PFAS in well water

RESIDENTIAL WELL WATER

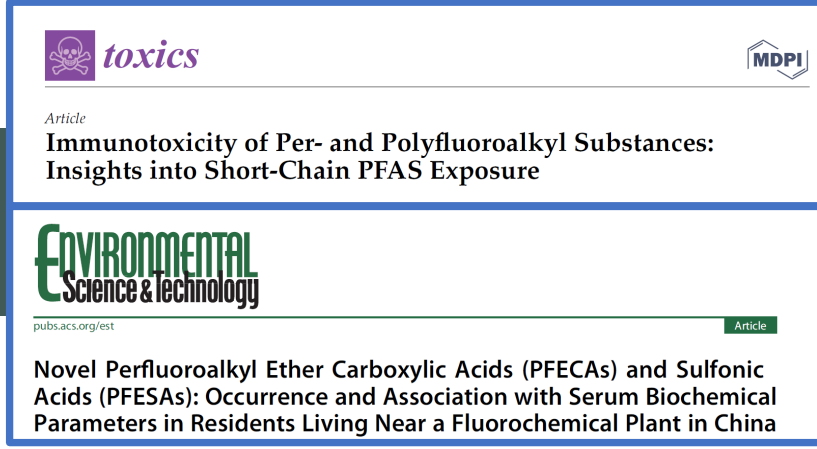


PFAS in North Carolina



- These are PFAS that are specific to NC and the waterbodies sampled in the lower Cape Fear region.
- There is not much existing toxicity information for these PFAS.

PFMOAA – Toxicology Studies Summary



Overall Summary:

Human serum measurements

- PFMOAA accumulates more than expected based on very low K_{ow} value (measure of adsorption)
- PFMOAA serum concentrations increased with age in humans
- PFMOAA in serum was not associated with changes in liver and kidney function biomarkers or lipid metabolism

Mice PFMOAA dosing

- No statistical differences in body, liver, or lymphoid organ weights or peroxisomal enzyme activity or immune cell function were detected.
- Sex-specific differences in peroxisome proliferation (not statistically significant).

Overall Conclusion:

This is evidence to support public health concerns for PFMOAA as even with a low bioaccumulation potential in humans, high, chronic environmental doses could still lead to adverse health outcomes.

PFMOAA – Previous Discussion Summary

Overall Summary:

- The two existing publications are well done and are not enough to derive a Reference Dose (RfD) for PFMOAA.

Additional Information:

- There are no new publications to be considered.
- There are no other non-regulatory protective values that can be derived without an RfD.
  - A Provisional Peer-Reviewed Toxicity Value (PPRTV) could be a remediation and not a health-based value, if the Board supports using one toxicology paper that presented no-effects data to derive this value.

Overall Conclusion:

This is evidence to support public health concerns for PFMOAA as even with a low bioaccumulation potential in humans, high, chronic environmental doses could still lead to adverse health outcomes.

Provisional Peer-Reviewed Toxicity Values (PPRTV)

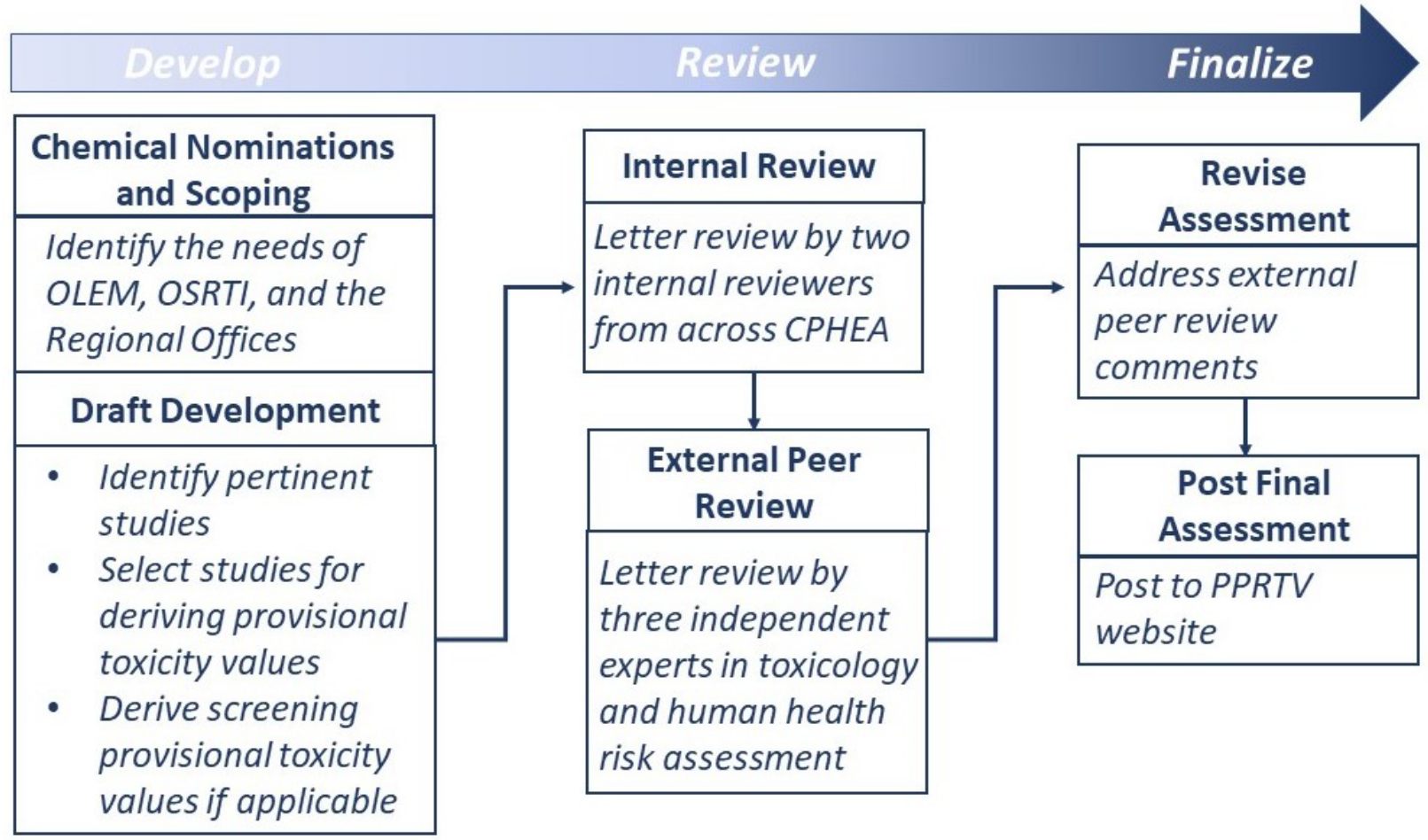
- EPA uses PPRTVs when:

  Some useful human or animal toxicity data are available for a chemical, but…

  1. *The data are published in non peer-reviewed sources.*
  2. *The data are published and peer-reviewed, but have associated uncertainties such as:*
     - *The composite Uncertainty Factor is greater than 3,000.*
     - *The principal study is not comprehensive (e.g., few or one endpoint examined).*
     - *Other: the principal study has a small number of animals tested, poor study design, incomplete reporting, etc.*
  3. *When no useful human or animal toxicity data are available for a chemical…*
     - *An expert-driven read-across approach can be applied.*
       - A computational method based on other chemicals in the same class

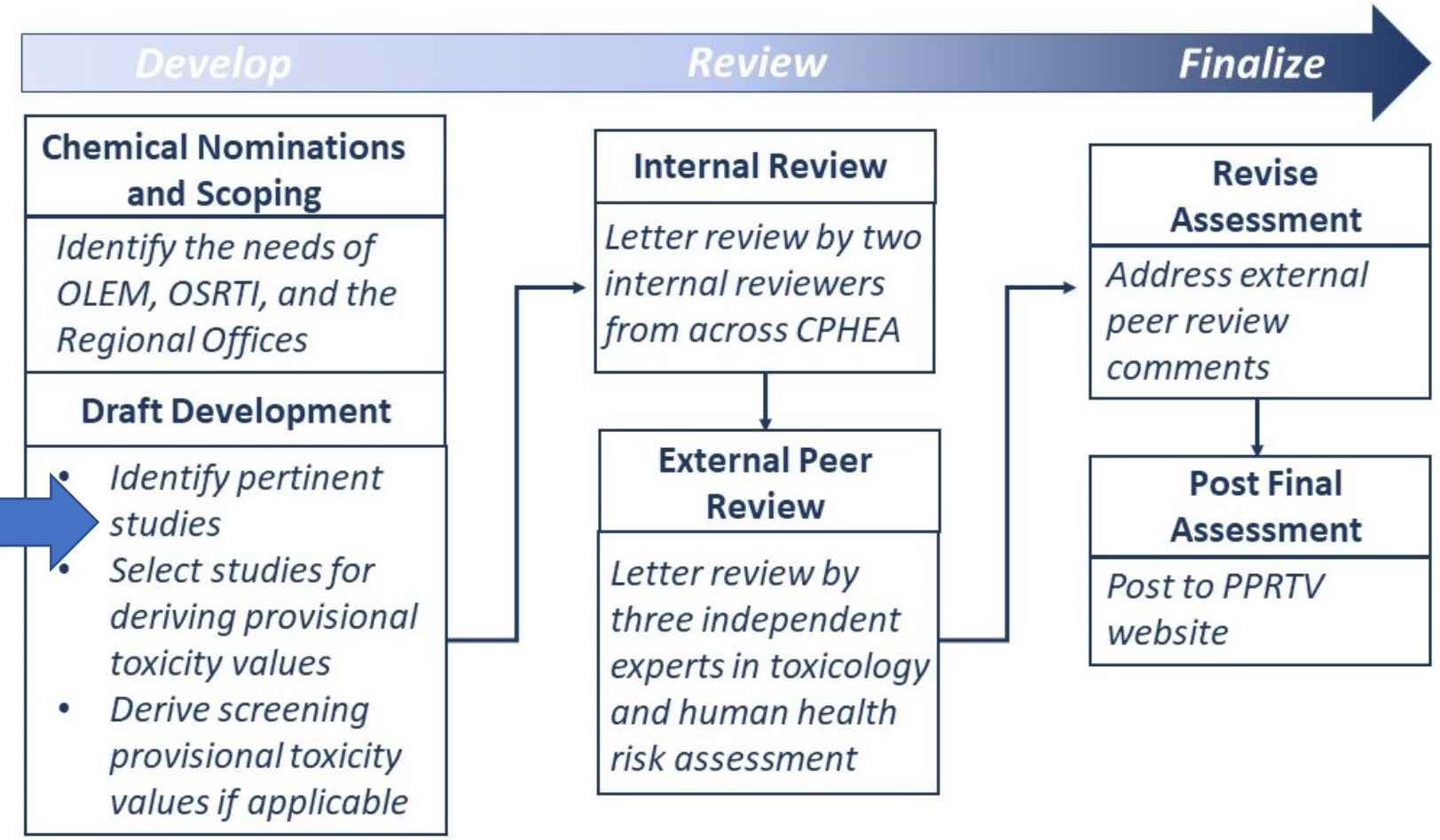
- EPA's PPRTV Program provides an important source of toxicity information and toxicity values for, chemicals of concern to the Superfund Program.

PPRTV Development



PPRTV Assessment Development Process

PPRTV Development



PPRTV Assessment Development Process

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Additional Information:

- There are no new publications to be considered.
- There are no other non-regulatory protective values that can be derived without an RfD.
  - A Provisional Peer-Reviewed Toxicity Value (PPRTV) could be a remediation and not a health-based value, if the Board supports using one toxicology paper that presented no-effects data to derive this value.
    - ***Will the Board support this, and derive this value? Or is more data required?***

Overall Conclusion:

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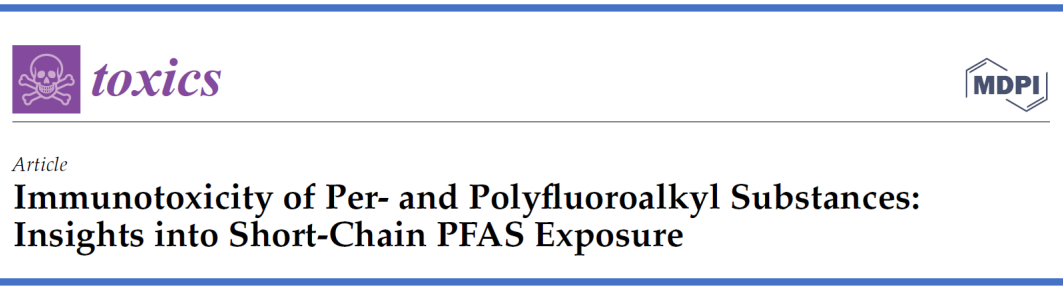
PFMOAA – Toxicology Studies



Summary: Immunotoxicity of Per- and Polyfluoroalkyl Substances: Insights into Short-Chain PFAS Exposure (Woodlief et al. 2021)

PFMOAA Doses: 0 mg/kg, 0.00025 mg/kg, 0.025 mg/kg, 2.5 mg/kg; daily oral gavage 30-day exposure

Results:

- No statistical differences in body, liver, or lymphoid organ weights or peroxisomal enzyme activity or immune cell function were detected
- Differences observed in peroxisome proliferation suggest effects but were not statistically significant.

Conclusion:

These data suggest that PFMOAA, at the doses administered, has toxicological potential, and requires additional studies to determine their health effects via drinking water exposure.

PFMOAA – Toxicology Studies

Environmental Science & Technology
pubs.acs.org/est Article

Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs): Occurrence and Association with Serum Biochemical Parameters in Residents Living Near a Fluorochemical Plant in China

Jingzhi Yao, Yitao Pan, Nan Sheng, Zhaoben Su, Yong Guo, Jianshe Wang, and Jiayin Dai*

Summary: Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs): Occurrence and Association with Serum Biochemical Parameters in Residents Living Near a Fluorochemical Plant in China (Yao et al. 2020)

PFMOAA Doses: serum concentration measurements

Results:

- PFMOAA in serum was higher in males than females
- Higher than expected serum PFMOAA levels were detected (based on very low K_{ow} value)
- PFMOAA concentration increased with age
- PFMOAA was not associated with changes in liver and kidney function biomarkers or lipid metabolism

Conclusion:

Results indicate greater PFMOAA accumulation potential than expected and highlight the need for empirical toxicokinetic studies to better understand toxicity.

NORTH CAROLINA DEQ Department of Environmental Quality