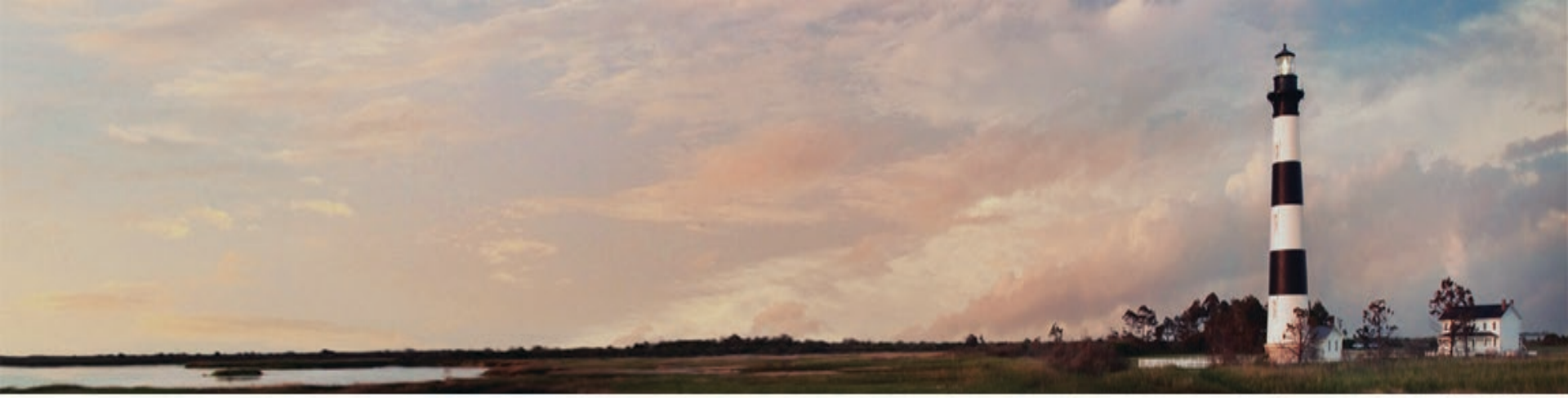

Summary of the Evaluation of Literature PFOA & PFOS Bioaccumulation Factors for use in Surface Water Standards Development

Originally Presented to the Secretaries' Science Advisory Board – October 3, 2022 link here

Surface Water Standards

Surface Water Standards

Protect a variety of surface water uses including:

- Human consumption of fish tissue
- Protection of specified waters for use as public water supplies (Water Supplies)

Standards established from:

- Published EPA Clean Water Act criteria
- Other published EPA regulatory values
- Calculated per 15A NCAC 02B .0208 – Narrative Standard for Toxic Substances

What are Bioaccumulation Factors (BAFs)?

Bioaccumulation Factors (BAFs)

Estimate accumulation in fish tissues from exposure with water & food

Determined by comparing fish tissue concentrations to water column concentrations from samples taken at the same location

$$BAF = \frac{C_{Biota}}{C_{Water}}$$

Where:

C_{Biota} = Concentration in fish tissue

C_{Water} = Concentration in water

BAF units = L/kg-wet weight

How are BAFs used to develop standards?

BAFs used to determine water column concentrations that, if met, prevent accumulation of a substance in fish tissue to a level that is potentially harmful to people

BAF used in the 02B .0208 criteria calculations

$$\text{Fish Tissue Standard} = (RfD\ x\ RSC) \times \frac{BW}{FCR\ x\ \mathbf{BAF}}$$

$$\text{Water Supply Standard} = (RfD \times RSC) \times \frac{BW}{WCR + (FCR\ x\ \mathbf{BAF})}$$

Constants defined in 02B .0208:

BW = Body Weight = 70 kg
WCR = Water Consumption Rate = 2 L/day
FCR = Fish Consumption Rate = 17.5 g/person/day

BAF sources

EPA evaluated literature BAFs as part of their draft criteria documents for Aquatic Life (2022)

- Draft Aquatic Life Ambient Water Quality Criteria for PFOA (EPA 842-D-22-001)
- Draft Aquatic Life Ambient Water Quality Criteria for PFOS (EPA 842-D-22-002)

NC-Specific Evaluation of BAFs

NCDEQ staff further evaluated EPA BAFs to identify:

- NC resident fish species
- Shellfish species with related species in NC
- Commonly consumed species
- Fish muscle tissue BAFs
- Whole body (WB) BAFs for shellfish

Dec 2022- Board requested that all species be included in the calculations for comparison.

BAF Comparison

PFAS	Group	Min	Max	GeoMean	Average	Median
PFOS	*NC Fish Muscle*	*537*	*7943*	*1962*	*3081*	*1585*
	NC Fish + Shellfish	*122*	*7943*	*1645*	*2635*	*1585*
	All Fish Muscle	**9**	**50234**	**1555**	**4574**	**1585**
	All Fish + Shellfish	**9**	**50234**	**1520**	**4170**	**1585**
PFOA	*NC Fish Muscle*	*3*	*213*	*13*	*29*	*10*
	NC Fish + Shellfish	*3*	*9680*	*51*	*741*	*32*
	All Fish Muscle	**0.3**	**313**	**15**	**55**	**13**
	All Fish + Shellfish	**0.3**	**9680**	**28**	**390**	**37**

The BAFs listed here are published in the 2022 EPA Draft Aquatic Life Criteria for PFOA; PFOS

(Fish = Fish Muscle Tissue BAFs
Shellfish = Whole Body BAFs)

Request for SSAB

1- Does the SAB support for the use of EPA literature for the foundation for BAFs for NC?

Yes- Dec 2022

2- Is the method that DEQ Applied to the EPA's vetted BAF data a scientifically sound approach for NC BAFs?

Yes- Feb 2023

3- Which value is most appropriate - the average, geomean, median, or some other statistic to represent PFOA & PFOS BAFs for NC?

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Is the EPA's method of using the geometric mean as the BAF scientifically sound for use in NC waterbodies with PFOA & PFOS?

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