



# Using Bioaccumulation Factors in Surface Water Standards Development & Rulemaking

June 7, 2023

Christopher Ventaloro  
Water Quality Standards Coordinator  
NCDEQ DWR Classifications, Standards & Rules Review Branch



# *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**

BAFs used in the 02B .0208 narrative standard calculations

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

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

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*

# *Adoption Process for Numeric Standards*

## Development

- Staff review current EPA guidance & scientific literature and develop the numeric standard
- Staff present to Environmental Commission (WQC/EMC)

## State Approval

- EMC approval (includes public comment period)
- RRC approval
- NC Attorney General sign off

## Federal Approval

- EPA Clean Water Act review
- Endangered Species Act consultation
- NC notified of approval/disapproval

*Questions?*