Secretaries' Science Advisory Board

DEQ PFAS Rulemaking Activities Update

April 3, 2024

Stephanie C. Bolyard, PhD and Jessica Montie

Rulemaking Update

- Purpose and Guiding Principles
- PFAS with Supporting Toxicity Assessments
- Surface Water Quality PFAS Rulemaking
- Groundwater Quality PFAS Rulemaking

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PFAS Water Quality Standards Rulemaking Guiding Principles

- Protect drinking water sources.
- Reduce treatment cost burden by addressing upstream dischargers.
- Propose surface water and ground water quality standards for PFAS with National Primary Drinking Water Standards.
- Propose surface water and ground water quality standards for remaining PFAS chemicals where toxicity and human health data are published.
- Provide transparency to regulated sources and reasonable time for monitoring and taking actions to meet effluent limits.

EPA Proposed Primary Drinking Water Standards for PFAS

- **Expected to be finalized in April 2024. Compliance requirement effective 2027.**

Compound	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA	Zero	4.0 (ppt or ng/L)
PFOS	Zero	4.0 ppt
PFNA	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS		
PFBS		
HFPO-DA (GenX Chemicals)		

- **Public Water Supply Systems (PWS)**
  - Supplies drinking water to 9,094,537 North Carolinians.
  - 459 PWS receive source water from surface water bodies.
  - 41% of large PWS (>10,000 people) exceed EPA proposed standards.
- **Proposed Surface Water Quality Standards**
  - Reducing PFAS in surface water discharges will reduce clean up requirements and costs for PWS.
  - Compliments EPA's drinking water standards that are under state authority.

Most Commonly Occurring PFAS in North Carolina

"Legacy" PFAS

Chemours Consent Order PFAS

EPA PFAS RoadMap Compounds

- PFBS ✓
- PFHxS ✓
- PFOS ✓
- PFOA ✓
- PFBA ✓
- PFHxA ✓
- PFNA ✓
- GenX ✓
- PFDA

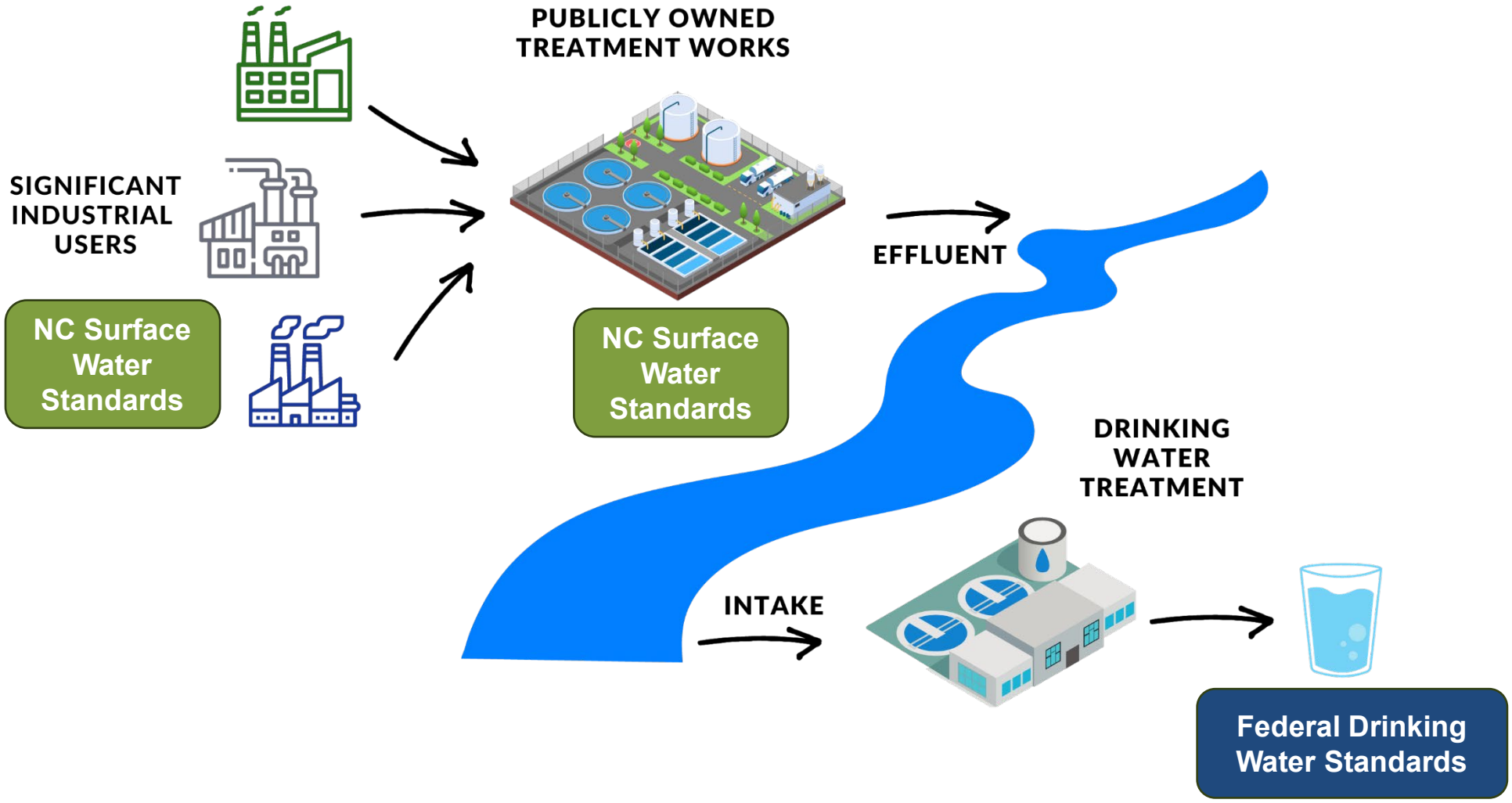
✓ Proposed NC State Water Quality Standards

Non-EPA PFAS RoadMap Compounds

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

Surface Water Standards

Upstream Impacts on Surface Water Intakes and Drinking Water Treatment Burden



How the Standards Are Derived

Proposed PFAS Numeric Standards Based on 15A NCAC 02B .0208

- Standards developed per the translation procedures & calculations described in rule - 02B .0208 (2)(A) & (2)(B)
- Numeric criteria derived for fish consumption & water supply designated uses
- Carcinogenic & non-carcinogenic endpoints considered

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Toxicological Values for Standards Calculations

1. Reference Dose (RfD)

   An estimate of a daily exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime

2. Cancer Slope/Potency Factor (CSF or CPF)

   The cancer risk (proportion affected) per unit of dose and can be used to compare the relative potency of different chemical substances.

3. Bioaccumulation Factor (BAF) *(Surface Water Standards Only)*

   The amount of a chemical taken up from water plus the contribution of chemical in the diet of the organism.

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Standards Proposed to be Added to 02B .0200

PFAS Constituent	DRAFT Proposed Non-Water Supply Standard (ng/L)*	DRAFT Proposed Water Supply Standard (ng/L)*	EPA Limit of Quantification (ng/L)**
PFOS	0.05	0.04	4.0
PFOA	0.01	0.001	4.0
PFBA	200,000	6,000	5.0
PFBS	10,000	2,000	3.0
HFPO-DA; GenX	500	20	5.0
PFHxA	200,000	3,000	3.0
PFNA	20	9	4.0
PFHxS	70	10	3.0

* Proposed standards are still under review by the Department.

** Proposed health based standards for PFOA and PFOS are below detection limits. Permit effluent limits for PFOA and PFOS will be determined based on 4 ng/L as reported by EPA as a **Limit of Quantification** from national lab validation of the wastewater test method.

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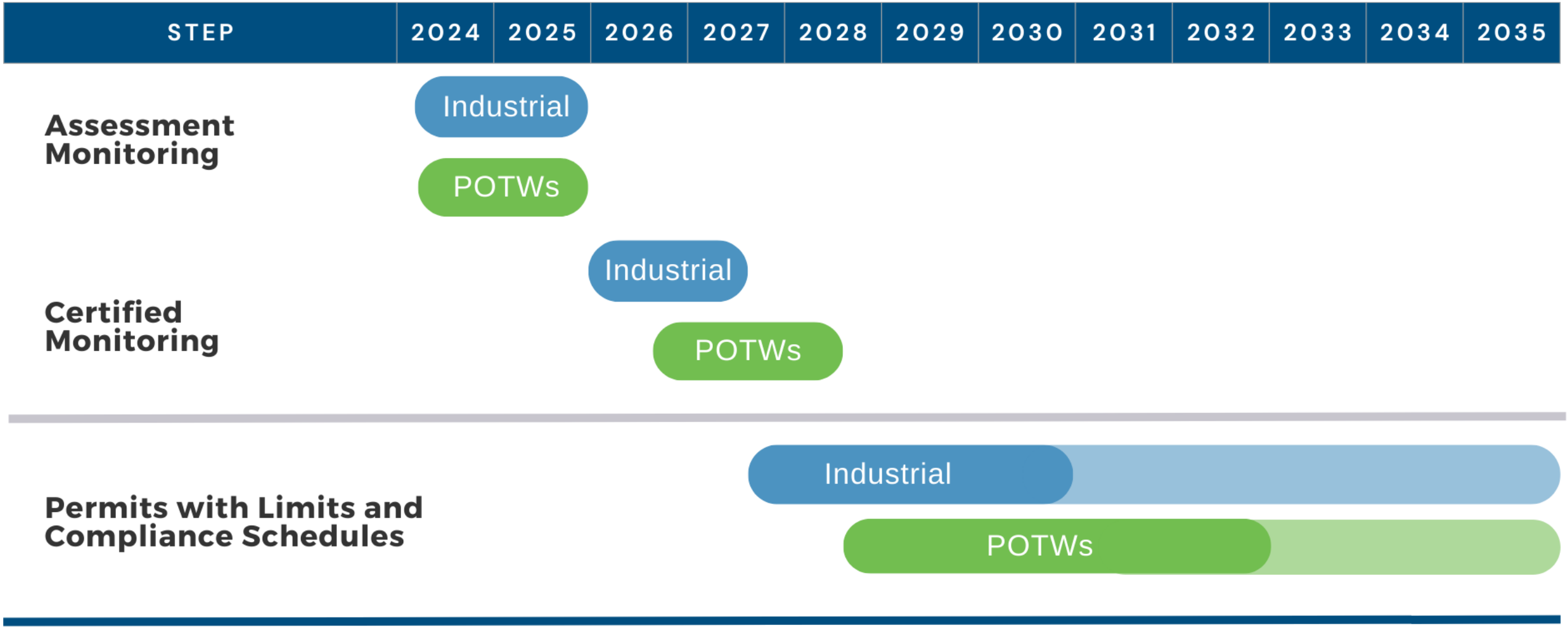
How are Standards Used to Determine the Impact on Regulatory Programs?

- Identification of affected sources/permitees
- Development of an implementation plan
- Use implementation plan to determine the fiscal impacts on a regulated entity
- Conduct a cost-benefit analysis

2B IMPLEMENTATION SCHEDULE OVERVIEW



Cost-Benefit Analysis Approach

Costs

- What are the costs associated with the proposed PFAS regulatory changes?

Private Sector

Local Government

State Government

Benefits

- Estimate the anticipated benefits of the proposed PFAS regulatory alternatives relative to the baseline, including quantification and monetization.

Quantitative: Human Health Benefits

Qualitative: Human Health, Ecosystem Enhancement & Economic Benefits

PWS Treatment Cost Savings

Treatment Cost Components

Capital Expenditure (CapEx)	Initial investment in treatment infrastructure
Operation and Maintenance (O&M)	Recurring costs to operate treatment system (annual basis)
Repair and Replacement	Based on equipment life and calculated as a % of CapEx

Treatment Costs Overview – Technology Review

- Conducted a comprehensive treatment evaluation – focused on shelf-ready technologies

Treatment Type	Removal Mechanism	Residual Type
Granular Activated Carbon (GAC)	Adsorption to Media	Media
Ion Exchange (IX)	Adsorption to Media	Media
Reverse Osmosis (RO)	Filtration (membrane)	Concentrate (liquid)

- Information used to determine the effectiveness of treatment technologies by sector type

Industry Type

Flow Rate

PFAS Concertation

Wastewater Matrix

Benefits Categories

- Human Health Benefits (Quantitative)
  - Improvements in total cholesterol, blood pressure, birth weight
  - Quantify using national studies to extrapolate to NC
- Human Health Benefits (Qualitative)
  - Improvements in low-density lipoprotein cholesterol (LDLC), small for gestational age, antibody response
- Environmental and Socio-Economic Benefits (Qualitative)
  - Recreational and accidental ingestion of surface waters
  - Reduced PFAS exposure to fish that are then consumed
  - Ecosystem enhancement and wildlife protection
  - Societal (commercial, community, natural resources value)
- Savings for Downstream Drinking Water Utilities (Quantitative)
  - Reduction in surface water clean up requirements and related treatment system CapEx+OpEx avoided costs
  - Reduced rate payer impacts
  - Infrastructure spending support (e.g., BIL, SRF)

2B Status Update

- Results of stakeholder discussions are being incorporated into permitting implementation strategy
- Completing the analysis of anticipated cost for POTW with pretreatment programs (including significant industrial users) and industrial dischargers
- Benefits analysis will be completed in the coming weeks
- Anticipate bringing a certified fiscal note to the EMC for the July meeting

Questions?

Stephanie C. Bolyard, PhD
Senior Engineer to the Assistant Secretary
Secretary's Office
NC DEQ
Stephanie.Bolyard@deq.nc.gov

Groundwater Standards

Existing Groundwater Quality Standard Requirements

- Rule .0202(c) states in part: “substances which are not naturally occurring and for which no standard is specified shall not be permitted in concentrations at or above the practical quantitation limit….”

- Rule .0202(b)(1): “Where the standard for a substance is less than the PQL, the detection of that substance at or above the PQL constitutes a violation of the standard.”

Developing Groundwater Quality Standards

Established as the least of the following (15A NCAC 02L .0202(d)):

1. Systemic/non cancer threshold concentration
2. Concentration which corresponds to an incremental lifetime cancer risk of $1x10^{-6}$
3. Taste threshold limit value
4. Odor threshold limit value
5. Maximum contaminant level
6. National secondary drinking water standard

Groundwater Standards Calculation (15A NCAC 02L .0202 (d)(1))

1. Noncancer/systemic

$$GWQS = \frac{RfD \times BW \times RSC}{WCR}$$

2. Cancer

$$GWQS = \frac{RL \times BW}{CPF \times WCR}$$

Toxicity benchmarks

RfD = Chronic Oral Reference Dose

CPF = Carcinogen Potency Factor or Cancer Slope Factor (CSF)

Exposure factors

RSC = Relative Source Contribution (0.1 for inorganics; 0.2 for organics)

BW = Body Weight = 70 kg (adult)

WCR = Water Consumption Rate = 2 L/day (adults)

RL = Risk Level = $1x10^{-6}$

Developing Groundwater Quality Standards

The following references are used, in order of preference (15A NCAC 02L .0202(e)):

1. EPA Integrated Risk Information System (IRIS)
2. EPA Drinking Water Health Advisories
3. Other EPA health risk assessment data
4. Other relevant, published health risk assessment data and scientifically valid peer-reviewed published toxicological data

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DRAFT PFAS Groundwater Quality Standards

	PFAS Compound	DRAFT Calculated 02L Standard (ng/L) *	EPA PQL (ng/L) **
1	PFOS	0.7	4.0
2	PFOA	0.001	4.0
3	HPFO-DA (GenX)	20	5.0
4	PFBS	2,000	3.0
5	PFBA	7,000	5.0
6	PFHxA	4,000	3.0
7	PFNA	20	4.0
8	PFHxS	10	3.0

(*) DRAFT proposed groundwater standards as presented to stakeholders – NOT FINAL and subject to change.
(**) PQL from U.S. EPA's Economic Analysis for Proposed PFAS National Primary Drinking Water Regulation (draft), or for PFBA and PFHxA, set using the same methodology).

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DEQ Programs that Implement or Utilize Groundwater Quality Standards

- Division of Waste Management regulated sites may utilize 02L standards as compliance trigger and as a clean-up goal for remediation (among other remediation options):
  1. Hazardous Waste
  2. Solid Waste
  3. Superfund
  4. Underground Storage Tanks
- The Brownfields Redevelopment Section also uses 02L standards when reviewing Brownfields Agreement Applications.
- Division of Water Resources also uses 02L standards for permitting under the Non-Discharge Program.

Questions?

Jessica Montie
Environmental Program Consultant
Division of Waste Management
NC DEQ
Jessica.Montie@deq.nc.gov