



# **Health Effects of GenX and Related Compounds in the Lower Cape Fear River Basin**

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# Public Health Role

- **Determine whether compounds detected through environmental sampling could pose a risk to human health**
- **Provide health-based guidance on levels of exposure to such contaminants**
- **Conduct risk assessments and risk communication**

# Usual Sources for Health-Based Guidance

1. National regulatory standards (EPA)
2. State Standards (DEQ/Environmental Management Commission)
3. National health advisories or other health values (EPA, CDC)
4. Other governmental guidance
  - Standards from other states or countries
  - World Health Organization, European Union values
5. If guidance not available from 1–4, can consider establishing state-specific health goal

# What is a Health Goal?

- **Level of contamination below which no adverse health effects would be expected over a lifetime of exposure**
- **Calculated based on the most vulnerable population**
- **Non-regulatory, non-enforceable**
- **Change as new information becomes available**

# Health Goal: Requirements

- **Must have sufficient health-related information**
  - Animal studies (*required*)
  - Epidemiologic studies
  - Other laboratory studies
- **Some health-related information not in public domain**
- **Health-related information often lacking for emerging compounds**

# Per- Polyfluorinated Alkyl Substances (PFAS)

- Large class of man-made chemicals used since 1950s
- Includes GenX, PFOA, PFOS, Nafion by-products
- Found in people, wildlife, and fish all over the world
- Some PFAS can stay in people's bodies a long time
- Some PFAS do not break down easily in the environment

# PFAS: Health Effects

- Potential health effects not well understood
- Certain PFAS may
  - Affect growth, learning, and behavior
  - Interfere with body's natural hormones
  - Increase cholesterol levels
  - Affect the immune system
  - Increase the risk of cancer
- Thousands of PFAS; could have different effects

# PFOA and PFOS

- **Perfluorooctanoic acid (PFOA or C8) and perfluorooctane sulfonic acid (PFOS)**
- **Used in manufacture of carpets, clothing, fabrics, food packaging, cookware, firefighting foam, etc.**
- **Studied more than other PFAS**
- **EPA Lifetime Health Advisory: Combined PFOA/PFOS concentration of 70 ppt**
- **Can result in changes to liver, thyroid, pancreas and hormone levels**



# GenX

- Trade name for one unregulated PFAS chemical compound
- Used in manufacturing nonstick coatings and for other purposes
- Produced as a byproduct of certain manufacturing processes

# GenX: Health Effects

- **Laboratory studies on animals:**
  - Cancers of the liver, pancreas, and testes
  - Non-cancer effects to the liver and blood
- **Effects on human health unknown**

# GenX: Preliminary Assessment

- Received request from Brunswick County, responded within 24 hours
- No federal health levels
- DHHS staff began working with federal partners, conducting review of available data
- European Chemical Agency calculated Derived No Effect Level based on a 2-year rat chronic toxicity/carcinogenicity study
- NC DHHS calculated a level of 70,909 ng/L (ppt)

# GenX: DHHS Provisional Health Goal

- Updated based on new data shared by EPA
- Identified different animal studies for use as starting point → 100-fold decrease
- Included assumption that exposure could come from sources other than drinking water → 5-fold decrease
- Updated provisional health goal: 140 ng/L (ppt)

# Other Perfluorinated Compounds

- EPA Health Advisory available for PFOA/PFOS
- Insufficient information to calculate health goal for other identified PFAS, including
  - Nafion byproducts 1 & 2
  - Three other emerging compounds in EPA report
    - PFMOAA
    - PF02HxA
    - PF030A
- Unable to accurately measure concentrations of some emerging perfluorinated compounds

# Current DHHS Activities

- **Coordinating with NC DEQ on ongoing investigation**
- **Facilitating CDC Public Health Assessment of GenX and other PFAS in Cape Fear River**
- **Working with EPA**
  - Intergovernmental Agency Toxicology Subject Matter Expert Working Group evaluating PFAS effects
  - National Center for Computational Toxicology
- **Supporting studies by academic partners**
- **Analyzed data in the NC Cancer Registry**

# Future of Emerging Compounds

- **Rapid advances in environmental testing**
  - Identification of “non-targeted” compounds
  - Able to identify lower concentrations
  - Outpacing advances in toxicology, health knowledge
- **Likely to detect more compounds with limited (or no) health data in Cape Fear River and elsewhere**