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

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September 28, 2017
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
    • PFO2HxA
    • 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