

# **Epidemiologic Evidence on PFOA from the C8 Science Panel and Beyond**

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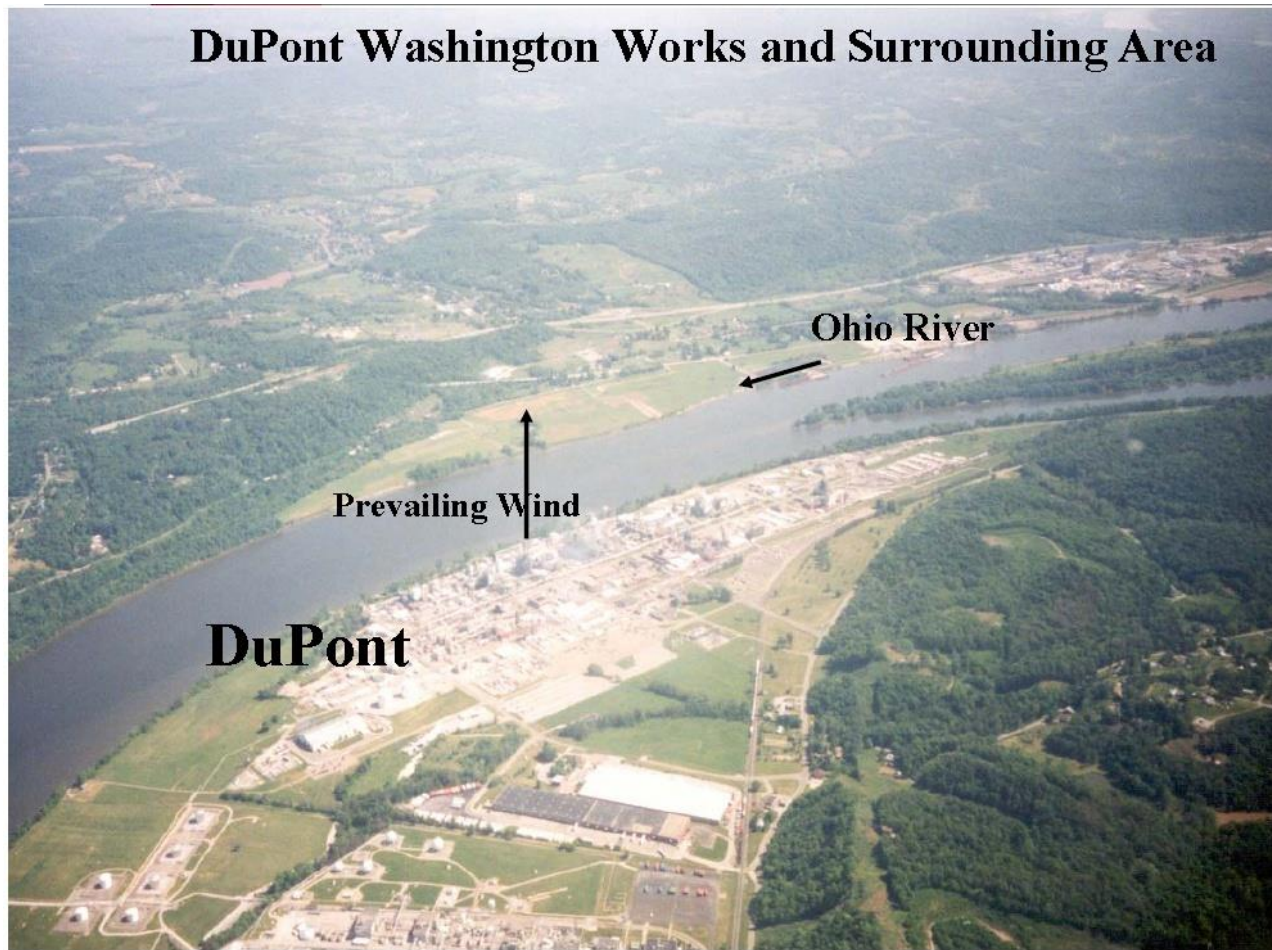
# Overview of Presentation

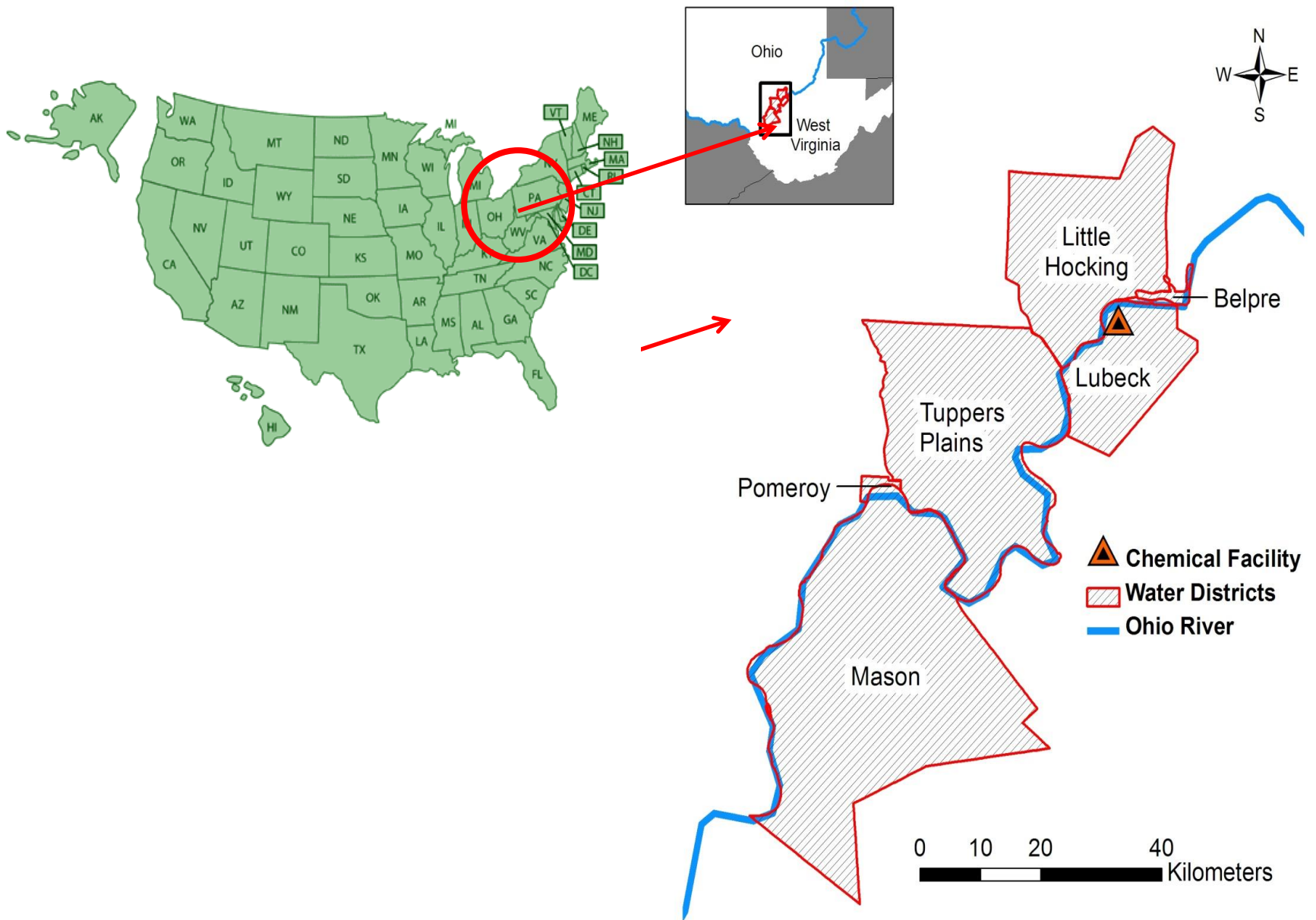
- Describe DuPont plant contamination in Ohio/West Virginia
- C8 Science Panel research activities
- Probable link findings
- Update based on more recent research

# PFAA Toxicity

- Persistent, resistant, and pervasive in the environment
- Reported adverse effects in animal models
  - Carcinogenicity – liver, pancreatic, and testicular
  - Developmental toxicity – reduced growth, survival
  - Hepatotoxicity – hypertrophy, altered lipid metabolism, peroxisome proliferation
  - Neurotoxicity – altered behavior, cell replication, and proteins
  - Immunotoxicity – suppression

# PFOA Emissions from a Teflon Plant in West Virginia





# **PFOA in Public Water and Private Wells near DuPont Washington Works**

Detection of elevated PFOA in water supplies near the DuPont Plant due to air emissions and river discharges led to a class action lawsuit

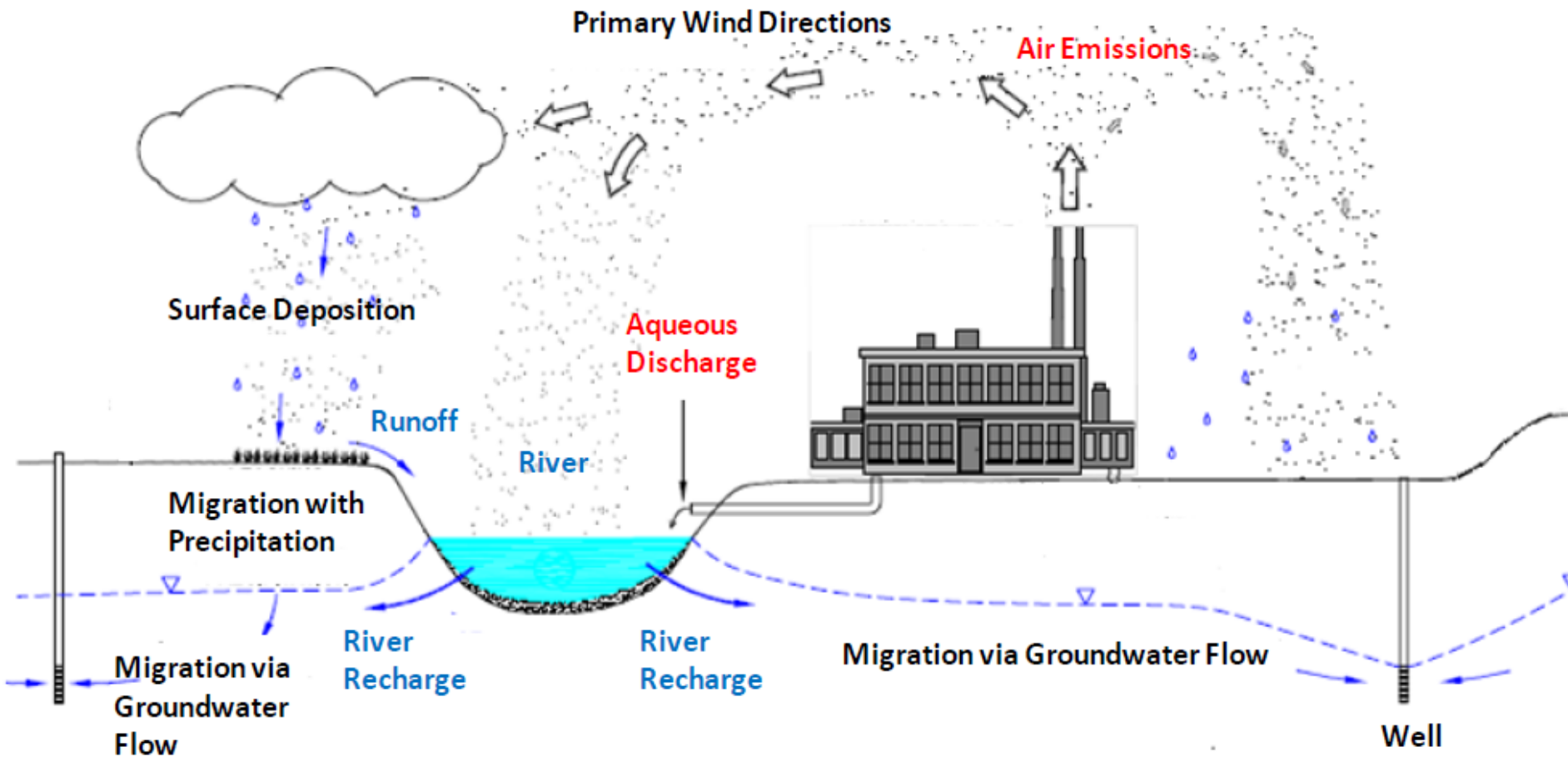
Settlement mandated:

1. Filtration of water
2. C8 Health Project, a survey of exposure and clinical markers in exposed population
3. C8 Science Panel to study and evaluate link of PFOA to disease



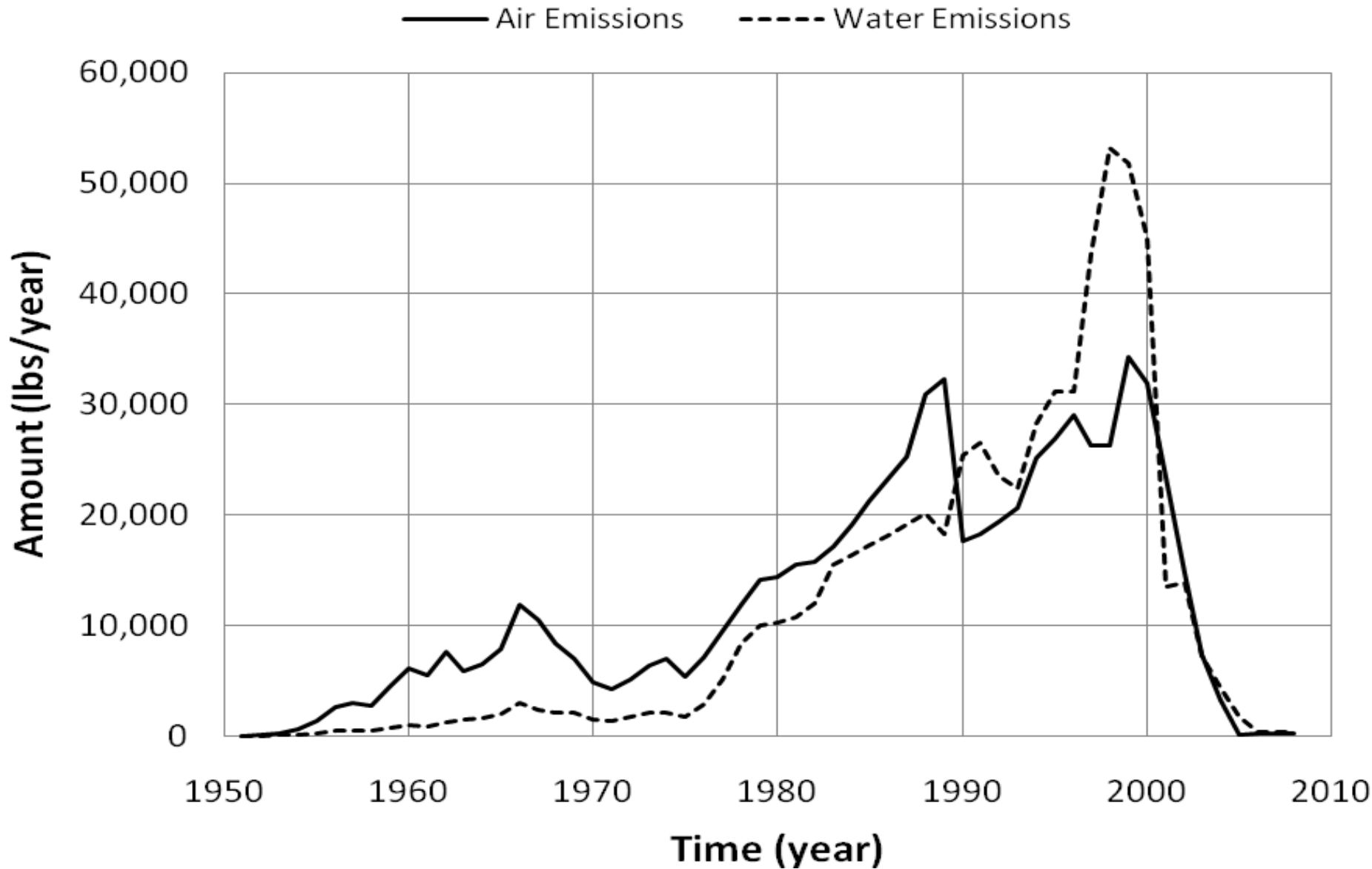
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# Schematic Transport Pathways



Source: Data Assessment Report, DuPont (2008)

# Plant Emissions to Air and River, 1950-2005



[Shin et al ES&T 2011]



# Serum Levels of PFOA

- Background range of 4-5 ng/mL in US at this time with subsequent decline
- Mid-Ohio Valley mean = 82.9, median = 28.2
- Dominant determinant is water district and duration of residence
- Additional predictors of elevated exposure are older age, male, private well user, grows own vegetables

# The C8 Science Panel

**Tony Fletcher, London School of Hygiene & Tropical  
Medicine**

**David Savitz, Brown University**

**Kyle Steenland, Emory University**

- Selected by agreement between the “Settling Parties” - DuPont and the Plaintiffs/Class
- Charge: Determine if there is a “**Probable Link**” between C8/PFOA exposure and any human disease - would lead to medical monitoring program
- Conduct research needed to determine whether Probable Link is present between PFOA and disease



# Definition of Probable Link

- Given available scientific evidence, is it more probable than not that a connection is present between C8 (PFOA) exposure and human disease?
- Judge whether 50% threshold is exceeded considering biological evidence, chance and bias in epidemiologic studies

# C8 Science Panel Research Program

Overall objective: conduct research needed to reach informed judgment on probable links

- Cohort follow-up on community and worker populations to assess timing of disease onset, prospective identification of new disease
- Cross-sectional analyses of serum PFAAs and blood chemistry
- Half-life assessment after cessation of exposure
- Exposure reconstruction using modeling
- Ecologic exposure studies of birth outcomes and cancer
- Neurodevelopment in children



# Data Sources

- History of plant emissions of PFOA into the air and river to reconstruct exposure
- Serum PFOA levels, clinical chemistry, and questionnaire responses in community – 69,030 participants in the “C8 Health Project”

# Health Outcomes Judged to Have Probable Links

- Diagnosed elevated cholesterol
  - Limited support but corroborative studies
- Ulcerative colitis
  - Unanticipated, but clear dose-response gradient
- Thyroid disease
  - Mixed elevated and reduced levels, different by sex

# Health Outcomes Judged to Have Probable Links

- Testicular cancer
  - Dose-response gradient
- Kidney cancer
  - Dose-response gradient
- Pregnancy-induced hypertension
  - Small association but consistent across studies

# Major Research Areas Following C8 Science Panel Research

- Immunologic effects
  - Evidence of disruption to immune response to vaccines, not clearly linked infection
- Reduced birth weight
  - Support for small reduction in fetal & postnatal growth
- Thyroid disease
  - Mixed, sex-specific effects on T4
- Serum lipids
  - Continued modest support



# Concerns and Challenges

- Distinctive vs. general effects across PFAAs
- Potential for reverse causality affecting biomarker levels, especially in background exposure range
- Need for very large populations to address cancer, clinically significant chronic disease