Agenda

- PFCs as Emerging Contaminants
- NH Regulatory Framework for PFCs
- Status of NH PFC Investigations
- Human Blood Testing
- Public Messaging/Challenges
- Q & A
Magnitude of the Issue

• Over 30 million dollars has been allocated for addressing PFCs at a couple of sites in NH. A full state-wide assessment is just beginning………

• Since March 2016 – NH has sampled over 2,000 sources of drinking water for PFCs
  • 600+ homes on wells are been provided bottled water d
  • Public water systems are being extended to these homes (20+ miles of pipe)
  • March 2016 to Present – NH has sampled over 2,000 sources of drinking water for PFCs
PFCs – Just Not Another New Contaminant

- Two sites in NH Contaminated by Air Emissions
  - Undermines traditional waste site investigation/source water protection
  - Has caused contamination over standard over 30 sq. miles
- Its presence in drinking water is measurable in our residents’ blood – health implication is not known
- Currently have standards for only two out of dozens of PFCs
- Short-term exposure is considered a health risk
- Public in NH is demanding “0”. Other states contemplating standards 3-5 times lower than NH
## The Expansive Use of PFCs

<table>
<thead>
<tr>
<th>Commercial Products</th>
<th>Industrial Uses</th>
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<tbody>
<tr>
<td>Cookware (Teflon®, Nonstick)</td>
<td>Photo Imaging</td>
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<tr>
<td>Fast Food Containers</td>
<td>Metal Plating</td>
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<tr>
<td>Candy Wrappers</td>
<td>Semiconductor Coatings</td>
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<tr>
<td>Microwave Popcorn Bags</td>
<td>Aviation Hydraulic Fluids</td>
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<tr>
<td>Personal Care Products (Shampoo, Dental Floss)</td>
<td>Medical Devices</td>
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<tr>
<td>Cosmetics (Nail Polish, Eye Makeup)</td>
<td>Firefighting Aqueous Film-Forming Foam</td>
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<td>Paints and Varnishes</td>
<td>Insect Baits</td>
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<tr>
<td>Stain Resistant Carpet</td>
<td>Printer and Copy Machine Parts</td>
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<td>Stain Resistant Chemicals (Scotchgard®)</td>
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<td>Water Resistant Apparel (Gore-Tex®)</td>
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<td>Cleaning Products</td>
<td>Paper and Packaging</td>
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<tr>
<td>Electronics</td>
<td>Rubber and Plastics</td>
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<tr>
<td>Ski Wax</td>
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</table>
Most people have been exposed to PFOA/PFOS through everyday commercial products.

In 2006, PFOA/PFOS manufacturers joined an EPA global stewardship program:
- Phased out by the end of 2015

Materials imported not really addressed.

PFC chemistry is complex and PFOA and PFOS still show up in processes using other types of PFCs.
Health Effects Being Studied

- Changes to the liver enzymes levels
- Increases in total cholesterol levels
- Increases in uric acid levels, which may affect blood pressure
- Changes in sex hormone levels that could affect reproductive development and puberty
- Changes in thyroid hormone levels
- Lower immune function (lower antibody response to immunization)
- Growth and development (lower birth weight in infants, obesity in adolescents/adults, cognitive and behavioral development)
- Decreased kidney function
- Incidence of insulin resistance and diabetes
- Occurrence of some types of cancers: prostate, kidney, and testicular cancer
NH Regulatory Framework
PFCs as an Emerging Contaminant and EPA’s Provisional Health Advisory

- PFOA/PFOS are not currently regulated under the Safe Drinking Water Act

- 2009 - EPA established a Provisional Health Advisory (PHA):
  - 400 parts per trillion (ppt) PFOA
  - 200 ppt PFOS

- The PHA was a health-based concentration, above which action should be taken to reduce exposure to PFOA through drinking water

- The PHA was based upon short-term exposure
May 19, 2016 USEPA issued lifetime health advisories for PFOA and PFOS

- **PFOA**: 70 parts per trillion (ppt)
- **PFOS**: 70 ppt
- **Combined PFOA and PFOS**: 70 ppt

Advisories set by USEPA based upon most sensitive human receptors

NHDES reviewed and concluded to be appropriate and protective of public health
May 31, 2016 NHDES filed an emergency rule to adopt ambient groundwater quality standards (AGQS) – rule became permanent October 22, 2016

- PFOA: 0.07 µg/l or 70 parts per trillion (ppt)
- PFOS: 0.07 µg/l or 70 ppt
- Combined PFOA and PFOS: 0.07 µg/l or 70 ppt

AGQS is enforceable for purposes of site remediation requirements, provision of alternate drinking water, and for public water systems
Future Regulatory Considerations

- Monitor evolution of health effects data
  - PFOA and PFOS
  - Other PFCs
- Consider further regulation of PFOA/PFOS
  - Hazardous waste listing?
  - Additional regulation of air emissions?
- Implications for wastewater discharges
  - Ability to control influent
  - Ability to treat effluent
Status of NH PFC Investigation
Large Contamination Sites in NH

- **Pease Trade Port**
  - Airplane crashes
  - Fire training
  - Leaks
  - Contaminated one large PWS well over standards and threatens two others

- **Dover Madbury Metals**
  - Contaminated one large PWS over standard and threatens others

- **Saint Gobain (Merrimack, Litchfield, Manchester, Londonderry & Bedford)**
  - Two large water supply wells & several small PWS wells
  - Hundreds of private wells

- **TCI Amherst (Amherst)**
  - Dozens of private wells
## SAMPLING STATUS FOR PFCs IN NEW HAMPSHIRE (1/11/17)

<table>
<thead>
<tr>
<th>SITE</th>
<th>SAMPLES</th>
<th>APPOINTMENTS SCHEDULED</th>
<th>RESULTS RECEIVED</th>
<th>PFOA &amp; PFOS &lt;10</th>
<th>PFOA &amp; PFOS 10 - &lt;45</th>
<th>PFOA &amp; PFOS 45 - &lt;70</th>
<th>PFOA &amp; PFOS ≥70</th>
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<td>GENERAL INVESTIGATION</td>
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<td><strong>TOTAL</strong></td>
<td><strong>1619</strong></td>
<td><strong>26</strong></td>
<td><strong>1438</strong></td>
<td><strong>670</strong></td>
<td><strong>436</strong></td>
<td><strong>110</strong></td>
<td><strong>222</strong></td>
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</table>
Davis et al., 2007, *Chemosphere*
Investigation Around Saint-Gobain Performance Plastics
Alternate Water

- ~600 properties on bottled water
- POU systems
- Long-term solutions
  - Litchfield
  - Manchester
  - Merrimack
  - Bedford
  - Amherst
Current Public Water Supply Projects

- **Manchester Water Works – Brown Avenue, Manchester**
  - 26 +/- connections – nearly complete

- **Pennichuck Water Works – Litchfield**
  - 400+ connections planned
  - Several miles of main and 100+/- connections completed
  - Remainder in 2017

- **Merrimack Village District – Merrimack**
  - 15 +/- connections – in process

- **Pennichuck Water Works – Amherst**
  - 7+/- connections this fall
  - 100+/- in planning stage for 2017

- **MVD or MWW – Bedford**
  - Pre-design stage – 60+ connections
Kingston Fire Department
Summary of PFOA/PFOS Data Public Water System Sampling in NH (partial data)

- Approximately 400 water sources have been sampled
  - 69% Not Detected (reporting limits ranged from (0.7- 40 ppt)
  - 23% <= 10 parts-per-trillion
  - 4% 10-20 parts-per-trillion
  - 4% >= 20 parts-per-trillion

- Frequency of detection increases if non-regulated PFCs are included

- Frequency of detection increases if only data with very low reporting limits are shown
Current and Future Considerations

- Reviewing other potential source facilities
  - Information requests/inspections/sampling

- Targeted public water supply sampling near high-risk activities

- Voluntary Public Water System Sampling Request Letter

- Letter to fire departments, health officers and town administrators about Class B Firefighting Foam/AFFF to be issued soon
Contaminated Site Program Sampling

- Initial letter to stakeholders – Nov 2016
  - 800-1000 sites to be sampled over the next couple of years
- Web page additions
- Training
  - NEWMOA
  - NHDES
    - Analytical methods, target analyte list, sampling SOP, guidance materials, electronic data uploads, health effects
- Incorporate as a contaminant of concern
What Level is “Non Detect”? What compounds to look for? What to do with results for compounds with no health guidance values?

- EPA 537 Method covers 14 compounds – most labs report 6 of these
- More modern analytical method (isotope dilution) include 20+ compounds and have lower reporting limits.
  - “In-house” lab methods
  - Should accreditation be required?
  - Do data from lab to lab compare well? – Not always
    - Need to make sure labs are reporting BOTH linear and branched isomers of PFOA

- NHDES requires/recommends lower reporting limits
Lab Discrepancies

- Labs performing PFC testing interpret Method 537 differently
  - Some labs only report linear isomers of PFOA only
  - Some lab report both branched and linear isomers
  - Different Types of PFOA
    - 3M PFOA (30% branched isomer / 70% linear isomer)
    - Dupont (linear isomer only)
    - NHDES split samples have varied by 20%-40% between labs when branched isomers are not accounted for
  - NHDES/EPA Region 1 staff documented this issue
    - PE sampling
    - Split sampling
  - EPA HQ recently provided guidance
Southern NH and Pease (round 2) PFC Blood Testing Program Are Ongoing

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<td>MVD#</td>
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<tr>
<td>Completed registrations</td>
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<tr>
<td>Laboratory requisitions mailed to eligible participants</td>
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<tr>
<td>Blood samples received at DHHS</td>
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<tr>
<td>Blood samples sent to testing lab</td>
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<tr>
<td>Test results back from testing lab</td>
</tr>
<tr>
<td>Test results mailed to participants*</td>
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</tbody>
</table>

Round 1 Testing Results for Pease: [http://www.dhhs.nh.gov/dphs/pfcs/blood-testing.htm](http://www.dhhs.nh.gov/dphs/pfcs/blood-testing.htm)
Comparison of Average Blood PFOS Levels in Various U.S. Populations to NH Pease Adolescents/Adults (Age ≥ 12) and Children (Age < 12)

Average PFOS Levels in Blood (Micrograms per liter)

- 3M Workers, AL (2000): 910
- Decatur, AL (2009): 40
- C8 Study, Ohio River Valley (2005-2006): 19
- Pease Tradeport, NH, age ≥12 (2015): 9
- Pease Tradeport, NH, age <12 (2015): 8
Comparison of Average Blood PFOA Levels in Various U.S. Populations to NH Pease Adolescents/Adults (Age ≥ 12) and Children (Age < 12)

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Average PFOA Levels in Blood (Micrograms per Liter)</th>
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<tr>
<td>3M Workers, AL (2000)</td>
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<td>C8 Study, Ohio River Valley (2005-2006)</td>
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<td>Hoosick Falls, NY (2016)</td>
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<td>Decatur, AL (2009)</td>
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<td>16</td>
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<td>E. Metro, MN (2008-2009)</td>
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<td>Bennington, VT (2016)</td>
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<td>U.S. Population (2005-2006)</td>
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<td>Pease Tradeport, NH, age &lt;12 (2015)</td>
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<td>Pease Tradeport, NH, age ≥12 (2015)</td>
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<tr>
<td>U.S. Population (2011-2012)</td>
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</tbody>
</table>
Public Messaging/Concerns

- Some members of the public and toxicologists are demanding “0” PFOA/PFOS
  - Water systems using labs with low reporting limits likely detect PFCs and suddenly have a PR issue.
  - Cite proposed standards in NJ or a standard in VT
  - NH is one of the few states that have adopted a standard and is broadly sampling for PFOA & PFOS
    - NH has a lot of detects because we are addressing the issue
    - Other states contemplating very low standards have not committed to rigorous testing
  - Other important exposure pathways (especially building interiors) are not being addressed

- Understanding of relative risk is missing. Should also be concerned about
  - Radon, arsenic, manganese, sodium, nitrate/nitrate, uranium, bacteria………………………….
Questions and Answers