Expanded PFAS Exposure Assessments in Pennsylvania Communities
Today’s Speaker

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State Epidemiologist
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Per and polyfluoroalkyl substances (PFAS) Exposure Assessment Technical Tools (PEATT) Environmental Assessment Results

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Director, Bureau of Epidemiology
State Epidemiologist

Date: June 4, 2020
PFAS Exposure in Southeastern PA

- Affected area = population of 84,184 (2010 census)
- 32,595 households in water service area
PEATT Pilot Project

- Pennsylvania Department of Health (DOH) received federal funding through the Association of State and Territorial Health Officials (ASTHO) to perform a pilot study to check PFAS levels in blood samples of community residents.

- Weekly clinics in Bucks and Montgomery counties from May – September 2018 to draw blood samples from randomly selected community members.

- Testing on 235 participants from 119 households.

- July-November 2019 DOH tested PFAS levels in urine samples from participants and in dust and tap water within those same households.
PFAS in Blood Samples

- Tested for 11 PFAS compounds
- 4 compounds were commonly detected
  - Perfluorooctane sulfonic acid (PFOS) (100%)
  - Perfluorohexane sulfonic acid (PFHxS) (99.0%)
  - Perfluorooctanoic acid (PFOA) (98.7%)
  - Perfluoronononoic acid (PFNA) (78.1%)
- All four detected in 79% of participants
Blood Results Overall

- Four most commonly found PFAS

<table>
<thead>
<tr>
<th>PFAS Compound</th>
<th>Community Results</th>
<th>NHANES Results (2013-2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Median</td>
</tr>
<tr>
<td>PFOA</td>
<td>3.13</td>
<td>3.06</td>
</tr>
<tr>
<td>PFOS</td>
<td>10.24</td>
<td>9.86</td>
</tr>
<tr>
<td>PFHxS</td>
<td>6.64</td>
<td>6.61</td>
</tr>
<tr>
<td>PFNA</td>
<td>0.74</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Results shown in ug/L. Range excludes <LOD
NHANES - National Health and Nutrition Examination Survey
Serum PFAS Levels in U.S. Population Over Time

Median concentration of selected per- and polyfluoroalkyl substances (PFAS) in blood serum (1999-2014) in the United States

Source: ATSDR, 2018
Environmental Assessment - National Work

- Spokane County, WA Near Fairchild Air Force Base
- El Paso County, CO Near Peterson Air Force Base
- Lubbock County, TX Near Reese Technology Center
- Fairbanks North Star Borough, AK Near Eielson Air Force Base
- Bucks County and Montgomery County, PA Near Horsham Air Guard Station and former Naval Air Station Joint Reserve Base Willow Grove and Naval Air Warfare Center Warminster
- Orange County, NY Near Stewart Air National Guard Base
- Hampden County, MA Near Barnes Air National Guard Base
- Westhampton, NY Near Gabreski Air National Guard Base
- New Castle County, DE Near New Castle Air National Guard Base
- Berkeley County, WV Near Shepherd Field Air National Guard Base

Legend:
- PFAS Exposure Assessment Site
- PFAS Exposure Assessment Technical Tools (PEATT) Pilot Site
Urine Results Overall

- Testing on 186 of the 235 participants
- Participants collected first morning samples
  - Stored in frozen condition
- Tested for 16 PFAS compounds
- Centers for Disease Control and Prevention (CDC) tested 10% of samples
  - 24 participants
  - ALL results below the level of detection (<0.1ng/mL)
Urine Results Overall

• Similar to other studies
  - Calafat et al. found less than 0.1% of the U.S. general population has detectable levels of PFAS compounds in urine (2019)

• North Carolina study - (Pritchett et al. 2019)
  - GenX (precursor to PFOA) detected in Cape Fear River basin at 680 ppt
  - GenX NOT detected in residents’ urine samples

Calafat et al. 2019, Pritchett et al. 2019
Tap Water Results Overall

- 14 households had dust and tap water samples analyzed
- Tap water tested for 14 PFAS compounds
  - post filter results

<table>
<thead>
<tr>
<th>Compound</th>
<th>Percent Detected</th>
<th>Concentration range (ng/L)</th>
<th>EPA HAL (ppt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFOA</td>
<td>71% (10/14)</td>
<td>0.46 - 7.48</td>
<td>70</td>
</tr>
<tr>
<td>PFOS</td>
<td>86% (12/14)</td>
<td>0.484 - 7.67</td>
<td>70</td>
</tr>
<tr>
<td>PFHxS</td>
<td>43% (6/14)</td>
<td>0.45 - 4.20</td>
<td>70</td>
</tr>
<tr>
<td>PFNA</td>
<td>57% (8/14)</td>
<td>0.49 - 1.01</td>
<td>70</td>
</tr>
</tbody>
</table>

All households tested below the EPA HAL
### Tap Water Results by PFAS Compound

<table>
<thead>
<tr>
<th>PFAS Compound</th>
<th>Households with measurable levels</th>
<th>Percent Detected</th>
<th>GM and Concentration Range (ng/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFOS</td>
<td>12</td>
<td>85.71%</td>
<td>1.13 (0.46-7.67)</td>
</tr>
<tr>
<td>PFOA</td>
<td>10</td>
<td>71.42%</td>
<td>1.55 (0.65-7.48)</td>
</tr>
<tr>
<td>PFNA</td>
<td>8</td>
<td>57.14%</td>
<td>0.62 (0.50-1.01)</td>
</tr>
<tr>
<td>PFHxS</td>
<td>6</td>
<td>42.85%</td>
<td>0.57 (0.46-4.20)</td>
</tr>
<tr>
<td>PFHxA</td>
<td>11</td>
<td>78.57%</td>
<td>0.99 (0.34-3.50)</td>
</tr>
<tr>
<td>PFHpA</td>
<td>11</td>
<td>78.57%</td>
<td>0.62 (0.33-2.14)</td>
</tr>
<tr>
<td>PFBS</td>
<td>9</td>
<td>64.28%</td>
<td>0.65 (0.32-6.19)</td>
</tr>
</tbody>
</table>

PFHxA - Perfluorohexanoic acid  
PFHpA – Perfluoroheptanoic acid  
PFBS – Perfluorobutanesulfonic acid
## Tap Water Results by Water Source

<table>
<thead>
<tr>
<th>Source of Water</th>
<th>Number of Households</th>
<th>Percentage of Total Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warminster Municipal Authority (WMA)</td>
<td>6</td>
<td>42.86%</td>
</tr>
<tr>
<td>Horsham Water and Sewer Authority (HWSA)</td>
<td>4</td>
<td>28.57%</td>
</tr>
<tr>
<td>Warrington Township Water and Sewer Department (WTWSD)</td>
<td>2</td>
<td>14.29%</td>
</tr>
<tr>
<td>Warrington Township Water and Sewer District/North Wale Water Authority (WTWSD/NWWA)</td>
<td>1</td>
<td>7.14%</td>
</tr>
<tr>
<td>Private Well</td>
<td>1</td>
<td>7.14%</td>
</tr>
</tbody>
</table>
Dust Results Overall

- Household dust analyzed for 33 PFAS compounds
- Wide range of detections
- Composite sample of 1 gram
  - Master bedroom
  - Living room
  - Kitchen
  - Other locations as needed to yield 1 gram
Dust Results Overall

- PFOA, PFOS, PFHxS and PFNA detected in all samples (ng/g)
- Wide range

<table>
<thead>
<tr>
<th>PFAS compound</th>
<th>GM and range</th>
<th>Wisconsin* GM</th>
<th>Indiana** GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFOA</td>
<td>66.44 (3.94-522.00)</td>
<td>44</td>
<td>9.29</td>
</tr>
<tr>
<td>PFOS</td>
<td>35.97 (3.20-1,110.00)</td>
<td>47</td>
<td>14.12</td>
</tr>
<tr>
<td>PFHxS</td>
<td>21.08 (1.44-862.00)</td>
<td>16</td>
<td>8.74</td>
</tr>
<tr>
<td>PFNA</td>
<td>24.32 (1.24-276.00)</td>
<td>12</td>
<td>3.88</td>
</tr>
</tbody>
</table>

GM – Geometric mean
• CDC conducting a large national health study
• Hoping to obtain better information about health effects of PFAS exposure through drinking water
• Measuring PFAS levels in residents at 7 sites across the nation
• Want minimum of 6,000 adults and 2,000 children
PFAS Multi-Site National Study

- Pennsylvania
- New York
- New Jersey
- Michigan
- Massachusetts
- Colorado
- California

Environmental Working Group

https://www.ewg.org/interactive-maps/2019_pfas_contamination/

- PFAS Drinking water contamination
- Other known PFAS contamination site
- Military PFAS site
### PFAS Multi-Site National Study

- **Health outcomes of interest**

<table>
<thead>
<tr>
<th><strong>ADULTS</strong></th>
<th><strong>CHILDREN</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipids- high cholesterol, obesity</td>
<td>Lipids- high cholesterol, obesity</td>
</tr>
<tr>
<td>Coronary Artery Diseases</td>
<td>Renal Function</td>
</tr>
<tr>
<td>Renal Function</td>
<td>Liver Function</td>
</tr>
<tr>
<td>Glycemic- insulin, diabetes</td>
<td>Glycemic- insulin, diabetes</td>
</tr>
<tr>
<td>Thyroid Function</td>
<td>Thyroid Function</td>
</tr>
<tr>
<td>Liver Function</td>
<td>Sex Hormones</td>
</tr>
<tr>
<td>Osteoarthritis, Osteoporosis</td>
<td>Immune Response</td>
</tr>
<tr>
<td>Immune Response/Inflammation</td>
<td>Neurodevelopment</td>
</tr>
<tr>
<td>Autoimmune – Ulcerative colitis</td>
<td></td>
</tr>
</tbody>
</table>
DOH’s Partners in Multi-site National Study

RTI International

Temple University

Brown University

Buxmont Coalition for Safe Water
DOH PFAS Team

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